A scenic landscape featuring a winding asphalt road in the foreground, leading through a field of dry, yellowish-brown shrubs. In the background, there are several tall, dark evergreen trees and a range of mountains partially obscured by a thick layer of white mist or low clouds. The sky is filled with soft, white clouds, suggesting a bright but slightly overcast day. The overall tone is natural and serene.

Motor Vehicles in Yukon: A Public Health Perspective

Office of the Chief Medical Officer of Health

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Introduction

Injuries: A rationale for a public health focus on motor vehicle collisions.

Injuries are a commonly under-rated public health issue in Canada. Yet they result in notable loss of life, disability and health care costs, all of which are preventable. Injuries are typically classified as either intentional or unintentional. Intentional injuries occur when individuals purposely inflict harm on themselves or others, including in situations of interpersonal harm, self-harm, law enforcement interventions, war and acts of civil insurrection and disturbances. Unintentional injuries include those caused by falls, drowning, burns, unintentional poisoning and motor vehicle collisions.

According to the 2013-2014 Canadian Community Health Survey (CCHS), Yukoners reported the highest rates of injuries in Canada.⁽¹⁾ During the 2013-2014 CCHS cycle, 24.2 per cent of Yukoners reported an injury in the past 12 months that affected normal activities, and 13.4 per cent of Yukoners reported an injury in the past 12 months where they sought medical attention.⁽¹⁾ These compare to the respective Canadian rates of 15.8 per cent and 8.1 per cent. When examining people admitted to hospital for an injury in 2016, the age-standardized rate of injury hospitalization in Yukon was 1,269 per 100,000 population, compared to the national rate of 601 per 100,000.⁽²⁾

A significant contributor to preventable injuries and fatalities is motor vehicle collisions (MVCs). In 2010, motor vehicle incidents in Canada resulted in 16.5 per cent of injury deaths, 12.2 per cent of injury hospitalizations and 8.3 per cent of injury emergency department visits.⁽³⁾ In 2016, MVCs were responsible for almost 10 per cent of injury and trauma-related emergency department visits in Yukon and almost 16 per cent of injury and trauma-related hospitalizations.⁽²⁾

About This Report

Recently, in addition to obtaining Yukon RCMP-collected collision statistics from the National Collision Database (NCDB), the Office of the Chief Medical Officer of Health (OCMOH) collaborated with the Government of Yukon to undertake multiple analyses using Yukon data for internal use, in order to help us understand MVCs in Yukon from a public health perspective. Content in this report consists of information that can be disclosed publicly and is presented from each of these data sources (described in the “Data Sources” section below) by predominant themes or categories. While not every data source contributes to each theme, a more complete picture of MVCs and related risk factors and behaviours can be drawn from each of these data sources. An initial discussion comparing health data (emergency department visits and hospitalizations) with RCMP data (collision reports in the NCDB) is provided. Then, beginning with general information on MVCs and associated injuries in Yukon, information will progress into the themes of demographics and driver characteristics, vehicle and occupant types, contributing factors to collisions and injuries, injury characteristics and health care utilization. The report concludes with recommendations to help address the report’s findings, to improve road safety and to reduce the health impacts of MVCs in Yukon.

Purpose

This report aims to summarize and synthesize information from four data sources and provide direction for public health action to reduce the health impacts of MVC-related injuries in Yukon.

Data Sources

Four sources of information provided the content for this report:

A Public Health Perspective on Motor Vehicle Collisions in Yukon Territory

- A prior report from the Office of the Chief Medical Officer of Health, which examines hospitalization and emergency department visit data from 2011 to 2015, combined with data from the Office of the Chief Coroner and population survey data (CCHS) accompanied by a literature review.

The complete analysis was presented in an internal report: A Public Health Perspective on Motor Vehicle Collisions in Yukon Territory.⁽⁴⁾ In some cases where CCHS data is reported, Alberta was chosen as a comparator to Yukon. This comparator jurisdiction was selected based on data availability, as the data was derived from an optional CCHS module in which not all Canadian provinces and territories participated. While the population sizes are notably different, Alberta is somewhat comparable in terms of demographic, cultural and social factors.

Yukon Motor Vehicle Collision Report 2011-2015

- National Collision Database (NCDB) data, from Yukon RCMP motor vehicle collision incident reports, from 2011 to 2015.

A complete analysis was presented in an internal report: Yukon Motor Vehicle Collision Report 2011-2015.⁽⁵⁾ The NCDB has been the main source of data on motor vehicle collisions in Yukon in the past and is accessed regularly by the Department of Highways and Public Works for analysis.

Public Health Perspective on Injuries Attributed to Motor Vehicle Collisions in Yukon, 2011/12 to 2016/17

- Hospitalization and emergency department visit data, linked to RCMP motor vehicle collision report data from the NCDB, from 2011 to 2017.

The complete analysis was presented in an internal report: Public Health Perspective on Injuries Attributed to Motor Vehicle Collisions in Yukon, 2011/12 to 2016/17.⁽⁶⁾ Linking the hospital data with the non-health data source helped to better understand the differences

in reporting in different administrative databases around the same issue, and to gain a more detailed understanding of the characteristics and circumstances of motor vehicle collision injuries resulting in visits to the hospital.

2018 Yukon Roadside Survey of Alcohol and Drug Use by Drivers

- A roadside survey of alcohol and drug use by drivers, completed in collaboration with the Canadian Council of Motor Transport Administrators (CCMTA), Transport Canada and the RCMP.

From June 13 to 16, 2018, drivers were randomly selected from the traffic stream at 12 pre-selected locations in Whitehorse between the hours of 21:00 and 03:00. They were invited to complete an interview, provide a breath sample and provide a saliva sample. The intention of this survey was to gain information on the number and characteristics of drivers in Whitehorse who have used drugs or alcohol prior to driving. Full results were provided in a report: 2018 Yukon Roadside Survey of Alcohol and Drug Use by Drivers.⁽⁷⁾ The methodology was developed by Transport Canada for the CCMTA and has been used across the country to create comparable population-level statistics on alcohol and drug use by drivers.

Comparison of Data Sources: NCDB and Hospital Data

Key Points

- The NCDB under-reports injuries and less severe collisions.
- Under-reporting of injuries in the NCDB is likely related to the lack of information recorded for passengers involved in MVCs.
- Collisions involving male drivers may be under-reported in the NCDB.
- NCDB reporting of injuries is most complete for those aged greater than 60 years.

In the report entitled Public Health Perspective on Injuries Attributed to Motor Vehicle Collisions in Yukon, 2011/12 to 2016/17,⁽⁶⁾ linkages were made between hospital databases and the NCDB. Only 713 (34.4 per cent) MVC-attributed injury patients seen in the emergency department or admitted to hospital were matched with entries in the NCDB. This suggests under-reporting of

injuries in the NCDB, but may also be due to under-reporting of collisions overall. On average, the RCMP only attend 39 per cent of all MVCs, with higher attendance for more serious injuries.⁽⁸⁾ While this is likely related to decisions around appropriate use of RCMP resources, it means that injuries incurred in less severe collisions are less likely to be captured in the NCDB. Another factor contributing to the low linkage rate is a lack of complete data for passengers in collisions on collision reports. This is supported by the very low match rate found for the age group of 0 to 14 years (10.9 per cent of hospital cases were captured in both databases). In contrast, the rate of matching tends to increase as age groups increase, with the highest matching rate occurring in the greater than 70 years age group (41.1 per cent). This is consistent with the finding that injury reporting in the NCDB was most complete for those over 60 years of age.

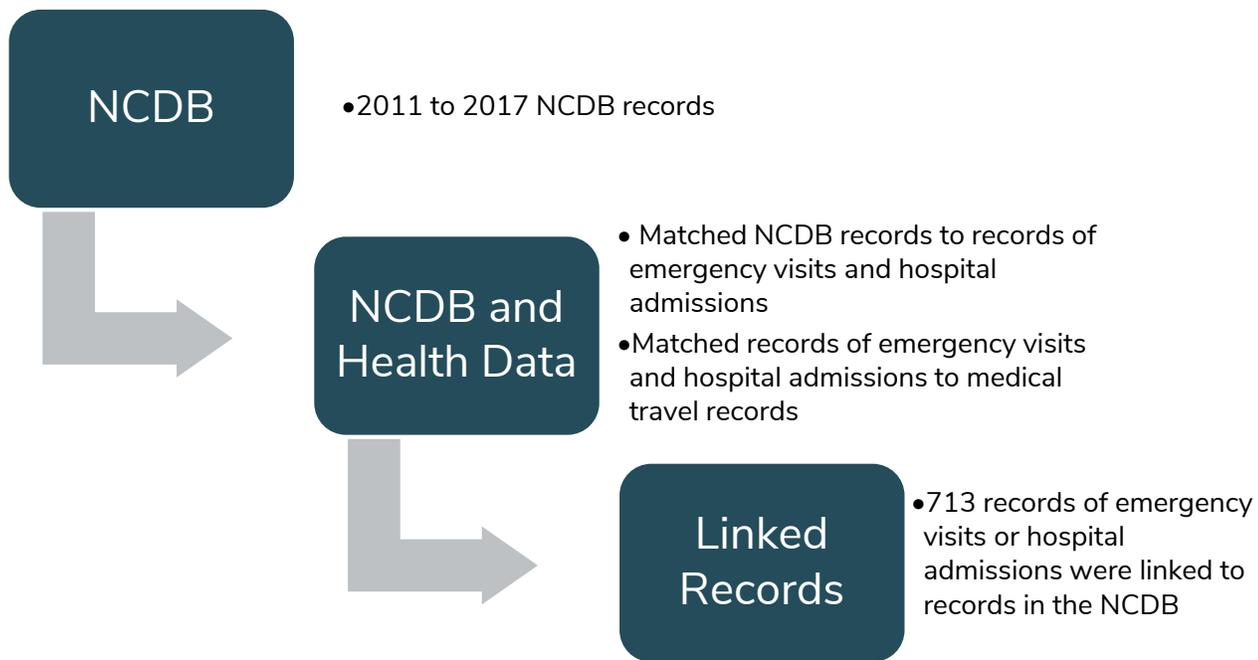


Figure 1: Record linkage process between NCDB and health databases

Even though males and females were equally likely to be reported as injured in the NCDB, matching of hospital and NCDB records was higher among females (39.8 per cent of hospital cases) than males (29.4 per cent of hospital cases), perhaps due to under-reporting of collision injuries to the RCMP among males, or differences in age distribution or passenger configuration between genders. For example, if males were more likely to be passengers or to be in the 10- to 14-year age group, this may have contributed to the lower match rate for males.

The rate of matching was highest among patients with the most urgent injuries, or triage level. Additionally, 97.1 per cent of patients who were transferred to another facility or died after arriving at the emergency department were reported as injured in the NCDB. Again, this is consistent with the NCDB report⁽⁵⁾ demonstrating an increase of police attendance at collisions as reported severity of injury increases. Among matched cases between the hospital records and the NCDB, 67 per cent had reported injuries in the NCDB. In other words, among matched records, 33 per cent of MVC cases who were seen in the emergency department or admitted to hospital were not reported as injury cases in the NCDB.

