

# ***Injury Surveillance in Canada: Current Realities and Challenges***

August 2003

Centre for Surveillance Coordination,  
Centre for Healthy Human Development  
Population and Public Health Branch,  
Health Canada

# Acknowledgements

This paper was prepared with the collaboration of the following individuals:

Morag MacKay, Executive Director, Plan-it Safe, Children's Hospital of Eastern Ontario;

Don Schopflocher, Health Surveillance, Albert Health & Wellness;

Phil Groff, Manager, Research Development and Evaluation, SMARTRISK;

Greg Webster, Manager, Clinical Registries, Canadian Institute for Health Information;

Susan Mackenzie, Senior Epidemiologist, Health Surveillance and Epidemiology Division, Centre for Health Human Development, Health Canada, and

Caroline da Silva, Project Officer, Injury Surveillance, Health Surveillance Coordination Division, Centre for Surveillance Coordination, Population and Public Health Branch, Health Canada.

With thanks to Paul Sales (Douglas Consulting) for editing and Monique Page (Centre for Surveillance Coordination, Health Surveillance Coordination Division, Population and Public Health Branch, Health Canada) for support with document preparation.

Alan Hotte, Project Manager,  
Injury Surveillance,  
Health Surveillance Coordination Division,  
Centre for Surveillance Coordination,  
Population and Public Health Branch,  
Health Canada

Margaret Herbert, A/ Chief,  
Health Surveillance and Epidemiology Division,  
Injury and Child Maltreatment Section,  
Centre for Healthy Human Development,  
Population and Public Health Branch,  
Health Canada

Deborah Jordan, Director,  
Health Surveillance Coordination Division,  
Centre for Surveillance Coordination,  
Population and Public Health Branch,  
Health Canada

ISBN # (application pending)

# Foreword

*Injury Surveillance in Canada: Current Realities and Challenges* is intended to initiate discussion among Canadians and organizations in government, non-governmental, academic and corporate sectors to support the formation of a national agenda for injury surveillance within the broader program, policy and research context of Injury Prevention and Control in Canada.

# Executive Summary

## Injury and Public Health Surveillance

Injury is a serious public health issue with a major impact on the lives of Canadians. It is the leading cause of death among children and young adults and is among the leading causes of hospitalization for children, young adults and the elderly. Injury is also a major cause of long- and short-term disability among Canadians. In economic terms, in 1998, injury accounted for 8.0% of the economic burden of illness in Canada.

Effective prevention and control of injuries in Canada requires a system of surveillance that monitors the incidence of injuries, their causes, treatment and outcomes. This requires an integrated system of data collection, analysis and interpretation and communication. A successful system would ensure not only that decision makers from different sectors receive the information that they need for planning and evaluating policies, programs and services, but that they receive it on a timely basis.

At the present time, responsibility for injury surveillance is multi-sectoral: prevention and control of injuries fall within the mandate of many sectors, including health, transportation, justice, environment, and consumer goods/manufacturing. As a result, injury-related data are scattered or fragmented among many organizations, with files and records reflecting specific needs or interests. Effective injury surveillance will require a coordinated data system that will allow the cause or pre-event conditions of an injury event to be related to not only the nature of the injury, but the course of treatment and rehabilitation, or even death. Creating such an efficient and effective injury surveillance system in Canada requires that many issues be addressed.

Given the current state of injury surveillance in Canada and the challenges associated with enhancing capacity, there is an urgent need to establish a framework for a national agenda. Discussions regarding the development of the framework should address, but not be limited to issues related to Data Holdings and Linkages; Capacity and Skills; Communication; Interconnectivity; and Surveillance Products. Ideally, an injury surveillance system would meet the information requirements across all sectors, while allowing each to have the ongoing information it needs for its policy and programming needs. In reality, however, resources are limited and need to be used wisely.

Better articulation of all options for moving forward and beginning the process of prioritization will have to occur for an overall national injury surveillance strategy to emerge.

# Table of Contents

Acknowledgements .....	ii
Foreword .....	iii
Executive Summary.....	iv
Injury and Public Health Surveillance .....	1
Introduction.....	1
Definitions .....	2
Injury .....	2
Types of Injury.....	2
Injury in Canada .....	3
Mortality.....	3
Hospitalization.....	3
Economic Cost of Injuries.....	4
Summary .....	5
Public Health Surveillance.....	6
A Model of Public Health Surveillance with Application to Injury .....	8
Injury Surveillance in Canada - Current Realities and Challenges .....	11
Current-Day Injury Surveillance Data Collection Vignette .....	12
Injury Surveillance Sub-Group (ISSG) .....	12
Post-ISSG and the Way Forward.....	13
Current State of and Challenges in Injury Surveillance .....	13
Data Collection .....	14
Injury Surveillance Integration .....	19

Conceptual Information Model (CIM) .....	20
Analysis and Interpretation .....	21
Surveillance Products and Dissemination.....	21
Options for Enhancing Injury Surveillance Capacity in Canada .....	23
Starting Point for Data Holdings and Linkages.....	25
Starting Point for Capacity and Skills .....	25
Starting Point for Communication/Coordination .....	25
Starting Point for Interconnectivity .....	26
Starting Point for Surveillance Products .....	26
Conclusion .....	27
Bibliography .....	29
Appendix .....	31
End Notes .....	33

# Injury and Public Health Surveillance

## Introduction

Injury is a serious public health issue in Canada with a major impact on the lives of Canadians. It is the leading cause of death among children and young adults, and is among the leading causes of hospitalization for children, young adults and the elderly. Injury is also a major cause of long- and short-term disability among Canadians. In economic terms, in 1998 injury accounted for 8.0% of the economic burden of illness in Canada.<sup>1</sup>

Yet, in spite of these data, all too often injury is forgotten in the public agenda – viewed, perhaps, as simply a “part of life” with no clear understanding of who should lead the many sectors involved in injury prevention. It has a major impact on the lives of Canadians, however, in terms of mortality, hospitalization and economic costs.

Effective prevention and control of injuries in Canada requires a system of surveillance that monitors the incidence of injuries, their causes, treatment and outcomes. This requires an integrated system of data collection, analysis and interpretation, and communication. A successful system would ensure not only that decision makers from different sectors receive the information that they need for planning and evaluating policies, programs and services, but that they receive it on a timely basis.

*“... one of the highest priorities in injury prevention and treatment is to improve ... capabilities for injury surveillance, interpreting injury data and translating data into policy-relevant terms, and predicting and measuring the effects of interventions.”<sup>2</sup>*

At the present time, responsibility for injury surveillance is multi-sectoral: prevention and control of injuries falls within the mandate of many sectors, including health, transportation, justice, environment, and consumer goods/manufacturing. Injury-related data are, therefore, scattered or fragmented among many organizations, with files and records reflecting specific needs or interests. As a result, no complete “flow-through” picture of any incidence of an injury can be created. To do so requires a system of data coordination that will allow the cause or pre-event conditions of an injury event to be related to not only the nature of the injury, but the course of treatment and rehabilitation, or even death.

Creating such an efficient and effective injury surveillance system in Canada requires that many issues be addressed. As its title suggests, *Injury Surveillance in Canada: Current Realities and Challenges* looks at these issues, beginning with a brief review of selected injury statistics and a discussion about the general concepts of public health surveillance and how these apply specifically to the surveillance of injuries. The report reviews the relatively brief history of injury surveillance in Canada, and the challenges and capacity limitations in terms of data collection, analysis, integration and communication. The final section of the paper begins to outline possible options for enhancing Canada’s capacity for injury surveillance.

## Definitions

The World Health Organization (WHO) provides the following definitions regarding injury.<sup>3</sup>

### Injury

“An injury is the physical damage that results when a human body is suddenly or briefly subjected to intolerable levels of energy. It can be a bodily lesion resulting from acute exposure to energy in amounts that exceed the threshold of physiological tolerance, or it can be an impairment of function resulting from a lack of one or more vital elements (i.e., air, water, warmth), as in drowning, strangulation or freezing. The time between exposure to the energy and the appearance of an injury is short.”

### Types of Injury

“Injuries may be categorized in a number of ways. However, for most analysis purposes and for identifying intervention opportunities, it is especially useful to categorize injuries according to whether or not they were deliberately inflicted and by whom. Commonly used categories are:

- unintentional (i.e. accidental);
- intentional (i.e. deliberate):
  - interpersonal (e.g. assault and homicide)
  - self-harm (e.g. abuse of drugs and alcohol, self-mutilation, suicide)
  - legal intervention (e.g. action by police or other law enforcement personnel)
  - war, civil insurrection and disturbances (e.g. demonstrations and riots);
- undetermined intent.”

