Listening for Direction on Injury

Identifying Priorities for Research and Capacity Development in Injury as a Multi-Institute Strategic Initiative within the Canadian Institutes of Health Research

Final Report of the
National Scientific Advisory Committee

April, 2004

Acknowledgements

Appropriately enough, the Listening for Direction on Injury project began with a series of conversations. So first and foremost, the authors would like to acknowledge their indebtedness to Terry Albert and Shaun Peck for starting the conversation, and to Morris Barer (IHSPR) for listening. As time progressed, a number of other individuals were crucial to keeping the conversation going. Robert Conn, held several meetings with Morris Barer and additional stakeholders, which led to formally proposing this initiative. He also met with Paul Kovaks, Stan Griffin, and Barbara Sulzenko-Laurie garnering the support of Insurance Bureau of Canada as a partner on this initiative. Philip Groff drafted the initial proposal to CIHR with support from the listserv of the Canadian Injury Research Network (CIRNet). Cy Frank (IMHA) joined Morris Barer as a second crucial champion within CIHR.

Lynn Warda and Morag McKay, the co-chairs of CIRNet agreed to serve as acting chairs for this initiative until a formal oversight structure could be created. Thereafter, Rob Brison and Cam Mustard served as co-chairs of the National Scientific Advisory Committee (SAC) who, along with a Management Team (See Appendix A for membership of both), provided leadership for this project. These individuals were assisted by invited experts in the writing of this final document including: Louis Francescutti, Parminder Raina, Margaret Herbert, Anna Auer, and Sally Lockhart.

The authors would like to acknowledge the contributions of many staff members who helped make this project successful. Loretta Wong was hired to manage CIHR's involvement in the project and Philip Groff of SMARTRISK took on the role of national coordinator. It is certainly worth noting the work of two additional CIHR project officers: Katherine Gardner who helped put the workshop binders together, helped with registration, took notes, and coordinated logistics at the workshops and Kim Gaudreau who took the minutes for the Montreal workshop. In addition, we would like to acknowledge the efforts of Sofia Tsouros who provided liaison between the management team and IMHA throughout the process, attended all SAC meetings, and the majority of workshops as a representative for that institute. We would also like to acknowledge the assistance of Jennifer Ghadiali, research associate at SMARTRISK, for her work in helping to generate lists of workshop invitees, serving as an initial point of contact for participants, note-taking at both the workshops and at the meetings of the SAC and for coordinating the logistics of SAC meetings.

The workshops were conducted in partnership with local host organizations. Accordingly we would like to acknowledge the contribution of: Mr. Kent Bassett-Spiers (Ontario Neurotrauma Foundation), Kathy Belton (Alberta Centre for Injury Control and Research), Jean-Yves Boucher (CRISE/UQAM), Ralph Nilson (Indigenous Peoples Health Research Centre) and Julian B. Young (Nova Scotia Trauma Program). We are extremely grateful to our facilitator at these workshops, Judy Birdsell.

The authors would also like to acknowledge the assistance of many CIHR staff, who approved, and in many cases provided text on the place of injury within the strategic focus of their institute. Specifically we wish to acknowledge the contributions of: Earl Nowgesic and Laura Commanda (IAPH), Michael Kramer (IHDCYH), Rod McInnes (IG), Ilana Kogan Gombos (IGH), Judith Bray (III), Benoît Lussier (IC), Erica Di Ruggiero (IPPH), Susan Crawford (INMD) and Astrid Eberhart (INMHA).

Finally, we would like to thank Jennifer Callum for her work on coordinating the production of the Injury Times newspaper insert.

Executive Summary

Injury is the leading cause of death for Canadians between the ages of 1 and 44 years and ranks fourth among causes of death for all ages. It is a major cause of premature mortality—the leading cause of Potential Years of Life Lost (PYLL) in Canada before the age of 70. Based on the metric of economic burden, injury ranks fourth, yet among the top ranked disease groups, research spending on injury prevention and control strategies ranks fifteenth.

The burden of injury can be reduced by targeted investments in research. Canadian-based research, international studies, literature scans, and stakeholder consultations each support this premise. Leadership and coordination, and sustained infrastructure support, have resulted in significant gains in combating injury in other jurisdictions.

Similar opportunities exist in Canada where the logical champions for research initiatives on the prevention and control of injury are the Canadian Institutes of Health Research. Injury is explicitly identified in the mandates of several institutes, and is implicit in the strategic focus of many of the others. However, no one institute is the logical home for injury research among the CIHR.

The Listening for Direction on Injury (LFD-Injury) project had as its main objective to seek strategic direction for an injury research program that could have a significant impact on the health of Canadians through reducing the burden described above. The project conceived 'Injury' as a new, high-profile national research focus led by a multi-institute consortium with significant participation from a wide range of Canadian, and potentially international, partners.

The eighteen-month LFD-Injury process of research and consultation brought together researchers, decision makers and programmers from diverse fields within four broad areas: unintentional injury prevention, violence and suicide prevention, acute care of injury and rehabilitation of injury. It was jointly led by CIHR and the Canadian Injury Research Network (CIRNet), with coordination by SMARTRISK and additional support from their sponsor, Insurance Bureau of Canada (IBC). The process was guided by a national scientific advisory committee, and consisted of commissioned background documents, facilitated workshops, a synthesis meeting, and a final report. This document summarizes the key findings emerging from this work, and lays out a strategic plan for a CIHR-led injury research agenda.

Here are some of the key recommendations:

1) That the CIHR take 'Injury' to Phase II as a multi-institute strategic priority. This phase would include a number of activities, including:

a) developing and executing a partnership strategy;

b) developing a knowledge translation strategy;

c) developing and posting a request for applications (RFA) to fund a minimum of five centres of excellence modelled on the Community Alliances for Health Research (CAHR) or the Community University Research Alliance (CURA) grants. These centres would promote interdisciplinary research, capacity building and knowledge translation for injury prevention and control. Phase III funding for these centres would begin in 2005/06 and would be sustained for a minimum of five years.

2) That the CIHR continue to sponsor the initiative through operational support of a national scientific advisory committee (SAC).

3) That the CIHR commission a number of critical synthesis ('state of the science') documents in areas where the LFD-Injury project shows that additional evidence is needed to justify specific priorities where insufficient time was available in Phase I to commission such work.

4) That the CIHR commission an internal review of its peer review committee structure, composition, and processes to ensure that research across the broad injury spectrum as conceived through the LFD-Injury project is not being discouraged or disadvantaged in any way through the absence of natural peer review committee 'homes', inadequate expertise amongst committee members, failure to engage injury research experts in the peer review process, or other impediments.

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Impact of Injury: Articulation of the Problem

Magnitude of the Problem

Injury is an important public health issue in Canada. Injury includes both unintentional injuries and intentional injuries, the latter are the result of interpersonal violence (assault and homicide), or self-inflicted harm (abuse of drugs and alcohol, self-mutilation, suicide). Injury is the leading cause of death for Canadians between the ages of 1 and 44 years (see note to Table 1), and ranks fourth among causes of death for all ages. It accounted for 13,059 deaths in 2000.[1] It is a major cause of premature mortality, often striking down adolescents and young adults. In 1999, injury was the leading cause of Potential Years of Life Lost (PYLL) in Canada before the age of 70 and, following cancer, the second leading cause of PYLL before the age of 75.[1] Rank-ordering injury with other diseases is somewhat misleading, as this tends to mask the fact that the rates for injury remain quite constant across the lifespan, and actually increases in the population over 65 (see Table 1).

