

# First Time Drinking and Driving Offenders – Unraveling the Myth with Ignition Interlock and Short-term Suspensions Data

K Quaye<sup>1</sup>  
P Boase<sup>2</sup>

<sup>1</sup>Saskatchewan Government Insurance, 2260 – 11<sup>th</sup> Avenue, Regina, Saskatchewan, Canada S4P 2N7. <sup>2</sup>Road Safety Directorate, Transport Canada, Ottawa, Canada K1A 0N5

## Background

One of the key policy and legislation initiatives contained in Canada's current Strategy to Reduce Impaired Driving (STRID 2010) [1] is a recommendation for Canadian jurisdictions to record and track roadside short-term license suspensions on the driver record as an information management tool.

The primary motivation for this recommendation is a need to revisit the way multiple offenders are defined and identified for appropriate remedial measures. For instance, most Canadian jurisdictions have implemented minimum license suspensions of 1, 3 and 5 years for first, second and third or subsequent drinking and driving offences within a specified "look-back" window – typically 5 years. In all jurisdictions the events that drive this definition are the number of convictions within this look back window.

Quaye and Boase [2] noted that because of resource constraints, enforcement agencies in many Canadian jurisdictions are substituting short-term 24-hr licence suspensions rather than pursuing the more rigorous and serious criminal charge. These suspensions are usually not recorded or tracked and no follow-up action is associated with them. This approach potentially leads to a sub-optimal intervention strategy since persons may have multiple short-term suspension without being identified as a repeat offender, delaying an opportunity to begin assessment or treatment earlier.

Saskatchewan introduced an ignition interlock program in November 2001. This paper will use data from Ignition Interlock participants in Saskatchewan to explore the extent to which the term "first offender" as defined through the conviction history of an individual is more myth than fact.

## Objectives

The primary objective of this paper is to quantify the number of times that individuals who are deemed to be first offenders, based on the number of Criminal Code convictions within a specified time window, may actually have driven after drinking. The number of short-term suspensions incurred by these "first offenders" prior to their first Criminal Code conviction is one statistic that can be used to gauge the magnitude of this phenomenon. This measure is however dependent on the level of police activity. Information on the number of times individuals who participated in the ignition interlock program failed in their attempts to start a vehicle because of an unacceptable level of alcohol on their breath is a better indication of the drinking and driving habits of these individuals. This measure is less a function of enforcement levels. The estimate of the number of drinking and driving attempts will be compared to the number of short-term suspensions to determine the disparity between these two measures and estimate the probability of apprehension of drinking drivers. This information is further explored using the age of drivers.

## Methodology

The primary data used for this study was information on participants of Saskatchewan's ignition interlock program from 2001 through 2003. The subjects were 578 drivers with a first conviction for impaired driving under the Criminal Code of Canada (CCC) and had completed the interlock program. Variables included drivers licence number, days on the interlock, the distance traveled while on the interlock, the number of tests requested, number of fails, warns and passes, and the number of "high" fails. Using the drivers licence number, we merged this information with Saskatchewan Government Insurance (SGI) data on persons with a first CCC conviction on file. The variables retained from the Criminal code data were offence date, conviction date and type of conviction. This merged data was then combined with information from SGI's database on drivers with short-term suspensions. The variables of interest from this database were the total number of short-term suspensions for each driver prior to their first time Criminal Code conviction, the dates of their first and last short-term suspension. Finally, we merged information on drivers' date of birth and gender into this data set.

The following are some of the key variables that we will focus on in our analyses:

*Ofcvdays*, days from the date of the CCC charge to date of conviction. This variable provides information on the time lag between the offence date and the conviction date.

