List of APPENDICES

APPENDIX A Scientific Advisory Committee & Management Team

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APPENDIX C

Listening for Direction on Injury
Summary report from five Canadian workshops

November 2003

Judy Birdsell

Report from a process designed to solicit input across Canada on strategic research priorities related to injury prevention and control.

NOTE:

> This report has been modified from its original format for inclusion as an appendix in this document. The table of contents has been removed, as has the appendix listing the LFDI SAC and Management Team. In addition, various sections have had white-space removed to conserve space. Those wishing to view the report in its original format, can download it from:
>
> www.injurypreventionstrategy.ca

Modified from Original Format for this Appendix by:

Philip Groff

Credit and Acknowledgements:

This 'Listening for Direction in Injury' process was a collaborative venture which included the contributions of many organizations:

- Canadian Institutes of Health Research
- The Canadian Injury Research Network (CIRNet)
- SMARTRISK
- Insurance Bureau of Canada

Special Thanks to the Regional Host Organizations:

- The Ontario Neurotrauma Foundation
- Centre de recherché et d'intervention sur le suicide et l'euthananasie (CRISE)
- THe Alberta Centre for Injury Control and Research (ACICR)
- The Nova Scotia Trauma Program
- Indigenous Peoples' Health Research Centre (IPHRC)

The process was directed by a national Scientific Advisory Committee (SAC) consisting of researchers from each of the four injury areas included in this initiative: Prevention of unintentional injuries, prevention of violence and suicide, acute care of injuries and rehabilitation of injuries. In addition, two scientific directors of CIHR institutes, who are acting as internal champions for the LFDI process are part of this committee. A management team consisting of the SAC chairs, the CIHR ExOfficio members, Loretta Wong (Team Lead from CIHR) and Phil Groff (National Coordinator from SMARTRISK) served as an executive, moving the process forward at the direction of the full committee. (Members of the SAC and Management Team are listed in Appendix A).

Workshops Facilitated by:

Judy Birdsell

On Management Ltd.

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(With Anna Auer for Aboriginal Workshop)

Report Written by:

Judy Birdsell

I. Background to LFDI Process and this Report

This 'Listening for Direction in Injury' process was designed to serve two purposes. Primarily, it was to provide substantive input into CIHR deliberations with respect to injury as a cross cutting theme. Funds have been provided by CIHR and the Insurance Bureau of Canada to undertake this first phase which is primarily to 'build a case' for injury as a cross cutting theme under the CIHR programming approach. Secondarily, it was designed to provide information on injury research needs, as part of the consultative processes informing the development of a Pan-Canadian Injury Prevention Strategy (See www.injurypreventionstrategy.ca for details). Third, it was intended to explore the potential in injury research collaboration across four distinct areas of injury-related research.

This report includes a summary description of key findings from five workshops which were held across Canada in October and November 2003. Four regional workshops were held on October 3 (Central – Toronto), October 10 (Central – Montreal), October 17 (Western- Edmonton) and October 28 (Eastern – Halifax/Dartmouth). In addition one workshop focusing specifically on injuries in aboriginal communities was held in Regina on November 5 & 6 and involved First Nations, Inuit and Metis representatives from across Canada. Detailed reports are available for each of the five workshops held. (See Injury prevention strategy website, above).

A. Approach to Consolidating Information from Five Workshops

This report does three things primarily. It 1) comments on the process overall 2) combines messages heard from all workshops and consolidates them in such a way as to directly address the objectives and 3) comments in an overall sense of some key themes observed not directly related to the objectives.

II. Comments on the Process and Workshops

Participants were invited and represented a range of interests: researchers from different disciplines and involved in research related to different injury areas (intentional, unintentional, acute, rehabilitation); policy makers; program planners; and care providers. There were approximately 30 people participating at each workshop.

The workshop process involved two basic components: 1) Homogenous groups worked in the morning to discuss and identify key gaps in the research spectrum (including areas where new knowledge is needed, areas where critical synthesis is needed, and areas where attention to knowledge translation is needed, and 2) Mixed groups worked in the afternoon to try to identify specific areas where there would be synergy and benefit by varied individuals and groups working together. The homogenous groups in the morning were based on area of involvement in the injury domain (acute, rehabilitation, intentional, unintentional) except in the Aboriginal workshop, where the homogenous groups were formed on the basis of ancestry (Inuit or First Nations).

The Aboriginal workshop was slightly different than the others, as there is already a process underway in that community which focuses on injuries, and

one of their streams of work relates to research. So, this group had already done some collaborative work, and this workshop was designed both to contribute to the LFDI process, but also to their ongoing process of developing a framework for injury research in aboriginal communities.

III. What We Heard Related to the Objectives

A. Objectives for the Workshops

1. To identify key areas reflecting injury-related needs of Canadians where further research would yield health improvements[1].
2. Identify opportunities for synergy and collaboration, connecting with other researchers; Identify opportunities for synergistic cross-fertilization of ideas and research.
3. Bring lead researchers from varied disciplines and those with program and policy expertise together
4. Develop appreciation for various disciplines within injury. Increase knowledge regarding the contributions of others in Injury Prevention

So in general, the purpose of the workshops was to bring people with varied interests and involvement in the injury topic together, to identify potential areas where research could 'make a difference' and perhaps more importantly to begin to explore ways of working together on many dimensions to bring more power to bear on the injury issue.

B. Key Areas for Research Attention

It should be noted that groups were instructed NOT to focus on surveillance and data related issues or on capacity building, as both these topics had emerged in other discussions to date, or were being addressed through a parallel process that would feed into the LFDI report-development. Therefore, the steering committee felt that these topics would be on the list of priorities to be discussed anyway. So, lack of mention of these two topics should not be construed as lack of interest and support from these workshop discussions.

In the workshops, there was a focus on three aspects of gaps: 1) those where knowledge is missing, period; 2) those where there is knowledge but there isn't a critical synthesis of what is known; and 3) those areas where it was felt there is solid evidence about what action or interventions should be taken, but the knowledge is not in broad general use. These three areas are reported on separately below. Of course, the discussions were not quite so nicely separated as is reflected in this report; often the conversation on any one topic vacillated between discussing the knowledge that was still missing, a critical evaluation of what was known, and the need to apply knowledge that is known, even if not completely adequate.

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[1] In the first workshop, we talked of identifying 'priorities'. This was problematic, and in fact, would have represented the input of only some of those consulted across Canada. So we switched to talk about key areas where research was needed, and in combination with that, sought input from participants about what they thought the criteria for selection of priorities should be.

Tables showing the most common topics mentioned in each of the three areas are given below.

New Knowledge Needed

Table 1: New Research Needed: Combined Results from Five Workshops

	New Research Needed*
Unintentional	- Rural/remote/aboriginal populations (contributing factors) - MVC - Perceptions (factors influencing, gender differences) - Risk perception, risk-taking behaviour and risk compensation - Environmental factors (contributions to injury and also contributions to interventions) - Falls - Supervision (including how decisions are made)
Intentional	- Inter-relationships among determinants (e.g. alcohol, divorce) - Suicide in aboriginal communities and in males (Determinants and evaluation of interventions) - Theory development relating to intentional injury at individual and population levels
Acute	- Evaluation of therapeutic interventions (including continuity of care) - Lack of knowledge of mechanisms of injury has implications for prevention and treatment
Rehabilitation	- Methods suitable to rehabilitation research need development - Evaluating varied service delivery models - Outcomes (what are appropriate outcomes; patient perspective; longitudinal studies important; differentiating effect of injury from other factors; key factors influencing outcomes; broad perspective; include psychological sequelae) - Prevention of further injury (intentional and unintentional) in brain injured individuals - Evaluation of interventions (what works?) - Develop criteria for ending treatment
Comments	

* Bolded topics seemed slightly more predominant.

In a general sense, areas identified as representing 'gaps' in knowledge could often be described either as factors contributing to injury (i.e. determinants) or as interventions or approaches to controlling or reducing the impact of injury.

Critical Synthesis

Table 2: Critical Synthesis Needed: Combined Results from Five Workshops

	Critical Synthesis
Unintentional	- Falls in children - How safety culture is developed - Impact of social marketing (for specific targets; public perceptions; - Assess bodies of literature for relevance on other targets (e.g. international literature relevance for Canada; Canadian literature relevance for aboriginal communities) - Effectiveness of policy (laws, policies) - Agricultural risk management - Environmental impacts on injury outcomes (i.e. physical, built, policy, social/cultural, climate).
Intentional	Overlaps in intentional injury research; overlaps in intentional and unintentional, mental health etc (Conceptual synthesis?) - Theories that may enlighten (Durkheim to contemporary)
Acute	- Link long term outcomes to just in time care - Current state of knowledge on outcomes and measurement of same
Rehab	- Assessment of utility of community based approach to injury prevention and control (e.g. a holistic approach) - Effects of social marketing on public awareness, community ownership, etc. - Best practices re discharge planning - Best practices re influencing policy makers
Comments	- Knowledge translation (topic came up in several categories). (What is done in other fields that is transferable; KT between researchers and policy makers;

Knowledge Utilization

Table 3: Knowledge Translation Needed: Combined Results from Five workshops:

	Knowledge Translation Focus
Unintentional	- Participatory research and its ability to contribute to enhanced uptake (and comparing it with other modes, eg. Public awareness and education) - Effective mechanisms for changing public policy - Barriers to implementation of programs or behaviors of known effectiveness - Responsiveness of researchers to policy needs. - How to transfer effective interventions across jurisdictions - Use of hip protectors to reduce injury from falls in seniors
Intentional	- Field trials of known effective interventions and conversion to useable packages - Study resistance to change - Transfer knowledge in violence and suicide - Examples where knowledge is available and not widely implemented: violence and suicide; media reporting of suicide; limiting packet size of analgesics; tracking prescription drugs; depression screening by policy, children's services;
Acute	- Addressing practice variation; - Need definitive statements about current state of knowledge for practitioners - Compare participatory methods to other methods e.g. training consumers - How to show what works and what doesn't in acute care is lacking
Rehab	- Best practices re disseminating research in rehabilitation settings - Gaps in use of cross functional teams to promote continuity of care between acute and rehabilitation
Comments	Montreal group did this exercise in mixed groups and their comments follow: - Cross-sector uptake of best practices (e.g. transfer learning regarding bicycle helmets to snowboarding); - Communications/knowledge translation gaps between researchers and communities (lack of communication to researchers by community groups re. key issues for future research, lack of understanding on part of community groups regarding translating research findings into programs, practice);- - Full face masks in hockey reduce eye and head injury; - Structured exercise programs for the elderly reduce falls; - Bicycle helmet use reduces head injuries; - Regionalized trauma systems reduce injury; - Graduated licensing reduces injury by 15%; - 30 years of mandatory reporting has not reduced the homicide rate of children (so, why are we still doing it?);

	- Drunk driving; - Environmental barriers to suicide (e.g. barrier on bridge); - Comprehensive programs are needed to reduce violence; - Putting limitations on the number of Tylenol (etc..) that an individual can purchase can reduce poisoning; - Intensive collaborative follow-up of suicide attempts reduces recidivism; - Intensive home visitation programs can reduce child abuse (but not injury); - MV – the use of belts reduces injury.

The types of topics arising in the discussion of knowledge translation or those areas where there is knowledge available, but it is not being widely used, tend to be less tightly coupled with the injury domain than topics in the first two areas (knowledge gaps and critical synthesis). For example, field trials of effective interventions and how to transfer effective interventions across jurisdictions could apply to any of the injury domains, or for that matter to any number of other public policy domains.

C. Criteria for Choosing Priorities

Participants in the workshops were asked for their input about what criteria they thought should be used in the process of identifying priorities for research investment. A draft list of criteria was presented based on input that had been received in pre-workshop surveys[2]. On the draft list that was presented to the groups, there were five main categories: Magnitude of the problem (or burden); potential for uptake; potential for building on capacity, potential for collaboration, networking or partnerships; and potential for prevention. This list evolved somewhat as the workshops were held, as increasing numbers of surveys were received. Following is a list of criteria which incorporates the predominant comments made in the workshops.

- *Magnitude*. This was arguably the criterion most often mentioned. Inherent in this 'burden of disease' category are several dimensions:
- *Incidence*. Include consideration of anticipated future magnitude (e.g. aging drivers, extreme sports; demographic trends).
- *Prevalence*
- *Potential for disability*
- *Severity*. It is important to include long term disability, varying impact across life roles,
- *Economic burden*. Consideration be given to dimensions of cost other than health and health care system costs, such as social, family, indirect costs to

[2] These pre-workshop surveys were sent to all those invited to workshops (many of who couldn't actually attend; and were completed by a variety of individuals, some of whom participated in workshops. The analysis of the information gleaned through this pre-workshop surveys has been done separately.

caregivers. The main point here was to make sure not to limit the burden to narrowly defined financial indicators.

- *Potential for uptake*. This criterion received a great deal of discussion. This was partly related to another theme, that potential for uptake should be considered in combination with magnitude of the problem. Several comments related to the potential for implementation of findings, with consideration of barriers, sustainability, etc. There was, however, considerable discussion around the use of the term 'uptake', with some concern expressed about the degree to which this particular criterion should be used (or perhaps the relative weighting given to it). The degree of political will related to uptake of a particular intervention is another factor, as is the potential for enforceability if the intervention of interest is a legal one. Underlying relationships among researchers and those who could potentially use the information is also a factor that has an impact on uptake.
- *Potential for building on capacity*. This criterion received relatively little additional discussion or comment in the workshops. It is not clear whether this is related to the fact that the participants were instructed not to dwell on the capacity building issue. The comment was made about capacity building being necessary among both programmers, end users AND researchers. One workshop suggested that special consideration be given to young researchers ('new entrants') to encourage them to work in the injury area. The potential to create innovative intervention and evaluative tools would also contribute to capacity.
- *Potential for collaboration*. Comments reflecting the nature of collaborations that should be considered in setting priorities referred to those among researchers of different disciplines. There were not many additional clarifications made with respect to this point.
- *Potential for prevention*. Several additional clarifications were made. Suggestions to consider the following were made:
- Primary, secondary and tertiary prevention outcomes in the deliberations
- Level of engagement of programmer partners and public engagement (e.g. assess readiness).

The topics above had already emerged from earlier input and discussions. The topics below are additional criteria that were suggested in the workshops:

- *Filling acknowledged gaps in knowledge*. This additional criterion had broad support across the workshops. Another one receiving support in more than one location was the potential for Canada to make a unique international contribution (e.g. cold climate related).

There were several other criteria suggested by one or two groups: Potential for short term success (the point was made that this would build momentum for injury research); targeting populations of special interest (e.g. specific age groups or vulnerable groups); applicability across 4 CIHR pillars; and generalizability to a larger context.

Criteria for choosing priorities were not explicitly discussed in the Aboriginal workshop. However, the key point was very clearly made that priorities for attention that relate to aboriginal communities MUST be chosen in collaboration (and not just consultation) with these communities.

D. Opportunities for Synergy and Collaboration

Heterogeneous groups in all five workshops were asked to identify specific research topics that were important where they could envision benefits from working across boundaries and with groups and individuals which may not have been the case in the past. The groups developed these in a 'casebook' format which mirrored that which had been developed and used by members of the scientific advisory committee. That is, they attempted to identify the following: General topic area; primary injury domain[3]; specific research question; population at risk; dimensions for collaboration[4], and potential partners. Three examples of 'casebooks' discussed are included in Appendix 2.

The topics addressed by groups across the country included:

- A randomized controlled study of the effectiveness of a comprehensive assessment and multi-factorial / multi-disciplinary intervention in elderly patients who have been admitted to acute care after a fall.
- What are the optimal strategies for prevention and treatment of health injuries in youth sports?
- With respect to single occupant, single vehicle crashes, what proportion are suicide attempts and what factors are associated with intention?
- Are injury outcomes in rural areas a function of severity of injury or service provision?
- What do we know about suicide in the aboriginal population? What factors contribute to suicide in this group?
- Is a multi-factorial approach to falls in the elderly cost-effective?
- How does a trauma 'system' impact on outcomes following fall-related injuries?
- How do we prevent falls on ice and minimize their consequences?
- What injuries do hockey players suffer as a result of 'checking'?

Most of the groups were able to identify several axes for collaboration and identify specific partners. The discussions were at a fairly superficial level, due partly to the milieu and limited time, but often because this was apparently a novel exercise for many of the participants. It was apparent that many had not been involved in substantive collaborative ventures in the injury domain, so there was considerable time spent in several groups finding a topic of shared and overlapping interest.

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[3] Intentional, unintentional, acute response, rehabilitation
[4] Such as injury domain, research disciplines, researcher to community, research to policy etc.

IV. Other Emergent Themes

In the course of the workshops there were several observations that may be relevant to the development of a national research agenda on injury.

Different world views / paradigms or 'ways of knowing' exist in the various communities involved in injury research and control. Examples include the use of the term 'participatory research' to include everything from research that focuses on the evaluation of the implementation of interventions to a model where those affected are integrally involved in all aspects of the research and where an explicit commitment is to persist until positive change occurs in the community of interest. Another example is the varied levels of legitimacy given to research knowledge versus other sources of knowledge, such as from ELDERS in Aboriginal communities. Some participants spoke with conviction about the need for 'theory based' research and this concept clearly meant different things to different people.

Optimism and 'willingness to engage'. Overall, participants engaged with a high level of energy, collaborative spirit and sense of optimism that it was possible to create a national agenda; and there appears to be good support from most parts of the country for contributing to building that agenda and contributing to its accomplishments.

Surveillance. Although groups were instructed not to spend time discussing surveillance and capacity, inevitably these topics came up, and it may be important not to lose the comments that emerged. It was clear at several points in the discussion that there is a lack of a solid descriptive profile in many instances (e.g. burden of injuries in Aboriginal population, brain injuries) Surveillance (as currently discussed) will never provide all of the data that is needed in all cases; therefore there is a need to acknowledge there will be a need for targeted surveys in some situations.

Capacity. There were two specific comments made which could refer to capacity. These were the creation of a national network of rehabilitation researchers to facilitate multi-site trials involving referrals from acute care; and the establishment of some group or organization in Canada to respond to questions about injury.

V. Implications for an Injury Research Agenda

Conceptual frameworks may help to bring varied perspectives together. Opportunities to create, develop or adapt conceptual frameworks which assist disparate partners to find common 'conversation' space would be helpful. In the course of the workshops, there was demonstrated desire to have 'conceptual frameworks' through which to understand a relatively complex area. There were several instances where frameworks enabled communication: reference to the cancer control model which has been used successfully in the development of the Canadian Strategy for Cancer Control[5]; the National First Nations and Inuit

[5] This model is described in the Action Plan of the Canadian Strategy for Cancer Control (see http://209.217.127.72/cscc/pdf/CSCCActionPlan2002.PDF) and was developed in its original state by the National Cancer Institute of Canada in the early 90's.

