Abstract

Background
In an effort to change drinking and driving behaviour and reduce the number of serious crashes attributable to alcohol, in the spring of 2010 the Government of British Columbia, Canada announced new measures to deal with drinking drivers.

Aim
This paper presents evidence of the impact of new immediate roadside prohibitions (IRP) for drinking drivers as assessed by random roadside surveys of alcohol and drug use among nighttime drivers conducted prior to and following the introduction of IRP.

Method
Drivers were randomly selected from the traffic stream in five cities and asked to provide a breath sample to determine alcohol content and a sample of oral fluid to be tested for the presence of psychoactive drugs. The surveys were conducted between the hours of 21:00 and 03:00 on Wednesday through Saturday nights in June 2010 and again in June 2012.

Results
Driving after drinking decreased significantly following the introduction of IRP. In particular, the percentage of drivers with BACs over 80 mg/dL decreased by 59%; drivers with BACs of at least 50 mg/dL decreased by 44%. The decreases in drinking and driving were not restricted to specific sub-groups of drivers but were universal across age groups, sex, and communities. The results also revealed a changing pattern of drinking and driving. For example, the typical pattern of increased drinking and driving on weekend nights was not observed in 2012 and the prevalence of drinking drivers on the road during late night hours was less than half that found in 2010.

Discussion and conclusions
The IRP program combined immediate short-term roadside suspensions with vehicle impoundment and monetary penalties to enhance the swiftness, certainty and perceived severity of sanctions for drinking and driving. These measures were associated with a substantial reduction in the prevalence of driving with a BAC over 50 mg/dL and driving with a BAC over 80 mg/dL.

Background
Following unprecedented decreases in the magnitude of the alcohol-crash problem during the 1980s and into the 1990s, recent years have shown little change in the number of alcohol-related serious crashes. In an effort to change behaviour and reduce the number of serious crashes attributable to alcohol, in the spring of 2010 the Government of British Columbia, Canada announced new measures to deal with drinking drivers that would come into force in September 2010. These measures included an increase in the length of the immediate
Roadside prohibition for drivers with BACs between 50 and 80 mg/dL from 24 hours to 3 days, possible vehicle impoundment, an administrative penalty of $200, and a licence reinstatement fee of $250. The sanctions became increasingly more severe for repeat violations. Drivers found to have a BAC in excess of 80 mg/dL were subject to an immediate roadside prohibition of 90 days, 30-day vehicle impoundment, a $500 administrative penalty, a $250 licence reinstatement fee, plus enrolment in the Responsible Driver Program and the Ignition Interlock Program.\footnote{Details of the IRP program can be found at \url{http://www.pssg.gov.bc.ca/osmv/shareddocs/Immediate_Roadside_Prohibition_Fact_Sheet.pdf}}

Previous research has demonstrated the beneficial impact of administrative licence suspensions, largely attributed to the speed and relative certainty with which the sanctions are applied (Mann et al. 2002, Ross 1987, Voas et al. 1998). The new administrative measures introduced in British Columbia also had the essential characteristics of effective deterrence – i.e., they were applied immediately, they were applied with a high degree of certainty, and they were considerably more severe than the previous administrative prohibitions that had been in place for many years. Hence, it was anticipated that these new measures would serve to reduce the prevalence of drinking and driving.

**Aims**

The purpose of this study was to use roadside surveys as a means to measure the extent of change in alcohol use among nighttime drivers in five communities in British Columbia following the implementation of the Immediate Roadside Prohibition (IRP) legislation.

**Methods**

The roadside surveys were conducted using the same data collection procedures employed in previous surveys in British Columbia (see Beirness et al. 2010). The procedures were based on the method originally outlined by Transport Canada and updated with a few minor modifications over the years to improve the efficiency of the operation (e.g., improved breath test technology) and to provide for the optional collection of oral fluid samples to test for the presence of drugs (Boase 2012).

Drivers were randomly selected from the traffic flow at pre-selected locations in four time periods (21:00-22:30; 22:30-00:00; 00:00-01:30; and 01:30-03:00) on Wednesday, Thursday, Friday, and Saturday nights in June 2010 and June 2012. Two six-person crews carried out the survey in each of five communities. Participation in the surveys was completely voluntary. A police officer accompanied each crew to direct traffic safely off the roadway into the survey site.

For each of the two surveys (i.e., 2010 and 2012), the target was to interview approximately 500 drivers in each of five communities for a total sample size of 2,500 in each year. Assuming a simple random sample, a sample size of 2,500 would provide an estimate of the prevalence of drug or alcohol use among drivers with a 95% confidence interval of ± 1.1%.

**Results**

In 2010, of the 2,840 vehicles randomly selected from the traffic stream, 87% of drivers provided a breath sample. In 2012, 89.6% of 2,513 drivers selected provided a breath
The most common reasons cited for refusing to participate were “in a hurry” (44.2%), “not interested” (23.6%), “language barrier” (11.0%), and “civil rights” (9.7%). Fear of prosecution was mentioned by only 2.2% of drivers who refused to participate.

The raw data were weighted to adjust for differences in the traffic volume at the various sites. This weighting procedure places greater emphasis on interviews from sites with higher traffic volumes. The data were also adjusted for population in each community and combined into a weighted total. This weighted total provides an estimate of the results of the survey across all five communities but should not be interpreted as a provincial estimate.

Figure 1 presents the percentage of drivers who tested positive for alcohol as well as the distribution of BAC in 2010 and 2012. In 2012, 6.5% of drivers were found to have been drinking. This represents a 34% decrease from the 9.9% of drivers who were positive for alcohol in the 2010 survey ($z=4.19$, $p<.001$). Not only was there an overall decrease in the percentage of drivers with positive BACs ($\chi^2=20.6, \text{df}=3, p<.001$), there were decreases in every BAC group. Notable was the decrease in the percentage of drivers with a BAC over 80 mg/dL. In 2010, 2.2% of drivers had a BAC of this magnitude; in 2012, less than 1% of drivers had a BAC over 80 mg/dL -- a 59% decrease ($z=3.08$, $p<.003$).