Table 1 Leading Causes of Death in Canada (Rates / 100 000)[†]

X	<1 year	1-4 years	5-9 years	10-14 years	15-19 years	20-24 years	25-34 years	35-44 years	45-54 years	55-64 years	65+ years	All ages
All	(541.2)	(29.0)	(15.5)	(19.8)	(56.9)	(64.0)	(72.5)	(132.6)	(303.9)	(835.1)	(4,548.6)	(719.1)
1	Causes of perinatal mortality (249.3)	Unintentional injuries (7.9)	Unintentional injuries (5.6)	Unintentional injuries (7.2)	Unintentional injuries (26.0)	Unintentional injuries (27.7)	Unintentional injuries (20.8)	Cancer (35.8)	Cancer (122.7)	Cancer (380.5)	Diseases of the circulatory system (1,888.9)	Diseases of the circulatory system (264.9)
2	Congenital anomalies (144.6)	Congenital anomalies (3.6)	Cancer (2.8)	Suicide (2.5)	Suicide (12.9)	Suicide (14.5)	Suicide (14.4)	Diseases of the circulatory system (19.9)	Diseases of the circulatory system (71.9)	Diseases of the circulatory system (237.1)	Cancer (1,132.3)	Cancer (195.7)
3	SIDS (42.9)	Cancer (3.3)	Diseases of the nervous system (1.4)	Cancer (2.5)	Cancer (4.2)	Cancer (4.6)	Cancer (9.3)	Unintentional injuries (19.8)	Unintentional injuries (19.4)	Respiratory diseases (38.6)	Respiratory diseases (502.6)	Respiratory diseases (66.8)
4	Diseases of the nervous system (12.4)	Diseases of the nervous system (2.6)	Congenital anomalies (1.0)	Diseases of the nervous system (1.3)	Diseases of the circulatory system (1.7)	Homicide (2.4)	Diseases of the circulatory system (4.6)	Suicide (17.2)	Suicide (18.0)	Diseases of the digestive system (33.7)	Diseases of the digestive system (161.5)	Unintentional injuries (27.9)
5	Unintentional injuries (11.5)	Diseases of the circulatory system (1.4)	Endocrine diseases, etc. (0.7)	Diseases of the circulatory system (1.2)	Homicide (1.5)	Diseases of the nervous system (1.8)	Infectious and parasitic diseases (4.1)	Infectious and parasitic diseases (6.5)	Diseases of the digestive system (12.9)	Endocrine diseases, etc. (29.1)	Endocrine diseases, etc. (161.4)	Diseases of the digestive system (25.4)
6	Diseases of the circulatory system (10.1)	Respiratory diseases (1.3)	Diseases of the circulatory system (0.6)	Congenital anomalies (1.0)	Diseases of the nervous system (1.4)	Diseases of the circulatory system (1.7)	Homicide (2.3)	Diseases of the digestive system (4.6)	Respiratory diseases (9.1)	Unintentional injuries (22.8)	Diseases of the nervous system (148.8)	Endocrine diseases, etc. (24.4)
7	Respiratory diseases (8.1)	Homicide (1.2)	Homicide (0.6)	Endocrine diseases, etc. (0.7)	Congenital anomalies (1.2)	Respiratory diseases (1.2)	Diseases of the nervous system (1.6)	Diseases of the nervous system (3.6)	Endocrine diseases, etc. (8.5)	Diseases of the nervous system (15.8)	Mental disorders (145.4)	Diseases of the nervous system (21.9)
8	Infectious and parasitic diseases (7.0)	Infectious and parasitic diseases (1.1)	Infectious and parasitic diseases (0.4)	Respiratory diseases (0.5)	Respiratory diseases (0.8)	Endocrine diseases, etc. (1.2)	Endocrine diseases, etc. (1.5)	Endocrine diseases, etc. (3.2)	Infectious and parasitic diseases (6.7)	Suicide (14.2)	Unintentional injuries (96.2)	Mental disorders (19.5)
9	Endocrine diseases, etc. (6.5)	Endocrine diseases, etc. (0.8)	Diseases of the digestive system (0.4)	Homicide (0.5)	Infectious and parasitic diseases (0.7)	Congenital anomalies (1.0)	Respiratory diseases (1.2)	Respiratory diseases (2.4)	Diseases of the nervous system (6.3)	Infectious and parasitic diseases (8.2)	Genito-urinary diseases (89.4)	Suicide (12.3)
10	Diseases of the digestive system (5.6)	Diseases of the digestive system (0.6)	Respiratory diseases (0.3)	Diseases of the digestive system (0.4)	Endocrine diseases, etc. (0.6)	Infectious and parasitic diseases (1.0)	Injuries of undeter-mined intent (1.1)	Mental disorders (2.3)	Mental disorders (4.0)	Genito-urinary diseases (8.1)	Infectious and parasitic diseases (37.9)	Genito-urinary diseases (12.1)

[†] Age Standardized Rate per 100,000, both sexes (Health Canada 2000) PPHB Child Injury Section tabulation of 1997 Statistics Canada data. URL: http://www.hc-sc.gc.ca/pphb-dgspsp/publicat/lcd-pcd97/index.html Note that for total injury mortality rates, one must combine the figures for Unintentional Injuries, Suicide, and Homicide. Once one does so, injury is clearly the leading cause of death for those aged 35-44.