Injury Prevention Working Group found that their initial step in creating a strategy was to develop a framework for injury research (which in fact emerged from their framework for injury control)[6]; and in one of the small working groups which involved many individuals interested in unintentional injury, they spent their whole time developing a matrix which provided a framework within which they could all see their particular interests represented. In an area that is just beginning to come together, it seems that some of these communication tools would be very valuable.

Opportunities for learning in modest partnerships would create a foundation for more ambitious undertakings. Although there are very notable exceptions, for the most part, individuals and groups working within the injury domain do not have a rich history of working together (especially within the breadth of landscape that was envisioned by the LFDI process). As a history and culture of working together for research purposes has not been an integral part of the experiences of the majority of stakeholders involved in the workshops, providing some gentle introduction to this way of doing business may be helpful in building capacity. Many have studied collaboration and partnerships, and it seems clear that starting with modest collaborative projects provides opportunities to begin to understand the frames of reference, models, and tools, of the "other", to develop trust, and to begin the establishment of longstanding relationships that would enable significant large undertakings in future stages[7].

Themes for action. The tables in the text provide common topics that emerged as needing research attention in each of three areas: knowledge gaps, critical synthesis and knowledge translation. When considering the three areas as a package there are some themes that emerge as predominant:

- Evaluation of interventions
- Specific populations (remote, rural, aboriginal)
- Environmental factors
- Knowledge of mechanisms of injury
- Knowledge translation (including influencing policy)
- Outcomes (with focus on long term outcomes)
- Methods (e.g. in rehabilitation and in evaluating methods in different contexts)
- Social marketing
- Holistic, comprehensive, and cross jurisdictional focus

This last topic warrants a brief explanation. Although no one used those words exactly, there was a sense of needing to expand horizons on several dimensions.

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[6] This model is described in the report from the Aboriginal workshop held in Regina.

[7] For a model of interaction among connected parties, see Hakansson, H. (1982). International marketing and purchasing of industrial goods. Chichester: John Wiley & Sons.

A specific example is that of doing a critical synthesis to assess the relevance of community based approaches for injury prevention; another is the wish to assess bodies of literature for relevance to other targets; and the reference to cross sector uptake of best practices.

Peer review committees need to be sensitive to the environments and contexts within which injury research is undertaken. For example, it is rarely possible to do randomized controlled trials in acute response situations in the injury area. Research in Aboriginal communities (and no doubt in other communities as well) must be undertaken in a way that respects the cultural sensitivities inherent there.

VI. Appendices

B: Examples of Opportunities for Collaborative Efforts

Casebook 1: Head Injuries in Youth Sports[8]

General Topic Area :	Head Injuries in Youth Sports
Primary Injury Domain:	Intentional, Unintentional, Acute, Rehab
Specific Topic Area/ Research Question	
What are optimal strategies for prevention and treatment?	
Population at Risk:	Youth who participate in contact sports (soccer, football, hockey) Poor, inexperienced, small body mass index
Collaboration Dimensions	
Research Discplines: geneticists (to look at susceptibility of injury and certain outcomes); neuroscience, biomechanics/engineering, physiology, biochemical (to look for markers of inflammation in body fluids and tissues), epidemiology, behavioral science. Research/ Implementation/ Uptake: Healthcare professionals, mental health professionals, manufacturers of sports equipment, drug companies, media, health authorities.	
Potential Partners	
Coaches associations, sports bodies, mental health groups, Canadian Standards Association, Insurance.	
Comments:	

[8] Group included D. Ramsay, T. Wall, B. Rowe, W Meeuwisse, G. Giesbrecht, B. Hagel, A. Morrison

Casebook 2: Suicide

General Topic Area :	Suicide
Primary Injury Domain:	Intentional
Specific Topic Area/ Research Questions (Implied)	
1. What do we know about suicide in the aboriginal population? (e.g. by age and gender, regional differences, comparisons with non-aboriginals) 2. What factors contribute to suicide (e.g. risk profiles, including such things as social support networks, isolation, protective factors (e.g. coping mechanisms), non-traditional influences (e.g. TV, video games); FAS, hopelessness, mental health disorders, maternal/infant attachment). 3. How do we reduce copycat suicides?	
Population at Risk:	Varied, and needs to be defined through descriptive research.
Factors to Consider: Regional differences, a wide range of factors which may potentially influence. Some suicide related issues have been studied extensively in southern communities. How relevant is this information to aboriginal settings?	
Collaboration Dimensions: This dimension was not explicitly discussed. Different disciplines within research were not discussed as there were not many researchers present at the workshop; inferred collaborations were along dimensions related to research planning and implementation of research findings in communities. Consistent with the model discussed throughout the workshop where aboriginal communities need to be collaborators in research, this would imply involvement at all stages of the research process and with the implementation of findings. For the most part, the potential partners mentioned below would presumably involved in planning and policy issues, primarily related to suicide prevention.	
Potential Partners: Non-government organizations, churches, community band chiefs, First Nations Inuit Health Branch (Health Canada); Assembly of First Nations, National Aboriginal Health Organization, ACADRE Centres, KIA[9], QIA, NTI, CIHT- IAPH, SMARTRISK, First Nations University of Canada, Canadian Coordinating Centres for Injury Prevention and Control.	

[9] The next three acronyms refer to regional aboriginal associations

Casebook 3: Injuries in Rural and Remote Areas

General Topic Area :	Injuries in rural/remote areas
Primary Injury Domain:	Intentional, Unintentional, Acute, Rehab
Specific Topic Area/ Research Question	
Are injury outcomes in rural areas a function of severity of injury or service provision?	
Population at Risk:	Rural Resource-based occupation Aboriginal Remote Socio-economic groupings
Collaboration Dimensions	
Research Disciplines: Psychology, sociology, health services research, academic clinicians, geography, economics, mental health, occupational medicine. Research / Implementation / Uptake: Employers – WCB, Aboriginal organizations, EMS (Emergency Medical Services) , Rehabilitation services – counselors, municipalities, policy, Community based organizations (e.g. brain injury associations, Red Cross)	
Potential Partners	
Regional Health Authorities Provincial Governments Oil & Gas industry Health Canada National Aboriginal Injury Steering Group National Agricultural associations Canadian Association for Suicide Prevention WCBs (Workers Compensation Boards) Foundations	
Comments: There were some specific opportunities identified in this area associated with the following organizations: Alberta Trauma Registry initiative, BC Medical Services Foundation, Emergency Room Research Initiative and the National First Nations and Inuit Injury Prevention Working Group (who represent stakeholders with the highest rates of injury, access to key target groups, and cultural perspectives).	

APPENDIX D.1

International Approaches to Promoting Injury Research and Prevention

August 2003

Barbara A. Morrongiello, Ph.D., C. Psych

This report was prepared as part of the Listening for Direction on Injury initiative sponsored by the Canadian Institutes of Health Research and the Canadian Injury Research Network.

NOTE:

This report has been modified from its original format for inclusion as an appendix in this document. The table of contents has been removed. In addition, various sections have had white-space removed to conserve space. Those wishing to view the report in its original format, can download it from:

www.injurypreventionstrategy.ca

Modified from Original Format for this Appendix by:

Philip Groff

1) SCOPE

The aim of this report is to summarize approaches other countries have taken to foster greater attention to injury research and prevention. This is not an exhaustive review. Rather, select approaches are reviewed and contrasted, and their implications for promoting of injury research and prevention in Canada are discussed.

2) METHODOLOGY

Three steps were taken to prepare this report.

First, key international informants were identified based on examination of Editorial Board members of journals that routinely publish injury-relevant research/prevention reports from international contributors (i.e., *Injury Prevention* and *Injury Control and Safety Promotion).* Once this list was compiled, several key informants (Dr. Barry Pless- McGill University, Dr. Ian Scott in Australia, Dr. Leif Swanstrom- Karolinska University in Sweden, Dr. Yousif Rahim, Norwegian Safety Promotion Centre) were asked to add names to the list. In addition, as individuals were contacted they were asked to recommend additional key informants in their country. In addition, consultation with Wolf Kirsten (wk@wolfkirsten.com), who is conducting a project (Global Injury Prevention Project) for the International Union for Health Promotion and Education, also resulted in additional contacts.

Appendix A contains the final list of contacts. Each individual listed was initially sent a short questionnaire to complete via email (Appendix B), with a subset of individuals subsequently interviewed over the phone to gather more in-depth information, clarify responses, etc. Those who completed a telephone interview are designated with an asterisk.

Second, an extensive review of websites and published articles was conducted in order to identify reports and publications that provide information on the process followed and steps taken within a country to promote injury research and prevention. In addition, individuals who were contacted in phase 1 were also asked to identify key papers and reports.

Third, after a summary of each approach was prepared, those experts on the contact list who were interviewed (Appendix A) were asked to review the document and make corrections, clarifications, etc.

3) INTERNATIONAL COMPARISONS OF THE BURDEN OF INJURY

The first meeting of the International Collaborative Effort (ICE) on Injury Statistics was convened in 1994 to improve the quality and comparability of injury data. At this meeting a new internationally accepted standard for presenting injury statistics was developed. Specifically, participants agreed to adopt the "matrix" for displaying injury data simultaneously by cause (mechanism) and intent; prior to this meeting most international sources (e.g., World Health Organization) provided statistics either by cause or by intent.

