



Canadian Centre on Substance Abuse

Drug Use by Fatally Injured Drivers in Canada (2000–2008)

Prepared for:

Canadian Council of Motor Transport Administrators

and

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INTRODUCTION

The drugs-and-driving problem

Following nearly three decades of progress on the alcohol-crash problem, safety advocates, policy-makers, legislators and enforcement agencies have begun to express greater concern about the use of drugs by drivers. Although the misuse of drugs has long been considered a major social problem, the acute and devastating consequences of driving while under the influence of drugs has only recently come to the forefront as a public safety issue.

In many respects, our collective understanding of the drugs and driving problem is only in its infancy. The extent of knowledge on drugs and driving pales in comparison to that available on alcohol-impaired driving. Whereas research has clearly demonstrated impairing effects of alcohol on driving as well as an exponential increase in crash risk associated with rising concentrations of alcohol in the blood (e.g., Blomberg et al., 2009; Borkenstein et al., 1964), research on drugs and driving has only begun to document such effects and only for specific substances (e.g., Jones et al., 2003; Raes et al., 2008). To a large extent, the complexities of studying drugs and driving have hindered research. For example, there are numerous substances known to have the potential to impair driver performance. Some of these substances are illegal; others can be obtained only by prescription while others can be obtained 'over the counter' for self-medication. None of these substances can be detected in breath samples (as is the case with alcohol); detecting their presence in the body requires a sample of blood, urine or oral fluid. Such tests require special equipment and professional expertise in toxicology to conduct the tests and interpret the results—complexities that limit the pace at which knowledge accumulates. Nevertheless, there is an ever-increasing body of scientific literature documenting the impairing effects of many substances and the elevated risk of traffic crash involvement following drug use (Beirness, Logan & Swann, 2010).

In Canada, data from various sources have begun to shed light on the magnitude of the problem of driving after drug use. Self-report data from the Canadian Addiction Survey show that 4.8% of drivers in Canada admitted driving within two hours of using cannabis at least once in the past year. Among those aged 16–18, 20.6% reported having driven after using cannabis, slightly higher than the 19.6% who reported driving after alcohol use (Beirness &

Davis, 2007). In 2008, a roadside survey of alcohol and drug use among drivers in British Columbia found 10.4% of drivers tested positive for drugs; 8.1% were found to have been drinking (Beirness & Beasley, 2010; 2011). Cannabis and cocaine were the most commonly detected drugs. A more recent 2010 roadside survey found similar rates of alcohol and drug use (9.9% and 7.2%, respectively). In this recent survey, oral fluid samples that tested positive for cannabis were quantified. In 89% of cases, the concentration of cannabis was greater than 5 ng/ml—a level above which impairment is generally found (Grotenhermen et al., 2007; Ramaekers et al., 2006).

Very little information is available on the use of drugs by drivers involved in crashes. A study of drivers treated at a trauma centre in Toronto for injuries sustained in a serious crash found 41% tested positive for drugs and 35% were positive for alcohol (Studuto et al., 1993). Cannabis (14%), benzodiazepines (12%) and cocaine (10%) were the most frequently detected substances. A few Canadian studies have examined the use of drugs by drivers killed in road crashes in particular jurisdictions. These studies indicate that drugs, sometimes in combination with alcohol, are detected in up to 30% of fatally injured drivers (e.g., Quebec: Dussault et al., 2002; Ontario: Cimbura et al., 1982; British Columbia: Mercer & Jeffery, 1995).

Purpose

The primary purpose of this paper was to examine data on the results of toxicological examinations of bodily fluid samples collected by coroners/medical examiners from fatally injured drivers across Canada to provide an estimate of the prevalence of drug use by drivers killed in road crashes. A secondary purpose was to examine the characteristics of fatally injured drivers who test positive for drug and/or alcohol use.

METHOD

For more than three decades, data on alcohol use by fatally injured drivers in Canada have been collected from coroners'/medical examiners' files and compiled in the National Fatality Database. These data are collected by the Traffic Injury Research Foundation (TIRF) on behalf of Transport Canada and the Canadian Council of Motor Transport Administrators (CCMTA) (e.g., TIRF, 2010). This database has been used to assist policy development,

public awareness and monitoring of alcohol-impaired driving in Canada. In 2000, the database was expanded to include the results of toxicological tests for drugs other than alcohol.