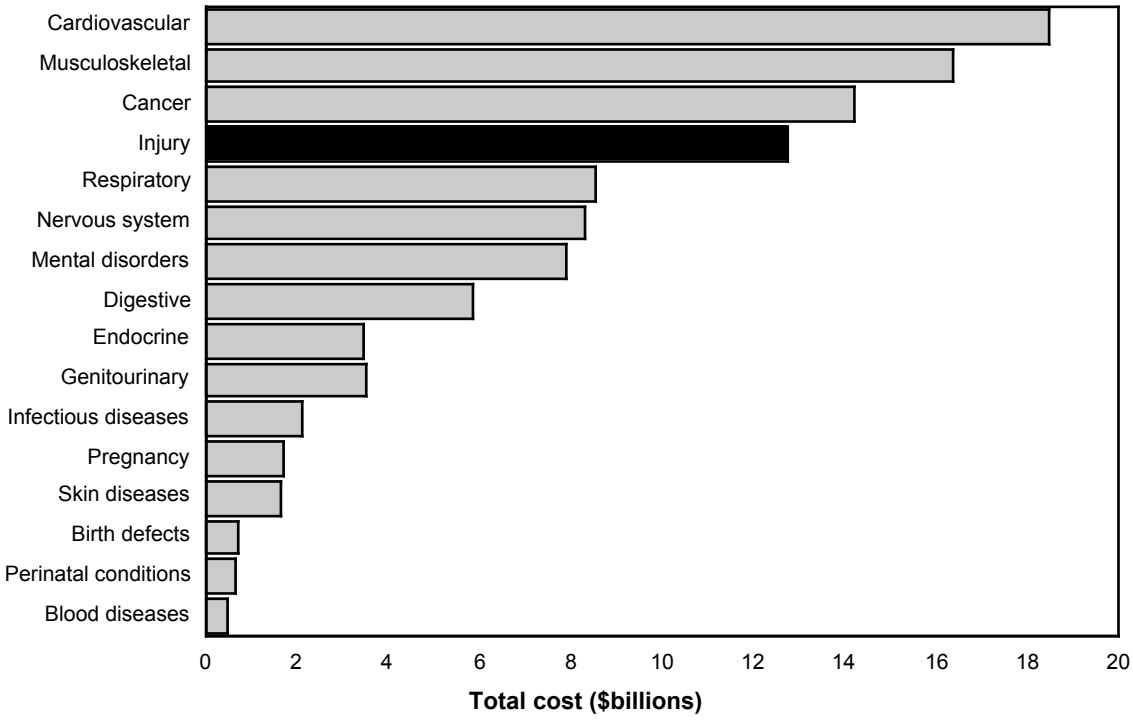
Motor vehicle crashes and suicide are the leading causes of injury mortality. But mortality is only the highly visible tip of the injury iceberg. The toll of non-fatal injury is also high. Between 1 April 2000 and 31 March 2001, almost a quarter of a million people were admitted to hospital in Canada because of injury, accounting for 8.4% of all hospitalizations.[1] Falls predominate among the causes of injury hospitalization and fall-related injuries are particularly frequent among older Canadians. Many more injured persons attend outpatient services such as emergency departments, are never admitted to hospital, but still suffer long-term disability from injury. All too often serious injury results in intellectual deficit due to brain injury, impairments and disabilities including blindness, paralysis and chronic pain syndromes. Injury-related disabilities among seniors frequently deprive them of the independent lifestyles they cherish. For example, one year following a hip fracture, the rate of return home varied from 50% to 75%, with the remaining patients requiring long-term care.[2]

Suicide is a particularly noteworthy problem. Worldwide it accounts for more deaths than war, terrorism and murder combined. Canada, with an annual suicide rate of 14 per 100,000 population ranks in the middle of 22 industrialized countries, whose rates range from 3.4 to 22 per 100,000.[3] Some Scandinavian countries, the U.K. and the U.S., have initiated national suicide prevention programs and are experiencing declining trends. In contrast, Canada has not seen the same decline over the past 10 years. Suicide has overtaken motor vehicle traffic fatalities as the leading cause of injury-related death for some age groups and in some provinces. One of the most disturbing trends is the recent rise in national suicide rates among 10-14-year-old children.[4] Among those who attempt suicide and survive, almost 10% of women and 8% of men try again and, according to World Health Organization estimates, 10% of those hospitalized for a suicide attempt will eventually die by suicide.[5]

Economic Burden of Injury

All of this comes at enormous cost to injured Canadians, their families and our society. Health Canada has estimated the total economic cost of injury in 1998 to be $12.7 billion, or 8.0% of the total economic burden of illness in Canada.[6] Injury ranked 4th among 17 specific diagnostic categories. Another recent economic study estimated that unintentional injury alone costs Canada more than $8.7 billion annually.[7] A New Brunswick study estimated the average cost of a suicide death to be $850,000[8]. Annual costs of hip fractures in Canada are currently estimated at $650 million and are projected to be $2.4 billion by 2041.[9] Economically, subsequent long-term health care costs account for a major proportion of total health costs for injuries such as brain trauma or hip fracture.[9, 10]

Figure 1 Total Costs of Diseases/Disorders, Canada, 1998†



International Comparisons

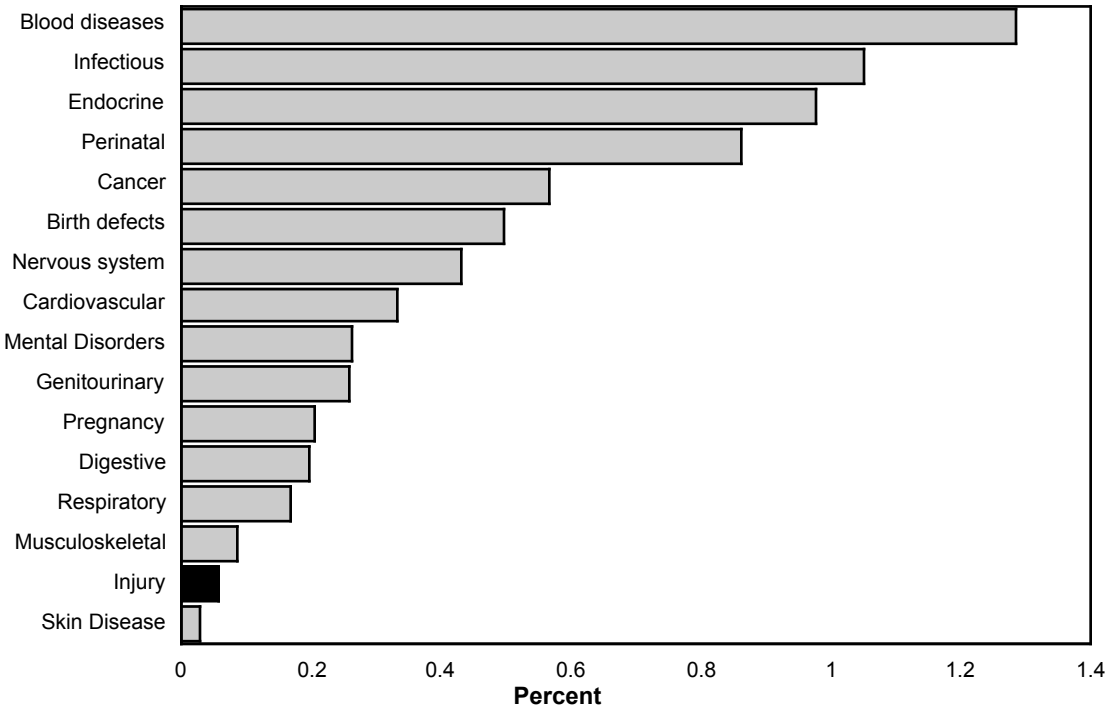
Comparing Canada with other developed countries, reveals that we are not among those with the lowest injury rates. There is considerable room for improvement. An international comparison of mortality rates in 11 developed countries shows Canada with the 5th lowest death rate for injury, excluding adverse events in medical care, and the 7th lowest rate for suicide.[11] UNICEF notes with alarm the high incidence of suicides among Canadian children and teens compared with other industrialized countries.

Modest Investments in Research

One of the reasons that Canada has not realized lower injury rates may lie in its modest investment in injury research. In terms of medical research expenditure as a percentage of total economic burden, injury ranked second-last among all diagnostic categories—a marginal 0.7% of total health research expenditure. This is in marked contrast to the place of injury in terms of contribution to total economic burden of illness, where it ranks 4th (Figures 1 and 2).[6]

† Economic Burden of Illness in Canada, 1998 (Excluding categories ill-defined, other, unattributable & well-patient care)

Figure 2 Research Funding as Percentage of Total Economic Burden, by Disease/Disorder, Canada, 1998[††]



This might be acceptable if we knew that the causes and consequences of injury could not be affected by research. The tragedy of these statistics lies in the fact that most injuries are predictable and preventable. Research has the potential of substantial impact on reducing the health and economic burden of injury. The potential for successful injury prevention, drawn from research findings, has been well documented in the transportation sector. A recent Government of Canada report titled Road Safety Vision 2010 describes the impact of evidence-based interventions, resulting from Canadian research investments, within one domain of preventable injury:

> Traffic fatalities peaked in the early 1970s. Since that time, Canada's population has grown by 40%, and the number of vehicles has increased by 80%. Despite this increased mobility, the number of traffic fatalities has been cut by more than half. This improvement is the result of a combination of factors, including interventions that focused on getting motorists to buckle up and to refrain from driving after drinking, improved vehicle safety standards, safer road designs, improved emergency medical services and tougher police enforcement measures.[12]

There is an urgent need to engage in injury-related research that, when translated into action, will result in further successes.