Applying this new standard several recent publications provide data showing international comparisons of injury data (www.cdc.gov/nchs/data/ad/ad303.pdf). Figure 1 displays an international

comparison of mechanisms of unintentional injury, collapsed across all ages. Figure 2 shows comparable data for children 1-14 years of age. Figure 3 provides comparable data for 15-24 year olds. Finally, Figure 4 shows the comparison data for older adults, 65 years and older. In all of these comparisons, Canada falls near the middle of the 11 countries listed.

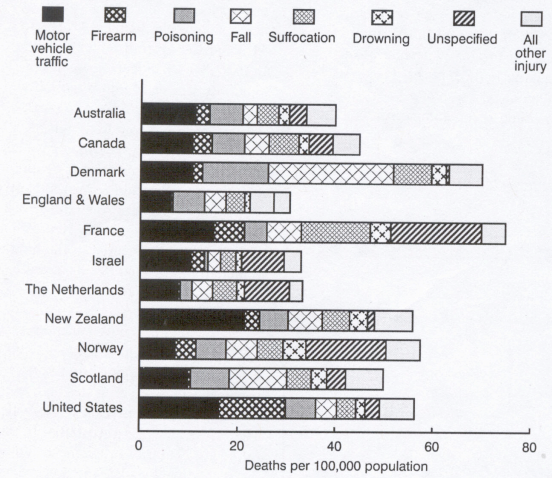

Figure 1 Average annual injury death rates by mechanism: Injury ICE countries, selected recent years

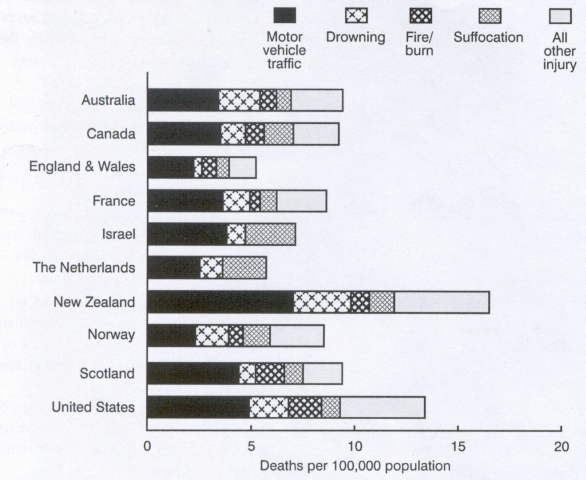

Figure 2 Average annual injury death rates by mechanism among children 1-14 years of age: Injury ICE countries, selected recent years

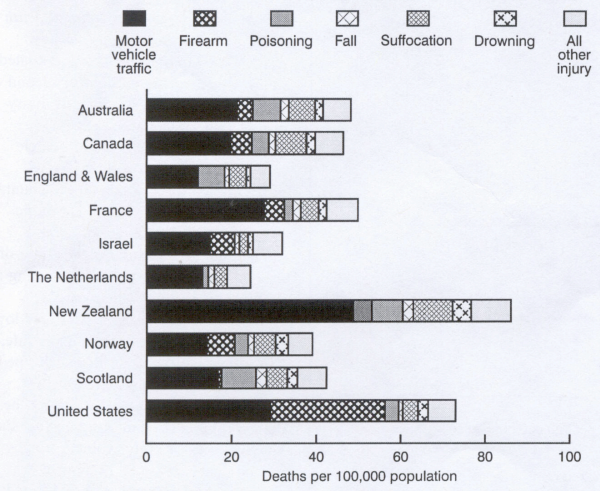

Figure 3 Average annual Injury death rates by mechanism among children 15-24 years of age: Injury ICE countries, selected recent years

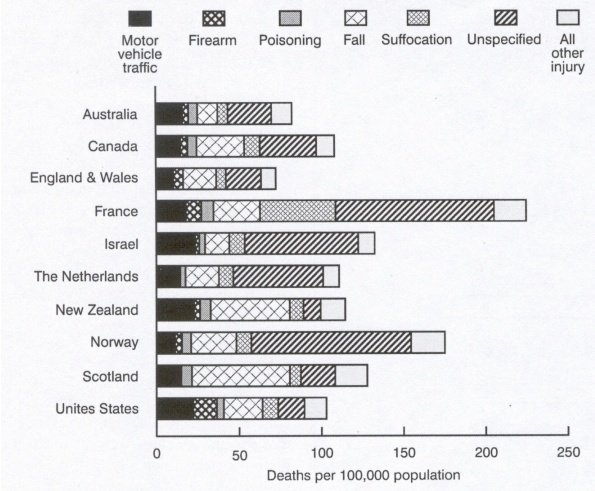

Figure 4 Average annual injury death rates by mechanism among persons 65 years of age and over: Injury ICE countries, selected recent years

These data clearly underscore the proposition that the burden of injury is substantial in all nations that have gathered injury statistics. It is also apparent from these international comparisons of injury rates that there is considerable

variability in the scope and nature of injuries, and the populations at greatest risk of injury in different countries around the world.

These comparative data were used as the basis for selecting a number of countries for more in-depth analysis of approaches to promoting injury research and prevention.

4) APPROACHES TO PROMOTING INJURY RESEARCH AND PREVENTION

i) United Kingdom

Overview

Evidence concerning the burden of injury in the UK resulted in the creation of a timeline for achieving particular targeted reductions in injuries.

A number of preliminary actions were taken to address injury prevention and control (e.g., creating a task force, reports outlining priority areas).

The approach advocated by the task force to promote injury prevention in the UK was to coordinate injury-prevention efforts across a variety of government agencies, with the coordination managed by the Department of Health. Rather than a centralized, single controlling agency, however, a devolving principle of responsibility was advocated. Thus, increasing authority for injury prevention and control was transferred from central government to regional governments and local agencies, with greater autonomy granted at all levels. In sum, injury prevention is addressed by a variety of organizations working in a coordinated fashion within a framework of standards set by the Department of Health.

Unfortunately, before any substantive and sustainable initiatives were implemented (e.g., funding allocation, program development), political attention to the issue dwindled, resulting in limited subsequent progress.

Primary Focus

In the written documentation, the primary focus is on injury prevention (to achieve the targeted reductions), more than research; more accurately, the focus is on **accident** prevention. Moreover, it is noteworthy that, throughout the UK documents, there is pervasive use of the term accident, which contrasts with international practices.

***History*:**

Success in promoting a focus on injury prevention is relatively recent (i.e., last 5 years).

Precipitating Events:

Several papers addressing different aspects of health/wellness were prepared within a few years of one another, each independently drawing attention to the burden of injury. These papers include:

(1) *Safety Lives: Our Healthier Nation* was a critical paper that was published in July 1999 by the Secretary of State for Health, outlining 4 priority areas, including accidents/injuries, with specific target goals set for 2010;

(2) *Tomorrow's Roads- Safer for Everyone* was prepared by the government in 2000, with specific target goals set for 2010. NOTE: There has been a long-term interest in traffic safety. Hence, this was the second set of target goals for Road Safety, with the first achieved by 2000.

(3) *Safe as Houses* was prepared by the Community Fire Safety Task Force in 1997, with specific target goals set for 2004. This paper led to the establishment of the National Community Fire Safety Centre in 1998;

(4) *The White Paper on Excellence in Schools* was prepared in 1997, safety being one of its themes, with certain expectations for school safety specified in the report (e.g., development of safe travel policies, safe playgrounds).

As indicated above, many of these papers issued target goals and dates for injury reduction. By doing so, the reports provided the impetus for a sustained focus on injury because achieving these goals necessitated 'next steps' to be taken.

Subsequent Steps

An Accidental Injury (cross-sectoral) Task Force was established (November 2000), comprised of experts from academia, the NHS, local government, the police, voluntary sector, and government departments. The task force was to identify high-risk groups (they chose to focus on children 1-14 years, and older adults, 65 years and older, and to limit the focus to unintentional injury) and prevention priorities. The task force subsequently recruited three working groups (Children, Older Adults, Surveillance); separate papers were prepared by each of the working groups (e.g., Prevention of Childhood Injury by Dr. Elizabeth Towner).

The specific mandate of the task force was to advise the Chief Medical Officer on: (1) the most important priorities for action in order to meet the targets, including specification of particular programs to address particular injury issues; (2) developing an implementation plan (it had to be a united approach across Government and the NHS); and (3) how progress should be monitored.

The task force addressed these issues using a consultative process that involved bringing together researchers, accident prevention specialists, and practitioners to two conferences to discuss priorities and best practices. As well, key government agencies and stakeholder groups that spearheaded injury-prevention initiatives were also involved, including: Department of Transportation, Department of Trade and Industry, Health and Safety Executive, and Office of the Deputy Prime Minister.

The task force communicated this information in the form of a 60-page report ("Preventing Accidental Injury- Priorities for Action") to the Chief Medical Officer in 2002. This report identified priority areas, interventions to address each area, longer-term priorities that merit attention in the future, and a framework for accomplishing these goals. Hence, the report addressed both the **what** and **how** of injury prevention: what the priorities for prevention and targeted initiatives should be, and how to design an infrastructure to deliver programs.