In the database, a motor vehicle fatality is defined as a person who dies within 12 months as a result of injuries sustained in a crash involving a vehicle. This includes incidents occurring on- and off-road, particularly those involving vehicles such as bicycles, snowmobiles, and all-terrain vehicles. Fatalities involving watercraft are not included in the database. Although passengers and pedestrians are included in the database, the present analysis was restricted to drivers – i.e., the person deemed to have operational control of the vehicle.

The numbers of driver fatalities reported in this paper do not necessarily correspond to those provided by provincial/territorial motor vehicle departments. This is because these government agencies typically report only those fatalities that occur on public roadways and may restrict inclusion to persons who die within 30 days of the crash. Hence, the broader definition of a fatality used in this report typically results in a higher number of fatalities than reported by provincial/territorial agencies. (See Appendix A for a breakdown of numbers according to jurisdiction.)

An initial review of the data suggested that drivers are sometimes tested for a wide variety of drugs, including many substances not known to have psychotropic properties and unlikely to cause driving impairment (e.g., acetaminophen). Therefore, as an initial step, all substances listed in the database were reviewed and then recoded into categories corresponding to those used by the Drug Evaluation and Classification (DEC) program: central nervous system (CNS) depressants, inhalants, dissociative anaesthetics, cannabis, CNS stimulants, hallucinogens and narcotic analgesics (IACP, 1999). These seven drug categories are intended to reflect the similarities in psychophysical and clinical symptomatology and not necessarily similarities in pharmacological properties. Substances not consistent with these categories were coded as 'other'. Drivers that only tested positive for a drug(s) in the 'other' category were considered to be drug negative. Up to six substances were recorded for each fatally injured driver.

RESULTS

From 2000–2008, a total of 17,237 drivers died in vehicle crashes in Canada. Although more than 80% of fatally injured drivers were tested for alcohol, drug testing has yet to become routine practice in all provinces and territories. Hence, testing rates vary considerably among provinces/territories, ranging from more than 80% to less than 30%. The policies and procedures governing drug testing vary considerably across jurisdictions. Table 1 displays the overall drug and alcohol testing rates for Canada as well as by jurisdiction for 2000–2008. The final two columns present the drug-testing rate for 2007 and 2008 to highlight the increased testing rates in some jurisdictions in recent years.

The percentage of drivers testing positive for alcohol and/or one or more of the seven categories of drugs is displayed in Table 2. The alcohol- and drug-positive test rates are presented for all the cases tested between 2000 and 2008 as well as separately for the most recent year available (i.e., 2008).

Table 1: Testing Rates for Alcohol and Drugs by Jurisdiction

Jurisdiction	Fatally Injured Drivers (N)	Alcohol Test Rate 2000-2008 (%)	Drug Test Rate 2000-2008 (%)	Drug Test Rate 2007 (%)	Drug Test Rate 2008 (%)
Canada	17,237	82.6	47.2	62.3	60.6
BC	2,521	83.8	65.8	78.4	83.7
AB	2,415	95.1	40.8	85.4	86.3
SK	892	86.4	81.4	85.1	87.5
MB	652	91.7	88.3	88.6	91.7
ON	5,060	84.3	22.5	33.7	9.9
QC	4,119	69.0	47.4	59.6	72.6
NB	596	85.9	81.0	85.9	84.3
NS	508	87.4	76.4	76.9	80.6
PE	110	83.6	75.5	80.0	100
NL	225	86.7	30.2	28.6	26.7
YT/NT/NU	108	84.3	59.3	64.3	37.5

It is evident that drug use among drivers killed in motor vehicle crashes rivals that of alcohol use. In 2008, 40.8% of fatally injured drivers tested positive for alcohol; 36.7% tested positive for one or more psychoactive drugs. Among drivers who were tested for both alcohol and drugs, 15.1% were found to be positive for both. It is also evident in Table 2 that the rates of alcohol- and drug-positive drivers vary considerably among jurisdictions. To

some extent this variability may be a result of small numbers and relatively low testing rates rather than a true difference in the extent of alcohol and drug use by drivers in various regions.