[††] Ibid

Scope of Injury for this Initiative

For the purpose of the Listening for Direction on Injury (LFD-Injury) initiative, the WHO definition of injury was adopted:

> 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.[13, p.5-6]

Clearly the management of injury from prevention, through treatment to rehabilitation will have to involve many disciplines and sectors. The health care sector has been primarily responsible for the treatment, recovery from and rehabilitation of injury. In contrast, safety and injury prevention have been the mandate of public health, transportation, agriculture, justice, labour and many other sectors. As a number of other CIHR sponsored projects have been examining the issue of patient safety, iatrogenic injuries were specifically excluded from this investigation.

The LFD-Injury process was deliberately structured to reflect this diversity. The objective of this Listening for Direction exercise was to canvass views across sectors and disciplines likely to be able to provide expertise and advice, on research priorities across the injury management spectrum, from prevention, to treatment, through recovery and rehabilitation. But it was more than this. The process was structured so as to elicit those views through a process that brought researchers from many disciplines, injury program personnel and policy-makers from across the four areas of injury, together to talk about synergistic opportunities.

The Potential of Injury Research to Have a Significant Impact on the Health of Canadians

As the delivery of health care moves more toward a model of early intervention, preventive or prospective care, the opportunities to apply new models in the prevention and management of injury are at least as applicable as in other disease groupings. Yet effective integration of many disciplines both within and outside the traditional health care system will be needed if we are to optimally prevent the occurrence of injury and best manage its sequelae. Not surprisingly, with current limited resources the present approach to research on injury is fragmented. Within our current health care system, for example, there is little integration of the disciplines of public health, acute care delivery (including mental health) and post acute care or rehabilitation of those affected by injury. Research models that would integrate these groups as well as strengthen ties with those in education, public policy and industry offer potential to improve the management of injury substantially.

There are examples from the Canadian context where research on injury has made a difference in the lives of Canadians. Canadian research in the transport sector led to the development of seatbelt legislation in various provinces throughout the 1970s. Similarly, graduated licensing has begun to demonstrate significant decreases in the rates of motor vehicle collisions (MVCs) among young and inexperienced drivers,

thanks to translational and evaluation research conducted in Canada, based on models from New Zealand. In the prevention of suicide, an intervention developed and evaluated in Montreal, has essentially eliminated suicide deaths among police officers in that city. Even in terms of basic research, necessary for the acute care and rehabilitation of injury, Canadians have led—for example the development of novel in vitro spinal cord models and studies aimed at the basic pathophsyiology of CNS injury.

Despite the success of initiatives like these, Canadian research also points to how much is yet to be done. Young workers are disproportionately represented in Canadian mortality statistics, an observation that becomes even more pointed and alarming when one examines the data on Canadian children injured on the family farm. There are also clear examples of proven practices for prevention that have not been optimally translated into action in the Canadian context. For example, despite Canadian research pointing to the effectiveness of bicycle helmet legislation in reducing serious injury among cyclists, the attempts to implement such legislation have been inconsistent throughout the country. Proven practices in the prevention of suicide, such as limiting the availability of acetaminophen, have not been consistently implemented in Canada. Research is needed to identify effective interventions where none exist, and to explore the best ways to effectively translate knowledge where they do. (See the appended Injury Times newspaper, for more details on these and other examples of injury research successes and gaps.)

Why Now?

Mobilization of the Issue

The Policy Context

A number of recent Canadian health policy documents have emphasized the importance of prevention in any discussion of renewal of Canada's health care system. The potential of prevention has been highlighted in national commissions undertaken by the Senate[14] and for the House of Commons.[15] There is an opportunity to link a first five years of CIHR research investment in injury prevention and control to potential new resources which have been recommended to be invested in public health and health care delivery services over the same period of time. These new resources, and reallocation of existing infrastructure, will be dedicated to the provision of prevention and treatment services in Canada, a significant fraction of which should be allocated to injury prevention and control. Any new investment in public health and health care services would realize the greatest benefit in improving the health of Canadians if it is linked to a strengthening of injury prevention research and knowledge translation capacity and activity.

In October 2003, the National Advisory Committee on SARS and Public Health released their report *Learning from SARS, Renewal of Public Health in Canada*. It called for a new federal agency to provide national leadership in public health services in Canada, a significant new federal funding commitment to public health and the development of a national public health strategy[16]. The National Advisory Committee's report provides a detailed and comprehensive blueprint for the

renewal of public health services in Canada. This blueprint centres on the recommendation to create a powerful integrated public health agency at the federal level, modelled after the Centres for Disease Control (CDC) in the United States, the Centre for Disease Control in British Columbia (BCCDC) and the National Public Health Institute in Quebec. Within the CDC, injury prevention and control is allocated approximately 2.3% ($124 million US) of the agency's overall budget of $5.4 billion US (excluding homeland security investments). Paul Martin's recent throne speech stated that the new agency will become a reality. When the new Canadian federal agency is established, we would expect a similar fraction of the existing and new federal commitments of approximately $500 million to be allocated to injury prevention programming. This would represent at least $11.5 million. In addition, the National Advisory Committee's report emphasizes the importance of investments in training, research and development and surveillance.[16] Again, following the American model, we might reasonably anticipate that the new federal agency would allocate at least $500,000 annually to injury prevention training, $500,000 annually to injury prevention research and development and $1 million annually to the strengthening of injury surveillance capacity. It should be noted that there are many who are very dissatisfied with the current level of funding for injury within the CDC, and thus we might hope that the proportion devoted to this serious, chronic public health problem might be even greater, when the Canadian centre is established.

Whatever the magnitude, any new federal investments in public health programs will likely be oriented to collaboration and partnership with other agencies, particularly federal agencies, with complementary mandates. CIHR, as the country's leading health research funding agency, is a natural leader, and partner, on the research piece of any injury component of the new public health initiatives. In particular, the return on the investment in public health renewal should be sharply improved through the application of research-based evidence in areas where the potential impact is likely to be greatest, and on effective interventions in those areas.