Finally, among all collisions reported in the NCDB for this time period that had an injury recorded, only 23.3 per cent were matched with visits in the hospital data. This may be a result of injuries being treated outside of the hospital, or of reported injuries not being severe enough for individuals to seek treatment.

Thematic Summary of Data Sources

Between 2011 and 2015, 3,789 MVCs in Yukon were reported by the RCMP, of which 746 (19.7 per cent) were reported to have resulted in an injury. During the same time period, there were 1,567 individuals who presented to Yukon hospital emergency departments for MVC injuries, for a total of 1,880 visits to the emergency department. There were also 187 hospital

Measuring MVC Injury and Fatality Risk

Why are there different ways to measure risk of injuries and deaths due to MVCs? Each measure tells us something a bit different and allows for different comparisons. **Per 100,000 population** is a rate that controls for different population sizes in different regions and is useful for comparing rates of MVC deaths and injuries to other causes of death and injury. **Per billion vehicle-kilometres** adjusts for the varying distances people in different jurisdictions might drive, which can affect their exposure to the risk of collision. This is a good indicator to describe the safety of a road network, but does not take into account injuries and fatalities from those using non motorized vehicles (such as bicycles).

Comparing deaths and injuries **per 100,000 licensed drivers** adjusts for the number of licensed drivers on the road and can be used to compare the safety performance of licensed drivers in different jurisdictions. Examining data on **emergency department visits and hospital admissions** can give us an idea of how severe injuries were, what types of injuries were sustained by people involved in MVCs and the burden of MVC injuries on the health care system. However, this does not capture injuries that do not result in a hospital visit, or long-term impacts of injuries sustained in MVCs.

admissions, from a total of 169 individuals. According to the Chief Coroner, between 2011 and 2015, a total of 17 MVC deaths occurred both on and off-road, with most of these collisions occurring on the Alaska Highway.

Table 1 presents the rates of motor vehicle fatalities and injuries for Canada in 2016 and allows comparison of Yukon’s rates to other jurisdictions in Canada. In 2016, Yukon ranked the second highest for motor vehicle injury and fatality rates per capita in the country. Yukon, similar to other Northern areas, exhibits variability in climate, socio-economic status, per capita alcohol consumption, access to trauma care, road infrastructure, enforcement measures and other factors that could influence road safety outcomes.⁽⁹⁾ These factors likely contribute to higher rates of casualty in Yukon. Overall, Yukon has a relatively high overall risk of MVC injuries and fatalities and after adjusting for the number of licensed drivers in the population, has the second highest rate of injuries.

Table 1: Casualty rates of motor vehicle collision injuries and fatalities by population, billion vehicle-kilometers and licensed drivers among Canadian provinces and territories in 2016 ⁽¹⁰⁾

Legend	Per 100,000 Population		Per Billion Vehicle-Kilometres		Per 100,000 Licensed Drivers	
	Fatalities	Injuries	Fatalities	Injuries	Fatalities	Injuries
3 rd highest						
2 nd highest						
highest						
Canada	5.2	442.1	5.1	427.8	7.4	626.7
Yukon	10.5	643.3	6.0	367.3	13.9	854.0
Northwest Territories	9.0	277.9	9.8	304.7	15.1	469.6
Nunavut	5.4	104.9	51.3	1000.0	37.5	732.0
British Columbia	6.1	463.0	7.4	538.5	8.5	644.1
Alberta	7.1	392.4	4.8	269.6	9.5	528.5
Saskatchewan	10.9	499.7	8.7	400.8	15.7	720.3
Manitoba	8.1	951.8	7.3	859.1	11.9	1400.4
Ontario	4.0	396.2	4.0	392.5	5.6	553.5
Quebec	4.2	448.2	4.6	491.5	6.3	672.5
Prince Edward Island	7.4	390.7	7.3	389.3	10.1	535.8
Newfoundland	8.3	565.9	8.4	574.9	11.3	767.7
Nova Scotia	5.1	508.6	4.2	423.1	6.7	670.2
New Brunswick	6.6	354.4	5.8	314.0	9.0	484.3

Demographics and Driver Characteristics

Key Points

- While most hospital visits related to MVCs in Yukon were from residents of Whitehorse, research has shown that, after adjusting for population size and age, rural and remote residents are at higher risk for unintentional injuries, including MVCs.
- Over 50 per cent of emergency department visits and over 60 per cent of hospital admissions for Yukon MVCs were for males.
- Males represented the majority of MVC deaths in Yukon between 2011 and 2015.
- Individuals aged 15 to 19 years and 20 to 24 years were the age groups with the most emergency department visits. Those aged 50 to 54 years saw the most hospitalizations, followed closely by those aged 20 to 24 years and 35 to 39 years.
- During the roadside survey, males were more likely to drive alone than females and females were more likely to have family in the vehicle than males.
- The most common trip origin and destination for drivers in the roadside survey was home. Far more drivers reported their trip destination as home (63.7 per cent of drivers) than their trip origin as home (20.3 per cent).

Geography

Among emergency department visits and hospitalizations related to MVCs between 2011 and 2015, 88.7 per cent of visits were from Yukon residents (Whitehorse – 77.3 per cent; rural – 15.7 per cent), 7.4 per cent were from residents from elsewhere in Canada, and 3.9 per cent were from outside of Canada. When considering the visits from Yukon residents only, 82 per cent were from Whitehorse residents and 18 per cent were from those residing outside of Whitehorse. It is important to note that this is a measure of overall burden and the split between Whitehorse and rural is likely explained by the fact that the population of Whitehorse represents approximately 78 per cent of Yukon's population. However, rural and remote communities have been shown to have higher rates of injury and mortality compared with urban jurisdictions, and much of this is attributed to motor vehicle collisions.⁽¹¹⁾ In a study conducted by Kmet and Macarthur using Alberta data, rural youth were significantly more likely to die or be hospitalized for injury due to a MVC when compared to urban youth.⁽¹²⁾ This was true for both 0- to 14-year and 15- to 19-year age groups; risks across age groups and sex ranged from 2.6 to 7.3 times higher for rural youth than

for urban youth. Factors contributing to this disparity may include: driving in vast areas with sparse communications; differing social norms around driving behaviours (e.g., seatbelt use); more unregulated resource roads; variable design, construction, or maintenance standards for roads; prolonged collision discovery times; delays in accessing emergency medical services, hospital care and/or tertiary trauma services; and level of available trauma services and emergency response personnel.

While wide confidence intervals preclude definitive comparisons, it does appear that rural residents of Yukon have higher unintentional injury mortality rates than urban residents.⁽¹³⁾ Rates of Yukon emergency department visits and hospitalizations per 100,000 population related specifically to MVCs from 2011 to 2015, adjusted for age and sex, do suggest emergency visit and hospitalization rates have been higher for residents from outside of the Whitehorse area in the past (Figures 2 and 3 below). While the trends show higher rates for non-Whitehorse residents over time, some counts of emergency department visits and hospitalizations are small and these rates should be interpreted with caution. Further analysis using data aggregated over longer time periods and using indirect standardization rates would assist with providing more stable and confident rate estimates for both urban and rural Yukon residents.

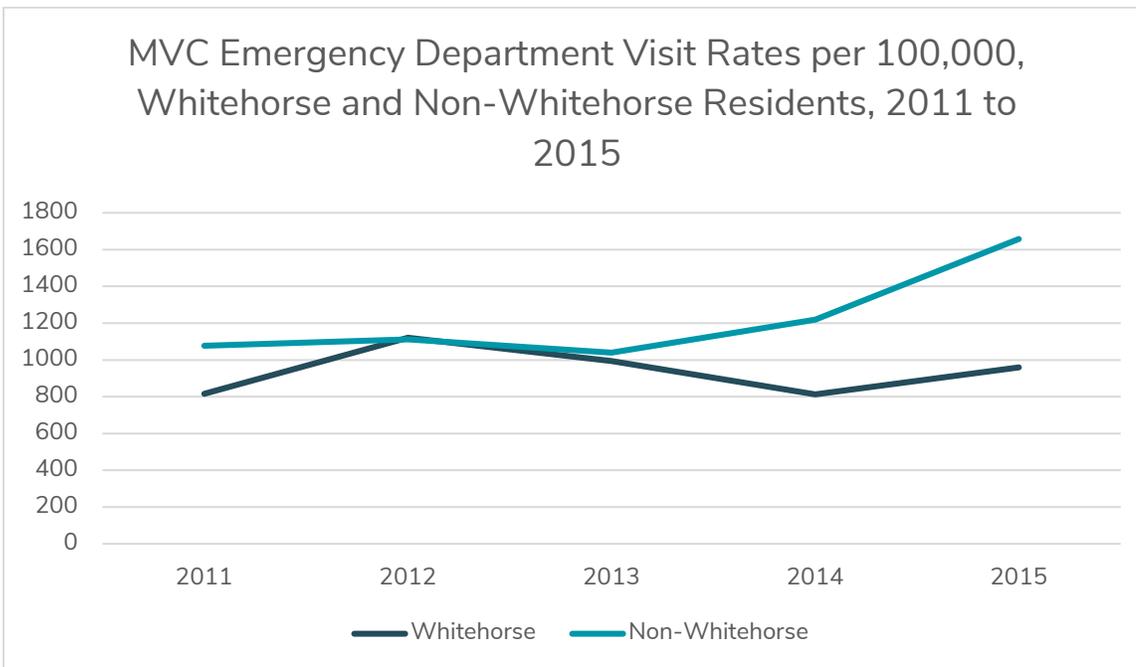


Figure 2: MVC Emergency Department Visit Rates, 2011 to 2015*

*Due to some small cell counts, rates should be interpreted with caution.