*Days*, number of days from installation of an ignition interlock device to the completion of the program;

*Failrt*, the rate of failed ignition interlock tests (i.e., a BAC over 0.02) recorded by participants as defined by number of fails divided by number of days participant stayed on interlock program;

*Hfailrt*, the rate of "high fails" as defined by number of high fails (i.e., a BAC over 0.04) divided by number of days on interlock program;

*Stsum*, the number of short-term suspensions prior to the first CCC conviction;

*Stfailrt*, the rate of short-term suspensions, defined as the number of short-term suspensions divided by the variable *licvdays*. The variable *licvdays* was set to 5 years if a driver has more than five years of driving experience, otherwise it was calculated as the difference between the date of the Criminal Code conviction and the date of first licensure.

In our analysis of these variables, we shall generally rely on the estimates of their sample means, standard errors and, in some cases, their cumulative frequencies as represented by cumulative polygons. We shall construct confidence intervals of the means of these variables and use these as the basis for making probability statements regarding differences between the magnitudes of the expected values of comparable variables.

To explore the relationship between short-term suspensions, which typically dictate the opportunities for drinking drivers to come to the attention of licensing agencies, and an estimate of the number of times that individuals actually drink and drive, we shall introduce the following random variables.

Let

$X_1$  = the expected number of *Stfailrt*, and  $\text{Var}(X_1)$  be its variance (or the square of its standard error).

$X_2$  = the expected number of *Failrt*, and  $\text{Var}(X_2)$  be its variance.

We shall define a new variable  $Y = X_2/X_1$ . The expected value of  $Y$ ,  $E(Y)$ , and its variance  $\text{Var}(Y)$  can be approximated by [3]:

$$E(Y) = \frac{E(X_2)}{E(X_1)} + \frac{2X_2}{X_1^3} Var(X_1) \quad 1$$

$$Var(Y) = \left(\frac{X_2}{X_1^2}\right)^2 Var(X_1) + \left(\frac{1}{X_1}\right)^2 Var(X_2) \quad 2$$

We will use  $E(Y)$  to determine the number of times an individual drives after drinking before being apprehended by an officer given a short-term suspension. With information on the  $Var(Y)$  we can make probability statements about  $Y$ .

### Results and Analysis

Table 1 provides information on the expected values and standard errors of the variables *days*, *ofcvdays*, and *licvdays*. This information is categorized by driver age, driver sex, and the number of short-term suspensions prior to the first time CCC conviction. Table 2 shows information on the expected values and standard errors of the variables *stfailrt*, *failrt*, and *hfailrt*. The number of observations within each category is provided in the last column of the table.

### Age and Sex of Participants

As can be noted from Table 1, when compared to their proportion in the overall driving population, male drivers are significantly over represented among ignition interlock participants. Additionally, drivers who are 50 years or younger are also over represented. The most over represented age groups are 21 – 25 years, 36 – 40 years, and 41 – 45 years. Drivers 66 years and over made up only 1.7% of ignition interlock participants. Because of the small number of drivers in this age group, they will be dropped from the analysis.

### Days on the Interlock

On average, each participant had an interlock device installed for 202 days with a median 216 days. We notice that there does not appear to be any statistically significant difference between the number of days spent on the interlock by males and females or by age. The only notable difference is a lower average number of days on interlock among drivers in the 16 – 20 year age group. This may be because the members of this group are unable to afford having interlocks installed on their vehicles for a long period and therefore take advantage of the ignition interlock program at a later stage.

### Offence to conviction days

On the average, the time from offence to conviction was 145 days. The median number from offence to conviction days was about 58 days. The period from offence to conviction was shorter for females versus males, although this difference is not statistically significant. It is noteworthy that the 16-20 age group has the smallest average lag period between offence and conviction – less than 100 days. The 31 – 35 age group recorded the longest average delay of 205 days. We also note that the average delay increases with the number of prior 24-hour suspensions that an individual has accumulated.