Canada has the Opportunity to Learn from Other Countries

Many other jurisdictions have already made significant advances in injury prevention and control specifically by making strategic investments in injury research infrastructure. In the United States, the CDC was given the mandate to develop the infrastructure to address needs in injury research and prevention. This ultimately led to the creation of the National Center for Injury Prevention and Control (NCIPC) at CDC in the early 1990s. The NCIPC sets a national research agenda for injury using a national consensus process; identifies and funds individual university-based injury control research centres (duration of funding is 5 years, with an opportunity for renewal); and oversees coordination of NCIPC's research with research conducted by other government departments and non-government agencies. The NCIPC currently funds about 10 injury control research centres and 140 investigator-initiated projects, conducts intramural research, and works closely with injury programs in state health departments. This substantial commitment and careful planning has significantly advanced injury control in the U.S. in the past 15 years. Key to the success of this approach has been sustained funding for injury research, with long-term (5 year) awards to injury control

research centres allowing the time needed to develop and evaluate empirically-driven injury prevention and control initiatives. For example, the centre at Johns Hopkins School of Public Health is well known for its community-based injury prevention initiatives targeting home injuries in young children. The Harborview centre in Seattle provided data critical to documenting the efficacy of bicycle helmets to reduce the burden of injury among children and youth.

In Australia, the National Injury Prevention Advisory Council (NIPAC) was established (1997) to provide high level independent advice about injury to the Commonwealth Department of Health and Aged Care and to Health Ministers through the National Public Partnership. The council engaged in a process involving the development of review documents in a series of injury domains, a consultation with injury surveillance specialists on a number of epidemiological studies, and a national consultative process involving injury researchers and stakeholders to inform the development of a report, *Injury: From Problem to Solution*, released in 1999. The report made several recommendations to address short and medium term needs for injury research, including the need for capacity building, training and infrastructure. It also recommended reforms to peer review practices at the National Health and Medical Research Council (NHMRC), and the designation by the council of injury as a priority issue area for funding. In addition, the report argued for ongoing, targeted strategic research funding for priority areas of injury research. These recommendations led to the development of several research centres which have had measurable impacts, not only on research excellence but also on translation to injury prevention and control targets, for example, in the area of motor vehicle safety and the prevention of falls in seniors.[17]

Both the U.S. and Australian examples demonstrate the value of investing in injury research infrastructure, both from the perspective of promoting high-quality research in a traditionally under-funded domain, and in terms of the health-enhancing impact of knowledge translation activities in their respective jurisdictions. In contrast, in the United Kingdom a sizeable investment has been made in establishing injury priorities through national consultations and in promoting injury research and prevention practice through local strategic partnerships, but a prevailing philosophy of devolved responsibility, and consequent lack of central coordination or infrastructure support is believed by some to have resulted in a stagnation of efforts and of effectiveness (See Appendix D for a more detailed international environmental scan). Canada now has an opportunity to learn from these international experiences, which suggest that a key to an effective national strategy for injury prevention and control is strategic investment in injury research infrastructure.

Call for a National Strategy

Injury prevention and control stakeholders in Canada have long called for and worked towards a national injury strategy. Momentum began to build at a meeting held in Edmonton, Alberta, in 1991 that led to the document *A Safer Canada: Year 2000 Injury Control Objectives*. By 1998, injury stakeholders had mapped out steps to build the infrastructure to support a strategy. Since that time, many developments have occurred:

- In June 1999, deputy ministers of health from across Canada endorsed the recommendations contained in a paper prepared by the F/P/T Sub-Committee on Injury Prevention and Control, of the Advisory Committee on Population Health;
- A series of Economic Burden of Unintentional Injury studies have been published in British Columbia, Alberta, Saskatchewan, Ontario, and Atlantic Canada, with a study forthcoming in Manitoba.
- A Health Canada Secretariat was established to support the development of a framework but that function was later eliminated. However, during the secretariat's tenure, the Canadian Collaborative Centres for Injury Prevention and Control (CCCIPC) were formed, and the Canadian Injury Research Network (CIRNet) was created—two coalitions of committed injury prevention professionals.
- Insurance Bureau of Canada (IBC), was assisted by SMARTRISK to make submissions on the importance of injury prevention to both the Romanow and Kirby commissions. In 2002, IBC published a paper entitled *Injury Prevention for Canadians: Essential elements for an effective program*.
- In 2002, SMARTRISK secured support from IBC to facilitate three series of consultative processes across Canada, dealing with the issues of surveillance, research and programming that could inform the development of a pan-Canadian injury prevention strategy.
    - To address the programming issues, a series of national consultations were convened by SMARTRISK, in partnership with CCCIPC, in 2003 to identify priority issues in injury prevention and control. These 11 meetings, held in nine provinces, focused on programming and policy priorities.
    - To address surveillance issues, further national meetings, specifically addressing injury surveillance and data collection, maintenance and reporting, were convened by SMARTRISK in partnership with Health Canada, Statistics Canada, Alberta Health and Wellness and the Canadian Institute for Health Information (CIHI).
    - To address research issues, the Listening for Direction on Injury (LFD-Injury) initiative was led jointly by CIHR, particularly the Institute of Health Services and Policy Research (IHSPR) and the Institute of Musculoskeletal Health and Arthritis (IMHA), and CIRNet, with coordination by SMARTRISK.

The results of all three series of consultations will inform future development of a national strategy for injury prevention and control. The importance of a strong research component to this national strategy cannot be over-stated. Indeed, research results are seen as the foundations on which the success of the rest of the strategy must rest. CIHR is the logical organization to champion this aspect of the national strategy.

Listening for Direction on Injury

The LFD-Injury initiative was patterned after the highly successful "Listening for Direction" priority-setting process led by the Canadian Health Services Research

Foundation during early 2001, in which IHSPR was an active partner. This "Listening" initiative was undertaken under the direction of a national Scientific Advisory Committee (SAC) and a management team (See Appendix A).

The LFD-Injury initiative was intended to further the development of a shared research agenda for injury prevention and control in Canada. The goals of the LFD-Injury initiative were to bring together leading Canadian researchers and decision makers to identify strategic priorities for research, capacity building, knowledge translation and infrastructure support for injury research. These individuals would represent the four content areas that dominate research in injury control. They are:

1. Unintentional Injury Prevention
2. Intentional Injury (Violence and Suicide) Prevention
3. Acute Care of Injury
4. Post Acute Care (Rehabilitation) of Injury

What We Did

First we assembled a national scientific advisory committee (SAC) with representations from the four core areas of injury noted above. We identified for participation on this committee recognized senior researchers with both research expertise in these fields as well as having a breadth of understanding of the challenges involved in seeing applied research find application in programs that would have a direct impact on the lives of Canadians. Background documents were commissioned or developed by the SAC:

- an environmental scan of international efforts at the development of national injury research initiatives and priorities in other jurisdictions;
- a series of brief documents summarizing the current state of the art, gaps and opportunities in each of the four Injury domains;
- a case book authored by SAC members containing examples of the potential value of interdisciplinary work, and particularly collaboration across subsets of the four areas, for advancing the field.

These background documents were used to stimulate discussion at a series of consultation workshops. (The background documents can be found in Appendices D.1—D.7)

Four regional workshops (Toronto, Edmonton, Montreal, and Halifax) and one Aboriginal workshop (Regina) ensured participation in this process by key researchers, programmers, and policy makers. These workshops tool place during October and November in 2003. The objectives of the workshop were to:

- Identify priority areas reflecting injury-related needs of Canadians, where further research investments are most likely to yield health-improving dividends;
- Identify opportunities for synergistic cross-fertilization of ideas, research data and programs, and human resources, from amongst four areas of injury research – unintentional injury prevention; intentional injury prevention; acute care of injury; and injury rehabilitation;

- Bring lead researchers from the many content areas and disciplines together with those active in program delivery and policy to identify key knowledge translation gaps and develop a strategy for effective translation of injury research in Canada;
- Gain an appreciation, through working together on this process, of the contribution of various perspectives and disciplines, to reducing the burden of injury for Canadians.