With regard to infrastructure/delivery recommendations, it is noteworthy that the committee did not agree with the recommendation of the British Medical Association (2001) that a new agency be created to oversee injury prevention at a national level. Instead, in keeping with the principle of devolved responsibility that was advocated by government at the time (Secretary of State for Health speech January 2002; *Shifting the Balance of Power: Securing Delivery* report in January 2002), the committee recommended greater coordination between the National Health Service (NHS) and local authorities to address unintentional injury. The Health Department would set strategic directions and standards for health, but NHS front-line staff would be given greater authority to deliver services to meet local health needs, thereby increasing the flexibility and autonomy of local delivery initiatives. Local Strategic Partnerships (LSPs) between community and government organizations would be formed for program delivery.

In its report, the committee emphasized the following recommendations, which were seen as critical for success:

(1) Department of Health should assume responsibility for coordinating delivery across government levels.
(2) Regional Directors of Public Health should assume responsibility for taking a lead role in regional program delivery.
(3) At local levels, Local Strategic Partnerships should be established, with a single identifiable individual given responsibility for program delivery and monitoring.

Hence, the view of this committee was that, at all levels (local, regional, national), success hinges on having a designated individual or department assume responsibility for program delivery and monitoring.

Current Status

According to key informants, the topic of injury appears to be fading from the national public health agenda and from local agendas in turn. Hence, the report prepared for the Chief Medical Officer for the UK has not resulted in the desired follow-up activities.

It is noteworthy that there is a clear strategy and progress being made in preventing traffic injury, which is overseen by the Department for Transport. This independently operating department has its own budget, an infrastructure that provides for career development, and has shown a longstanding commitment both to research and to injury prevention.

Conclusions

The UK experience suggests:

(1) Even after the burden of injury is reported, acknowledged by politicians, and initially addressed by outlining an approach to prevention, without a 'champion' (i.e., agency, department, branch, etc) to sustain attention to this issue, it is unlikely that any momentum will be gained.

(2) Lead agencies with money for research and prevention, an infrastructure to support capacity building and career advancement, and a clearly focused agenda (e.g., Department of Transportation's), are needed in order to make significant progress on injury control and prevention.

Thus, the UK experience suggests that strong and clearly identifiable leadership with national jurisdiction is essential for advancing injury research and prevention.

Ways to achieve this include establishing a national center for injury research and prevention or designating a lead agency to assume responsibility to oversee research and coordinate efforts among diverse groups and organizations, as occurred in the United States.

ii) **United States**

Overview

Evidence of the burden of injury resulted in Congressman William Lehman successfully championing the cause of injury prevention in Congress, resulting in a large appropriation of money (10 million dollars) to address the burden of injury in the US; informants indicate that this money actually was re-directed by Congress from the Department of Transportation budget allocation.

The Centers for Disease Control (CDC), a branch of the federal Department of Health and Human Services, was given the mandate to develop an 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 centers (duration of funding is 5 years, with the option for renewal); and oversees coordination of NCIPC's research with research conducted by other government departments and non-government agencies.

Note: Information about building consensus for a national research agenda can be found at their website and at www.cdc.gov.niosh/docs/2003-148/

Several key informants indicate that the NCIPC is still a 'relatively young' organization and that it is still in the process of defining its scope and mandate. Hence, there will likely continue to be changes to organizational infrastructure, research programs, and/or injury control and prevention activities.

This substantial commitment and careful planning have significantly advanced injury control in the US in the past 15 years.

Key informants also stressed that the development and funding of other national organizations that focus on targeted aspects of injury (e.g., Department of Transportation; National Institute for Occupational Safety and Health-NIOSH), and that coordinate their efforts with those of NCIPC at CDC, also have substantially contributed to promoting advances in injury prevention and control in the US. In fact, several informants argued that these other agencies have historically played a lead role in the development of organizational approaches to injury surveillance and control, providing a 'model' of an infrastructure that can be successful in approaching the issue of injury control and prevention.

Primary Focus

Materials available from NCIPC reveal a focus on both injury research and prevention. Specifically, the Centers for Disease Control considers four main phases of research: (1) Foundational research covers basic studies that delimit and quantify the nature and scope of the injury problem (e.g., what types of injuries are occurring, to whom, etc); (2) Developmental research includes studies to identify determinants of risk taking and risk factors for injury, as well as preliminary testing of potential interventions to address these determinants and risk factors; (3) Efficacy/Effectiveness studies address whether interventions reduce risk taking and/or injuries; and (4) Diffusion research leads to identification of the best strategies for implementing, disseminating, and promoting uptake of "best practices" interventions. Each successive phase builds on previous findings. Thus, the NCIPC defines research broadly, advocates for evidence-based prevention initiatives, and focuses on both basic research and prevention relevant to achieving greater injury control; the same is true of the Department of Transportation and NIOSH organizations.

History

Progress in injury prevention and control has been improving since 1985.

Precipitating Events

A 1985 report prepared by the Committee on Trauma Research of the National Academy of Sciences (established 1983 and comprising well respected physicians, engineers, and public health researchers) highlighted the burden of injury in America. The primary aim of the report was to raise awareness of the disparity between the scope of the injury problem and the amount of money invested in research on injury. In addition to documenting inadequacies in funding, the report also emphasized three other issues: the lack of a central agency to address the problem of injury, the lack of trained manpower, and the need for coordination among those working in five areas (epidemiology, prevention, biomechanics, treatment, and rehabilitation).

The committee's report, *Injury in America*, was widely disseminated and publicized by the national media, and recruited the interest of Congressman William Lehman who championed this cause in Congress, resulting in an immediate re-allocation of 10 million dollars from the Department of Transportation's budget allocation. The emphasis in this initial report was on communicating statistics to highlight the scope of the injury problem in America; reports focusing more on the economics of injury came later and helped to maintain momentum and focus on the need to improve injury control.

The report recommended that the CDC be given the responsibility of managing injury control/prevention initiatives. The CDC quickly initiated requests for proposals (1986) for multi-disciplinary university based research centers on injury and for individual research grants.

Subsequent Steps

By 1991 the importance of achieving greater injury control was more widely acknowledged, and the program at CDC had grown sufficiently to establish a

new center there, the National Center for Injury Prevention and Control (NCIPC). The center addressed issues in unintentional injury, violence, and injury-related acute care and rehabilitation. The center also assumed responsibility for coordinating injury control efforts across federal, state, and local organizations (e.g., National Highway Traffic Safety Administration, National Institute on Aging, National Institute on Child Health and Human Development, National Institute on Occupational Health and Safety, Consumer Product Safety Commission), although informants have suggested that this is less of a 'coordination' process and more of a 'parsing the pie up' process.

In addition, the activities of the university centers funded by the NCIPC (as well as by other agencies and foundations) had diversified to include widespread educational activities, community based activities, and media promotion of injury prevention. These activities also increased attention to the injury problem, thereby helping to sustain progress and momentum in the field.

Certain centers also went on to develop additional programs or foci that addressed specific barriers to progress in injury research and control. For example, the center at Johns Hopkins School of Public Health focused on training and capacity building. This was the first institution, for example, to offer a wide range of courses related to injury research and control, and to offer a Summer Training Institute to quickly develop necessary skills among individuals working in state health departments and program delivery centers.

Current Status

The NCIPC currently funds about 10 injury control research centers and 140 investigator-initiated projects, conducts intramural research, and works closely with injury programs in state health departments.

The NCIPC recently conducted a series of regional conferences across the U.S. to strengthen partnerships, involve more organizations and individuals in the injury prevention movement, and raise public awareness of the need for improved injury control in the US. Thus, the NCIPC continues to play an active role in sustaining a focus on injury control among key stakeholders throughout the U.S.

More recently, there has been an emphasis at NCIPC/CDC on training and programs have been implemented to support this goal (e.g., 1-year career development awards for young investigators), although key informants felt that more could be done to address this gap (e.g., student fellowships are not available).

The NCIPC also has recently formed a working group to determine what infrastructure changes need to be made to improve upon the effectiveness and scope of the organization. The Chair is Dr. Barak Wolfs (barakwolff@doh.state.nm.us). In addition, there is a State Assessment Team that is going to each state and assessing how far along each Health Department is with regard to injury control and prevention, using a template that outlines infrastructure requirements and is available at www.stipda.org

Conclusions

The US experience suggests that:

1) Having a lead agency to oversee research on injury and prevention can result in significant gains in injury control.
2) Moreover, there are lessons to be learned from the way in which this agency works. Specifically, giving the agency responsibility for developing the national research agenda but funding outside research centers and individuals with expertise relevant to the issues outlined in the agenda maximizes efficiency, promotes capacity building, and results in shared accountability among stakeholders. It also means that those employed at the lead agency do not have to be experts in all types of research, injury topics, etc.
3) National injury organizations with clearly focused or specialized mandates in injury research and prevention (e.g., transportation, occupational health and safety) has proved to be a successful way of achieving advancements in injury prevention in those targeted areas.
4) The sustained funding provided to injury research centers aids capacity building in the field of injury, particularly the promotion of research expertise. Moreover, support of university-level investigators ensures excellence in the quality of research, conceptualization of issues, breadth of approaches, and motivation to disseminate findings and translate them into practical initiatives to achieve greater injury control.

   NOTE: Lack of sustained funding is a barrier to progress in injury that was raised by many key informants interviewed internationally. Hence, providing a long-term funding commitment to organizations/individuals may prove particularly important to promoting advancements in injury control in Canada.
5) Drawing on epidemiological data, the opinions of experts in the field, and results of a national consensus process promotes development of a national research agenda that focuses on substantive issues for injury control and improves coordination of efforts among key stakeholders.