**Table 1 Expected Values**

	<i>Days</i>	<i>Days</i>	<i>Ofcvdays</i>	<i>Ofcvdays</i>	<i>Licvdays</i>	<i>Licvdays</i>	<i>N</i>
Age	Mean	Stderr	Mean	Stderr	Mean	Stderr	
16 – 20	167.5	8.4	57.0	9.4	1048.9	53.3	63 [10.9%] {9.9%}
21 – 25	195.4	5.9	108.6	13.8	1726.8	29.6	103 [17.8%] {8.9%}
26 – 30	216.7	8.2	143.9	24.7	1825.0	0	50 [8.6%] {7.7%}
31 - 35	205.9	8.9	205.8	27.6	1821.2	3.76	56 [9.7%] {7.7%}
36 – 40	193.6	7.6	178.8	18.7	1825.0	0	75 [13.0%] {9.7%}
41 – 45	213.8	7.0	153.0	21.2	1825.0	0	84 [14.5%] {10.9%}
46 – 50	215.8	6.9	178.8	22.0	1825.0	0	67 [11.6%] {10.3%}
51 – 55	203.6	11.7	159.8	32.1	1818.3	6.7	33 [5.7%] {8.4%}
56 – 60	221.0	13.1	163.0	41.1	1825.0	0	23 [4.0%] {6.4%}
61 – 65	225.5	17.1	143.4	43.6	1825.0	0	14 [2.4%] {5.3%}
66 – 70	207.3	19.1	171.0	61.5	1825.0	0	6 [1.0%] {4.7%}
over 70	197.3	34.3	98.0	69.7	1825.0	0	4 [0.7%] {10.0%}
Sex							
F	204.8	7.4	134.2	21.9	1719.1	43.2	61 [10.6%] {48.7%}
M	202.1	2.8	146.9	7.5	1722.5	13.2	517 [89.4%] {51.2%}
Stsum							
0	205.5	4.1	84.4	9.2	1704.8	19.5	242
1	199.8	3.8	179.2	10.2	1741.7	17.3	286
2+	202.2	9.7	249.1	26.5	1694.7	51.3	50
All	202.4	2.6	145.6	7.1	1722.2	12.6	578

**Table 2 Expected Values**

	<i>Stfailrt</i>	<i>Stfailrt</i>	<i>Failrt</i>	<i>Failrt</i>	<i>Hfailrt</i>	<i>Hfailrt</i>	<i>N</i>
Age	Mean	Stderr	Mean	Stderr	Mean	Stderr	
16 – 20	0.00089	0.00020	0.0367	0.0045	0.0136	0.00003	63
21 – 25	0.00056	0.00010	0.0349	0.0041	0.0138	0.00005	103
26 – 30	0.00037	0.00005	0.0341	0.0051	0.0118	0.00017	50
31 - 35	0.00050	0.00007	0.0283	0.0053	0.0097	0.00002	56
36 – 40	0.00040	0.00004	0.0367	0.0055	0.0138	0.00005	75
41 – 45	0.00030	0.00004	0.0315	0.0039	0.0133	0.00004	84
46 – 50	0.00045	0.00005	0.0312	0.0058	0.0125	0.00010	67
51 – 55	0.00030	0.00005	0.0312	0.0089	0.0118	0.00007	33
56 – 60	0.00036	0.00006	0.0139	0.0069	0.0068	0.00007	23
61 – 65	0.00035	0.00007	0.0294	0.0138	0.0141	0.00025	14
66 – 70	0.00073	0.00042	0.0148	0.0074	0.0046	0.00020	6
over 70	0.00027	0.00016	0.0220	0.0154	0.0112	0.00020	4
Sex							
F	0.00053	0.00011	0.0246	0.0038	0.0110	0.00008	61
M	0.00047	0.00003	0.0331	0.0018	0.0127	0.00003	517
Stsum							
0	0.00000	0.00000	0.0342	0.0028	0.0129	0.00005	242
1	0.00067	0.00004	0.0277	0.0021	0.0110	0.00002	286
2+	0.00166	0.00016	0.0490	0.0073	0.0203	0.00009	50
All	0.00047	0.00003	0.0322	0.0017	0.0125	0.00002	578

### Short-term suspensions prior to conviction

On average, there were 0.00047 short-term suspensions/day or 0.85 suspensions over a five-year period. Interestingly, females had an average of 0.00053/day, which was higher than the male average of 0.00047/day – although not statistically significantly different. The 16 –20 year group had the highest average number of short-term suspensions of 0.00089/day (1.62 over 5 years). Approximately 42% of the participants hadn't received a short-term suspension prior to their first conviction.