Broad consultation using a regional workshop format provided the opportunity to bring together researchers from many disciplines representing a great diversity of research interests and expertise, along with representation from groups/agencies dependent upon research evidence for programming and policy development. (The final roll-up report from these workshops can be found in Appendix C, while the participants' list can be found in Appendix B)

A "translation" session with the SAC and a small number of invited advisers, was held at the end of November to craft an action agenda for CIHR, develop the skeleton for a final report from the LFD-Injury process, and begin development of a partnership strategy and identify potential funding partners. The sections below document the results of this translation session and subsequent consultations amongst members of the SAC.

What We Heard

The LFD-Injury consultation process sought to identify priorities for injury research, and ideas about how to strengthen and facilitate the development of interdisciplinary and cross-area collaboration on injury research in Canada. Participants included experts in etiologic research, behavioural and environmental risk factors for injury occurrence, individuals investigating prevention strategies, and individuals working on the reduction of disability and recurrence of injury in those already injured. Research disciplines represented at the workshops ranged from engineering to sociology, with quite diverse disciplines between. All four CIHR pillars were represented in the workshops. The "area of injury" expertise and interests were equally diverse, ranging from fall-related injuries in seniors and children; the primary prevention, treatment and rehabilitation of motor vehicle crashes and their victims; and intentional injury patterns associated with suicide behaviours and assault, to name a few.

There was a diversity of traditional approaches to injury control research and programming represented through the consultations and workshops. Despite this, there was a clear recognition of the tremendous potential inherent in developing new research collaborations with the sharing of skills, insights, and methodologies. This existed within research groups represented as well as groups representing program delivery and public policy agencies.

Priority Themes

1. Need for Improved Surveillance and Evidence Based Priorities

There was agreement that research funding should be directed towards patterns of injury, which if reduced, would have high social, health, and economic impacts. The

need for improved collection of and access to, quality surveillance data on injury occurrence was recognized as essential in identifying the highest impact areas for future attention. In addition, periodic hazard surveillance to examine behavioural and environmental risk factors was identified as important.

Those representing the policy and programming communities were clearly supportive of improving the evidence base on which their decision-making might rest. They are looking to the research community for both direction and collaboration in the evaluation of existing and new injury prevention strategies. They indicated a clear willingness to serve as supportive partners in efforts to improve surveillance, and to increase high-impact research that could be used to inform programming and policy decisions.

The need for systematic reviews in some areas of injury research to help guide strategic investments in new research, was also identified as a priority. Some identified priorities included: falls in children, best practices in social marketing for health promotion, the role of continuity of care in prevention and control of injuries, among others (See APPENDIX C for a complete listing). Such reviews would provide a necessary roadmap to direct funding decisions for CIHR, as well as providing important information to individual researchers looking for areas of work with high potential uptake and impact. Some of this work has already been done in other countries and for some individual provinces. Beyond the direction provided by the priorities noted above, individual researchers and research groups believe that the identification of priority research areas should be based on incidence/prevalence, injury severity and/or disability, economic/social burden and the potential for uptake of feasible intervention strategies likely to reduce any of these. Of note was the near universal view that priority consideration should be given to projects and areas that could capitalize on the obvious potential for collaboration across diverse disciplines and content areas.

2. Capacity Building

A clear need was identified during the workshops, for increased human capacity for injury research in Canada. Despite the substantial burden of injury on society, the number of researchers working in this field and the research funding committed to it, are relatively small compared to fields with an equivalent societal burden such as cancer or cardiovascular disease (Figure 2). The consultation process made evident that there are few researchers in injury with full time commitments to this field and most work independently or in small groups. Many believed this was due to a lack of both dedicated funding and national coordination of injury research.

The provision of training opportunities for researchers and dedicated career scientist support in this field is clearly important. However, to attract and retain researchers, injury research must develop organizational structures that can lead to centres of excellence around important research themes.

3. Building a Research Community around Injury Prevention and Control

Organizational changes that would promote collaboration between researchers and practitioners from the many disciplines comprising injury prevention and control would enhance Canada's ability to make most efficient use of existing injury

research capacity. The LFD-Injury consultation process invited a spectrum of researchers with interests in injury from primary prevention and acute care through to the prevention and management of disability. Participants recognized clear potential for enhancing the scope of their existing research activities and interests through collaboration with researchers with whose work they were unfamiliar prior to their involvement in this process.

Canada also has a strong network of regional trauma centres based in university centres with varying clusters of affiliated qualified researchers working, often independently, within many of the content areas comprising the injury research domain. They utilize a variety of research methodologies and approaches. But there are few current examples of Canadian researchers from different areas of injury research collaborating to make best use of existing data, or to enhance their work through greater sharing of ideas, methods and expertise. There has been some collaboration around unintentional injury between public health researchers and those working in the acute care setting. Less of this is seen in the study of intentional injuries. Although many clinical links exist at the level of acute and rehabilitative care of the injured, very few research networks exist between these groups and those studying primary, secondary and tertiary prevention of injury.

This LFD-Injury consultation did bring disparate groups of researchers together, often for the first time. It also brought them together with those who would be the potential users of the results of their work – program developers, managers, and policy-makers. LFD-Injury workshop participants voiced appreciation for the opportunity to meet and work with representatives of other disciplines. There was widespread agreement that considerable potential exists for enhancing the breadth, sophistication and quality of research through sharing of ideas, methodology and knowledge, particularly relating to the use of both administrative and patient care data sets. The workshop process itself generated outlines for specific interdisciplinary research projects. Some examples of areas where potential for collaboration was seen are identified in Table 2. Some specific illustrations of how such projects could be developed can be found in the Casebook (See Appendix D.7).

Table 2 Areas for Potential Collaboration Identified in LFD-Injury

Mechanism of Injury Domain*	**Target Population at Risk**	**Anatomical Locus of Injury**	**Behavioural Dimensions** ALL
MVC ARU Falls AIRU Self inflicted AI Assault AI Sports/recreation (e.g. drowning) ARU	Children ALL Youth ALL Young workers ARU Older adults ALL Rural ALL Aboriginal AIU Gender ALL	Traumatic Brain Injury ALL Hip fracture ARU Soft tissue injury ARU Spinal cord ARU	Risk Behaviours (etiology, variation, risk management) Psychosocial sequelae Attitudes & behaviours Supervision & care giving

* Domain refers to the initial injury domain(s) identified as having an interest in this area of research with the following code: A = Acute care of injury; I = Intentional injury prevention; U = Unintentional injury prevention; and R = Rehabilitation of injury. Those topics marked "ALL" were initially voiced by all groups.