Table 2: Percentage of Drivers Testing Positive for Alcohol or Drugs by Jurisdiction

Jurisdiction	Alcohol Positive 2000-2008 (%)	Alcohol Positive 2008 (%)	Drug Positive 2000-2008 (%)	Drug Positive 2008 (%)
Canada	37.9	40.8	33.5	36.7
BC	41.2	43.0	36.6	45.1
AB	38.5	39.6	38.4	38.3
SK	44.2	54.9	24.8	34.7
MB	42.9	63.8	23.1	32.7
ON	31.6	28.4	42.4	34.8
QC	38.2	42.3	31.0	27.8
NB	45.2	55.3	31.3	34.9
NS	41.7	28.8	30.2	48.0
PE	44.0	66.7	28.4	58.3
NL	55.9	75.0	38.2	37.5
YT/NT/NU	48.4	57.1	28.1	33.3

Figure 1 displays the percentage of drivers that tested positive for alcohol or drugs across all jurisdictions according to year. The percentage of drivers testing positive for alcohol has shown relatively little change for the years 2000–2008, fluctuating between 36.0% and 40.8%. On the other hand, the percentage of drug-positive drivers has increased progressively, rising from 29.7% in 2000 to 36.7% in 2008. This increase in the percentage of drug-positive cases has occurred despite the increase in drug testing rates. In the past, testing for drugs in some jurisdictions was done selectively on the basis of suspicion of drug use. An increase in the overall testing rate (regardless of suspicion) would be expected to reveal higher number of drug-negative cases, thereby lowering the rate of drug-positive cases. This has not happened. In fact, the increased testing rate has yielded more drug-positive cases and, hence, a higher drug-positive rate.

Figure 2 displays the frequencies of drug categories detected for 2000–2008. Among those drivers who tested positive for a psychoactive substance, the most common drug categories found were CNS depressants and cannabis; this is followed by CNS stimulants and narcotic analgesics. Hallucinogens, inhalants and dissociative anaesthetics were rarely found among fatally injured drivers. It should be noted, however, that these latter three categories of drugs might not necessarily be included in standard drug screens.

Figure 1: Percentage of Fatally Injured Drivers Positive for Alcohol or Drugs According to Year

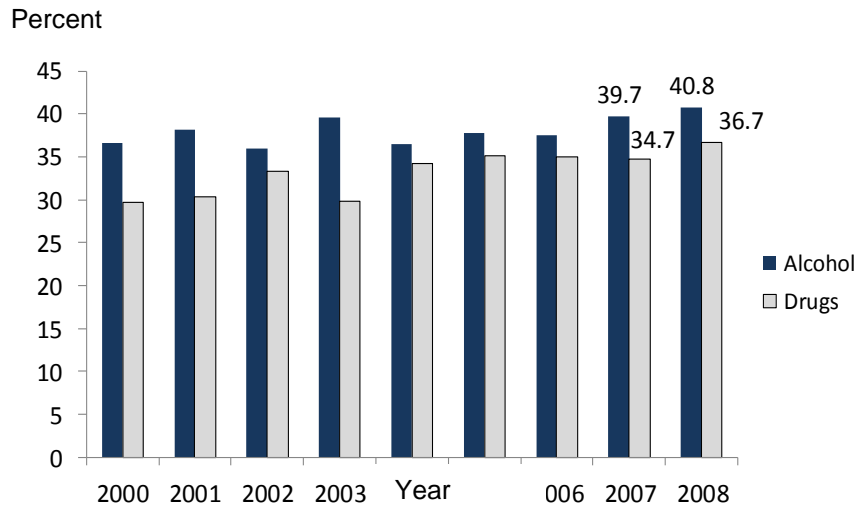
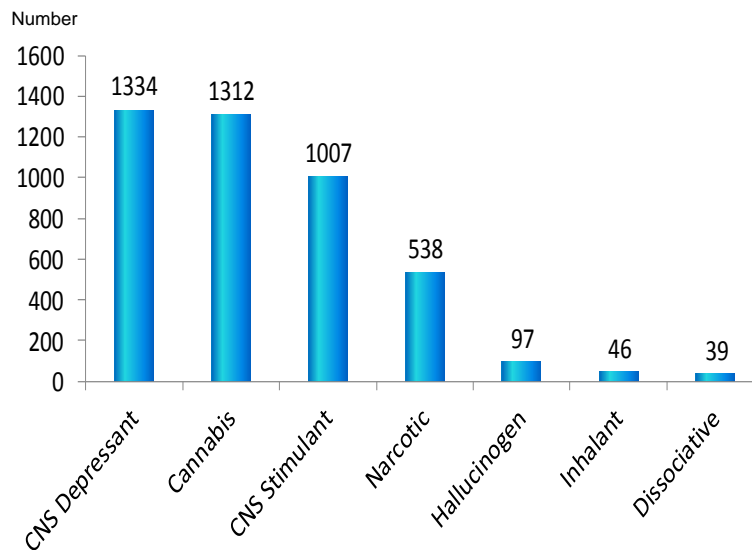