Overall, there are many positive aspects of this approach to advancing injury research and prevention nationally. Nonetheless, some negative aspects of this approach also merit discussion.

The most significant drawback of this approach is that centers are limited in the scope of work that NCIPC will fund. For example, even though firearm-related injuries significantly affect youth in America, the political climate precludes research on gun control. Hence, research agendas are developed within the confines and constraints of political agendas, which can substantially compromise advancements in injury control.

Another drawback is that individual investigators who are not affiliated with funded centers can have difficulty obtaining funds for research. Hence, having targeted individual operating grants (e.g., in response to Request for Proposals to address specific injury topics) is essential to fully support capacity building among researchers nationally. Key informants noted, however, that there are no regular application dates for operating grants by NCIPC/CDC. In essence, grant applications are sought only when there are additional funds (i.e., funds in

excess of those needed to maintain all other NCIPC/CDC programs), which is unpredictable.

Key informants also noted that because of the NCIPC/CDC there was little interest among other funding agencies (e.g., National Institutes of Health) in allocating money for injury-relevant research projects. Hence, it can be challenging to conduct research in areas of injury prevention and control in topic areas not designated as a priority topic by NCIPC/CDC.

iii) **Australia**

Overview

In Australia, successes in the control of road traffic injuries led to recognition that it is possible to reduce the burden of injury substantially.
About five years ago recognition of the broad scope of the injury problem in Australia led to a thorough analysis of the state of injury research and control in the country, and development of a strategic plan to address gaps and needs in these areas.

There has been steady progress in implementing this strategic plan, resulting in growth in research (e.g., increased capacity, larger funding allocations) and improvements in injury control.

Because of Australia's similarity to Canada's population health indicators (see *Australia's Health*, 2000, document available at www.aihw.gov.au/publications/health/ah00), it provides an example of a successful approach to advancing injury research and control that may be particularly relevant.

Primary Focus

In the written documentation there is a strong focus on research, with the primary early emphasis on creating the skill base and infrastructure to support progress in injury research in Australia in the long term.

A review of the literature leaves the distinct impression that many federal, state, local government, non-government organizations, corporate industries, research centers, and individual researchers are involved in injury research, and a variety of disciplines are making contributions to the research (e.g., social sciences, health sciences, police science, law, engineering, etc.). Hence, there seems to be an integrated, well-developed, multi-sectoral approach to injury prevention and control in Australia.

History

Although Australia's history of success in injury control in the road traffic field extends far beyond the last five years, more comprehensive work on injury control is relatively recent (i.e., last 5 years),

Precipitating Events

In 1997, publication of a report, *The Cost of Injury to Victoria (*prepared by the Monash Injury Research Centre*),* spotlighted the economic burden resulting from several major classes of injury and among different age groups. This report documented the scope of the problem, the sources of the primary burden of

injury, and the more general significance of this national health issue. It should be emphasized that placing injury within an economic framework was a strategy that had been used successfully to garner resources within the road traffic safety area. It proved to be equally effective in gaining the attention of government officials who now recognized how much could be saved by advancements in injury control in Australia.

NOTE: Many documents outlining the burden of injury in a variety of countries were reviewed in preparing this report. However, the Australia document is truly unique in using an economic framework to communicate the burden of injury, communicating statistics about injury in terms of costs.

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.

Subsequent Steps

The National Injury Prevention Advisory Council drew on the expertise of leading researchers to review the research literature in a number of injury topic areas (e.g., road, work, home, sports), summarize the state of evidence along a number of dimensions (incidence, burden/cost, risk factors, solutions, interventions tested, cost:benefit analysis), and make suggestions for research priorities and needs.

Epidemiological studies by the National Injury Surveillance Unit, the Australian Agricultural Unit, and the Australian Institute of Health and Welfare provided the empirical evidence needed to identify the relative risks of various sub-populations.

In addition to this empirical evidence, a national consultative process was used to confer with researchers and administrators about research priorities, barriers and opportunities, and possible partnerships. This consultative process revealed a number of key barriers to progress in injury research, including: a highly fragmented approach lacking interdisciplinary cooperation; no system for training new injury researchers; poor understanding of injury research by funding agencies, thereby disadvantaging injury researchers; no injury researchers as part of the health research funding-review bodies; fragmentation between health research structures and administrative structures; lack of senior appointments of injury researchers in university settings; and the short-term nature of funding, making sustainability problematic for injury researchers.

In 1999 a report outlining a strategic plan for action was published, "Injury: From Problem to Solution", identifying short-term, medium-term, and long-term actions. Short-term actions included: capacity-building initiatives, partnership-building strategies, increased funding of injury research, and development of steps to identify research priorities. Medium-term actions included encouraging government leadership to formulate a broad strategy for coordinating research and practice partnership activities, and to make a commitment to invest in research as a basis for improving safety.

The report also recommended the development of a government-based 5-year plan outlining how and when these various initiatives would be achieved. The report also contained a discussion of the success achieved in the US by having a lead organization (CDC/NCIPC) oversee injury research and control, and acknowledgement that lack of a lead agency could be a significant barrier to successfully moving forward with this strategic plan in Australia. Hence, while there was clear acknowledgement that some mechanism needs to be in place to promote inter-agency coordination of activities related to injury research and control, the report stopped short of any statements about how this would be accomplished in Australia.

Finally, the report contained several recommendations for the National Health and Medical Research Council (NHMRC) with regard to funding injury research (e.g., shift more monies to injury research, limit the breadth of research to high-burden topics) and training-development initiatives, the two primary foci for the short-term actions outlined above. There also was a call for the Strategic Research Development Committee (SRDC) to play a more forceful role in directing the nature and scope of injury research by establishing action priorities (e.g., targeted Request For Proposals in important injury topic areas).

Moving forward with this important research focus, the NHMRC designated injury as a distinct research area to which grant applications could be directed; this decision evoked little controversy because it was consistent with the Commonwealth government's designation of injury as one of five national target priorities. Hence, the Commonwealth designated injury a national priority and health funding agencies then acted on this mandate. The NHMRC's role also extends to public health advice in Australia, and they used this education mandate to also foster attention to broader injury research and prevention issues.

In 2000, under the NHMRC Health Research Partnerships program, the Federal Minister for Health and Aged Care announced a multi-million dollar investment in injury research in Australia. This funding led to establishment of 2 centers (Injury Prevention and Control Australia was one group that comprised researchers from around the country, while the second group focused on fall prevention among older adults). There also were many smaller grants that were allocated as part of this program. In 2001, the Injury Prevention section of the Department of Health and Aged Care announced a national injury prevention plan, which identified high priorities for immediate attention, (National Injury Prevention Plan: Priorities for 2001-2003 report available at www.dhs.vic.gov.au/nphp/sipp/injprev/prev_plan.pdf).

Responsibility for implementing the plan rests with the Strategic Injury Prevention Partnership (SIPP), a group funded by the Commonwealth and comprising representatives from Health Departments in all jurisdictions, the Consumer Affairs Division of Commonwealth Treasury, NHMRC, Australian Institute of Health and Welfare, and the Australian Injury Prevention Network. Explicitly recognizing the importance of research, the plan's authors stated "this plan for orchestrating a national response to the burden of injury will be founded upon enhanced research capacity".

Thus, allocation of a sizable amount of money by the Federal Minister of Health and Aged Care provided the NHMRC the resources needed to implement a strategic plan to enhance research capacity and direct research activities. The effect was to orchestrate a national response to the burden of injury in Australia, which was designated a national priority by the Commonwealth.

NOTE: A National Injury Surveillance Unit was already in place at the initiation of these activities, with funding provided by the Department of Health and Aged Care. Hence, in contrast to the poor surveillance systems reported in many countries, in Australia, surveillance far surpassed the state of research and prevention in 1997 when focused attention on injury promotion was just beginning. This made it much easier to document the full scope of the injury problem, and to track progress in injury control. Key informants consistently agree that have a national, well planned, injury surveillance system needs to be a critical focus in efforts to advance injury prevention and control within a nation.

Current Status

A complete evaluation plan has been developed in order to determine the extent of success of this National Injury Prevention Plan in meeting desired objectives.

There is a critical mass of researchers now in place and several injury-research centers/groups are now operational. It is noteworthy too that the centers engage in considerable collaborative work with non-academics and can play a substantive role in program/service/policy development activities (*Injury & Road Safety Research: The Australian Experience*, 2003, report available at www.uwo.ca/fammed/pchu).

The organizational structure and scope of work conducted at these injury-research centers are much like those funded by the CDC/NCIPC in the US. However, they differ sharply from the US centers in their (inferior) sustainability. Specifically: (1) Funding is insufficient to cover all costs. Hence, directors need to generate additional funds from other sources, which results in "a constant state of scrambling". (2) There is no plan in place to sustain funding of centers over the long term. Hence, there is no guarantee that productivity will result in renewal of funding, which contrasts with the US system in which CDC/NCIPC holds out the possibility of sustained funding for productive centers.

Presently, the most pressing issue for injury control in Australia is the sustainability of progress and momentum. Targeted funds for injury research within the NRMRC no longer exist, leaving injury researchers to vie for funds with bio-medical researchers and others. Several key informants see this as a significant barrier to continued progress. Others felt that this approach forces injury researchers to improve the quality of their work, which ultimately benefits the field.

In the past year a group of directors of injury centers throughout Australasia have met to address the issue of sustained funding from government. They are in the strategic planning stages to try and address this critical issue.