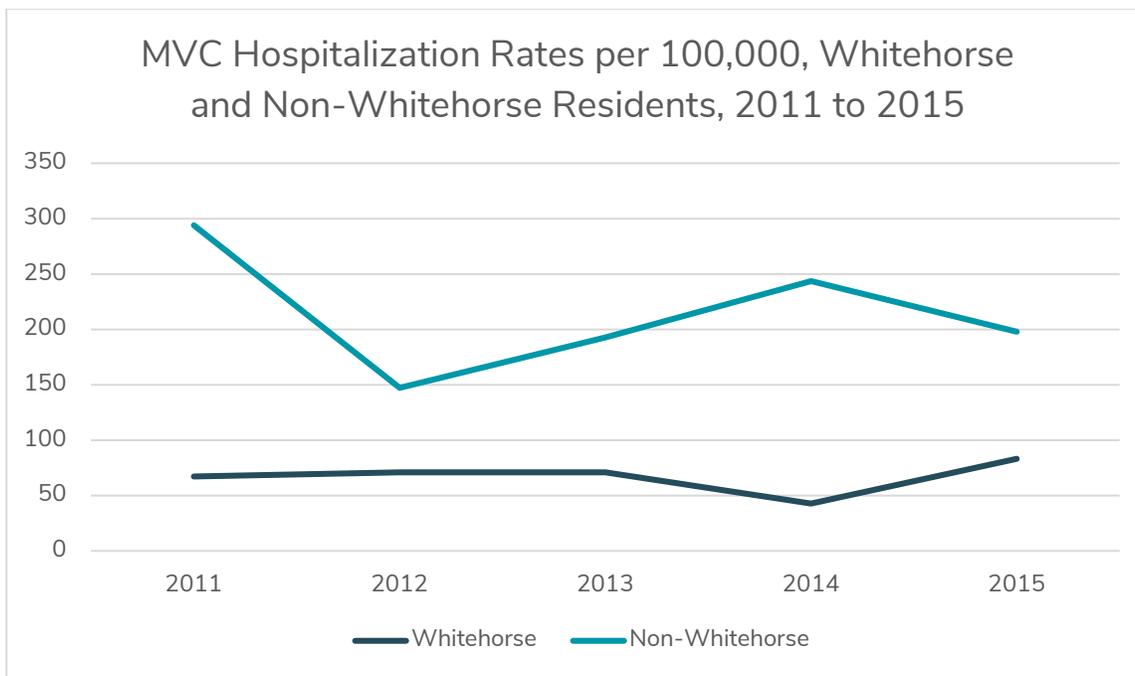


Figure 3: MVC Hospitalization Rates, 2011 to 2015*

*Due to some small cell counts, rates should be interpreted with caution.

Among MVC deaths investigated by the Chief Coroner from 2011 to 2015, almost 86 per cent were Yukon residents. The remainder were from outside of the territory, but within Canada. All individuals who died in off-road vehicle collisions were Yukon residents.

Gender and Age

Males represented 52.4 per cent of hospital emergency visits related to MVCs, and 61 per cent of hospital admissions related to MVCs between 2011 and 2015. The largest age group represented among emergency visits was 15 to 19 years (12.3 per cent of visits), followed by the 20- to 24-years age group (12 per cent of visits). Among patients admitted to hospital, the most admitted were aged 50 to 54 years (10.7 per cent of admissions), followed by the 20- to 24-years age group and the 35- to 39-years age group (both at 10.2 per cent of admissions).

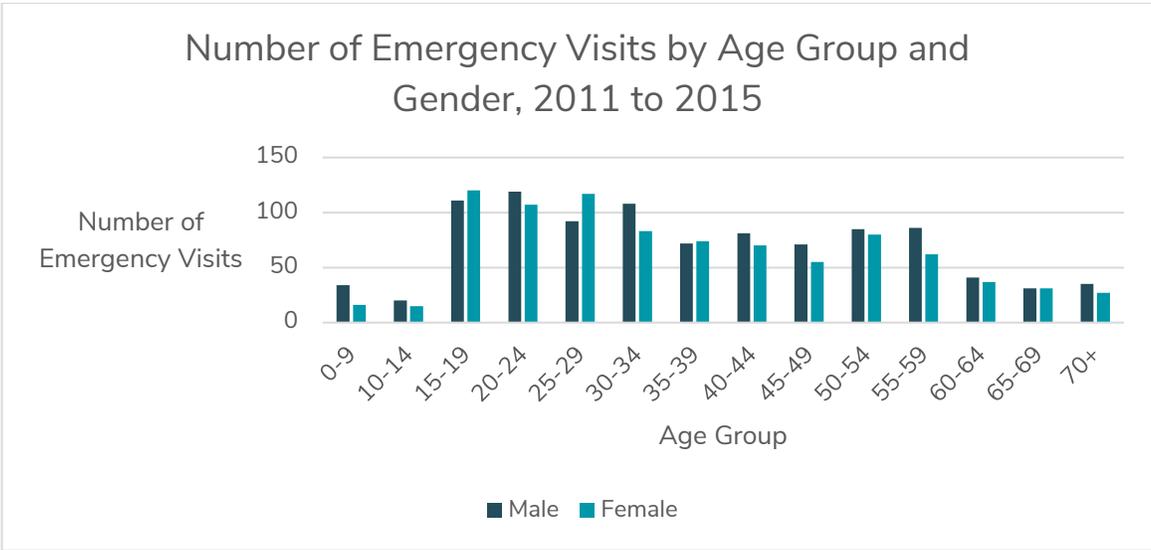


Figure 4: Number of MVC-Related Hospital Emergency Visits by Age Group and Gender, 2011 to 2015

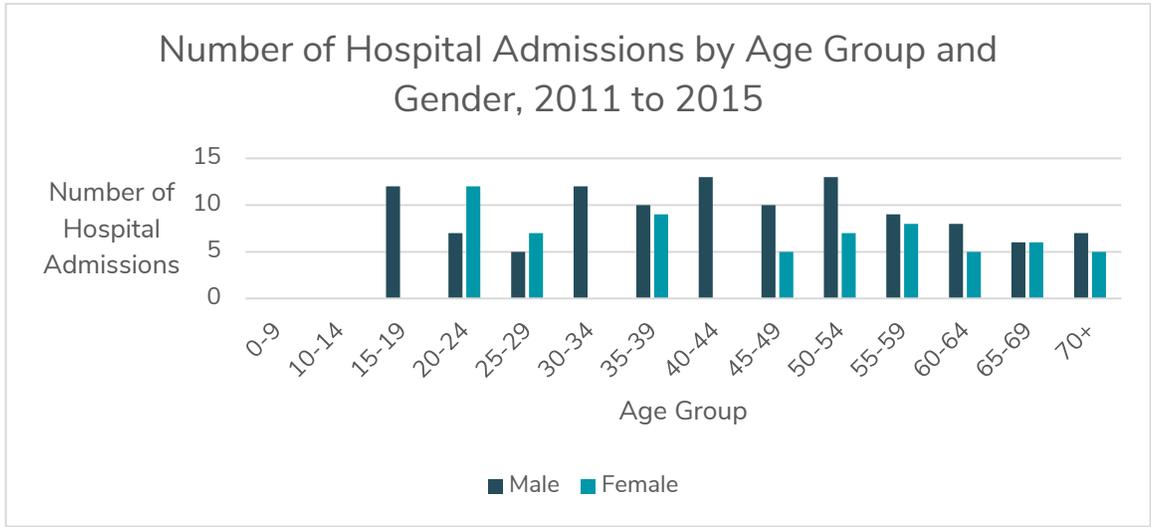


Figure 5: Number of MVC-Related Hospital Admissions by Age Group and Gender, 2011 to 2015*

*Counts under 5 are suppressed.

According to the Chief Coroner, males represented over 70 per cent of the deaths on-road and 100 per cent of the off-road deaths (e.g., snowmobiles, ATVs) in Yukon between 2011 and 2015. The highest number of MVC deaths in Yukon between 2011 and 2015 took place among the 51- to 65-year-old age group. Other age groups that had a relatively elevated number of deaths were those under 21 and those 36 to 50 years old.

It is not clear why the 51- to 65-year-old age group is the highest represented age group among deaths due to MVCs. This may be a result of other presenting comorbidities (which are more common in older individuals, for example cardiovascular disease), as well as less ability to overcome serious injuries. Stratifying data by vehicle type and other contributing factors, such as unsafe driving behaviours, can help clarify these findings. For example, analysis of Canadian road fatalities in 2014 by age and road user group shows the largest fatality rate among motorcycle users was in the 25- to 64-years age group. The highest fatality rate for all road user groups were those aged 75 to 84 years.⁽¹⁴⁾

In the roadside survey of alcohol and drug use by drivers, male drivers comprised 62.5 per cent of survey participants. The distribution of male and female drivers did not vary according to night of the week or the time of night. Participant age in the survey ranged from 17 to 84 years, with an average age of 38.2 years. The age distribution of drivers was similar among men and women and did not differ according to the day of the week. There was a greater proportion of drivers under 35 years of age in the survey than in the general population, indicating that younger drivers in Yukon may be more likely than older people to be out driving at night; however, this difference was not statistically significant. There were, however, statistically significant differences in vehicle occupant configuration according to sex. Males were more likely than females to be alone in the vehicle and more likely to have one passenger of the opposite sex. Females were more likely than males to have family in the vehicle.

Other Characteristics

Approximately 8 per cent of emergency department visits related to MVCs from 2011 to 2015 occurred while the individual was on the job.

Among drivers participating in the roadside survey, the majority (63.7 per cent) indicated 'home' as their trip destination, followed by 'home of a friend or relative' (14.3 per cent of drivers); this is logical given the late hours during which the roadside survey took place. 'Home' was also the most commonly reported point of trip origin (20.3 per cent of drivers), followed by 'work or school' (14.9 per cent of drivers).

Socioeconomic status is associated with higher rates of injury-causing collisions, pedestrian collisions, fatal speeding collisions and fatal collisions.⁽⁹⁾ We do not have data on this health disparity specific to Yukon. Purposeful reporting of the social determinants of health is recognized

as an important precursor to taking public health action on health and social inequities.⁽¹⁵⁾ An equity-based approach to reporting on MVCs in the future, for example stratifying MVC outcomes by different geographic, socioeconomic, and demographic groups, could shed light on health inequities related to MVCs that may exist in Yukon.

Vehicle and Occupant Type

Key Points

- Between 2011 and 2015, the majority of MVC-related hospital visits were for collisions that involved a car, while the majority of reported collisions in the NCDB involved pickup trucks.
- 55 per cent of MVC emergency department visits were for drivers involved in traffic collisions, and 23 per cent of visits were for passengers involved in traffic collisions.
- Motorcycles were involved in 13.1 per cent of emergency department visits and 18.1 per cent of hospital admissions, but represented only 1.1 per cent of vehicles involved in NCDB-reported collisions.
- Almost 50 per cent of road deaths between 2011 and 2015 involved cars and SUVs, about 20 per cent involved motorcycles and about 20 per cent involved heavy vehicles (pickup trucks and transport trucks). Drivers represented just over 70 per cent of deaths.

Among emergency department visits related to MVCs between 2011 and 2015, approximately 58.4 per cent were for collisions that involved a car, 19.2 per cent involved a pickup truck and 13.1 per cent involved a motorcycle. This contrasts with the NCDB report for the same time period, where the majority of vehicles involved in collisions were pickup trucks (42.4 per cent), followed by cars (36.2 per cent); motorcycles represented only 1.1 per cent of vehicles involved in NCDB-reported collisions. Other collisions including cyclists, other land transport collisions and heavy transport collisions represented less than 10 per cent of emergency department visits. The roadside survey had a slightly lower representation of cars (45.5 per cent of survey participants) and slightly higher representation of pickup trucks (23.7 per cent of survey participants) than the hospital data.

Traffic collisions take place on a public highway or road, and non-traffic collisions occur in places other than a public highway or road. Approximately 23 per cent of emergency department visits were from passengers in vehicles involved in traffic collisions, while approximately 55 per cent of visits were from drivers. About 6.5 per cent of visits were from passengers or drivers involved in non-traffic collisions, and most of those non-traffic collision emergency department visits were for drivers of motorcycles. The proportion of passengers in the hospital data is important to note because, while trying to link NCDB collision report data to hospital data, passenger data in the NCDB was found to be incomplete in many cases, preventing record linkage.