## Injury in Canada

### Mortality

In 1999, 13,750 Canadians died as a result of injury, representing 6% of all deaths (Table 1). The distribution of deaths due to injury among the population is bimodal, with apparent peaks in both the young adult and elderly populations. Three-quarters of deaths of 15-to-24 year-olds were due to injury. Individuals aged 85+ years accounted for the highest rate of injury deaths, reflecting 3% of deaths for this age category.

Among leading causes of death, unintentional injury was ranked first in the 1-14, 15-24 and 25-39 year age groups, and suicide ranked second among 15-24 and 25-39 year-olds.

### Hospitalization

Between April 2000 and March 2001, treatment of injuries accounted for 247,000 hospitalizations, or 8% of all hospitalizations, in Canada (Table 2). Injury accounted for 22% of all hospitalizations among 15-24 year-olds and 14% of hospitalizations among individuals in the 1-14, 25-39 and 85+ year age groups. While the highest rate of all hospitalizations for injury per 100,000 population was found among adults aged 85+ years, unintentional injury was the second-ranked cause of hospitalizations for 1-14, 15-24 and 85+ age groups. Across all age categories, unintended injury ranked fourth among all causes of hospitalization, injuries from assault ranked seventh, and self-inflicted injuries fifteenth.

**Table 1 Deaths Due to Injury, by Age, Canada, 1999**

Age (years)	All <sup>a</sup> injury deaths		Injury death rates/100,000 population and rank among leading causes of death						
	Number	% of all deaths in age-group	All <sup>1</sup> rate	Unintentional rate	rank	Suicide rate	rank	Homicide rate	rank
<1	39	2.2	11.6	8.9	9	0	-	2.4	12
1-14	430	43.0	7.7	6.5	1	0.2	7	0.5	10
15-24	1,766	75.2	42.8	26.4	1	13.5	2	2.0	4
25-39	3,048	51.6	42.5	20.9	1	17.6	2	2.2	7
40-64	4,135	11.0	43.5	22.1	3	18.3	4	1.5	14
65-74	1,085	2.4	50.8	36.0	7	12.8	12	1.0	17
75-84	1,450	2.2	114.6	99.0	9	13.1	14	1.3	17
85+	1,797	3.0	457.9	443.9	8	10.7	15	1.0	17
All ages	13,750	6.3	45.1	29.0	4	13.4	9	1.5	17

<sup>a</sup> Includes unintentional injuries, suicide, homicide as well as injuries of undetermined intent and those due to legal intervention, operations of war and terrorism. Excludes adverse events in medical care.  
Source: Health Surveillance and Epidemiology Division, Health Canada analysis of Statistics Canada data

**Table 2 Hospitalizations for Treatment of Injury, by Age, Canada, 2000-2001**

Age (years)	All <sup>a</sup> injury hospitalizations		Injury hospitalization rates/100,000 population and rank among leading causes of hospitalization							
	Number	Percentage of hospitalizations <sup>b</sup> in age-group	All <sup>1</sup> rate	Unintentional rate	rank	Self-inflicted rate	rank	Assault rate	rank	
<1	1,469	2.1	435.9	391.4	9	0.3	14	41.5	18	
1-14	24,379	13.7	437.8	411.9	2	16.2	16	6.4	17	
15-24	30,887	22.1	738.5	509.7	2	144.2	8	64.4	12	
25-39	42,034	14.5	589.2	416.1	4	114.4	9	42.5	15	
40-64	61,837	7.8	630.6	519.2	7	79.3	14	18.8	17	
65-74	23,627	5.3	1,108.0	1,065.6	8	25.0	15	7.5	17	
75-84	35,972	8.1	2,794.1	2,748.5	5	24.7	15	7.5	7	
85+	26,651	14.0	6,478.6	6,431.2	2	25.3	15	8.8	17	
All ages	246,856	8.4	799.9	682.9	4	77.2	15	27.1	7	

<sup>a</sup> Includes unintentional injuries, suicide, homicide as well as injuries of undetermined intent and those due to legal intervention, operations of war and terrorism. Excludes adverse events in medical care.

<sup>b</sup> Excludes pregnancy-related hospitalizations.

Source: Health Surveillance and Epidemiology Division, Health Canada analysis of data from the Canadian Institute for Health Information

## Economic Cost of Injuries

Health Canada has estimated the total economic costs of injury in 1998 to be \$12.7 billion.<sup>4</sup> Injury ranked 4<sup>th</sup> among 17 specific diagnostic categories, behind cardiovascular diseases, musculoskeletal diseases and cancer, and ahead of respiratory diseases (Table 3). Injury also ranked 4<sup>th</sup> in terms of indirect costs<sup>5</sup> (\$11.8 billion) and 5<sup>th</sup> in direct costs<sup>6</sup> of \$3.2 billion.

In spite of its high ranking for economic costs, injury ranked only 11<sup>th</sup> among 17 specific diagnostic categories with respect to funds available for research.

**Table 3 Comparison of Research and Total Costs for the Five Specific Diagnostic Categories<sup>a</sup> with the Highest Total Costs, Canada, 1998**

Diagnostic category	Total costs		Direct costs		Indirect costs		Research costs <sup>b</sup>	
	\$ Billion	rank	\$ Billion	rank	\$ Billion	rank	\$ Million	rank
Cardiovascular diseases	18.5	1	6.8	1	11.6	3	61.2	2
Musculoskeletal diseases	16.4	2	2.6	7	13.7	1	14.3	8
Cancer	14.2	3	2.5	10	11.8	2	80.4	1
Injuries	12.7	4	3.2	5	9.5	4	7.3	11
Respiratory diseases	8.5	5	3.5	4	5.1	6	14.4	7
<sup>a</sup> Three non-specific categories (Unattributable, Others and Well-patient care) were omitted from the rankings presented in this table. <sup>b</sup> Research costs are a component of direct costs. Source: Health Canada. Economic Burden of Illness in Canada, 1998. Ottawa: Health Canada; 2002.								

## Summary

The mortality, hospitalization and economic data confirm the significance of injury as a public health concern. Since most injuries are preventable, it is essential to know enough about them and their occurrence to implement appropriate preventive measures, which must in turn be evaluated so that scarce resources are used efficiently. Injury surveillance clearly underlies both effective injury prevention and the evaluation of preventive measures.

This paper does not include in depth discussions of data on pre-event circumstances that result in injury from the non-health sectors. This is indicative of the challenge in injury surveillance: while the health sector sees the *results* of injury, the preventive measures tend to be *outside* the health sectors. This confirms the challenge of establishing an injury surveillance system to provide all the data needed to effectively prevent and control injuries.

## Public Health Surveillance

Public health programs and services protect, promote and restore the health of the population. While influenced by evolving technology and social values, they have always maintained the goals of reducing discomfort, disability, and premature death in the population.<sup>7</sup> The recent Kirby report<sup>8</sup> underscored the importance of public health activities. The report estimated that approximately 25% of the health of Canadians is attributable to the health care system alone; thus, the majority of factors influencing the health of Canadians (including public health) lie outside the health care system. It is clear that the health sector cannot act alone, but must work with other sectors to influence health.

Surveillance is an essential part of evidence-based public health practice as it provides the evidence for decision making that promotes the health of Canadians and protects them from health hazards.

Effective surveillance requires:

- Data and information management;
- Communications infrastructure;
- Policy agreements on data access and use; and
- Commitment by stakeholders to develop and maintain distributed, interoperable<sup>9</sup> information systems that can use components developed within the health care sector or outside it (in transportation and industry, for example).

The requirements of this vision for health surveillance in Canada have much in common with the development of the country's electronic health record. The recent announcement of a Memorandum of Understanding between Canada Health Infoway Inc.<sup>10</sup> and the Canadian Institute for Health Information (CIHI)<sup>11</sup> specifying roles of each organization in developing and maintaining standards, is a step toward improving surveillance capacity while furthering the development of the electronic health record.

*Injuries "... are amenable to the same epidemiologic approach (as disease), and, what is least well appreciated, they are preventable and controllable. Instead of something set apart from disease and scarcely to be considered within the scope of preventive medicine, injuries are as much a public health problem as measles."<sup>12</sup>*

Effective injury surveillance leads to appropriate and effective public health actions aimed at preventing and controlling injuries. Injury surveillance in Canada needs to be part of a comprehensive information infrastructure (sometimes termed infostructure) that will enable the:

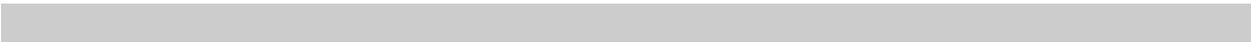
- Timely collection and use of high-quality data;
- Integration, analysis and interpretation of this into information products; and

- Dissemination of these products to those who work to protect and promote the health of the public.