4. Behavioural Research in Injury Prevention

One specific research priority often mentioned was the need to better develop behavioural research in injury prevention. The needs identified here included the following:

- Improved identification and understanding of risk-taking behaviours;
- Investigation of the role of risk factor modification and strategies in facilitating behavioral change, for example in the study of alcohol use behaviours, was particularly cited;
- A better understanding is needed on how to affect the uptake of change in attitudes and behaviours in populations with respect to the perception of risk for injury and acceptance of strategies for prevention. This issue was raised at all workshops and particularly at the aboriginal workshop;
- Investigation into the importance of supervision of those at risk, and safe environments, in preventing injury. This was cited particularly for children, the elderly and the workplace. However, understanding what comprises appropriate or necessary supervision requires more investigation and evaluation
- Drawing on the extensive bodies of evidence from outside the field of injury, for example that related to tobacco use and control, in understanding the changing of attitudes and behaviours related to injury

5. Knowledge Translation

Researchers, acute care providers, rehabilitation providers and those responsible for injury programming and public policy recognized the need for knowledge translation (KT) research. Many examples surfaced of prevention priorities where there was sufficient evidence to support the broad implementation of evidence-based programming into the community. Examples included RIDE programs, bicycle helmet use, car seats for children, exercise programs and prescription drug review in the elderly to prevent falls. A national suicide prevention strategy, effective in other jurisdictions, would address a small number of known, identifiable risk factors associated with suicide mortality. These include limiting quantities in packaging of analgesics, constructing barriers at high-risk locations, instructing physicians in the assessment of clinical depression and providing guidelines for post-intervention activities in schools. Here the research challenge is knowledge translation—identifying the impediments to, and critical success factors for effective uptake of research evidence.

Conversely, there are many strategies that have been implemented in community settings that have yet to be evaluated. Perhaps the greatest potential for the near term reduction of injury in Canada would stem from strengthening links between researchers, clinicians and those in public policy and programming, with the aim of increasing the breadth of evaluative evidence on interventions already in place. This would better enable the design, evaluation and fine-tuning of injury prevention strategies that could then, where appropriate, see more widespread implementation.

6. Leadership

" Injury prevention and control research needs a home in Canada". This message was delivered consistently throughout all stages of this consultation process. Many agencies have existing interests in some aspect of injury research. This is also true within the Institutes of CIHR as well (See below, and APPENDIX E). There are currently a variety of parallel processes that seem likely to yield national leadership on the surveillance and programming fronts. The LFD-Injury consultation process made clear that national coordination of the research piece of this broader strategy is also required and that this leadership logically belongs within the Canadian Institutes of Health Research.

7. Peer Review

Many workshop participants suggested that the small volume of injury research supported currently through CIHR is a product of a number of factors, including the size of the research community, and the perception that CIHR is not generally as supportive of Canadian injury research as some other agencies (including agencies outside the country). Another important reason surfaced during these discussions was the view that injury research does not currently get a "fair hearing" within the CIHR peer review process because research proposals are not reviewed by peers with expertise in injury research. Improving this situation might best be accomplished through the development of a distinct peer review committee within CIHR for injury research. Such a committee would also be a source of valuable consultation to those Institutes supporting research on injury, and could assist in reviewing applications from the injury area to other competitions (e.g. training or knowledge translation).

Injury and the Role of CIHR

Injury as a Strategic Priority

Evidence to support the need for more research in the area of injury is plentiful. The issue will resonate with many of the 13 CIHR Institutes, for which injury-related work has relevance and offers the prospect of knowledge translation successes. The fact that injury in Canada is the leading cause of death for Canadians 1—44 years of age is compelling. But for some special populations the toll of injury is more deeply felt. Aboriginals, seniors, adolescent males and children are particularly vulnerable populations when it comes to injury.

Injury and the Institutes

Injury prevention research can be thought of as being comprised of two broad categories – research intended to understand risk-taking and the determinants of injury; and research intended to develop and evaluate interventions whose objectives are to reduce the incidence or impact of injury. These types of research will be of interest to, at least, the Institutes of Aboriginal Peoples' Health; Human Development, Child and Youth Health; Gender and Health; Aging; Neurosciences, Mental Health and Addictions; Nutrition, Metabolism and Diabetes; Population and Public Health; and Health Services and Policy Research. In addition, because the

consequences of injury are not discriminating in terms of affected body parts and systems, research on improving the health care system response to injury will be of interest to, at least, the Institutes of Circulatory and Respiratory Health; Musculoskeletal Health and Arthritis; Aging; Cancer; Gender and Health; Infection and Immunity; and Health Services and Policy Research. Finally, basic pathophysiological processes involved in injury and cell death are already core areas of research in several institutes such as the Institute of Neurosciences, Mental Health and Addiction, and the Institute of Musculoskeletal Health and Arthritis. Issues such as the role and control of the ill effects of alcohol consumption in unintentional and intentional injury are particularly wide-ranging in nature, and of interest to a number of these Institutes.

In APPENDIX E we describe briefly some of the specific aspects of injury research that will be of particular interest to each CIHR Institute.

Injury as a Multi-Institute Strategic Priority within CIHR

While each of the institutes has obvious claim to part of the domain of injury research, and indeed, in some cases pieces of injury research overlap the mandates of more than one institute, researchers working in the wide array of injury-related fields believe that injury as a discipline is deserving of a home within the currently defined mix of institutes. International examples of successful organizational structures for injury research have shown it to be a field that benefits from coordinated strategic planning and funding to achieve the greatest translational impact. Accordingly, it is being proposed that injury be developed as a Multi-institute Strategic Research Program in CIHR. The Listening for Direction on Injury process was a consultative process undertaken primarily to identify gaps and priorities and to assess the country's research capacity and ability to respond to those gaps and priorities. In addition, the process was designed to explore potential advances from new cross-area, cross-pillar and cross-disciplinary research collaborations, and develop a strategy for capitalizing on the tremendous potential of injury research, and the leadership of CIHR, for improving the health of Canadians.

A Strategic Way Forward

The Proposed Model

It is proposed that CIHR continue to support injury research as a multi-Institute priority with clear potential to have a significant impact on the health of Canadians and on the demands on the health care system. The institutes have already supported Phase 1, in supporting the current LFD-Injury process. The activities proposed for a Phase 2 and beyond comprise two parts—the support of a few shorter-term priority projects to meet strategic needs and the development of an RFA envisioning a longer-term injury research infrastructure investment.

The eventual goal is for CIHR to fund the creation and five years sustainability of at least five Centres of Excellence for interdisciplinary and cross-theme injury research throughout the country. Each centre would be funded at a level of $500,000 per year, for five years, from CIHR, with expected leveraging through partnerships to a

minimum operating-budget of $1.5 million per centre per year. The budget/proposed activities of a given centre should include training and other capacity building, knowledge translation (including partnerships with organizations with strong community and clinical links), seed/development funding for applications for directed research grants as well as infrastructure/administrative support. The centres of excellence would be patterned after CIHR's highly successful Community Alliances for Health Research (CAHR) grants made during the transition from MRC to CIHR, as well as the CURA grants offered by SSHRC.

Each centre would be selected by a purpose-built international peer review committee. Selection criteria would encompass normal CIHR requirements for excellence, plus clear commitment to a number of specific guiding principles:

- Providing links between researchers and the community, broadly defined to include those with responsibilities for developing injury prevention programs, as well as emergency departments, rehabilitation units and other clinical areas responsible for the care and rehabilitation of injured individuals;
- Development of a clear strategy for effective uptake of research results;
- Creation of links between diverse areas of injury research (e.g. prevention of unintentional injury, prevention of violence or suicide, acute care, and rehabilitation) through an emphasis on collaboration across disciplines, and content areas;
- Ability to work across geographic boundaries;
- Expertise in mentoring and training;
- Capacity to facilitate work in both official languages.