Similar proportions of passengers, drivers and types of vehicle were observed for hospital admissions. One notable difference was the higher number of hospital admissions related to motorcycles when compared to pickup trucks (18.1 per cent of admissions versus 16.6 per cent of admissions respectively). This is disproportionate to the number of emergency visits for motorcycles (13.1 per cent of visits) compared to those for pickup trucks (19.2 per cent of visits) and the number of pickup trucks and motorcycles involved in collisions overall according to the NCDB (42.4 per cent of vehicles were pickup trucks, compared to 1.1 per cent for motorcycles).

According to the Chief Coroner, almost 50 per cent of road deaths in Yukon between 2011 and 2015 involved cars and SUVs, about 20 per cent involved motorcycles, and about 20 per cent involved heavy vehicles (pickup trucks and transport trucks). The remainder were off-road vehicles. Of all MVC deaths, just over 70 per cent were drivers.

An analysis of injuries related to off-road vehicles may warrant specific attention in the future. In the CCHS for 2013-2014, both male and female Yukoners were more likely to report driving a motorcycle, ATV, snowmobile, motorboat or personal watercraft than in Alberta, chosen as a comparator jurisdiction. Additionally, the hospital visits related to motorcycle non-traffic incidents between 2011 and 2015 made up 83.8 per cent of non-traffic incidents, which are incidents that occur in places other than a highway or road. This may be reflective of dirt bikes, rather than motorcycles intended for use on maintained roads.

Contributing Factors

Key Points

- Distracted/inattentive driving, driving too fast for road conditions, road condition (surface/structure), weather conditions and alcohol were the top five reported contributing factors to MVC injury among records linked between hospital databases and the NCDB. These also resulted in the most severe injuries.
- Yukon has some of the highest reported alcohol and drug impaired driving rates in Canada.
- Drivers under 25 years of age had the highest rates of alcohol and drug use during the roadside survey, making this group a prime target for enhanced prevention.
- The three most common reasons drivers in the roadside survey believed it was hard for people to avoid driving after drinking or using cannabis were:
 - people don't think they are impaired,
 - people don't think they will get caught by the police and
 - people don't want to leave their car somewhere.
- Rates of seatbelt use among drivers participating in the roadside survey were high, however, self-reported rates of seatbelt use in the 2013-2014 CCHS were lower. The CCHS data also suggests that rural residents have lower rates of seatbelt use than urban residents. Among on- and off-road collision fatalities, almost 60 per cent of people were not wearing a seatbelt or a helmet.
- Between 2011 and 2015, Yukon RCMP cited falling asleep as a contributing factor in 1.6 per cent of all collisions and 4.9 per cent of single-vehicle collisions.

When RCMP complete the collision reports that populate the NCDB, up to four factors contributing to a single collision can be recorded. Among records linked from the NCDB and hospital databases, the most common contributing factors to collisions were:

- 1) distracted/inattentive driving,
- 2) driving too fast for road conditions,
- 3) road condition (surface/structure),
- 4) weather condition and
- 5) alcohol.

Emergency department triage level (level of urgency assessment) can be used as a proxy for severity of injury. Triage level 1 is the most urgent (resuscitation); level 2 is considered emergent (should be seen within 15 minutes); level 3 is urgent (should be seen within 30 minutes); level 4 is less urgent (should be seen within one hour); and level 5 is non-urgent (should be seen within two hours). Figure 6 displays the top five contributing factors to collisions among linked records, stratified by triage level. These top five factors also contributed to the most severe injuries. While alcohol continues to be a contributing factor of concern in MVCs in Yukon, inattentive/distracted driving resulted in the largest proportion of level 1 visits. All of the top five contributing factors have a similar proportion of visits in the top three triage levels, ranging from 52 per cent (weather condition) to 64 per cent (alcohol) of visits classified as either level 1, 2, or 3 (“severe” visits).

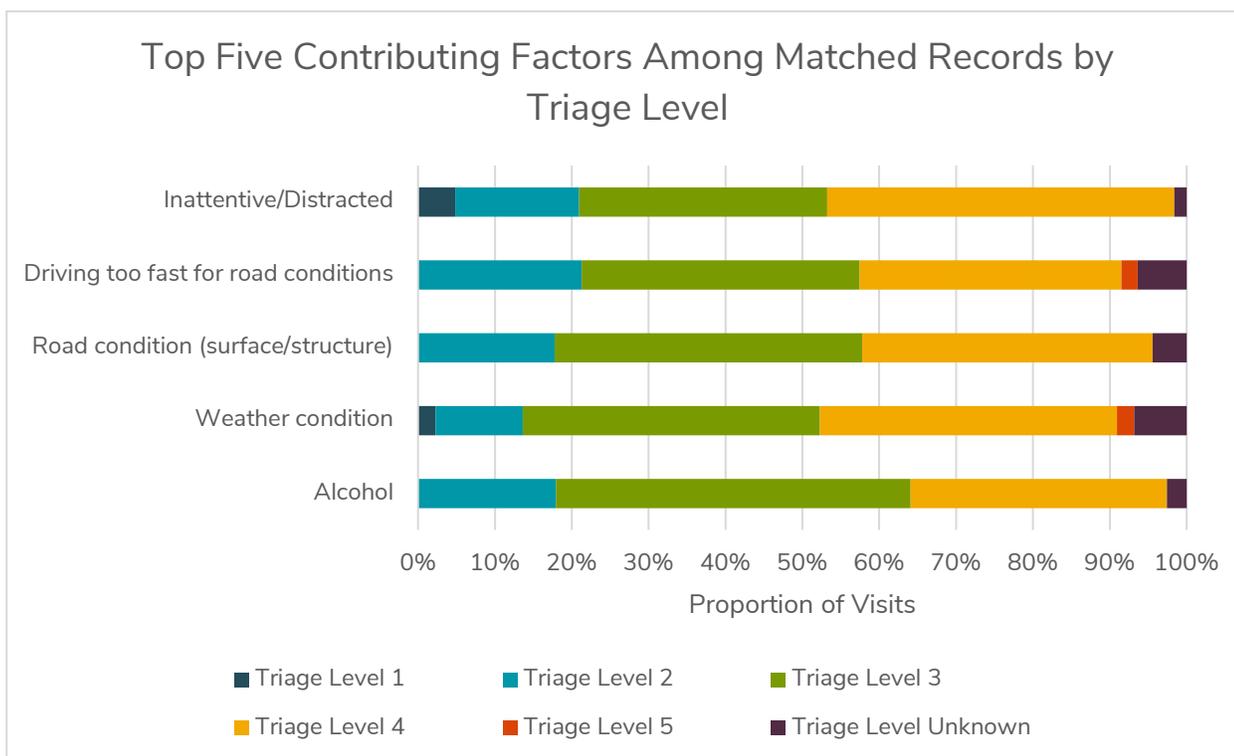


Figure 6: Top Five Contributing Factors to Collisions Among Matched NCDB and Hospital Records, by Triage Level

The majority of fatal collisions in Yukon between 2011 and 2015 (approximately 53 per cent) occurred in the summer months (May to September). This coincides with the highest number of reported injury-causing collisions in the NCDB for the same time period. This may be a result of several factors, including the perception that roads are safer in the summer, increased levels of outdoor activity, driving longer distances during summer vacation and an increase in tourism resulting in an increase in vehicles on the road. An analysis of unintentional injury mortality in Canada from 2001 to 2007 did show a clear seasonal pattern among deaths due to motor vehicle collision, with significantly increased risk in the summer.⁽¹⁶⁾

When considering winter months only (December to February), one British Columbian study found that higher winter temperature was associated with lower rates of overall collisions, single vehicle nighttime collisions, collisions involving heavy vehicles and total fatalities.⁽⁹⁾ This is important to note as, according to the NCDB, between 2011 and 2015, the total number of collisions reported in Yukon was highest in December and January. In essence, in Yukon, the most collisions occurred in December and January, but more injuries reported from collisions (and more severe injuries) occurred in July.

Alcohol and Drug Use

Statistics Canada reported that, in 2015, the highest impaired driving rates were in the Northwest Territories, Yukon and Saskatchewan, respectively.⁽¹⁷⁾ During the 2013-2014 CCHS, an estimated 11.3 per cent of Yukon residents reported having driven after having two or more drinks in the previous hour at least once in the last 12 months, compared to 7.8 per cent of Albertans (though this difference was not statistically significant). The estimated proportion of Yukon passengers who, at least once in the past 12 months, had been in a vehicle with a driver who had had two or more drinks in the hour before driving (15.6 per cent) was significantly higher than Albertan passengers reporting the same (11 per cent). In addition, the highest police-reported drug-impaired driving incident rates in 2015 were observed in the three territories, with Yukon being the highest at 32 per 100,000.⁽¹⁷⁾ Drug-impaired driving appears to have been on the rise in Canada since 2009. It is unknown if this is a true increase, or if this reflects improved detection and reporting by the police.⁽¹⁷⁾ A study conducted in rural Alberta⁽¹²⁾ suggested that, given the low probability of encountering a police officer while driving, impaired driving citations of collisions likely underestimate the true impaired driving rate, and such underestimation is probably greater in remote and rural areas compared with urban areas.

During the roadside survey, once the data was weighted¹ for traffic volume at various sites, 22.3 per cent of drivers tested positive for alcohol, drugs, or both. Overall, 5.1 per cent of drivers tested positive for alcohol, with 1.9 per cent of drivers testing with a Blood Alcohol Concentration (BAC) of 50 mg/dL (0.05 per cent) or higher. The legal BAC limit for fully licensed drivers is under 0.08 per cent, however 0.05 per cent is used as an administrative BAC limit in many jurisdictions, due to the ability of even a small amount of alcohol to impair one's driving ability. The proportion of drinking drivers in the roadside survey (5.1 per cent) was comparable to that found in recent surveys in other jurisdictions (4 per cent of drivers in Ontario in a 2017 roadside survey, 6.5 per cent of drivers in British Columbia in a 2012 roadside survey). The percentage of female drivers who had been drinking (7.1 per cent) was higher than that of males (4 per cent), but the difference was not statistically significant.

While the roadside survey ran from Wednesday to Saturday night, drinking and driving was most prevalent on Friday night and most common between the hours of 01:30 and 03:00 (5.6 per cent, for all nights aggregated together). However, the distribution of drivers found with a positive BAC throughout the night was more uniform than in other jurisdictions. Typically, the survey conducted in other areas has found fewer positive BACs early in the evening, whereas in Whitehorse, 5.4 per cent of drivers were positive between 21:00 and 22:30 and 4.3 per cent of drivers were positive between 23:00 and 00:30.