Injury surveillance is essential for:

- Systematic monitoring of injury trends and risk and protective factors;
- Identification of clusters or emerging injury issues;
- Policy and program-based management of injury risks;
- Planning of health services;
- Evaluation of policies, programs and services and the individual and collective empowerment of people with the information to take action to reduce the risk of injury.

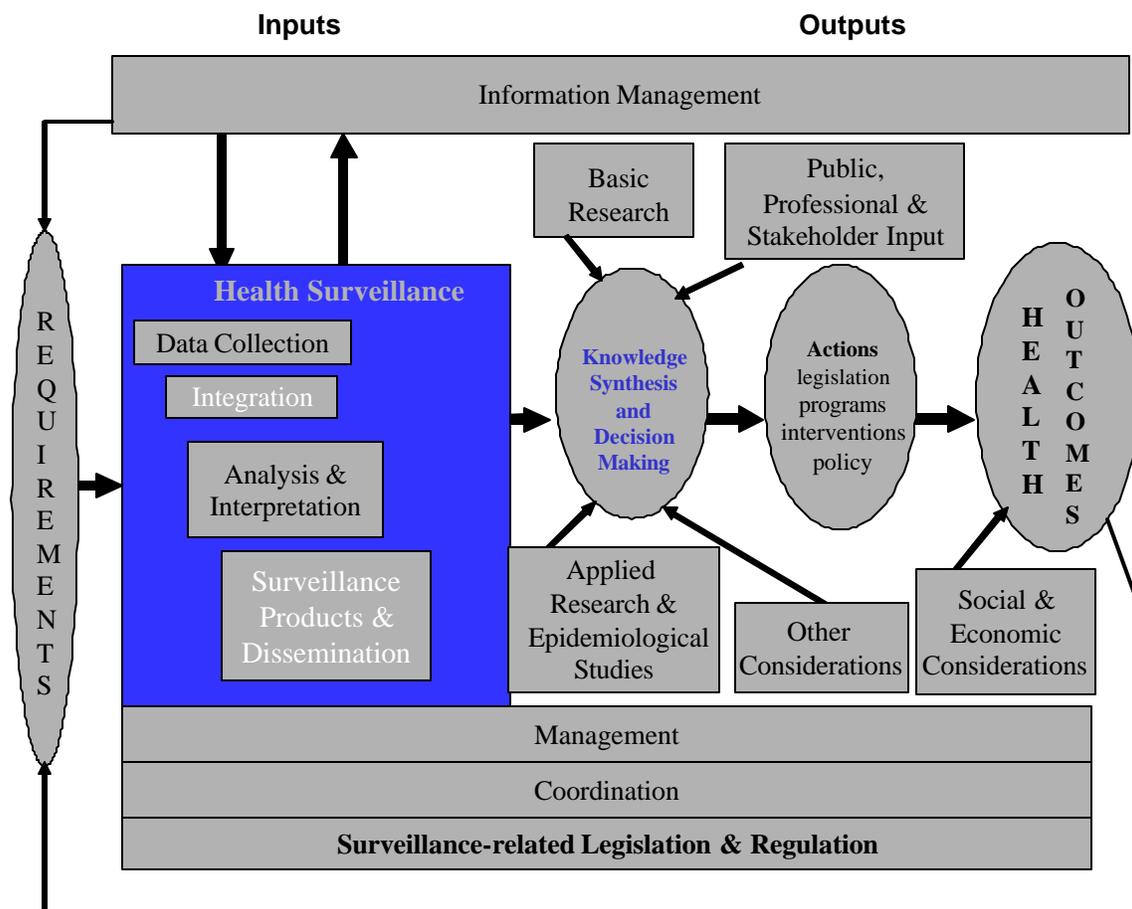
The use of surveillance information should be an ongoing part of the management cycle. To achieve this, the surveillance system needs adequate funding and a business environment that encourages and supports not only the collection and analysis of data, but also its use.



## A Model of Public Health Surveillance with Application to Injury

The Health Surveillance Working Group (HSWG)<sup>13</sup> developed the High Level Surveillance Model (Figure 1). It describes the iterative nature of what is essentially a knowledge-generation process: the collection, analysis and interpretation of data into information for action. Information derived from surveillance data and supplemented by other information leads to greater knowledge and decision-making capabilities.

**Figure 1 High Level Surveillance Model**



The High Level Surveillance Model is a useful tool for understanding not only the surveillance process in general, but also the role of surveillance in injury control. It has been modified to depict the broader context in which public health decision making takes place.

Data generated by injury events (such as deaths, hospitalizations, fires, poisonings and motor vehicle collisions) produce information that is integrated, analysed and interpreted into surveillance products that can communicate:

- Risk;
- Variation of incidence by geography and risk group;
- Quality of life and disability; and
- The relationship between exposures and injury outcomes.

Surveillance-based evidence is combined with basic and applied research knowledge, social, economic and value considerations, and interacts with skills and available tools in an overall decision-making process. Surveillance information informs injury interventions, ranging from short-term operational decisions (such as withdrawing products from sale), through programming, to regulatory (mandatory helmet use by cyclists) and other policy actions. The High Level Surveillance Model depicts the functioning of these health surveillance ‘inputs’, supporting processes such as information management and coordination and the ‘outputs’ or actions which impact on health outcomes.

To examine the unique challenges facing injury, it is useful to compare and contrast injury surveillance with communicable and chronic disease surveillance. In addition to evidence for prevention and control of disease and adverse health events, surveillance also provides evidence about the modification of related risks, whether in the realm of communicable disease, chronic conditions or injury.

For communicable disease, the timeliness of surveillance data is critical. Effective control of outbreaks requires surveillance that immediately recognizes an infection, promptly tracks its cause and follows new cases in order to evaluate treatment. In contrast, for chronic diseases, one of the challenges in surveillance is to capture accurate information on the many lifetime exposures that may have contributed to the development of a chronic disease. Exposure to key causal factors often occurs years or decades before symptoms develop.

For injury, timeliness of surveillance data is critical so that action can be taken to prevent injury to others. For example, the need to know is immediate, so that if the product or the built environment were a factor in the injury event, modifications could be made or other action taken. Although the direct cause of an injury is often immediately evident (the collision of two motor vehicles, for example) other less-direct factors often play contributing roles. These may be related to human behaviour, the natural environment, manufactured products and our built environment. Table 4 outlines additional differences in communicable, chronic and injury surveillance.

**Table 4 Communicable, Chronic and Injury – Differences for Surveillance\***

<b>Issue</b>	<b>Communicable</b>	<b>Chronic</b>	<b>Injury</b>
<b>Temporality</b>	Immediate causality – exposure to infectious agent often days or hours before disease onset	Latent causality – exposure to causal factors decades before onset of disease	Immediate causality – directly affected by energy transfer at time of injury event  Latent causality – initial injury causes later injury from compensation
<b>Disease course</b>	Can be short – response to treatment tends to be rapid, cure is often likely	Usually protracted – response to treatment can lag, exacerbations and remissions can occur	Recovery from minor injuries can be short and complete; moderate to severe injuries can result in long-term or irreversible impairment and disability
<b>Cause of disease</b>	Identified infectious agent (may have other contributing factors)	Complex interaction of risk factors, determinants, infectious triggers. Co-morbidity important	Very wide range of direct and indirect causal factors, co-occurrence of risks can increase likelihood and severity of injury
<b>Intervention</b>	Individual and population level	Population level	Individual- and population-level event, vector (product), environment.
<b>Data collection</b>	Person-oriented (e.g., 25-year-old female with hepatitis B, report to health unit)	Event-oriented (e.g., number of hospitalizations for AMI in past year at institution X)	Person-oriented; event oriented; vector (product) oriented
<b>Report systems</b>	Oriented to individuals, event, vector	Oriented to populations	Person, population, event, vector
<b>Legislation and regulation</b>	Specific statutes and enforceable regulations aimed at containment and eradication.	With the exception of legislation around the reporting of cancer, no legislation for report of chronic disease	Legislation across many sectors including occupational health and safety; product safety; building code and transport legislation.
* Adapted from <i>Chronic Disease Surveillance in Canada: A Background Paper</i> . Prepared by the Health Surveillance Coordination Division, Centre for Surveillance Coordination, Population and Public Health Branch, Health Canada, July, 2003 (Final).			

# Injury Surveillance in Canada - Current Realities and Challenges

*The Chief Medical Officer for Ontario has recommended that national and provincial injury surveillance capacity be strengthened, and he observes that:*

*“A great deal of data are currently collected by different groups but not adequately shared with people who could benefit from that information. Access to information and critical analysis is needed, as are links between data sets, such as geographic and census data, police, ambulance and hospital data sets.”<sup>14</sup>*

The prevention and control of injuries falls within the mandate of many sectors including health, transportation, justice, environment, and consumer goods/manufacturing. As a result, the responsibility for injury surveillance is multi-sectoral. The complexity of this multi-sectoral relationship is illustrated in the example of data holdings pertinent to injury surveillance.