The focus of any given funded centre would be on an area of significant societal burden where there is significant potential for translational impact. However the specific focus could be based on approaches addressing any of a number of categories ranging from mechanism of injury (e.g., a centre focused on motor vehicle collisions), through anatomical locus of injury (e.g., a centre focused on brain injury), to specific patterns of risk and protective factors (e.g., a centre focused on adolescent risk-taking behaviour).

In addition to the creation of these centres of excellence, several shorter-term initiatives were identified as priorities. These include the commissioning of systematic reviews in a number of topic areas identified during LFD-Injury as ready for critical synthesis and the development of a partnership group sufficient to support the longer-term agenda. Finally, the scientific advisory committee is prepared to work with CIHR to develop implementation plans that would address a number of infrastructure issues identified during the Listening process. These include the lack of injury prevention and control expertise in current CIHR peer review committees, and the role of knowledge translation within CIHR in supporting future injury prevention and control initiatives in Canada.

Table 3 Proposed Timelines and Budget

	Phase 2 **2004/05**	**Phase 3** **2005/06**	**Phase 4** **2006-2011**
Scientific Advisory Committee	Convening of reconstituted committee Approval of final action plans, budgets, timelines, and evaluation framework for next five years Commissioning and oversight of systematic reviews. Development of partnership strategy and language for RFAs	Operational oversight of launch of CIHR supported injury CAHR teams Addition of partners to partnerships consortium	Operational oversight of CIHR multi-Institute strategic initiative Strategic planning for subsequent phases of CIHR multi-Institute strategic priority Ongoing development and maintenance of partnerships consortium
Systematic Reviews	Topics identified early in 04 by topic area expert committees. Development and funding of review teams	Collection, synthesis and dissemination of reviews Funding of consensus conferences on reviews	Dissemination of consensus documents Ongoing cycle of review funding, etc., as necessary
Infrastructure Discussions	Peer Review Process and Knowledge Translation discussions	Partnerships established with international agencies (peer review across borders)	Launch of dedicated Injury Prevention and Control Peer Review Committee
Centres of Excellence	Writing of RFA(s)	Letters of Intent (LOIs) for development grants for those wishing to respond to full RFAs RFAs for 5+ Centres	Funding for 5 years from CIHR with partners
Approximate Budget	$150k CIHR admin support, SAC meetings, etc. $150k commissioning of systematic reviews + liaison with KT unit	$150k admin $150k for synthesis workshops	$100k admin/yr + $500k/centre/year from CIHR, with additional funding from partners to a minimum of $1.5M /centre/year.

Immediate Action for 2004/05

The most immediate concern is to maintain the momentum and to continue the work begun by the Scientific Advisory Committee of the LFD-Injury process this year, converting its membership and roles to one of oversight of the longer-term Strategic Multi-institute Injury initiative. The committee will need to meet a number

of times over 2004/05, and to have budget for these meetings as well as for recruiting of additional members, commissioning systematic reviews, and some flexibility to develop new ideas.

The first order of business for the newly formed committee will be to finalize work-plans, budgets and timelines for the next phase of the initiative. In addition, expert panels will need to be set up to select the topics for systematic reviews, and to develop the RFPs for those reviews. Finally, a team to analyze peer review, and make recommendations to CIHR to address needs for greater injury expertise in the peer review process and another to provide liaison with CIHR's KT unit, will need to begin work, under oversight from the SAC.

Governance

Throughout the life of the next phases of development of injury research, governance would be provided by a national Scientific Advisory Committee. Initial membership on this committee would likely come from current LFD-Injury SAC members willing to continue service, though the first order of business for the new committee would be to recruit additional members from partnering organizations (for example, SMARTRISK has offered to continue providing management support for this committee) and other important stakeholder groups, and additional or alternate representatives from each of the four injury research areas. This committee will consist of 10-12 members, and meet quarterly, with listserv facilitated communication between meetings.

Partners

The committee acknowledges that an investment of $500,000 per year will be inadequate for any given centre to successfully pursue the full scope of the envisioned mandate. It also recognizes that an overall investment of $2.5 million/year for strategic priorities in injury research, capacity development and knowledge translation, may be beyond the capacity of CIHR, at least in the medium term. Therefore, a necessary component of the short term work in the next phase will be the ongoing development of a partnership strategy that would leverage the $500,000 invested by CIHR in each centre, by a factor of 3 or more.

Above and beyond the necessity of additional financial partners, a comprehensive partnership strategy would provide a means to build relationships with organizations that will prove crucial to each centre's translational success. This strategy would broaden the base of support for injury prevention and control beyond the health sector. It is anticipated that CIHR will be able to engage a number of national and provincial partners, and that these new centres will be able to bring additional local partners on board as part of their application development process. The approach of nurturing partnerships centrally through a national strategy developed and managed by the advisory committee, rather than requiring that all partners be brought to the table by individual applicants, prevents potential partners (particularly national- and provincial-level) from being approached by multiple prospective applicants. It also prevents the sense of entitlement, which often accompanies grant applications that have already attracted significant external support (though the SAC sees a model that permits and, indeed, encourages,

individual applicant teams to bring financing and knowledge translation partners to the table).

While development of the full partnership strategy will have to await the 2004/05 activities of the reformed scientific advisory committee, a number of potential partners have already been identified, and many have informally indicated an interest in participation. Without any commitments being implied, organizations listed below have either already expressed an interest in potential partnership, or were identified during the LFD-Injury process as potential partners going forward:

- Canadian Agricultural Safety Association (CASA)
- Canadian Association for Suicide Prevention (CASP)
- Canadian Medical Association (CMA)
- Commissions and Boards who are members of the Association of Workers' Compensation Boards of Canada (AWCBC)
- First Nations and Inuit Health Branch (FNIHB)
- Health Canada
- Insurance Bureau of Canada (IBC) & potentially public payers in appropriate provinces (e.g. Insurance Corporation of British Columbia (ICBC))
- National Aboriginal Health Organization (NAHO)
- National NGOs dedicated to injury prevention and control such as SMARTRISK, Safe Kids Canada, Safe Communities Foundation, ThinkFirst Foundation
- Ontario Neurotrauma Foundation (ONF)
- Rick Hansen Institute
- Social Sciences and Humanities Research Council
- The Canadian Red Cross
- Transport Canada
- Trauma Association of Canada (TAC)

Conclusion

The LFD-Injury process accomplished a great deal in a short time. It brought together researchers with diverse content expertise and interests, along with those who would be responsible for the implementation of research knowledge in preventing and managing injury. This process identified many areas where fruitful collaboration across disciplines and areas of injury research seemed likely to produce new advances, and benefits in terms of the health of Canadians.

The researchers, decision makers and programmers participating in this process agreed that Canada currently lacks a comprehensive and effective national injury prevention and control strategy, despite the huge economic, health, and personal burden that injuries to Canadians represent. While parallel efforts to put such a strategy in place are underway, participants were unanimously of the view that the

whole strategy must rest on a base of evidence emerging from new types of research collaboration, and that the only organization in the country in a position to take a leadership role in facilitating the evolution of such new and innovative research consortia is CIHR. This document sets out a vision for a significant CIHR role in the evolution of Canada's injury prevention and control strategy, and proposes some concrete early steps for realizing that vision.

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List of APPENDICES