Figure 1: BAC Positive and BAC Distribution of Drivers in 2010 and 2012

In previous surveys, and as seen in 2010, the percentage of alcohol-positive drivers peaked on Friday and Saturday nights. A considerable change in this pattern was observed in 2012 with a 49.5% reduction in alcohol-positive drivers on Saturday night and a 33.9% reduction on Friday night. Figure 2 presents the percentage of drivers with BACs of 50 mg/dL and over according to survey night in 2010 and 2012. A notable change in this pattern was observed in 2012, including a 65.9% decrease in drivers with BACs of 50 mg/dL and greater on Saturday night ($z=3.01$, $p<.01$).

Figure 2: Night of Survey and BAC Positive

Although oral fluid samples were collected from drivers to assess drug use, the detailed results are not particularly relevant to this paper except to say that there was no change in the prevalence of drug use between the two surveys.
Figure 2: Percentage of Drivers with BACs ≥ 50 mg/dL According to Survey Night

The typical pattern of an increasing percentage of drivers with a positive BAC during later survey times that was evident in 2010 was markedly reduced in 2012. Figure 3 presents the percentage of drivers with BACs over 50 mg/dL according to survey time. In 2012 there was a 49.3% reduction in drivers with a BAC of 50 mg/dL or greater between midnight and 01:30 (z=2.05, p<.05) and a 40.7% reduction between 01:30-03:00 (z=1.49, p>.1). Although the pattern of more drinking drivers at later site times was still evident in 2012, it was considerably less pronounced than in 2010.

Figure 3: Percentage of Drivers with BACs ≥ 50 mg/dL According to Survey Time

Figure 4 shows the percentage of male and female drivers with BACs of 50 mg/dL and over in both 2010 and 2012. Females were just as likely as males to drive with a BAC over 50 mg/dL in both 2010 and 2012 (p>.5). Compared to 2010, the percentage of drivers in 2012 with a BAC of 50 mg/dL or over was 38.9% lower among males (χ²=5.3, df=1, p<.05) and 45.4% lower among females (χ²=3.4, df=1 p>.07).

Figure 4: Percentage of Drivers with BACs > 50 mg/dL According to Sex and Year

Figure 5 presents the percentage of drivers with a BAC of 50 mg/dL or over by age group in 2010 and 2012. In 2012, there were no drivers age 16 to 18 with a BAC of 50 mg/dL or greater. Most other age groups showed a reduction in the percentage of drivers with BACs over 50 mg/dL. The largest decreases were among drivers age 25 to 34 (39.6%) (z=1.69, p<.10), and those 35 to 44 (63.2%) (z=2.17, p<.05).
The findings provide evidence of a profound change in the prevalence and pattern of drinking and driving behaviour in British Columbia following the introduction of the new immediate roadside prohibition legislation. The overall prevalence of driving after drinking, and in particular driving with a BAC over 50 mg/dL, decreased substantially following the introduction of the new IRP legislation. Driving after consuming any alcohol was reduced by 34%, driving with a BAC of 50 mg/dL or over decreased by 42% and driving with a BAC of 80 mg/dL or over was decreased by 59%.

Further analysis of the data revealed that the reductions in drinking and driving were not restricted to males or females or to specific age groups. The exception was among 19-24 year old drivers where there was no change. In addition, the temporal patterns of drinking and driving changed. The typical pattern of increased drinking and driving on weekend nights was not evident in 2012. In fact, in 2012, drinking and driving was least prevalent on Saturday night. Although driving after drinking was still most common after midnight, the percentage of drivers interviewed between 01:30 and 03:00 with BACs over 50 mg/dL was 40% lower than that found in 2010. The findings provide evidence of a profound and universal change in drinking and driving in British Columbia following the introduction of the IRP legislation in September 2010.

Administrative licence suspensions have been used for many years as an effective measure to reduce driving after drinking. Critical elements of administrative suspensions are the speed and relative certainty with which the sanctions are applied – also key factors in effective deterrence. The IRP program in British Columbia took administrative suspensions to the next level. The celerity and relative certainty of the suspension, combined with enhanced sanctions, created favourable conditions for an enhanced deterrent effect. The present results are consistent with this hypothesis.

It should be noted, however, that as compelling and persuasive as the present results are, they cannot be unambiguously attributed to the IRP legislation introduced in September 2010. The research utilized a simple pre-post design. The absence of comparable surveys in another jurisdiction that did not introduce similar legislation (i.e., a control group) leaves opens a number of threats to the validity of a causal interpretation of the documented decrease in drinking and driving. Further evidence examining data on crashes, injuries, and fatalities.
would help strengthen the inference that the IRP legislation was responsible for the observed changes in drinking and driving in British Columbia.

The next challenge is to sustain and strengthen the impact of the IRP legislation. In the two years between the roadside surveys, a great deal of media attention was devoted to the IRP program. The high profile of the issue served to increase public awareness of, and interest in, the issue of impaired driving. Police enforcement was intensive and many drivers experienced the sting of immediate sanctions. Although the results are encouraging, it is also evident that there remain many drivers who continue to get behind the wheel after consuming too much alcohol. Further efforts to help understand the reasons why some drivers have failed to change their behaviour will be necessary to develop new and innovative countermeasure programs specifically targeted to high risk groups. In particular, drivers age 19-24 were not impacted by the new legislation should be targeted for special measures. In the meantime, maintaining public attention along with ongoing high profile enforcement will be key elements in changing behaviour and continued success.

References