The percentage of drivers with positive BACs was highest in the 20 to 24 years age group (10.6 per cent of 20- to 24-year-olds tested), followed by the 16 to 19 years age group (9.5 per cent of 16- to 19-year-olds tested). No drivers over 64 years of age had a positive BAC. The authors of the roadside survey report noted that more young people are drinking and driving in Yukon compared to other jurisdictions.⁽¹⁸⁾

Drivers who reported coming from a restaurant were most likely to have a positive BAC (21.7 per cent of drivers coming from a restaurant), when compared to drivers reporting other trip origins. Among the 11 people who reported their trip origin was a bar, pub, or tavern, none was found to have been drinking. Only drivers of cars (5.9 per cent), pickup trucks (4.8 per cent) and SUVs (5.7 per cent) were found to have been drinking, whereas no drivers of vans or minivans

1 Weighting is a method used to make statistics more representative of the general population. For example, if one site in the roadside survey had more traffic volume than the others, the data could be weighted to ensure data from one site is not over-represented in the overall average.

had a positive BAC. Drivers with one same-sex passenger were most likely to have been drinking (11.6 per cent), followed by those with a same-sex group of passengers (10 per cent). These two groups were also most likely to have a BAC of at least 0.05 per cent.

While it is suspected that alcohol involvement is under-reported in International Classification of Disease (ICD) coding for emergency department visits, some data is available in this area. Among emergency department visits for MVCs between 2011 and 2015, 58 visits, or 3.1 per cent of visits, were noted to have alcohol involvement and less than five were noted to have other substances involved. Of those visits with alcohol involvement, 23 (39.7 per cent) were from females and 35 (60.3 per cent) were from males. Among hospital admissions, 16 admissions (8.6 per cent of admissions), were noted to have alcohol involvement and less than five admissions were noted to have other substances involved. Among those emergency department visits triaged as level 1, 2, or 3, 40 visits (6.8 per cent) had alcohol involvement. Approximately 69 per cent of visits with alcohol involvement (40 out of 58 visits) had injuries that could be considered severe (triage levels 1, 2, or 3). Out of these severe visits, 18 were from females and 22 were from males. During the same time period, just over 40 per cent of on- and off-road vehicle deaths involved at least some alcohol in the blood. Most of the deaths involving alcohol had greater than the legal limit allowed in the blood to drive (0.08 per cent or greater). In the deaths where drugs were found, alcohol was also found in the blood.

Among the 336 drivers who provided a saliva sample during the roadside survey, 17.8 per cent tested positive for at least one psychoactive drug, when the data was weighted. Among those who tested positive for drugs, 5.7 per cent also tested positive for alcohol. Cannabis was the most frequently detected substance, found in 77.1 per cent of drug-positive samples. Stimulants were detected in 27.1 per cent of the drug-positive samples, opioids were detected in 5.7 per cent of the drug-positive samples and benzodiazepines were detected in one positive sample.

While roadside surveys in other jurisdictions typically found higher rates of driving after drug use than drinking and driving, the proportion of drivers testing positive for drugs in Yukon was considerably higher than other jurisdictions. In the 2012 British Columbia Roadside Survey, 7.4 per cent of drivers tested positive for drugs and in the 2017 Ontario Roadside Survey, 10.5 per cent of drivers tested positive for drugs, compared to Yukon's 17.8 per cent. The saliva screening test for drugs detects use within the past four to six hours.⁽¹⁹⁾ While a positive saliva

test does not necessarily mean impairment, at increased doses cannabis impairs human cognitive and motor tasks necessary for safe driving. Those who drive within two hours of using cannabis have increased risk of collision. Additionally, several studies have shown that when drivers use cannabis in conjunction with alcohol, the risk of collision increases more than with cannabis impairment alone, suggesting a synergistic effect.⁽²⁰⁾

The percentage of male drivers who tested positive for drugs (21.6 per cent) was higher than the percentage of females who tested positive (12.4 per cent) and this difference was statistically significant. Males represented 61.3 per cent of all drivers, but accounted for 73.3 per cent of drivers who tested positive for drugs. Similar to drinking and driving, the 20- to 24-year age group had the highest proportion of drug use, with 30.2 per cent of drivers in this age group testing positive for drug use. The second highest rate of drug use was among 16- to 19-year-olds, with 25 per cent of drivers in this age group testing positive. Cannabis was the only drug found among these two age groups.

Unlike alcohol, cannabis use among drivers participating in the roadside survey was consistent across the nights surveyed (Wednesday through Saturday night) and the proportion of drug-positive drivers increased throughout the night (for all nights aggregated together) – similar to a typical pattern seen for alcohol in other jurisdictions.

When comparing trip origins among roadside survey participants, drivers coming from a sport or recreation event were most likely to test positive for drugs (31 per cent of drivers coming from a sport or recreation event), followed by drivers coming from the home of a friend or relative (29.5 per cent). Most drug-positive drivers with these trip origins tested positive for cannabis.

During the roadside survey, participants were asked a series of questions about their attitudes and knowledge related to driving after consuming alcohol and/or drugs. Drivers thought it was more likely one would be stopped by the police after drinking too much than after using drugs. Among drivers who had not been drinking, 64.4 per cent knew it would take one to three drinks to reach a BAC of 50 mg/dL (0.05 per cent), while only 55.6 per cent of drivers who had been drinking correctly indicated this.

Among those drivers who reported using cannabis in the past 12 months (30.6 per cent of people completing the questionnaire), 31.3 per cent reported having driven a vehicle within two hours of using cannabis. Among all respondents, 67.9 per cent were of the opinion that cannabis impaired one's ability to drive; 11.5 per cent didn't know or were unsure; 15.5 per cent said "it depends"; and 5.2 per cent said it didn't impair driving. In contrast, among the drivers who tested positive for cannabis, 36.6 per cent said cannabis impaired the ability to drive; 7.3 per cent said it didn't impair driving; and 58.1 per cent said "it depends."

The three most common reasons drivers participating in the roadside survey believed it was hard for people to avoid driving after drinking or using cannabis were:

- people don't think they are impaired,
- people don't think they will get caught by the police and
- people don't want to leave their car somewhere.

Rural and remote jurisdictions encounter challenges to increasing awareness and concern about impaired driving. Some contributing factors include ingrained attitudes and behaviour that affect the acceptability of impaired driving, lack of alternative transportation options (i.e., taxis and public transit), off-road vehicles not patrolled by police, lack of administrative sanctions related to impaired driving and limited resources directed towards enforcements and educational efforts.⁽²¹⁾ Additionally, drivers perceive rural roads as less risky than urban roads.⁽²²⁾ The information outlined above should be considered when designing interventions in Yukon to reduce driving after drinking or using drugs.

Fatigued, Distracted/Inattentive and Aggressive Driving

In 2011, 18.5 per cent of Canadians reported that they had fallen asleep or nodded off even for a moment while driving in the previous year and 14.3 per cent reported that they often drive when they are tired or fatigued. Of the 18.5 per cent that reported falling asleep or nodding off in the past year, approximately 30.5 per cent reported having done so on three or more occasions.⁽²³⁾ Between 2011 and 2015, Yukon RCMP cited falling asleep as a contributing factor in 1.6 per cent of all collisions and 4.9 per cent of single-vehicle collisions. In the 2013-2014 CCHS, reports of fatigued driving were similar between Yukon and Alberta; approximately 36 per cent of Yukoners reported sometimes or often feeling tired while driving. There was a pattern of Yukon males

reporting fatigued driving more often than females, though this difference was not statistically significant.

Inattentive/distracted driving was the most commonly reported contributing factor to MVCs in Yukon between 2011 and 2017 and also resulted in some of the most severe injuries, as indicated previously in Figure 6. As demonstrated in Figure 7, in the 2013-2014 CCHS, self-reported cell phone use while driving was lower in Yukon than in Alberta, with 9.8 per cent of Yukon respondents reporting sometimes or often using a cell phone while driving, compared to 16.2 per cent of Albertan respondents. However, Albertan respondents were significantly more likely to report using a hands-free device when talking on a cell phone while driving a motor vehicle, compared to Yukon respondents (Figure 8). This is important as hands-free cell phone use is likely less distracting than using hands.⁽²⁴⁾ Further investigation of sources of distracted driving in Yukon could help target prevention strategies for this very important contributor to MVCs.

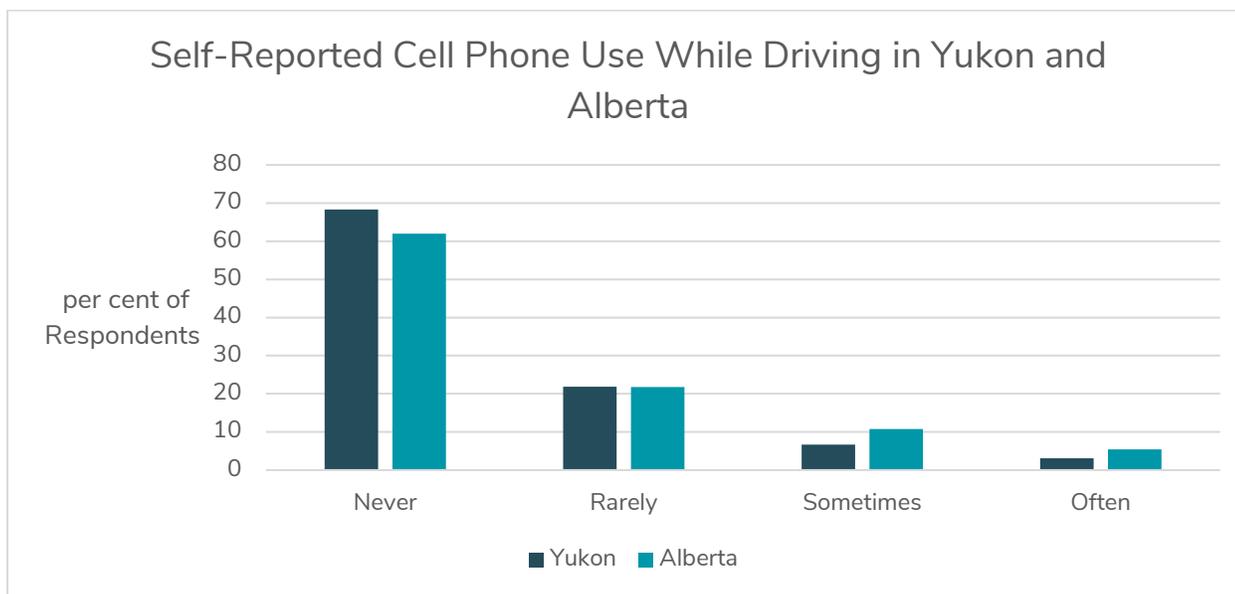


Figure 7: Self-Reported Cell Phone Use While Driving, Yukon and Alberta, 2013-2014 CCHS