Figure 2: Frequency of Drug Categories Detected Among Fatally Injured Drivers

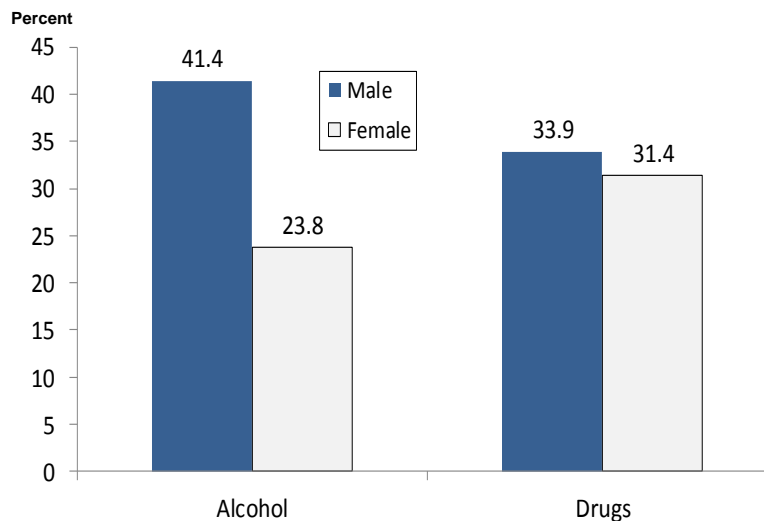


Characteristics of the Drivers

Sex: Figure 3 presents the percentage of male and female drivers who tested positive for either drugs or alcohol. It is evident that whereas males are more likely than females to test positive for alcohol, females are almost equally as likely as males to test positive for drugs.

While males and females are equally likely to test positive for drugs, there is a very different pattern in the drug categories for which they test positive. Figure 4 shows the percent of each drug category among all the positive cases according to gender. Females are far most likely to test positive for a CNS depressant than any other substance. Cannabis, CNS stimulants and CNS depressants are the substances most likely to be found among male drivers.

Figure 3: Percentage of Drivers Positive for Alcohol or Drugs According to Sex



Age: Table 3 provides the age distribution of all fatally injured drivers as well as all fatally injured drinking drivers and fatally injured drug-positive drivers. Drivers aged 16–24 comprise the largest group, accounting for 22.2% of fatalities. This age group also accounts for the largest proportion of drinking-driver fatalities (27.6%) and drug-positive driver fatalities (26.9%). This age group has also been divided into two groups (ages 16–19 and 20–24) to illustrate the greater degree of overrepresentation of drivers aged 20–24 in

alcohol- and drug-involved crashes. However, it is drivers aged 25–34 that show the greatest degree of overrepresentation in alcohol- and drug-involved crashes.

Figure 4: Percentage of Male and Female Fatally Injured Drivers Testing Positive for Each Drug Category

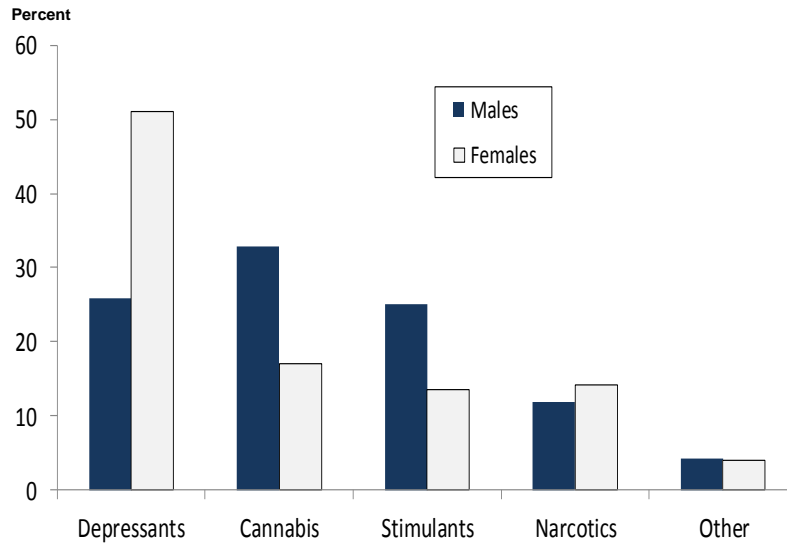


Table 3: Percentage of All Driver Fatalities, Alcohol-positive Cases and Drug-positive Cases According to Age Group