The multi-disciplinary and cross-sectoral nature of injury presents a formidable challenge for injury surveillance. For example, data holdings for the care of people with injuries resides in the health sector, whereas data on the circumstances surrounding injury events are held by many sectors. This involvement and accumulation of data in many diverse systems and sectors most clearly distinguishes injury surveillance from other types of health surveillance. Further, the policy and program needs for prevention and control need to be the driving force behind surveillance – driving data needs not only in the health sector, but in all sectors related to injury. In other words, those using the data to design and deliver prevention programs should be actively involved in the decisions regarding the data that are required.

All of these relationships are unlikely to become any less complex in the future. The very nature of injury means that any truly effective prevention and control efforts must span the full spectrum from primary prevention (including causal factors), through treatment, rehabilitation and optimum management of long-term impairments and disabilities. They must also pertain to all segments and ages in the population. The surveillance that supports these efforts must be equal to the task.

While this section refers in many cases to the situation nationally, it is important to note that jurisdictions across Canada vary considerably with respect to injury surveillance capacity.

The following vignette of an alcohol-involved car crash illustrates the challenges present in the current reality, including the current distribution of injury surveillance data across a broad range of data sources and its collection under various mandates and purposes.

### **Current-Day Injury Surveillance Data Collection Vignette**

Joe, an 18-year-old who has recently qualified to drive on his own, has just driven his friends home from the high school sports banquet. As required by the terms of his graduated driving license he has not consumed any alcohol, but it is raining heavily, visibility is less than ideal and Joe has not lowered his speed to adjust for poor driving conditions.

Driving in the other direction is a 55-year-old man, an habitually heavy drinker, who has already lost his license but continues to drive when impaired, as he is doing tonight. He swerves to avoid something he imagines on the side of the road, taking his van directly into Joe's path. The vehicles collide. Joe's car crosses the shoulder of the road and rolls over down an embankment. Even though he is wearing a seat belt, Joe sustains multiple injuries.

A passing motorist calls 911 on his cell phone. Police and paramedics arrive promptly and Joe is transported by ambulance to hospital where he is treated by the trauma team in emergency department and then taken for surgery. He has suffered a serious head injury, a ruptured spleen, several fractures and other minor injuries. His recovery will require a stay in the hospital for more than two weeks, followed by a long period of convalescence and rehabilitation. His home will need to be modified to accommodate his inability to lift things above his head.

Joe's hospital record will document in detail his injuries, medical procedures, treatments, medications, length of stay, and referrals for home care and physiotherapy. His specialists and family physician will have additional medical files that document his recovery. Other than mentioning that Joe's injuries are due to a motor vehicle crash, the medical records will contain neither information regarding the circumstances of the crash, nor the changes that his home will require to allow him to remain in the community.

Meanwhile, at the scene police investigate and document the crash in detail. They administer a breathalyzer test on the second driver who has not been seriously injured and they note his lack of a valid driver's license. Roadway characteristics, weather conditions, skid marks and vehicle positions are documented. Vehicle makes, models and identification numbers are noted. Other than noting that Joe was injured and transported to hospital, the police report will contain no further information on his injuries. Additional files will be created by insurance adjusters and prosecutors.

### **Injury Surveillance Sub-Group (ISSG)**

Within the former committee structure of the Conference of Deputy Ministers (CDM) of Health, surveillance was addressed by a Federal, Provincial/Territorial Committee, called the Health Surveillance Working Group (HSWG). Four sub-groups of HSWG pursued the application of surveillance to environmental health, communicable disease, chronic disease and injury.

The mandate of the Injury Surveillance Sub-Group (ISSG) was to advance injury surveillance. Membership included representatives from Alberta, British Columbia, Quebec, CIHI, Statistics Canada, Plan-it Safe (a non-government organization), McMaster University and Health Canada to represent

injury surveillance, epidemiology, products safety, First Nations and Inuit, mental health promotion, seniors and aging, and surveillance coordination. (A list of members is included in the Appendix.)

Although ISSG was only active from February 2000 until the reorganization of the committee structure of the CDM of Health in March 2002, in its brief existence it accomplished three major projects:

1. Development of the “Inventory of Injury Data Sources and Surveillance Activities - March 2003” - a web-based national inventory of injury data sources and surveillance activities for surveillance data covering all ages and all injuries;<sup>15</sup>
2. Development of a framework for describing and comparing national injury surveillance systems and its application to systems in seven countries; and
3. Initial application of a conceptual information model approach to injury (built on public health data models). This provided a starting point for building a framework for defining and describing data and information across injury data sources in Canada.

## Post-ISSG and the Way Forward

Following the ISSG’s dissolution, Health Canada’s Centre for Surveillance Coordination took up the Sub-Group’s work, completing both the inventory of national data sources and the framework for describing national-level injury surveillance systems. The process applied the ISSG’s conceptual information model to injury representing a specialized tool to facilitate a process for building standards among existing data systems. (Many of the ISSG’s members have continued to contribute on a voluntary basis.)

At the same time, the Insurance Bureau of Canada (IBC) in partnership with SMARTRISK, a national injury prevention organization, and other partners is supporting a number of initiatives moving toward the development of a comprehensive pan-Canadian strategy for Injury Prevention – one area of focus is injury surveillance. The others include consultations and strategic planning on injury research in partnership with the Canadian Institutes of Health Research (CIHR) and the Canadian Injury Research Network (CIRNet)<sup>16</sup> and on injury programming and policy in partnership with the Canadian Collaborating Centres for Injury Prevention and Control (CCCIPC)<sup>17</sup>.

This background paper is an example of the Centre’s continued efforts to advance the injury component of a network for public health surveillance in Canada. It also serves as the starting point for a consultative process on injury surveillance that is being conducted in partnership with the IBC, SMARTRISK, the Canadian Institute of Health Information (CIHI) and Alberta Health and Wellness.

## Current State of and Challenges in Injury Surveillance

The following sections assess the current state of and challenges in injury surveillance in Canada, within the specific context of the process and outcomes identified in the High Level Surveillance Model (Figure 1):

- Data collection;

- Integration;
- Analysis and Interpretation; and
- Surveillance Products and Dissemination

## **Data Collection**

There are a number of available routinely-collected data sources on injury in Canada. Table 5 depicts the relationship among these data sources at the national level only, according to the injury severity reflected in the data and the amount of detail or quantity of injury information that it provides.<sup>18</sup> The data sets are administered by five different organizations. Data holdings for the care of people with injuries reside in the health sector, whereas data on the circumstances surrounding injury events are held by many sectors, including health, transport, justice and consumer goods/manufacturing. Specific jurisdictions, such as Alberta, have information in addition to that shown.

The accumulation of data in many diverse systems, across jurisdictions and industrial sectors not only reflects the multi-sectoral nature of the responsibility for injury surveillance, but also presents a formidable challenge. Because these systems and sources were developed independently, and often for purposes other than surveillance, they are poorly integrated and use different standards and definitions.

Data on the type and extent of injuries and their treatment and management are generally collected in health information systems. Data on the actual injury events - such as traffic crashes, fires, investigations involving interpersonal violence, and work related injuries - their circumstances and causes are usually documented in information systems that are managed by a variety of other sectors. Their data are held in the data systems of a wide range of organizations and institutions, such as transport, justice and insurance companies. Information on the indirect causes of injury, including determinants of health such as societal factors, are typically found in large general population surveys such as those conducted by Statistics Canada or the Rapid Risk Factor Surveillance System (RRFSS) in Ontario, conducted by public health units.

**Table 5 Overview of National Surveillance Data Sources\***

	<b>Fatal Injuries</b>	<b>Serious Injuries</b>		<b>Injuries Treated in Hospital Emergency Departments</b>	<b>Other Treated and Untreated Injuries</b>	<b>Injury-Related Impairments and Disabilities</b>
		Severe Trauma	Hospitalized			
<b>Minimum Detail</b> Population-based Surveillance	Mortality data from Death Certificates	National Trauma Registry – Minimum Data Set		National Ambulatory Care Reporting System <sup>+</sup>		
<b>Moderate/Expanded Detail</b> Using Samples	National Coroner Medical Examiner Database <sup>@</sup>	National Trauma Registry – Comprehensive Data Set <sup>+</sup>		Canadian Hospitals Injury Reporting and Prevention Program		
<b>Moderate/Expanded Detail</b> Using Periodic Collection					Canadian Incidence Study of Reported Child Abuse and Neglect	
<b>Moderate/Expanded Detail</b> Focus on Specific Injury Types	National Surveillance System for Water-related Fatalities	Canadian Agricultural Injury Surveillance Program <sup>#</sup> Traffic Accident Information Database <sup>#</sup>				
<b>Population Surveys</b>		National population health surveys (Canadian Community Health Survey (CCHS), etc.)				Health and Activity Limitation Survey

\* Adapted from Herbert M and Mackenzie SG. Model of an injury surveillance system. Health Canada. Personal correspondence.