Conclusions

The precipitating events in Australia were very similar to those in the U.S. and UK; the burden of injury was publicized and resources were allocated to this topic. Based on the success of road traffic initiatives, the cost-effectiveness of addressing broader injury control issues was emphasized. Clearly, however, as

the UK experience illustrates, recognition of the burden of injury may be necessary to gain resources initially, but is not sufficient to ensure continued funding and research momentum.

In Australia, as in the U.S. (and unlike the UK), the allocation of a substantial amount of money for injury research resulted in a sustained focus on this issue. And, analysis of the injury field by experts provided essential and timely information regarding the scope and nature of gaps in research, including personnel and infrastructure issues, providing a rational basis for determining how the money should be best spent to advance the field of injury control.

It is noteworthy that in both the U.S. and Australia the money was not allocated to specific injury prevention initiatives or programs. Instead, it was invested primarily in building research capacity and the infrastructure needed to address injury issues over the long term. Hence, the money was essentially used to invest in future research, which is critical for sustained growth in the field of injury research and control. The Australian documentation quite clearly indicates an expectation that it would take time to address the burden of injury, and that the focus on capacity building was a key requirement to (eventually) manage this health issue.

In the last five years, with the maturity and growth of a number of Australian university-based centers, there has been tremendous growth in capacity. There are currently at least 5 research chairs in injury research, and these senior investigators now play an active role in the recruitment and training of talented researchers to comprise the future generation of injury researchers. These senior investigators are also in a position to advocate for post-doctoral and junior faculty positions in injury research, thereby helping to build a structure to support career development among injury researchers.

NOTE: Several key informants have talked about the fact that progress in traffic safety has derived from having the capacity for research, which has occurred because there is an infrastructure in place to support career development within that field.

As in the U.S. (and unlike the UK), an existing agency took the lead (Department of Health and Aged Care) and developed a strategic plan to build the capacity and infrastructure to support expansion of research on injury. Implementation of the plan involved the activities of a research-focused agency (National Health Research and Medical Council).

As in the UK (and unlike the U.S.), sustained funding for injury research is now the challenge facing Australia. Recognition by government of the importance of injury control can help to sustain a focus on injury. However, funds and resources must continue to be allocated to address the burden of injury in order to ensure continued success in Australia.

The current Australasia group of directors of injury research centers will (hopefully) develop a strategic plan that ensures continued growth in injury research and control, funding for these activities, and legitimizes the role that injury researchers can play in improving the health of the population.

iv) **New Zealand**

Overview

In June, 2003, the "New Zealand Injury Prevention Strategy" was publicized (*New Zealand Injury Prevention Strategy* report available at www.nzips.govt.nz/background/index.htm) There are 10 objectives outlined in the New Zealand Injury Prevention Strategy, including: (1) raising awareness of and commitment to injury prevention; (2) increasing prevention capacity; (3) improving environments, systems, and products; (4) enhancing legislative and policy approaches to prevention; (5) increasing collaborations; (6) advancing prevention knowledge; (7) implementing effective interventions; (8) increasing resources for prevention; (9) developing, implementing, and monitoring national prevention strategies; and (10) fostering leadership in prevention. These objectives are broadly stated and are not accompanied by any implementation strategies. In addition, at this time, there is no mention of targeted funding to support the implementation process.

Primary Focus

The documents that are available emphasize injury prevention more than research and capacity building.

History

New Zealand is still in the early stages of addressing its injury problems and is therefore at a critical stage of the process (i.e., developing an implementation strategy and long-term strategic plan that will allow it to realize its objectives).

Precipitating Events

A report was commissioned by the Health Research Council (authored by Dr. John Langley and Liz McLoughlin) to document the burden of injury and make recommendations about ways to promote injury research in New Zealand. Three key recommendations were: (1) to establish injury research centers; (2) to make a substantial investment in capacity building; and (3) to assign responsibility for the funding necessary to enact these recommendations to the Accident Compensation Corporation (ACC) and the Health Research Council (HRC).

Recognition of the burden of injury led to the ACC soliciting input from a variety of groups (New Zealand Injury Prevention Strategy Project Team, Stakeholder Reference Group, Expert Advisory Panel of researchers; Government Interagency Steering Group, public consultation workshop groups) in order to develop the "New Zealand Injury Prevention Strategy" (2003). This document provides a national framework for injury prevention activities of government agencies, non-government organizations, communities, and individuals.

Subsequent Steps

Next steps depend on the implementation strategy that is currently being developed.

Current Status

Interviews with key informants reveal pessimism that an implementation strategy will result and receive the resource allocation necessary to ensure success.

Apparently, the Health Research Council is backing away from injury and is doing away with the designated split of 1/3 of funds for public health research and 2/3 of funds for biomedical research. The return to a focus on biomedical research by HRC is expected to disadvantage injury researchers who, historically, have fared poorly in grant competitions with biomedical researchers for a variety of reasons, including the lack of injury expertise on the review boards. Also, there is no sustained funding for capacity building. HRC Fellowships for injury researchers were short lived and are no longer offered. Hence, the general viewpoint is that any interest in promoting advancements in injury research by HRC has faded.

Although the Minister of Health is apparently continuing to pressure the ACC to do more with regard to injury research and control, it is unclear what ACC's next steps will be and what resources will be allocated to injury.

Key stakeholders were frank about the perils of funding solely from ACC, as opposed to HRC. Specifically, research under the ACC is a negotiated process. Because ACC does not have a research culture, it is not much interested in generating peer-reviewed publications. Instead, it is primarily interested in quickly obtaining answers to difficult questions; the board of ACC is politically elected every 3 years. Hence, it can be difficult to persuade the ACC to fund randomized controlled community trials, which are the gold standard for testing intervention programs. Centers and investigators that give in to the ACC pressures to do things quickly often are unable to publish in peer reviewed journals, which results in an inability to obtain funding from HRC and an increased dependence on ACC. The general concern therefore was that, as HRC funding for injury research dwindles, there will be an increasing dependence on ACC funding, which, in the long term, may undermine the conduct of high quality research on injury control and prevention.

Conclusions

New Zealand's success in advancing injury research and control will depend largely on the implementation plan that is developed. Experiences in the U.S., UK, and Australia suggest that it is essential that a lead agency assume responsibility for owning and promoting injury control and prevention; ensuring that that there are sufficient funds for capacity building, infrastructure development, and research activities; and fostering effective coordination of activities across sectors so that a comprehensive, integrated approach to injury research and control is taken.

In summary, New Zealand is at a critical point. Presently, it does not have the capacity needed to sustain momentum and advancements in injury research, it lacks sufficient money to invest in injury research, and there is a dwindling of interest in injury by the HRC. The critical question at this time is whether the ACC can develop a strategic plan and allocate sufficient resources to maintain momentum and add to the initiatives that commenced several years ago.

v) Norway

A very different type of process has led to advancements in injury control in Scandinavian countries. Specifically, using a bottom-up model that capitalizes on grassroots-based energy and focuses on community-level initiatives, countries like Norway and Sweden have made significant advancements without a centralized infrastructure or allocation of large funding resources. In the following sections I focus on Norway for illustrative purposes.

Overview

The main emphasis in Norway has been on community-level initiatives, with the Safe Communities model serving as the main template of their success. Key informants indicated that working within a Safe Community framework automatically fostered interdisciplinary collaborations, cross-systems dissemination strategies, and integrated/comprehensive approaches to injury prevention and control, producing substantive gains in relatively short time intervals (e.g., 3 years).

Primary Focus

In the documentation available, the primary focus is on injury prevention, as opposed to research per se.

History

There has been steady progress over the past 30 years, with more substantive and rapid progress during the past 10 years.

Precipitating Events

In the 1970's Dr. Gunnar Tellens, a local physician in a small community, took on the task of developing strategies to reduce the burden of injury in his community. Effects were realized within 3 years. This became the first real 'success story' and launched a focus on injury prevention at the community level in Norway.

By the mid- 1980s several additional municipalities were focusing on injury prevention, with most of these programs being headed by physicians. The Harstad municipality was very programmatic and analytic in its approach and became almost a 'field testing' site for prevention work, focusing on child injury initially. By 1988 a variety of reports were publicizing the scope of the burden of injury and the success of some municipalities in advancing injury control.

Subsequent Steps

These developments fostered increasing interest in injury prevention throughout Norway in the late 1980s. In 1990 the Institute of Public Health decided to finance an injury focus in 4 hospitals, strategically selecting these hospitals for population sampling across Norway. This was the first time that 'injury' was designated a national health priority.

These hospital-based initiatives were funded for 3 years, until 1993, and then each hospital had to finance their own injury prevention programs; note that the person in charge of these initiatives were surgeons in each hospital. In 1994, Harstad was designated the first Safe Community in Norway by the WHO, and this led to establishment of a Secretariat for Injury Prevention and Safe Communities throughout Norway; these developments further recruited attention to injury control and prevention and sustained momentum.

This Secretariat worked with many ministries (Ministry of Health and Social Affairs, Ministry of Children and Family Affairs, Ministry of Defense, Ministry of Justice, Ministry of Education, Ministry of Transportation and Communications, etc) to develop the first national strategy for injury prevention and control in Norway (*Plan of Action 1997-2002: Prevention of injuries at home, school and recreation, 1997*). This marked the beginning of centralization of injury prevention work, which culminated in the newly formed Norwegian Safety Promotion Centre in 2003.