Age Group	% of All Fatally Injured Drivers	% of Fatally Injured Drinking Drivers	% of Fatally Injured Drug Positive Drivers
11-15	1.3	0.3	0.3
16-24	22.2	27.6	26.9
16-19	8.8	9.0	9.5
20-24	13.4	18.6	17.4
25-34	17.4	23.9	22.0
35-44	17.0	21.0	19.9
45-54	16.0	15.8	15.6
55-64	11.2	7.3	8.1
65-74	7.0	2.9	4.3
75+	7.5	0.5	2.8

Figure 5 represents the percentage of alcohol- and drug-positive cases by age group. Clearly, alcohol is more prominent than drugs in many age groups, particularly drivers aged 20–24 and 25–34. The percentage of drinking drivers declines steadily after age 34. In contrast, the percentage of drug-positive cases shows a similar peak in the 20–24 and 25–34 age groups, but the decline in older age groups is less pronounced than is the case with alcohol. Of note, however, is the fact that among fatally injured drivers 55 years of age and older, drug use is more prevalent than alcohol. Among drivers age 16–19, drug use is almost as prevalent as alcohol.

Figure 5: Percentage of Alcohol and Drug Cases

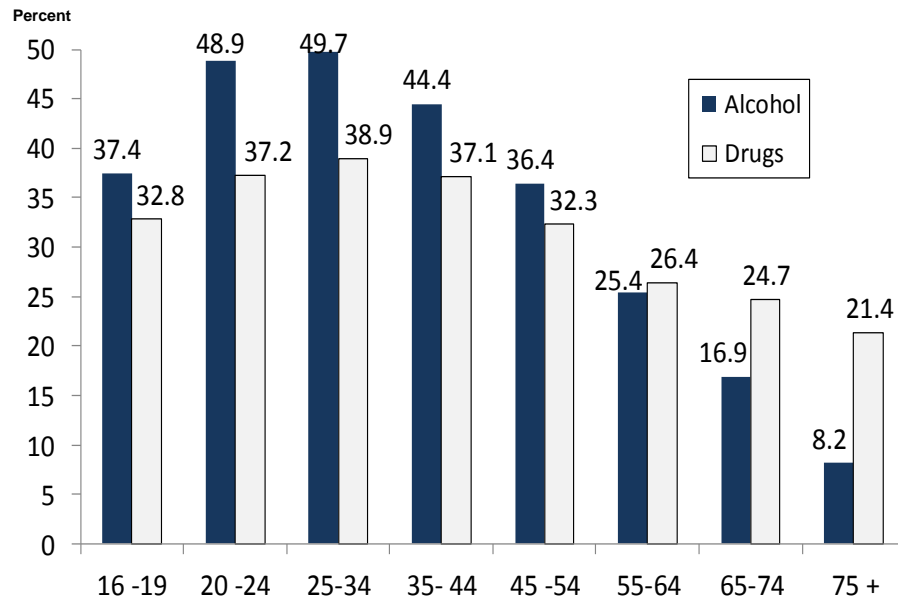
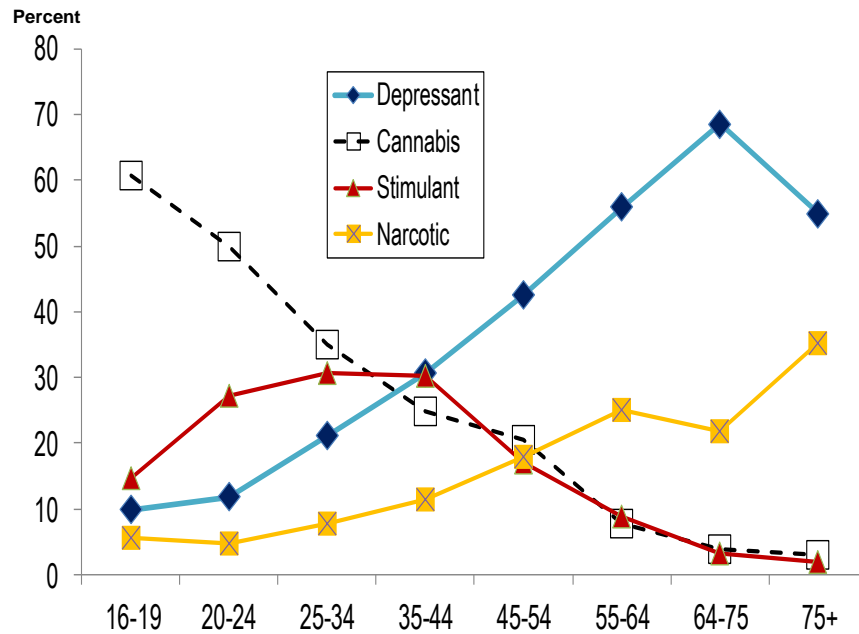