@ Data source is under development

+ Data source developed; not yet implemented in all provinces.

# Also collect information on fatal injuries.



The ISSG's "Inventory of Injury Data Sources and Surveillance Activities - March 2003" describes national and provincial/territorial data sources available to support the surveillance requirements for injury prevention and control. Currently, the inventory lists 57 data sources and organizations that handle and provide injury data.

### **Minimal Data Set Initiative**

In 1998, a group of national and international experts met in Ottawa to assess the feasibility of a "minimal data" approach to guide surveillance in Canada. They concluded that population-based systems for non-fatal injuries were affordable and, therefore, sustainable if restricted to a small number of critical variables. The use of standard data elements would:

- Permit comparisons internationally and inter-jurisdictionally at the local, regional, provincial/territorial levels;
- Support monitoring and priority setting; and
- Could provide a foundation for local emergency department monitoring.<sup>19</sup>

The World Health Organization (WHO) has developed recommendations for the structure of minimal, optional and issue-specific supplementary data sets (Figure 2). Considering and agreeing on standard definitions and approaches to these recommendations would be a major step toward improving injury surveillance in Canada.

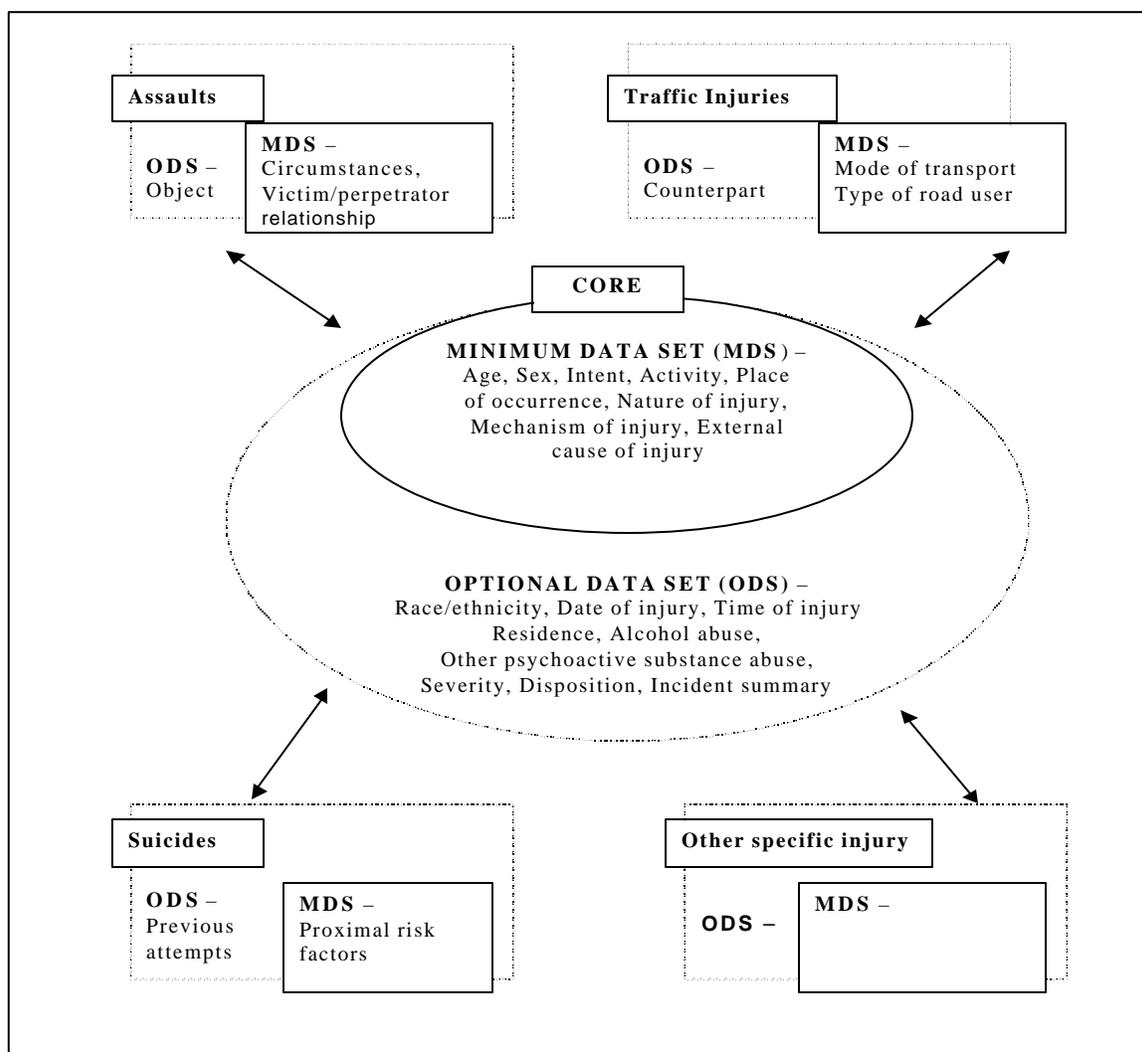
### **Data Collection Challenges**

The primary challenge facing the collection and reporting of data for injury surveillance lies in the need to meet a very diverse range of needs. These needs include, but are not limited to:

- Information on injuries across a range of severity - not only fatal and very serious injuries but also minor and frequent injuries, such as playground and sports-related injuries.
- Better exposure data to allow for the calculation of exposure-based rates to provide a more accurate description of the magnitude of specific-injury issues. For example, calculating motor vehicle crash injuries per licensed driver or per 1,000 km driven is more precise than injuries per 1,000 population.
- Population-based data for calculating rates for the entire population and for major subgroups, supporting comparisons at many levels.
- Detailed information on the circumstances of specific types of injuries or injury events, such as fires, motor vehicle crashes, suicides, spinal cord injuries and poisonings. Particular gaps of note include data on sports and recreational injuries and the long-term outcomes of injuries.
- Standardized information on the characteristics and treatment of severe injuries (e.g., severe burns, serious head injuries).

- Information on both intentional and unintentional injuries.
- Economic variables for cost estimates.
- Information on the characteristics of those living with long-term impairments and disabilities.

**Figure 2 Building Block Data Sets (Injury Surveillance Guidelines, WHO, 2001)**



- Availability of data at the national, provincial/territorial, regional and local levels to support primary prevention (preventing injury events), secondary prevention (mitigating the nature and severity of injury) and tertiary prevention (timely and appropriate medical care and rehabilitation).

At the present time, while most health data are aggregated at the provincial or national levels, information on the underlying causes of injury is primarily located at the local level (though some is at the provincial and national levels). Perhaps the greatest beneficiary of an enhanced capacity to link

data sources, then, would be at the local level – the point where most injury prevention initiatives take place. Local networks need local data to help them generate awareness, motivate networks for injury prevention in communities, and assist in planning and evaluating the success of local prevention efforts.