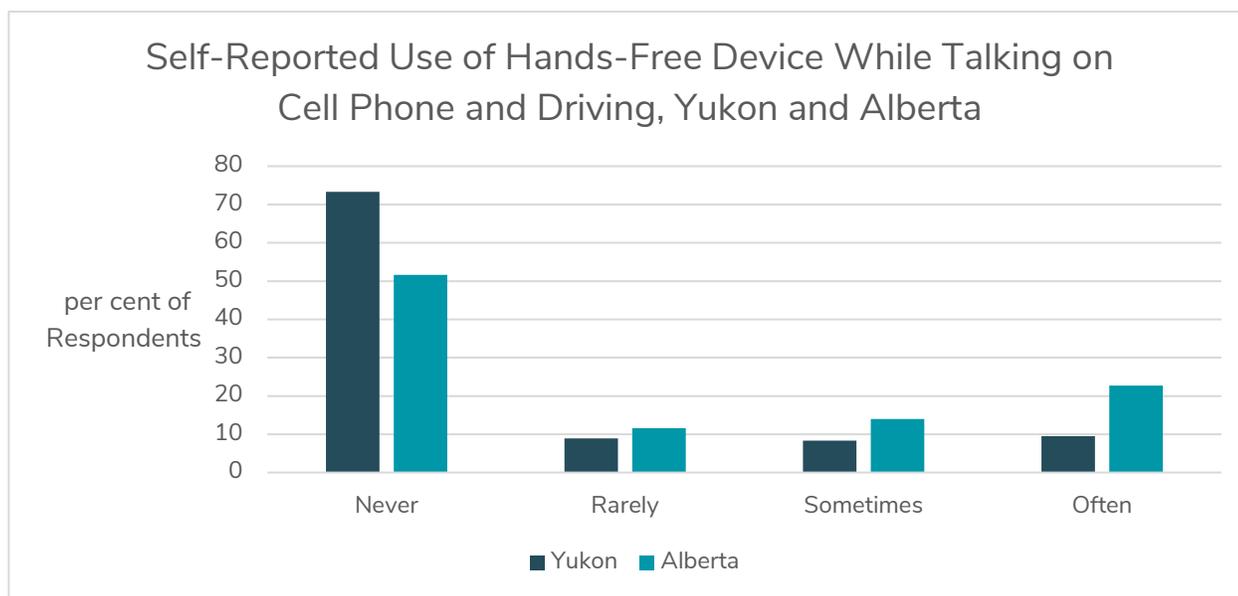


Figure 8: Self-Reported Use of Hands-Free Device While Talking on Cell Phone and Driving, Yukon and Alberta, 2013-2014 CCHS

Between 2011 and 2015, about 36 per cent of the on-road fatalities occurring in Yukon had “excessive speed” or “over the speed limit” cited as a contributing factor. “Driving too fast for the road conditions” was the second most common contributing factor to MVC-related injuries between 2011 and 2017 among linked hospital and NCDB records. Research has demonstrated that drivers are more likely to exceed the speed limit on rural roads compared to urban roads.⁽²⁵⁾ Jurisdictions with a high prevalence of low speed roads (speed limit < 60 km/hour) have been shown to have lower rates of single vehicle nighttime crashes, fatal crashes, fatal speed-related crashes and total fatalities.⁽⁹⁾ This is important to consider for Yukon, where the vast majority of the geographical region is considered rural.

Restraint Use

Rates of seatbelt use in the roadside survey were 98.7 per cent among drivers and 96.6 per cent among front seat passengers. However, 2013-2014 CCHS data showed that both passengers and drivers in Yukon were less likely to self-report seatbelt use when compared to Alberta; 86 per cent of Yukon respondents reported always wearing a seatbelt, 10.3 per cent reported mostly wearing a seatbelt and 3.7 per cent reported rarely wearing a seatbelt (Figure 9). When Yukon responses were stratified by urban/rural geography (Figure 10), 89.9 per cent of urban respondents reported always wearing a seatbelt, compared to 80.9 per cent of rural respondents; while 5.2 per cent of rural respondents reported rarely or never wearing a seatbelt, compared to 2.6 per cent of urban respondents. Previous surveys in Canada have demonstrated that seatbelt use is less likely in rural areas compared to urban areas⁽²⁶⁾ and it appears this may still be the case in Yukon. Therefore, while rates of seatbelt use were high among drivers captured in the roadside survey, this may not reflect use at the population level, particularly in areas outside of Whitehorse. Initiatives to increase seatbelt use may yet be warranted.

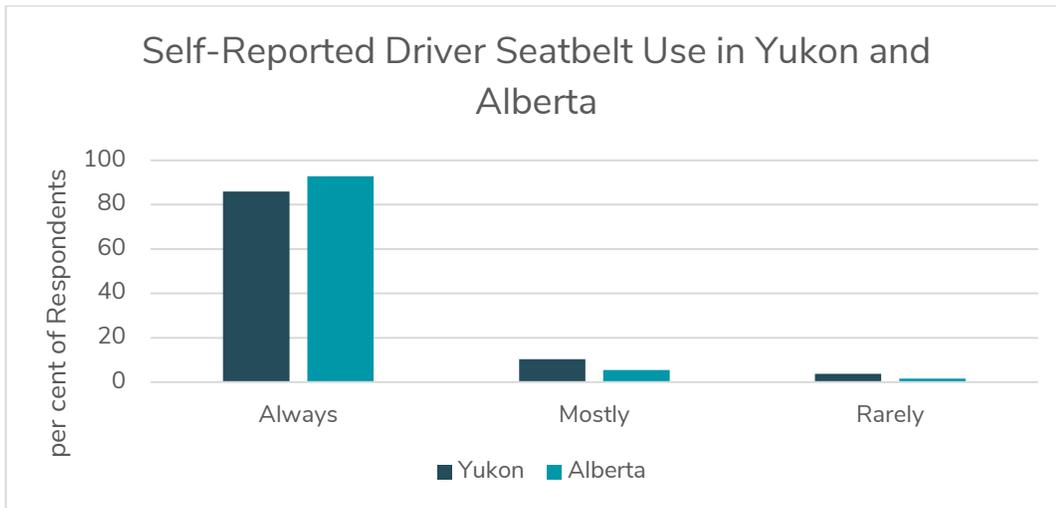


Figure 9: Self-Reported Driver Seatbelt Use in Yukon and Alberta, 2013-2014 CCHS

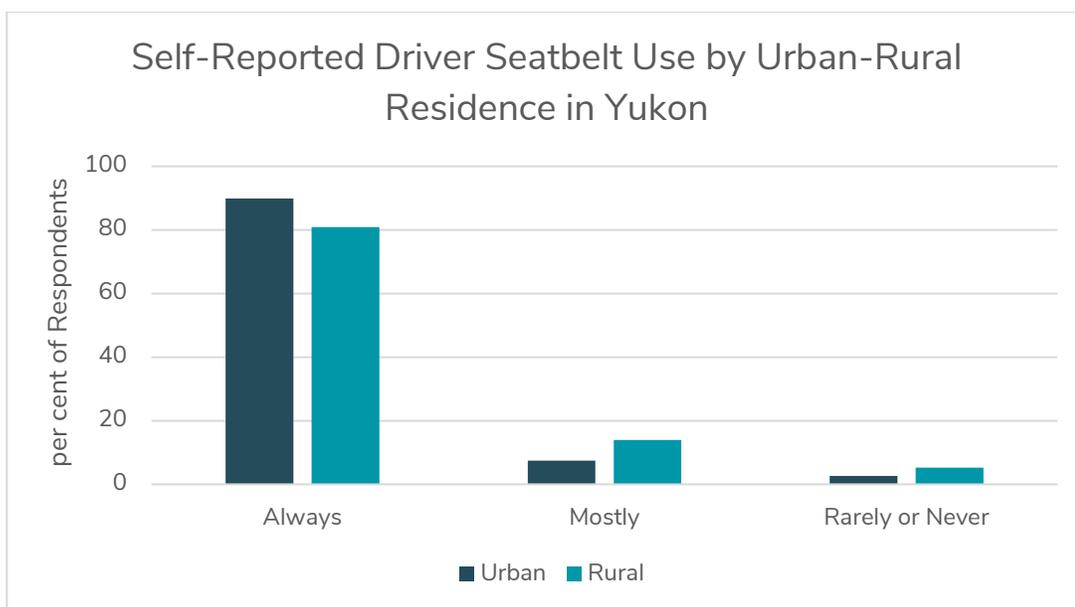


Figure 10: Self-Reported Driver Seatbelt Use by Urban-Rural Residence in Yukon, 2013-2014 CCHS

Among emergency visits related to MVCs between 2011 and 2015, 54.1 per cent were reported to involve individuals wearing seatbelt restraints at the time of the collision; 8.6 per cent of visits were recorded as no seatbelt used; and the remainder of emergency visits had a seatbelt indicator of not applicable (7.4 per cent), not available or unknown (10.6 per cent), or no entry (19.3 per cent). Among on- and off-road collision fatalities between 2011 and 2015, almost 60 per cent of people were not wearing a seatbelt or a helmet.

Injury Characteristics

Key Points

- Between 2011 and 2015, 589 visits to the emergency department (31.3 per cent) for MVC-related injuries were triaged as “severe” (level 1, 2, or 3) and among these visits, 54 per cent were for males.
- Most emergency visits (approximately 61 per cent) fell into triage level 4.
- The most common injury presenting to the emergency department was injuries to the neck, for a total of 24.6 per cent of MVC-related visits. Of the neck injuries, almost half (44.1 per cent) of those included (or were classified as) whiplash. The next most common injury was injuries to the head, with 19.6 per cent of those being classified as concussion.

Between 2011 and 2015, 589 visits to the emergency department (31.3 per cent) for MVC-related injuries were triaged as severe (level 1, 2, or 3) and among these visits, 54 per cent were for males. However, when stratified by age group, females in the age groups of 15 to 19 years, 25 to 29 years, 45 to 49 years, 50 to 54 years and 65 to 69 years had a higher proportion of severe visits than males (Figure 11). An article that will be published in a future issue of the journal *Traffic Injury Prevention* found that females are more likely to sustain serious or fatal injuries in traffic collisions than males, linked to a lack of female-specific vehicle safety testing data.⁽²⁷⁾ This may explain some of the patterns observed among severe visits for males and females.

The age group with the highest proportion of severe visits for both males and females was the 70 years and over age group, potentially indicating less resilience to injuries from MVCs among this age group. Most emergency department visits (approximately 61 per cent) fell into triage level 4, which corresponds to a recommended interval from time of arrival to physician assessment of one hour.