Figure 6 shows differences in categories of drugs found among drug-positive drivers according to age group. Cannabis predominates among young drivers and then decreases with age. Narcotic analgesics and CNS depressants are rarely present in young drivers but the incidence increases steadily and these substances become the most commonly found among older drivers. CNS stimulant use peaks among drivers aged 35–44.

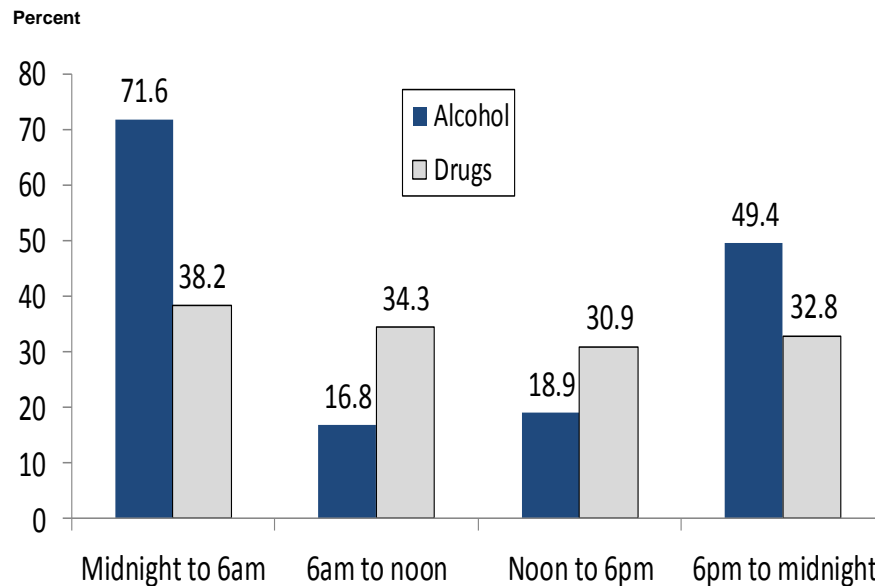
Figure 6: Percentage of Drug Category Detected According to Age Group



Characteristics of the Crash

Time of Day: Figure 7 shows the percentage of fatally injured drivers who tested positive for alcohol and drugs according to the time of day in which the crash occurred. During the period from midnight to 6 a.m., 71.6% of drivers tested positive for alcohol. During daytime hours (which are divided into two segments: 6 a.m. to noon and noon to 6 p.m.), the percentage of alcohol-positive drivers was considerably lower (16.8% and 18.9%, respectively). Between 6 p.m. and midnight, the percentage of alcohol-positive drivers increased to 49.4%. In contrast, the percentage of drug-positive fatally injured drivers remains more consistent across time periods, varying from 30.9% between noon and 6 p.m. to 38.2% between midnight and 6 a.m.

Figure 7: Percentage of Alcohol- and Drug-positive Driver Fatalities According to Crash Time



DISCUSSION

In Canada, testing for alcohol among drivers who die in motor vehicle crashes has become commonplace, with more than 80% of fatally injured drivers tested for the presence and amount of alcohol. These data have been an important surveillance tool, providing a valuable source of information that has been instrumental for monitoring the magnitude and characteristics of the alcohol-crash problem and assessing changes in the problem over time. These data have also been utilized extensively in evaluating the impact of legislation and countermeasures in reducing the extent of the problem.

Since 2000, the results of drug tests on fatally injured drivers have been included in the National Fatality Database. The testing rate for drugs (47.2%) lags considerably behind that for alcohol. However, due to the efforts of several jurisdictions over the past few years, drug testing rates have increased, providing a better—albeit still incomplete—picture of drug use among fatally injured drivers. The process surrounding drug testing varies considerably across jurisdictions. Many factors are at work in determining which drivers get tested for drugs and which drugs are included in the testing protocol. Greater consistency in drug-

testing rates and drug-testing procedures across jurisdictions would enhance the validity of the estimates of drug use derived from this database.