## **Injury Surveillance Integration**

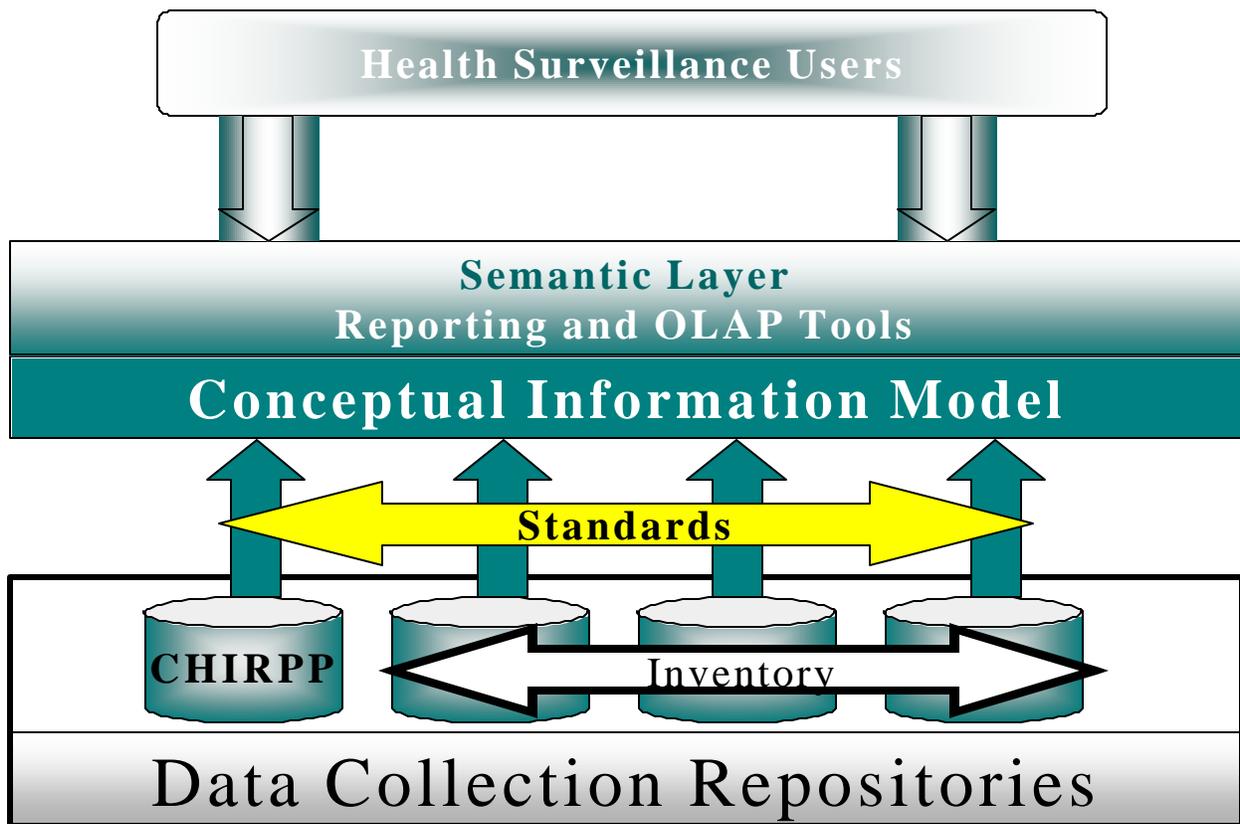
The “Current-Day Injury Surveillance Data Collection Vignette” (page 12) reflects the current lack of integration in injury surveillance: data sources cannot be linked to construct a consistent and complete data picture of injury across police, ambulance, emergency medical treatment and rehabilitation data sources. While most jurisdictions are examining access-to-information legislation, no national data-access and data-sharing standards currently facilitate the linking of inter-jurisdictional (e.g., federal, provincial/territorial and local) and inter-sectoral (e.g., health, transport, corporate) data sources to support injury prevention and control.

The scope of interest, range of severity and volume of injury events in Canada preclude the possibility of a single source or program to gather all information needed for comprehensive injury surveillance. Even a fully realized electronic health record would not necessarily extend to all the data pertinent to injury surveillance. In practice, population-based surveillance is limited by the lack of capacity to integrate data; it is conducted only for fatal and severe injuries; and it is limited in detail because it is restricted to limited number of variables within each sector.

Table 5 shows that injury surveillance can encompass a wide variety of data sources, such as the Mortality Database from Statistics Canada, the National Trauma Registry from CIHI, the Canadian Hospitals Injury Reporting and Prevention Program from Health Canada, the National Surveillance System for Water-Related Fatalities from the Red Cross Society, and the Traffic Accident Information Database from Transport Canada. While this approach presents a framework for depicting distinct data sources, any potential enhancement for integration at both the data and systems levels requires advances in the establishment of, and communication and connection among, common data elements.

The Conceptual Information Model (CIM) represents one step in the progress toward both enhancing data integration and fostering the development of interoperable data elements across data sources (Figure 3). The CIM’s purpose is to create a common framework that defines and describes data and information for health monitoring, surveillance and alerts. This approach, which originates in information technology, provides the “what” and “how” between surveillance databases - such that concepts, relationships, processes and resources can be specified as a platform for building enhanced integration of injury surveillance systems and data elements. In other words, the CIM may serve as a “screen” between the various sources of data with their differing standards and the various analytical tools used by injury surveillance stakeholders.

**Figure 3 Role and Function of Conceptual Information Model (CIM)**



Note: OLAP = On-line analytical processing tools

### Conceptual Information Model (CIM)

The CIM can be considered as a means for integrating data models for surveillance at a high level. As such, it is more about promoting the utility of a standard nomenclature and standard definitions than about promoting the adoption and support for any specific national database.

The purpose is to create a common framework for defining and describing data and information for health monitoring surveillance and alerts in order to make sharing information easier. As such, the CIM represents a model for aiding the organization of related pieces of information that may be widely distributed in a broad array of specific contexts.

As a tool for facilitating the process of building standards, applying CIM to injury surveillance may hold potential for contributing to a distributed surveillance system from the existing data sources identified in the national “Inventory of Data Sources and Surveillance Activities – March 2003” and future data holdings.

## Analysis and Interpretation

Once surveillance data are collected and an integrated system is established, the data need to be analyzed and interpreted in order to be useful. This not only requires specialized skills, but also a standardization of approach to foster inter-regional, inter-jurisdictional and inter-sectoral consistency and collaboration.

Few regional centres in Canada possess these requisite skill sets. As well, few formal educational opportunities address the needs of injury prevention and control; and those that do exist are often limited to metropolitan areas with few distance-learning opportunities. Two current initiatives that may provide opportunities to build upon are the Canadian Injury Prevention and Control Curriculum<sup>20</sup> and the Skills Enhancement for Health Surveillance Initiative<sup>21</sup>, which will include an e-learning course on injury surveillance.

However, even where the skill sets do exist, there is little interaction between jurisdictions or sectors and very little infrastructure to support a standardized approach. In order for a national surveillance system to meet the needs of injury prevention, interaction between surveillance scientists, researchers and decision makers responsible for programming and policy is absolutely necessary.

Currently, no national forum brings together coordinating bodies such as Statistics Canada, CIHI, Health Canada and Industry Canada with the Canadian Injury Research Network (CIRNet), the Canadian Collaborative Centres for Injury Prevention and Control (CCCIPC) and other groups. This gap limits discussion and the potential coordination of:

- Data and information management standards;
- A communications infrastructure;
- Policy agreements on data access and use; and
- Perhaps most significantly, a place to build commitment among stakeholders to develop and maintain a distributed network of information systems supporting injury.

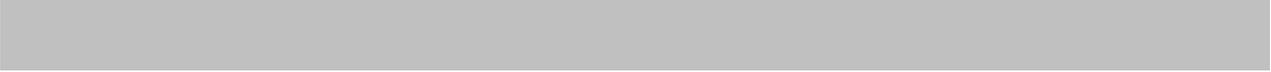
One particular kind of data interpretation involves the development of injury indicators. Indicators link program impacts to health outcomes and can shape the development and implementation of prevention programs. Sixty-seven performance indicators related to health status, health outcomes and quality of service have been identified for the Canadian health care system. Of these, only one deals with injuries: potential years of life lost (PYLL) for deaths due to suicides and unintentional injury. Other indicators that are relevant to injury prevention are needed in order to provide additional relevant information to senior policy makers in government.

## Surveillance Products and Dissemination

Currently, the generation of injury surveillance products and dissemination to those who need to know is limited to a series of independently conceived and produced national and provincial research reports from Statistics Canada, Health Canada, CIHI, Transport Canada, Justice Canada and several provincial jurisdictions. No national clearing-house exists for information related to injury prevention and control

programs and activities that work, and some provincial and territorial jurisdictions have not yet identified injury as a specific issue to be targeted by surveillance, research, and prevention and control initiatives.

In addition, when developing surveillance products for dissemination, a user's needs and intentions in applying a surveillance product are often not considered. Generally, data collectors are currently unaware of what people need, use or understand. Standardized approaches for delivering injury information, as reflected in Tables 1 and 2, clearly do not meet the needs of a community stakeholder and require further discussion and refinement. The processes for including policy developers and program managers in the development of surveillance systems are still in their infancy and need to be further developed.



## Options for Enhancing Injury Surveillance Capacity in Canada

Given the current state of injury surveillance in Canada and the challenges associated with enhancing its capacity, there is an urgent need to establish a national agenda. The first step requires discussion about the available options for action within some type of framework.

No single scenario depicts the ideal solution and an integrated and comprehensive surveillance system for injuries can be achieved in a variety of ways and through a variety of technical options. As a way for stimulating thinking, the following vignette offers one example of how an ideal system might function.

### **Ideal injury surveillance vignette**

Joe, an 18-year-old who has recently qualified to drive on his own, has just driven his friends home from the high school sports banquet. As required by the terms of his graduated driving license he has not consumed any alcohol, but it is raining heavily, visibility is not ideal and Joe has not lowered his speed to adjust for poor driving conditions.