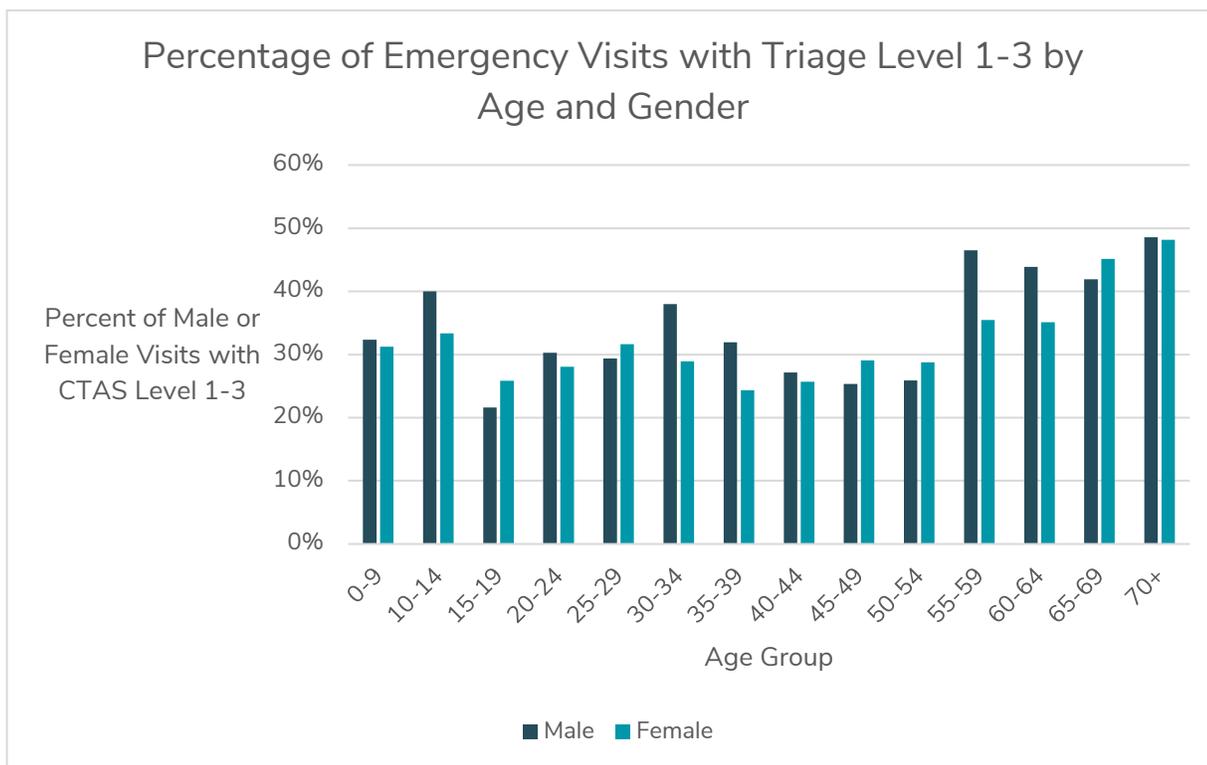


Figure 11: Percentage of ER Visits with Triage Level 1-3, by Age and Gender, 2011-2015

The most common injury presenting to emergency was injuries to the neck, for a total of 463 visits (24.6 per cent of MVC-related visits). Of the 463 neck injuries, almost half (44.1 per cent) of those included (or were classified as) whiplash. The next most common injury was injuries to the head with a total of 429 visits and with 19.6 per cent of those being classified as concussion. Other major areas included the thorax; the shoulder and upper arm; and abdomen, lower back, lumbar spine and pelvis.

Health Care Utilization

Key Points

- In Yukon, between 2011 and 2015, 822 days in hospital stays were related to MVCs.
- Between 2011 and 2017, the cost of medical travel for Yukon related to MVCs was \$609,152.20, the majority of which was due to medevac air ambulance.
- Approximately 68 per cent of total MVC injury-related cost was attributed to travelling outside of the territory to receive health care services.
- Between 2011 and 2017, about one in five patients with MVC-related injuries made one or more follow-up visits to the hospital within 12 months of their first visit. The top reported injuries among patients with one or more follow-up visits were injuries to the knee and lower leg; injuries to the thorax; and injuries to the abdomen, lower back, lumbar spine and pelvis. These injury types also resulted in higher numbers of follow up visits than other injuries.
- A total of 60 patients with MVC-related injuries were admitted to hospital outside of the territory between 2011 and 2017 and 25 per cent of these patients were captured in the NCDB.

In 2010, motor vehicle collisions cost Canadians approximately \$2.2 billion; \$1.2 billion in direct costs (the resources used to treat the injury or illness) and almost \$1 billion in indirect costs (the value lost to society as a result of the injury or illness).⁽³⁾ Per capita costs for transport incidents (including pedestrians, cyclists and off-road vehicles) were highest for the 15- to 19-year age group at \$288.67 per capita, and for males at \$169.46 per capita.⁽³⁾ When broken down by both age group and gender, males aged 25 to 64 were responsible for the most costs, but males aged 20 to 24 had the highest per capita cost from transport incidents, at \$379.90 per capita.⁽³⁾

In Yukon, between 2011 and 2015, there were 822 days in hospital stays related to MVCs. Most of the 1,880 emergency department visits for MVCs were to Whitehorse General Hospital (96.7 per cent of visits). Approximately 71 per cent of emergency department visits saw individuals arrive by their own means, while about 24 per cent had individuals arrive by ambulance and 4.7 per cent of visits had individuals arriving by medevac. About 88 per cent of all emergency department visits resulted in a discharge home with no support services, 7.4 per cent were admitted to hospital and 2.1 per cent were transferred directly to another acute care facility from the emergency department.

Between 2011 and 2017, the cost of medical travel for Yukon related to MVCs was \$609,152.20, the majority of which was due to medevac air ambulance. Approximately 68 per cent of total MVC injury-related cost was attributed to travelling outside of the territory to receive health care services. About one in five (20.1 per cent) patients with MVC-related injuries made one or more follow-up visits to the hospital within 12 months of their first visit. The top reported injuries among patients with one or more follow up visits were injuries to the knee and lower leg; injuries to the thorax; injuries to the abdomen, lower back, lumbar spine and pelvis; injuries to the head; and injuries to the shoulder and upper arm. These injury types also resulted in higher numbers of follow up visits than other injuries. Among patients who received treatment in a hospital outside of Yukon, 58 per cent had more than one follow up visit within 12 months of their initial visit, compared to only 4 per cent of those who received treatment within the territory only. A total of 60 patients with MVC-related injuries were admitted to hospital outside of the territory between 2011 and 2017 and 25 per cent of these patients were captured in the NCDB.

Discussion and Recommendations

This report summarized and synthesized four analyses that were completed in Yukon over the past two years, along with published and grey (not peer-reviewed) literature. Readers are encouraged to explore the widely available published and grey literature on public health responses to MVC injuries in order to gain a more in-depth understanding of the issue. The aim of this report was to provide a picture of what we know about MVCs and their associated injuries in Yukon, using the data available. This is intended to be the beginning of a larger conversation about how to reduce the impact of MVCs on Yukoners moving forward. The following recommendations are anticipated to reduce the public health impact of MVCs in Yukon, based on available evidence.

Recommendation #1

Implement injury surveillance and work with partners to improve data collection in Yukon, to better define the problem of MVC injuries and improve the ability to evaluate the impact of policies and programs.

While the NCDB is a valuable source of collision data for Yukon, it has a low capture rate for injuries due to MVCs. Linking NCDB data and hospital data allows for a richer understanding of the contributing factors to MVCs that cause the most severe injuries presenting to hospital. This linkage can help us identify gaps in our MVC injury data. Further analysis on this linked dataset could examine temporality between collisions and presentation to hospital, to describe the typical time from collision to presentation at emergency and to determine if there is a relationship between time from collision to hospital presentation and the severity and type of outcome.

Rural and remote drivers are at increased risk of MVCs; however, in Yukon we lack details on major contributing factors to MVCs in rural areas and what the best Yukon-specific approaches to prevention may be. To improve data collection, it will be important to incorporate suitable approaches to reporting where there is a lack of quantitative data (such as pooling data, incorporating qualitative data and comparing Yukon's trends over time to relevant peer regions). This can assist in taking an equity lens to reporting and ensuring all of Yukon is accounted for in prevention initiatives.

There are several options and factors to consider to improve data collection and analysis related to MVCs. The Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP) is an example of a sentinel surveillance system that would capture almost real-time information on injuries that present to hospital in the territory. Improving data collection regarding the use of cannabis before driving will be important to monitor the impacts of cannabis legalization on driving behaviours. Use of geocoded data could help identify “black spots” in areas within Yukon for targeted infrastructure design improvements. Use of information from community health centres, where available, could provide more information on motor vehicle collisions in rural communities and highlight areas to target for prevention outside of Whitehorse.

The misuse of alcohol in adulthood is strongly linked to prior use of alcohol in adolescence. Additionally, experiences in early youth (under 15 years of age) can influence subsequent

involvement in risk-taking behaviour related to vehicles: the earlier the age of initial drug use, the greater the likelihood of driving after drug use.⁽²⁸⁾ Similarly, earlier age of onset of drinking is associated with an increased risk of riding with a drinking driver.⁽²⁸⁾ Substance use in adolescence has been demonstrated to increase risk for serious driving offences and serious collisions in young adulthood. Conversely, higher levels of parental monitoring, parental nurturing and family connectedness have been associated with a lower risk for serious collisions and serious driving offences among young drivers.⁽²⁹⁾ Having a better understanding of risk factors that predispose Yukon youth to risky driving behaviour, through improved data collection and linkage, can help guide action for prevention in Yukon.

Motor vehicle collisions are a significant contributor to disability on a global level.⁽³⁰⁾ Investigation of health insurance claims and improved injury surveillance may allow us to fully quantify the issue of long-term disability due to MVCs in Yukon, but also better describe the circumstances leading to less acutely severe injuries, in an effort to focus prevention. Lower socioeconomic groups can be disproportionately affected by these injuries due to their increased risk of being in a MVC, but also due to less access to post-collision health care options, such as physiotherapy.⁽³⁰⁾ This further begs for an equitable approach to analysis and prevention of this public health problem.

Recommendation #2

Develop and implement a long-term road safety strategy for Yukon, based on multi-sectoral partnerships, that accepts shared responsibility for road safety between road users and providers of the road system.

An example of this is Sweden's Vision Zero traffic safety policy.⁽³¹⁾ Strategies that incorporate partnerships and road safety campaigns and introduce interventions at multiple levels (such as enforcement, awareness, legislation and infrastructure), have reduced collisions, injuries and fatalities.⁽³²⁾ A strategy would coordinate all of the approaches and recommendations contained within this report and found elsewhere.

The World Health Organization describes a public health approach to road traffic injuries as one involving injury surveillance, research, prevention and control, evaluation, policy, services and advocacy. Such an approach by definition involves a cross-sectoral strategy and significant

collaboration. The Haddon Matrix is well established to inform such a strategic approach (Figure 12). The matrix was developed as a systems approach to preventing and reducing road collision injuries and can serve as a guide for reducing exposure to risk, preventing collisions from occurring, reducing severity of injury in a collision and reducing the consequences of injury through improved post-collision care.⁽³⁰⁾

Phase		Factors		
		Human	Vehicles and Equipment	Environment
Pre-crash	Crash prevention	Information Attitudes Impairment Police enforcement	Roadworthiness Lighting Braking Handling Speed management	Road design and road layout Speed limits Pedestrian facilities
Crash	Injury prevention during the crash	Use of restraints Impairment	Occupant restraints Other safety devices Crash-protective design	Crash-protective roadside objects
Post-crash	Life sustaining	First-aid skill Access to medics	Ease of access Fire risk	Rescue facilities Congestion

Figure 12: The Haddon Matrix: A Systems Approach to Motor Vehicle Injury Prevention ⁽³⁰⁾

Yukon’s Motor Vehicles Act is currently being modernized and has great potential to improve Yukon’s approach to road safety. Additionally, the Department of Highways and Public Works executes campaigns and work dedicated to road safety. Few areas of public health illustrate more clearly the role of a one government approach to action. In collaboration with other governments and community partners, the Government of Yukon can play a leading role in reducing the health impact of MVCs by contributing to the development of a strategy to reduce the public health impact of MVCs.