On the basis of the data from alcohol and drug tests on fatally injured drivers provided by coroners and medical examiners from 2000–2008, 37.9% of drivers tested positive for alcohol and 33.5% tested positive for at least one of seven categories of drugs known to have a negative impact on the ability to operate a vehicle safely. Results from 2008 indicate that 40.8% of drivers tested positive for alcohol and 36.7% of drivers tested positive for drugs. It should be noted, however, that a positive drug test does not necessarily imply that the driver was impaired or that the use of the drug contributed to the crash. Whereas a presumption of impairment can be made on the basis of alcohol levels, research has yet to establish the same basis of evidence regarding the extent of impairment typically associated with the blood levels of psychoactive substances.

The data suggest that driving after drinking and driving after drug use appear to present separate and distinct problems. Whereas drivers who test positive for alcohol are more likely to be young males, drug use extends across age and sex groups. The type of drugs differs among age groups. Young drivers are most likely to test positive for cannabis; depressants and narcotic analgesics are more prominent among older drivers. There is also a different pattern of alcohol and drug use among fatally injured drivers. Driver fatalities involving alcohol are more prevalent in the early morning hours whereas drug use is similar across all times of day. This result is consistent with those from recent roadside surveys of alcohol and drug use among drivers conducted in British Columbia in 2008 and 2010 (Beirness & Beasley, 2010; 2011). Roadside surveys conducted during daytime hours may provide further evidence of the different patterns of alcohol and drug use among drivers.

This report documents the extent of drug use among fatally injured drivers in Canada and finds it to be of a magnitude comparable to that of alcohol use. This fact serves to highlight the need for societal action to deal effectively with the use of drugs by drivers. Unique prevention and enforcement strategies—separate from those targeting alcohol—need to be developed and implemented. For example, enforcement responses need to occur not only during late-night weekend hours as they do for alcohol, but during all hours of the day and across all days of the week.

It may also be helpful to view drug use by drivers as a series of separate issues. For example, it would appear that cannabis use is more common among younger drivers, the

use of depressants and narcotic analgesics is an issue among older drivers, and stimulant use occurs most commonly among middle-aged drivers. Understanding these differences in drug-use patterns may facilitate the development of successful education and prevention programs targeted to specific subgroups within the population.

Although there are obvious similarities between drinking and driving and drug use and driving, it would appear that the aetiology of the behaviour may be very different from that of drinking and driving. Hence, it cannot simply be assumed that the same techniques, policies, procedures and countermeasures that were developed and utilized effectively to combat drinking and driving can be readily adapted or transferred to deal with the drugs and driving issue. The use of drugs by drivers is a more complex issue than drinking and driving. Information such as that presented in this report serves to provide policy-makers with further evidence to advance efforts to develop and implement programs to deal effectively with drug use by drivers. The results also highlight the need for a comprehensive, national strategy on drugs and driving that deals with policy/legislation, enforcement, adjudication, rehabilitation, treatment and prevention. Collective efforts on all fronts will help ensure safer roadways for all Canadians.

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APPENDIX A
Provincial and Territorial Summaries

British Columbia

- 2521 fatally injured drivers between 2000-2008
- 246 fatally injured drivers in 2008

- 83.8% of drivers tested for alcohol (2000-2008)
- 65.8% of drivers tested for drugs (2000-2008)
 - 78.4% tested in 2007
 - 83.7% tested in 2008
- 41.2% tested positive for alcohol (2000-2008)
- 43% tested positive for alcohol (2008)

- 36.6% tested positive for drugs (2000-2008)
- 43% tested positive for drugs (2008)

Alberta

- 2415 fatally injured drivers between 2000-2008
- 293 fatally injured drivers in 2008
- 95.1% of drivers tested for alcohol (2000-2008)
- 40.8% of drivers tested for drugs (2000-2008)
 - 85.4% tested in 2007
 - 86.3% tested in 2008
- 38.5% tested positive for alcohol (2000-2008)
- 39.6% tested positive for alcohol (2008)
- 38.4% tested positive for drugs (2000-2008)
- 38.3% tested positive for drugs (2008)