Driving in the other direction is a 55-year-old man, an habitually heavy drinker, who has already lost his license but continues to drive when impaired, as he is doing tonight. He swerves to avoid something he imagines on the side of the road. This takes his van directly into Joe's path, the vehicles collide, Joe's car crosses the shoulder of the road and rolls over down an embankment. Even though he is wearing a seat belt Joe sustains multiple injuries.

A passing motorist calls 911 on his cell phone. Police and paramedics arrive promptly and Joe is transported to hospital by ambulance. The police use the unique event identifier number generated by 911 through their electronic notepad. This unique number is used by all responders/caregivers involved with this crash event. Police-sector records will have data that includes but not limited to, GPS location, weather conditions, roadway characteristics, skid marks, vehicle positions, vehicle makes, models and identification numbers (VINs), driving history of both drivers, and blood alcohol level of the second driver. The unique event identifier is electronically transferred to the electronic hand-held devices used by all responders/caregivers involved either directly or indirectly with the event. For example, the unique event identifier will be included in additional files created by the insurance adjusters and the prosecutors.

The paramedics generate identifiers for each of the individuals involved. Each responder enters data appropriate to his/her area of expertise and responsibility. Significant allergies or other medical alerts are beamed from the central server and flagged for the paramedic either by the individual involved in the crash or when the paramedics enter the person's medical number into their electronic hand-held device. As well, the paramedics will record pertinent data on Joe's initial condition and immediate medical assessment (such as time, level of consciousness, vital signs, etc). This information is sent to the hospital

where Joe will be taken to help the hospital staff anticipate what care will be needed. The paramedic data units may be able to collect data from voice signals.

The paramedics take Joe to the nearest hospital where he is treated by the trauma team in the emergency department, and then taken for surgery. He has suffered a serious head injury, a ruptured spleen, several fractures and other minor injuries. His stay in the hospital will be more than two weeks, and this will be followed by a long period of convalescence and rehabilitation. Joe's hospital record will document in-detail his injuries, medical procedures, treatments, medications, length of stay, and referrals for home care and physiotherapy, and it will contain the unique event identifier. He will have additional medical files with his specialists and family physician that document his recovery. The event identifier will be captured in all electronic records.

The files from all responders/caregivers will be uploaded to central servers at the community level dedicated to the emergency response systems during or, at the latest, at the end of their work shifts. Should there be a later need, a link to the 911 call can also be made. The central servers have been programmed to allow access to segments of the data for the various sectors, such as 911, police, fire and paramedics. As other sectors not involved in the initial emergency response require data for action (hospital records, justice system, coroners, transport) the unique event identifier for the event is maintained and becomes part of the record (this can enable later linkage). An alert is sent to the Ministry of Transport notifying them that this is the third incident that occurred on this stretch of the road. Protocols for access and data sharing have been previously established among sectors. As a result, those working in transport can acquire population data on the typical injuries that are associated with a particular type of traffic collision and advise on vehicle design modification more quickly than before.

The software to support and guide data collection has been developed primarily to meet the needs of each sector (such as the information needed and used by the paramedics at the scene), to use standard data definitions across sectors, and to meet the needs of business processes across the sectors.

When Joe is in rehab, the staff advise him that 85% of people with his type of injuries will require modifications to their homes. In addition, the caregiver provides him with forms to apply for a grant to help offset the costs of modifying his home.

Discussions regarding the development of the framework should address, but not be limited to issues around :

- Data Holdings and Linkages
- Capacity and Skills
- Communication
- Interconnectivity
- Surveillance Products

Many options for action are available – the following merely represent a starting point for discussion. They are not mutually exclusive, nor will it be possible to implement them all simultaneously.

## Starting Point for Data Holdings and Linkages

Injury surveillance in Canada could be improved through such actions as the following:

- Defining the policy and program issues to be addressed, and standardization of the indicators to be measured;
- Defining and disseminating the number and types of variables for which data are collected;
- Articulating the number and types of variables for which data need to be collected within and between sectors;
- Identifying opportunities for building an existing data collection programs;
- Where appropriate, removing barriers to accessing establish data holdings, and
- Increasing the communication around what information is needed from one sector to another

## Starting Point for Capacity and Skills

Some options for enhancing and building capacity for injury surveillance in Canada include the following:

- Consulting with surveillance development initiatives for other health issues to identify the lessons that might be learned from other areas, such as communicable disease;
- Enhancing regional surveillance capacity by pairing stronger jurisdictions with those in early development stages, and
- Developing and enhancing educational resources for injury epidemiology and injury surveillance (some of these resources should be part of college and university curricula and others should be in the form of continuing education for practitioners).

## Starting Point for Communication/Coordination

- Identifying specific goals, scope, budgets, time-lines, tasks and key milestones as a foundation for developing a national injury surveillance strategy;
- Maintaining a forum to develop roles and responsibilities for enhancing the flow of information to improve injury prevention and control activities in Canada;
- Developing a periodic national injury surveillance report (perhaps modelled on the CIHI 'Health Care in Canada' series) to address progress on critical issues, such as:
  - What would an adequate injury surveillance product consist of?
  - What is the function of an injury surveillance system?
  - Where would data and reports go?
  - What audiences would be served?
  - What are the specific needs of these audiences?

- Supporting the development of a forum to increase awareness of issues and initiatives being worked on in the area of injury prevention – this could include research, prevention initiatives in addition to surveillance.

## Starting Point for Interconnectivity

Interconnectivity involves the creation of legislation, standards and linkages. Options to consider for interconnectivity include:

- Identifying priority areas for standard development and maintenance work to begin;
- Knowing the business processes in each sector and where they do or should interface with another;
- Developing guidelines for specifying core, minimum and optional data sets for Canada. (International guidelines, such as those published by the WHO, the International Classification of External Cause of Injury and the minimum datasets developed by the European Union, may provide a structured approach to developing standards for these data sets);
- Applying the CIM to injury surveillance in order to enhance data integration of systems and data elements between sectors;
- Expanding the current inventory of surveillance data sources and surveillance activities for local initiatives and include an inventory of legislation;
- Establishing 3 additional indicators that better reflect the burden of injury in Canada that can be used by all provinces/territories and the federal government in their accountability frameworks;
- Conducting an environmental scan of injury indicators in Canada and other countries to enhance the development, validity and use of injury indicators, with specific consideration of:
  - Developing a matrix of mortality and morbidity indicators common to federal, provincial and territorial injury reports;
  - Developing a matrix of injury-related indicators (non-medical determinants of health and environmental factors) common to nationally and provincially-based surveys; and
  - Developing national indicators and a reporting guidebook.

## Starting Point for Surveillance Products

Enhancement of surveillance products needs to build on the current status and also look further a field to successes in other jurisdictions and health issues. Options include:

- Improving ability to create better products, and

- Acknowledging the needs of the intended audience. (Although interpreting the data is often complex, this process must start by understand the information needs of those who need to know.)

## Conclusion

Ideally, a national injury surveillance system would meet the information requirements across all sectors and jurisdictions, while allowing each to have the ongoing information it needs for its policy and programming needs. In reality, however, resources are limited. Scarcity of resources demands that they be used wisely.

Injury surveillance in Canada could be improved by:

- Knowing the information from one sector that is needed by another;
- Knowing the business processes in each sector and where they do or should interface with another sector;
- Defining and disseminating the number and types of variables for which data are collected; and
- Identifying both opportunities for building on existing data collection programs and where appropriate removing barriers to access.

Developing a comprehensive network of complementary surveillance sources that are accessible and well integrated into the business processes in each sector would ensure that injury surveillance in Canada is affordable – and therefore sustainable.

Clear communication and opportunities for consultation and collaboration with appropriate stakeholders will ensure that the final system meets the needs of its users.

Better articulation of all options and the beginning of a process or prioritization will have to occur for the overall national injury surveillance strategy so that priorities based on current need and available resources can be established.