Recommendation #3

Use updated technology to improve enforcement, encourage safe driving behaviours and improve safety for vulnerable road users. Update road safety engineering countermeasures to reduce the impact of human error on MVCs.

Yukon's rurality and remoteness can make enforcement of motor vehicle laws and regulations a challenge. Additionally, weather is the fourth most-commonly reported contributing factor to MVCs in Yukon, coming ahead of alcohol. There is a seasonal pattern that appears to be present in the number and severity of collisions in Yukon, with most collisions from 2011 to 2015 occurring in December and January, but more injuries reported from collisions (and more severe injuries) occurring in July. This is consistent with research and statistics from other regions. This information could be used to guide transportation engineering and enforcement priorities, while use of technology could further improve targeting of interventions.

Automated speed enforcement can assist with the minimal resources available for enforcement across a large geographic area. This could include photo radar, red light cameras and turn cameras installed at intersections. Speed reader boards, particularly when supplemented with intermittent enforcement, have been shown to reduce average speeds. Pedestrian hybrid beacons increase safety for pedestrians crossing streets and improve traffic flow. Pedestrian hybrid beacons are distinguished from traffic signals and flashing crosswalk warnings as they clearly indicate a pedestrian crossing when the signal is activated, but also improve traffic flow by allowing vehicles to proceed with caution once a pedestrian has passed. More information on this safety countermeasure can be found on the Canada Road Safety Strategy website,⁽³²⁾ and U.S. Department of Transportation Federal Highway Administration website.⁽³³⁾ Pedestrian hybrid beacons can be used in conjunction with a crosswalk if gaps in traffic are not adequate to allow crossing, if vehicle speeds are too high to permit crossing, or if pedestrian delays are excessive.

Winter road maintenance can be improved by installing snow fences to reduce snow drifting on highways and by installing Road Weather Information Systems that increase efficiency of scheduling winter maintenance operations. Variable speed limit signs have been demonstrated to reduce collisions by allowing adjustment of speed limits based on weather conditions and real-time traffic speed and flow data.⁽³²⁾ Another example of useful technology is the use of advanced

automatic collision notification response technology, to assist in earlier discovery and triaging of MVC victims on remote highways, such as with the partnership between OnStar and the US Centers for Disease Control and Prevention.

Older adults could be considered a vulnerable road user population – while they represented a small proportion of hospital visits related to MVCs, the age group of 70 and older had the highest proportion of visits with triage level 1, 2, or 3. We should consider our aging population and their corresponding vulnerability to injury when designing traffic systems and attempting to manage driver behaviour. Vulnerable road users also include motorcyclists, pedestrians and pedal cyclists. In Yukon’s hospital data, motorcyclists were disproportionately represented in hospital admissions, compared to representation in emergency department visits and collisions overall. Special attention should be paid to reducing the impact of MVCs for these road users.

Creating forgiving roadsides could involve creating clear zone areas adjacent to roadways, installing breakaway light poles and using barrier treatments.⁽³⁴⁾ Clear zones adjacent to roadways allow space for drivers who have gone off the road to manoeuvre back on, and they reduce likelihood or severity of a collision. If vehicles hit objects that breakaway at the base, this lessens the risk of injury, due to a more “forgiving” impact. Barriers with energy-absorbing treatments can reduce collision severity by absorbing much of the force of a crash.

Other evidence-based countermeasures include divided highways, shoulder rumble strips, barriers or dividers placed at the shoulder or median to prevent drifting vehicles from leaving the road, advanced intersection and signalized intersection warning systems and introducing roundabouts and passing lanes.⁽³⁴⁾ Traffic calming measures, particularly in urban settings with high traffic volumes, can also reduce the risk of pedestrian injuries and fatalities, along with pedestrian segregation at intersection crossings, physical separations of pedestrians from roadways and raised medians within longer pedestrian crossings.⁽³²⁾

Recommendation #4

Increase penalties and fines for aggressive and risky driving behaviours. Update Yukon's driver education and graduated licensing programs.

Many of Yukon's current penalties and fines for aggressive and risky driving behaviours, such as speeding and careless driving, are below the Canadian average. Additionally, the current minimum age for drivers in Yukon is 15, which is below the Canadian Council of Motor Transport Administrators' recommended minimum age of 16. Several aspects of policy, regulation and legislation can be updated in Yukon to improve road safety.

In early 2019, the Canadian Alcohol Policy Evaluation (CAPE) project research team released a report scoring all of the provinces and territories on their implementation of evidence-based policies to reduce the harms of alcohol.⁽³⁵⁾ One of the evaluated policy domains was impaired driving countermeasures, in which Yukon scored an "F," as Yukon has achieved only 20 per cent of its potential to reduce alcohol-related harm through impaired driving countermeasures. Best practices and policies identified in the report, which Yukon was recommended to work towards, include:

- 1) Increase the minimum age to enter the Graduated Licensing Program (GLP) to 16 years of age; set a minimum of two GLP stages lasting 12 and 24 months respectively; and subject GLP drivers to a nighttime driving ban.
- 2) Extend the zero tolerance for alcohol and drug use for a minimum of three years beyond the GLP.
- 3) Implement administrative licensing suspension (ALS) programs for a BAC between 0.05 and 0.08 per cent, which include a minimum three-day ALS and mandatory or discretionary vehicle impoundment for first occurrence and a minimum seven-day ALS for a second occurrence combined with vehicle impoundment.
- 4) Increase penalties when the presence of a drug is detected in addition to alcohol.
- 5) Mandate alcohol interlock programs in conjunction with license suspensions, with successful completion of the interlock program as a requirement for relicensing. Remove

eligibility for reduced license suspensions after completing the interlock program for those convicted of impaired driving causing death or bodily harm. Successful completion of the interlock program in Yukon requires the interlock device's data to record six consecutive months without program violation.

The recommendations from the CAPE report should be considered within the context of Yukon. For example, availability of interlock service providers and the cost of device installation could impact the ability of Yukon drivers to participate in the interlock program. Nonetheless, these recommendations serve as aspirational goals and deserve ongoing consideration.

As previously noted, the current minimum age for drivers in Yukon is 15. Increasing the driving age, lengthening the learning period from six months to one year and adding nighttime and passenger restrictions can reduce collision, injury and fatality rates among young drivers.⁽³²⁾ Driver education as part of the GLP should include emphasis on distracted driving and the risks of driving after using cannabis.

In Whitehorse, it appears that people are driving after drinking and using drugs fairly uniformly throughout the week, as well as throughout the night. Concentrating interventions such as Reduce Impaired Driving Everywhere (RIDE) programs only on weekends or only at certain times of the night may be missing a considerable proportion of impaired drivers. Trip origins and destinations observed in the roadside survey could be key locations for intervention and prevention.

The issue of driving after drug and alcohol use should not be overshadowed by that of inattentive or distracted driving, or driving with excessive speed. These were the most common contributing factors to collisions in Yukon between 2011 and 2017 among records linked between health and RCMP databases and also resulted in the most severe injuries. Additional measures to improve road safety could include increasing fines for *Motor Vehicles Act* offences and high-risk behaviours (such as street racing or stunt driving) to at least the Canadian average, introducing new penalties (such as immediate license suspension and vehicle impoundment) for all high-risk driving behaviours where possible, and introducing immediate roadside penalties for drug-impaired driving in addition to alcohol-impaired driving. These measures have been demonstrated to reduce fatal collisions, ambulance dispatches and hospital admissions for road trauma.⁽³²⁾

High visibility enforcement and Selective Traffic Enforcement Programs, which combine targeted enforcement activity and public education, can increase the perceived risk that people will be penalized for infractions and has been shown to reduce distracted driving.⁽³²⁾

Recommendation #5

Evaluate the outcomes of Yukon’s Information and Motivation for Positive Action and Choices Today (IMPACT) program, for drivers who have lost their license due to impaired driving.

Consider scaling up and increasing access to the IMPACT program if outcomes are found to be positive and sustainable. Alcohol rehabilitation treatment combined with other measures, such as license suspensions or follow-up contact/probation, can reduce drinking and driving recidivism. However, results vary by region and approach.⁽³²⁾ An evaluation could assist with maximizing the positive outcomes from such a program in Yukon.

Recommendation #6

Explore the provision of affordable and safe alternative driving services and overnight parking.

While there are few studies investigating options such as secure and free overnight parking to prevent drinking and driving, a main reason people in Yukon have cited for being unable to avoid driving after drinking or using drugs is that they do not want to leave their vehicle parked somewhere overnight. Multiple options for free overnight parking with security features (such as lighting and security cameras) may remove this barrier. Additionally, current options for public transportation within the City of Whitehorse are limited in the evenings, particularly on weekends, and public transportation options outside of Whitehorse are limited to chartered bus lines. Public transportation is important not only to reduce vehicle congestion and emissions, but also to enable transportation for individuals who have limited driving options, such as those with medical impairments. Examples of innovative solutions that are being used in other locations include Austin, Texas’ free overnight parking for safe drinkers⁽³⁶⁾ and Innisfil, Ontario’s public transportation partnership with Uber.⁽³⁷⁾ Evaluation of policy and program changes can guide process improvements and help strengthen the evidence base for effectiveness of new and innovative solutions.

Recommendation #7

Increasingly emphasize road safety education.

In Yukon, 15- to 24-year-old males were overrepresented in emergency department visits, hospital admissions and in driving after drinking or using drugs. Males also represented the majority of MVC fatalities. This is consistent with published literature demonstrating that male youth are more likely to be involved in a MVC than females⁽³⁾; what has stood out here is the rate of drug use and driving among Yukon youth, when compared to other jurisdictions. Concerted efforts to intervene with this segment of the population are warranted. This could include providing education as part of the school curriculum and at the roadside. For example, child pedestrian skills training programs improve children's choices around timing and location of road crossings.⁽³²⁾ Education and training of commercial vehicle drivers is also a key component of reducing risky driving behaviour and creating a culture of safety at work, indicating this strategy need not be limited to youth and children.⁽³²⁾ Motorcyclists are a road user group that should be targeted for educational interventions, given the disproportionately high severity of their injuries presenting to hospital. Education should include discussion of the risks associated with distracted driving, use of alcohol and drugs before driving and use of off-road vehicles, and should be uniformly accessible to rural communities.

Implementing these evidence-informed recommendations would be a significant step forward in addressing MVCs and their health consequences in Yukon. When multiple interventions are carried out, they have a synergistic effect and increase opportunity for impact. Ongoing monitoring and evaluation will assist with continuous improvements and adaptations, as the social and demographic landscape of Yukon continues to change into the future. A long-term, upstream and collaborative approach can have multiple benefits beyond injury prevention; by reducing MVC injuries and their impact, Yukoners can set goals and achieve improved health and wellness together.

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