Saskatchewan

- 892 fatally injured drivers between 2000-2008
- 112 fatally injured drivers in 2008
- 86.4% of drivers tested for alcohol (2000-2008)
- 81.4% of drivers tested for drugs (2000-2008)
 - 85.1% tested in 2007
 - 87.5% tested in 2008
 -
- 44.2% tested positive for alcohol (2000-2008)
- 54.9% tested positive for alcohol (2008)
- 24.8% tested positive for drugs (2000-2008)
- 34.7% tested positive for drugs (2008)

Manitoba

- 652 fatally injured drivers between 2000-2008
- 60 fatally injured drivers in 2008
- 91.7% of drivers tested for alcohol (2000-2008)
- 88.3% of drivers tested for drugs (2000-2008)
 - 88.6% tested in 2007
 - 91.7% tested in 2008
- 42.9% tested positive for alcohol (2000-2008)
- 63.8% tested positive for alcohol (2008)
- 23.1% tested positive for drugs (2000-2008)
- 32.7% tested positive for drugs (2008)

Ontario

- 5060 fatally injured drivers between 2000-2008
- 475 fatally injured drivers in 2008
- 84.3% of drivers tested for alcohol (2000-2008)
- 22.5% of drivers tested for drugs (2000-2008)
 - 33.7% tested in 2007
 - 9.9% tested in 2008
- 31.6% tested positive for alcohol (2000-2008)
- 28.4% tested positive for alcohol (2008)
- 42.4% tested positive for drugs (2000-2008)
- 34.8% tested positive for drugs (2008)

Québec

- 4119 fatally injured drivers between 2000-2008
- 376 fatally injured drivers in 2008
- 69% of drivers tested for alcohol (2000-2008)
- 47.4% of drivers tested for drugs (2000-2008)
 - 59.6% tested in 2007
 - 72.6% tested in 2008
- 38.2% tested positive for alcohol (2000-2008)
- 42.3% tested positive for alcohol (2008)
- 31% tested positive for drugs (2000-2008)
- 27.8% tested positive for drugs (2008)

New Brunswick

- 596 fatally injured drivers between 2000-2008
- 51 fatally injured drivers in 2008
- 85.9% of drivers tested for alcohol (2000-2008)
- 81% of drivers tested for drugs (2000-2008)
 - 85.9% tested in 2007
 - 84.3% tested in 2008
- 45.2% tested positive for alcohol (2000-2008)
- 55.3% tested positive for alcohol (2008)
- 31.3% tested positive for drugs (2000-2008)
- 34.9% tested positive for drugs (2008)

Nova Scotia

- 508 fatally injured drivers between 2000-2008
- 62 fatally injured drivers in 2008

- 87.4% of drivers tested for alcohol (2000-2008)
- 76.4% of drivers tested for drugs (2000-2008)
 - 76.9% tested in 2007
 - 80.6% tested in 2008
- 41.7% tested positive for alcohol (2000-2008)
- 28.8% tested positive for alcohol (2008)
- 30.2% tested positive for drugs (2000-2008)
- 48% tested positive for drugs (2008)

Prince Edward Island

- 110 fatally injured drivers between 2000-2008
- 12 fatally injured drivers in 2008
- 83.6% of drivers tested for alcohol (2000-2008)
- 75.5 of drivers tested for drugs (2000-2008)
 - 80% tested in 2007
 - 100% tested in 2008
- 44% tested positive for alcohol (2000-2008)
- 66.7% tested positive for alcohol (2008)
- 28.4% tested positive for drugs (2000-2008)
- 58.3% tested positive for drugs (2008)

Newfoundland

- 225 fatally injured drivers between 2000-2008
- 30 fatally injured drivers in 2008
- 86.7% of drivers tested for alcohol (2000-2008)
- 30.2 of drivers tested for drugs (2000-2008)
 - 28.6% tested in 2007
 - 26.7% tested in 2008
- 55.9% tested positive for alcohol (2000-2008)
- 75% tested positive for alcohol (2008)
- 38.2% tested positive for drugs (2000-2008)
- 37.5% tested positive for drugs (2008)

Yukon, Nunavut and Northwest Territories

- 108 fatally injured drivers between 2000-2008
- 16 fatally injured drivers in 2008
- 84.3% of drivers tested for alcohol (2000-2008)
- 59.3% of drivers tested for drugs (2000-2008)
 - 64.3% tested in 2007
 - 37.5% tested in 2008
- 48.4% tested positive for alcohol (2000-2008)
- 57.1% tested positive for alcohol (2008)
- 28.1% tested positive for drugs (2000-2008)
- 33.3% tested positive for drugs (2008)