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# **Appendix**

## **Injury Surveillance Sub-Group (ISSG)**

### **Membership list**

March 2002

**Dr. Shaun Peck**, Chair (2000-2002)  
Deputy Provincial Health Officer  
Ministry of Health  
British Columbia

**Donald Schopflocher**  
Health Surveillance  
Alberta Health & Wellness  
Alberta

**Greg Webster**  
Manager, Clinical Registries  
Canadian Institute for Health Information  
Ontario

**Yvonne Robitaille**  
Senior Epidemiologist  
Direction de la santé publique  
Québec

**Deborah Jordan** , Co-Chair (2002)  
Director,  
Centre for Surveillance Coordination  
Population and Public Health Branch  
Health Canada

**Parminder Raina** , Co-Chair (2002)  
Director,  
Evidence-Based Practice Centre  
Health Information Research Unit  
McMaster University  
Ontario

**Margaret Herbert**  
Chief, Injury Section  
Health Surveillance and Epidemiology Division  
Centre for Healthy Human Development Branch  
Population and Public Health Branch  
Health Canada

**Karin Johnson**  
Research Analyst  
First Nations and Inuit Health Branch  
Health Canada

**Sabit Cakmak**  
Statistician, Biostatistics & Research  
Coordination Division, Healthy Environment  
and Consumer Safety Branch, Health Canada

**Martha Fair**  
Senior Chief, Occupational & Environmental  
Health, Research Section  
Statistics Canada

**Susan Mackenzie**  
Senior Epidemiologist  
Centre for Healthy Human Development  
Population and Public Health Branch  
Health Canada

**Allison Malcolm**  
Mental Health Promotion Unit  
Healthy Communities Division  
Centre for Healthy Human Development  
Population and Public Health Branch

**Morag MacKay**  
Director, Plan-it Safe  
Children's Hospital for Eastern Ontario  
Ontario

**Simone Powell**  
Senior Project Officer  
Division of Aging and Seniors  
Centre for Healthy Human Development  
Population and Public Health Branch

**Alan Hotte** , Secretariat  
Project Manager, Injury Surveillance  
Centre for Surveillance Coordination  
Population and Public Health Branch  
Health Canada

**Caroline da Silva**, Secretariat  
Project Officer, Injury Surveillance  
Centre for Surveillance Coordination  
Population and Public Health Branch  
Health Canada

## End Notes

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- <sup>1</sup> Adapted from Chronic Disease Surveillance in Canada: A Background Paper. Prepared by the Health Surveillance Coordination Division, Centre for Surveillance Coordination, Population and Public Health Branch, Health Canada, July 2003 (Final).
- <sup>2</sup> Bonnie, R.J., & Guyer, B. (2002). Injury as a Field of Public Health: Achievement and Controversies. Journal of Law, Medicine and Ethics, 30, 267-280.
- <sup>3</sup> World Health Organization. (2001) Injury Surveillance Guidelines. Holder Y, Peden M, Krug E, et al (eds.) Published in conjunction with Centers for Disease Control and Prevention (CDC), Atlanta, USA., p. 5-6.
- <sup>4</sup> Health Canada. Economic Burden of Illness in Canada, 1998. Ottawa: Health Canada; 2002. Available at: Health Canada. EBIC On-line. URL: <http://ebic-femc.hc-sc.gc.ca/>
- <sup>5</sup> Indirect costs are defined as the value of economic output lost because of illness, injury-related work disability, or premature death. The three indirect cost components ... are measured in terms of the value of years of life lost due to premature death (mortality costs), and the value of activity days lost due to short-term and long-term disability (morbidity costs due to long- and short-term disability). Other indirect costs, including the value of time lost from work and leisure activities by family members or friends who care for the patient, are not included in this report.” EBIC On-line. URL: <http://ebic-femc.hc-sc.gc.ca/>
- <sup>6</sup> Direct costs are defined as the value of goods and services for which payment was made and resources used in treatment, care and rehabilitation related to illness or injury. The five direct cost components ... are organized and measured in terms of hospital care expenditures; drug expenditures; physician care expenditures; expenditures for care in other institutions; and additional direct health expenditures (including other professionals, capital, public health, prepayment administration, health research, etc). Other direct costs borne by patients or other payers (such as costs for transportation to health providers, special diets and clothing) are not included. EBIC On-line. URL: <http://ebic-femc.hc-sc.gc.ca/>
- <sup>7</sup> Last, J.M. (2001). A dictionary of epidemiology (4<sup>th</sup> ed.). New York: Oxford.
- <sup>8</sup> MJL Kirby (Oct, 2002), Chair Standing Committee on Social Affairs, Science and Technology, The Health of Canadian - The Federal Role (Final Report) Volume VI - Recommendations for Reform, Part VI : Health Promotion and Disease Prevention, Chapter 13 : Healthy Public Policy - Health Beyond Health Care. (Available at URL: <http://www.parl.gc.ca/37/2/parlbus/commbus/senate/Com-e/SOCI-E/rep-e/repoct02vol6-e.htm#ORDER%20OF%20REFERENCE>)
- <sup>9</sup> In a general sense, “interoperable” denotes the ability to operate in conjunction (Canadian OED, 1998). More specifically, it refers to the “...capacity of different information or communication systems to accept, process and forward each other’s information. It has also been defined as (a) the ability of knowledge-based systems to function together in a symbiotic manner and (b) the capacity of different system components and platforms to work together smoothly and predictably.” (Canada Health Infoway CHI Inc. Glossary - [www.canadahealthinfoway.ca](http://www.canadahealthinfoway.ca)).

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<sup>10</sup> In 2000, Canada Health Infoway Inc. (CHI) was granted the mission by the Conference of Deputy Ministers to foster and accelerate the development and adoption of electronic health information systems with compatible standards and communications technologies on a pan-Canadian basis with tangible benefits to Canadians (see [www.canadahealthinfoway.ca](http://www.canadahealthinfoway.ca) ).

<sup>11</sup> Canadian Institute for Health Information. Available at URL: [www.cihi.ca](http://www.cihi.ca)

<sup>12</sup> Gordon, J.E., (February, 1950). Epidemiology – Old and New. Journal of the Michigan State Medical Society, 49;194-199.

<sup>13</sup> The Health Surveillance Working Group (2000-2003) advised the Conference of Deputy Ministers of Health “...on the development of, and to coordinate the implementation of, a national network approach that integrates Canada’s health surveillance networks, promotes the collection of data and its use for health surveillance purposes, builds capacity to undertake health surveillance, and improves access to health information - The Network for Health Surveillance in Canada.”

<sup>14</sup> 2002 Chief Medical Officer of Health Report - Injury: Predictable and Preventable, p.26.

<sup>15</sup> The inventory, currently under evaluation, has been downloaded more than 10,000 times from the Health Canada Web-site and is available at [http://www.hc-sc.gc.ca/pphb-dgsp/csc-ccs/injury\\_e.html](http://www.hc-sc.gc.ca/pphb-dgsp/csc-ccs/injury_e.html).

<sup>16</sup> <http://www.cirnet.ca/>

<sup>17</sup> The IBC and SMARTRISK in partnership with the Canadian Collaborating Centres for Injury Prevention and Control (CCCIPC) are inviting stakeholders from across Canada to provide input into the development of an integrated Canadian Injury Prevention Strategy from a programming and policy perspective. Consultations will be held across Canada between September and November 2003. In addition, ThinkFirst Canada, the Safe Communities Foundation, Safe Kids Canada and SMARTRISK will host a consultation with national organizations interested in injury prevention in September.

Governments, non-governmental organizations, health and safety specialists, First Nations, Métis and Inuit people, business people, community leaders and others have important perspectives on how best to encourage and support injury prevention for all Canadians. Input from all these groups is needed and relationships need to be established or strengthened to help shape an integrated Canadian Injury Prevention Strategy. The Insurance Bureau of Canada has funded these strategy development consultations along with concurrent consultations in the areas of injury research and surveillance.

Input is being gathered in two ways: through strategic consultation meetings and submissions through an online consultation workbook. The input from these consultations and the consultations around research and surveillance will be presented in a workshop at the Canadian Injury Prevention and Safety Promotion Conference to be held in Ottawa on November 23-25, 2003.

<sup>18</sup> Herbert, M.R. & Mackenzie, S.G. (2000). A Model of a comprehensive injury surveillance system. Presented at the Fifth World Conference on Injury Prevention and Control in Delhi, India.

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<sup>19</sup> Mackenzie, S. (1999). Minimum dataset for Injury Surveillance (Meeting Summary Report) – November, 1998 (Ottawa).

<sup>20</sup> This curriculum, developed by the Canadian Collaborative Centres for Injury Prevention and Control does include as part of its core content a section on injury surveillance. For more information on the curriculum contact the project co-ordinator Jennifer Callum at (780) 492-9768 or by email at [jcallum@ualberta.ca](mailto:jcallum@ualberta.ca)

<sup>21</sup> For more information contact Carla Troy, Manager, Skills Enhancement for Health Surveillance, Public Health Training and Applications Division, Centre for Surveillance Coordination, Population and Public Health Branch, Health Canada. (613) 941-8558. [Carla\\_Troy@hc-sc.gc.ca](mailto:Carla_Troy@hc-sc.gc.ca) Also see : [www.healthsurv.gc.ca](http://www.healthsurv.gc.ca) .