### Fails from ignition interlock tests

The average of number of fails (a BAC of over 0.02) recorded by participants was 0.0322/day or 58.7 over a five-year period. Females were involved in an average of 0.0246 fails/day as compared to 0.0331 fails/day for males. Here again the results are not statistically different for the gender groups.

### High fails from ignition interlock tests

The number of times that participants attempted to drive at a BAC level in excess of 0.04 is captured by the variable *hfailrt*. The average *hfailrt* for drivers in the study was 0.0125 fails/day or 22.8 fails over a 5-year period. Drivers who had experienced two or more prior short-term suspensions had a statistically significant higher average *hfailrt* as compared to those with less than two short-term suspensions.

### Estimating the risk of apprehension

Expected values and standard errors of *stfailrt* and *failrt*, were calculated with equations (1) and (2) to estimate the number of drinking and driving events before an individual is caught by the police and issued a short-term suspension. We did a similar estimation for drinking and driving with a BAC in excess of 0.04 by using the variable *hfailrt* instead *failrt*. The results of this analysis are summarized in Table 3 below.

**Table 3: Estimates of the risk of apprehension**

	Average number of drinking and driving events per 24 hour suspension		Average number of drinking and driving events with BACs of over 0.04 per 24 hour suspension	
	Expected Value	Standard Deviation	Expected value	Standard Deviation
All	69.06	5.67	26.81	1.69
Females	50.41	12.01	22.54	4.31
Males	71.00	5.91	27.24	1.72

The results suggest that for every 69 drink driving trips, 27 involve a situation where the driver is operating with a BAC in excess of 0.04. Only one of these 27 trips will result in a short-term suspension. The risk of apprehension for male drivers is similar to that for the over all driver population while female drivers have a chance of being caught once for every 23 trips with a BAC in excess of 0.04.

### Discussion

The results of this study show that the term “first time offender”, as defined by the number of convictions an individual has had in a specified “look back” window, grossly underestimates the involvement of such offenders in drinking and driving events. We found that on average, a “first time offender” drives over 58 times after drinking before being convicted for a drinking and driving offence. This is further compounded by the fact that, when they are caught for drinking and driving, there are significantly long lag periods

between the offence and conviction dates – an average of 145 days and potentially another 5 drinking and driving trips. We have also demonstrated that the risk of apprehension for drinking and driving is very low. Overall drinking drivers can expect to be caught and issued a short-term suspension for every 27 trips warranting at least such a sanction.

### **Conclusion**

This work has used data from participants in Saskatchewan's ignition interlock program to quantify the magnitude of drinking and driving involving drivers who are considered first time offenders. We have shown that even the number of short-term suspensions accumulated by these drivers significantly underestimates their drinking and driving behaviour. This points to the urgency of using and taking progressive action based on such short-term suspension information as recommended in STRID 2010. As part of Canada's strategy to reduce impaired driving, opportunities for more effective applications of short term suspensions to trigger early intervention and remedial action is currently being looked at by the Canadian Council of Motor Transport Administrators.

### **Possible Next Steps**

We next intend to use the ignition interlock data to explore the reasons given by participants for failing tests on the device. Of interest will also be the BACs at which they fail these tests and the times of day when these fails were recorded. Age and sex based differences will also be explored.

### **References**

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3. Benjamin, J. and C. Cornell (1970). Probability, Statistics and Decision for Civil Engineers. McGraw-Hill, New York.