Current Status

Injury continues to be a priority in Norway. The Norwegian Safety Promotion Centre has injury prevention and safety promotion as its sole mandate (www.norsafety.no). The focus will continue to involve working at the community level to provide integrated and comprehensive programming.

Informants indicate that the country is now very skilled in implementing community-based initiatives and in doing so in cost-effective ways that do not require lots of financial resources but draw on resources already available. One example stands out to be remembered, namely- chimney sweepers (who visit a great number of homes in a community yearly) were trained to test smoke alarm batteries and to give fire prevention advice to home owners.

Conclusions

Obviously, there is at least one successful alternative (i.e., a Safe- Communities based approach to advancing injury prevention) to those reviewed previously in which the emphasis has been on assigning injury to a distinct organization or separate infrastructure which then develops a national (common) prevention/research strategy. Indeed, Norway provides an excellent example of how empowering local communities to address their individual injury issues can be successful. However, there are several caveats that merit mentioning.

First, informants in Norway highlight that there is a need for a centralized organization to oversee injury prevention and control. This is why there have been such efforts over the past few years to foster the establishment of this Norwegian Safety Promotion Centre. Simply put, leaving injury within the public health department domain makes for a very unstable organizational structure because interests and health foci change with politician terms and party elections. Hence, while Norway has made progress without a centralized organizational infrastructure informants clearly felt the need for the latter in order to continue to *sustain the focus* on injury control, and to now move with a more coordinated and integrated approach.

NOTE: The exact same points were made by informants in Sweden who are now pressuring the Ministry of Health for action to establish such an organization for Child Safety.

Second, along these same lines, informants mentioned the legitimization of injury prevention work that comes from having a designated centralized organization to address this health issue at a national level. And, this type of centralized organization presumably makes it easier to address national injury prevention priorities and to do so in a timely fashion.

Third, although there has not been any sizable and sustained financial support allocated for injury from a central agency or department, the initial event that marked a clear commitment to making injury a national health priority (i.e., designating four hospitals to have injury prevention units) was funded by the Institute of Public Health (1 million dollars Canadian was given across the four hospitals) for a period of 3 years. Hence, as was true in other countries, there was some financial support given to help kick start the initial centers on injury prevention, and this support was committed for a sufficient period of time to allow for full development of the unit before the funding terminated. The consensus seems to be that at least a 3-year term (preferably 5 years) is needed to reach full potential in these injury prevention units.

5) **COMMON ISSUES**

A number of common issues emerged from discussions with key informants and reviews of documents:

(1) The need for excellent surveillance; most countries reported needs for improvements in this area (e.g., improved data collection methods, improved linkages and coordination across databanks).

NOTE: Australia was an exception and had a national surveillance system in place and preceding the current focus on injury research and prevention. A number of informants commented on the excellence of this system, suggesting there may be benefits to Canada from consulting with Australia about developing a national Canadian surveillance system.

(2) Capacity building to address the need for a well-trained workforce in injury research and prevention. Several countries specifically noted the lack of senior researchers, and the inadequate support for senior researchers (e.g., personnel/salary awards). In addition, they mentioned an inadequate infrastructure supporting career development opportunities within the field of injury.

NOTE: a number of stakeholders mentioned that the infrastructure within the traffic safety research domain clearly supports career development and, therefore, maximizes capacity in research from junior through to senior levels. The feeling was that there are lessons to learn from a greater examination of the traffic-safety research infrastructure.

(3) The need for a research infrastructure to provide the data needed to address gaps in knowledge and ensure that developments in research capability are sustainable.

(4) The pressure/requirement to conduct interdisciplinary research can sometimes actually limit progress and close off opportunities for funding for innovative individual researchers who are not affiliated with such teams. Several key informants indicated that they did not believe there was a strong evidentiary base to support the proposition that advancements in injury research will be optimized by an interdisciplinary team approach to research, although virtually everyone thought that 'in theory' one could make a case for this argument.

(5) Recognition that results take time to achieve. Hence, one needs a commitment to continuous and sustained funding for injury research and prevention activities.

(6) Generally, there is a need for the skills of social marketers and for more advocacy activities to promote injury research and prevention. In particular, it is important to recruit the media to attend more to safety and injury reporting (not just violence but unintentional injury too) so that the public is made aware of the scope of the problem, risks, preventability of injuries, actions to be taken, etc.

NOTE: It should be noted that in Norway, which advocates a community-based approach to prevention, there was a strong emphasis in keeping the community informed of injury-

relevant issues, progress, etc. This was seen as an essential part of motivating individuals to participate and in fostering an interest in prevention at the individual level.

(7) The need for a strategic plan that coordinates multiple initiatives. For example, to address the issue of capacity building, the UK developed a post-graduate level short course in injury prevention. However, demand for the course has been weak, possibly because employers do not yet recognize the need for staff with this level of knowledge or the historic lack of sustained and long-term allocation of resources to injury prevention results in individuals not seeking careers in this area. Hence, a systems approach, that encompasses taking action at many levels, is essential to promote progress in injury research and prevention.

6) **BARRIERS TO PROGRESS**

Several barriers to progress were repeated mentioned by informants and in reports, including:

(1) The issue of "who owns injury prevention" was repeatedly mentioned in countries lacking a lead agency (i.e., agency or group that had the mandate to develop a national agenda related to injury research and prevention or to coordinate the efforts of agencies working on different aspects of injury). The general consensus was that the U.S. model works particularly well for promoting advancements in injury research and prevention in cost-effective ways (i.e., CDC/NCIPC as the lead agency that coordinates research across multi-sectoral groups and sets the national injury research agenda, with university-based centers conducting the research and bridging to communities and non-government groups).

(2) Capacity building barriers included insufficient numbers of researchers and poor infrastructure support for injury work. Moreover, problems in gaining *sustained* commitment to capacity building were raised repeatedly because such commitment is viewed as essential to significant progress in injury research and control.

(3) Inadequate financial support for injury research, notably injury researchers' difficulty obtaining funds from grant sources that did not specifically target injury (e.g., poor representation of injury researchers on grant review boards, poor supply of reviewers of grants on injury, insufficient commitment to injury work in comparison to other disease-focused research).

(4) Lack of a long-term commitment to injury research and control was also identified as a significant barrier to progress. Interest in injury waxes and wanes, making it difficult to achieve short-term goals, much less long-term outcomes. For researchers, this results in "constant scrambling" for research funds. For practitioners, this limits interventions to "quick fix programs".

7) **IMPLICATIONS FOR CANADA**

The consistency across countries in the 'key factors' contributing to success is striking. The following implications for Canada derive from these findings.

a. Progress necessitates leadership. Hence, some lead agency or group must assume responsibility for developing the framework and implementing the strategic plan that will address the issue of injury research and prevention nationally in Canada. This point has been made before, repeatedly (e.g., National Forum on Health paper authored by Dr. Barbara A. Morrongiello and entitled, *Preventing Unintentional Injuries Among* Children, 1996; editorial by Dr. Barry Pless entitled *Action on injury: setting the agenda for children and young people in the UK*, published in Injury Prevention, 1998 Issue 4 Supplement; position paper by the Canadian Public Health Association, 2002; Senator Michael Kirby's Senate Committee report, October 2002; SafeKids Canada letter to the Minister of Health, Honourable Anne McLellan, July 2003). Health Canada did (albeit briefly) create a Secretariat for Injury in 2001 though this commitment to injury was short lived. If now is an opportune time to gain a commitment to progress on injury in Canada, then the issue of leadership will need to be addressed. Strong national leadership is critical for success.

   The U.S. approach, establishment of a separate National Center for Injury Research and Control, was the most strongly endorsed by the key informants. Although some countries have tried to work within existing Health/Medical Research Councils (e.g., New Zealand, Australia) or Health Department (e.g., UK), the main difficulty that arises is that interest in injury eventually wanes (whether due to political pressures, other more pressing health issues that arise, or a general sense that 'injury has had its time'), resulting in losses in funding, fellowships, and long-term support for injury research. In short, without a separate and newly created center for injury research and control, or designation of injury as a cross-institute theme that has targeted and long-term funding commitments, there seems to be little hope of *sustaining a focus* on injury research.

   NOTE: There may be an opportunity for the Health Minister to implement this type of infrastructure soon. The Canadian Medical Association has recommended the establishment of a type of 'CDC North' to address public health issues (e.g., SARS, Mad Cow Disease, West Nile Virus). Injury prevention could become part of this mandate. Apparently, the Health Minister publicly announced strengthening of the public health system for infectious and non-infectious diseases at the CMAs annual general meeting on August 18, 2003, though no resources or strategic plan have yet been discussed.

b. Capacity building and infrastructure development are necessary activities in order to support and sustain progress in injury research and prevention. These foci must be part of a strategic plan to move forward on injury control and prevention in Canada.

   Indeed, the progress in Australia over the past 5 years is testimony to how much return on investments in capacity building can be realized. In addition, capacity building at many levels, spanning junior to senior investigators, is essential (e.g., graduate fellowships, post-doctoral fellowships, junior faculty positions, junior and senior investigator awards) for sustained growth in injury research.

NOTE: The Romanow Commission identified Health Promotion/Disease Prevention as one of the five pillars to a sustainable health care system, which is consistent with a commitment to training in health promotion, including injury prevention. In addition, CIHRs goals to establish centres of excellence to promote knowledge transfer (i.e., from research to practice) could include injury as a focus, thereby enhancing capacity building, injury research, dissemination of best practices, and improved coordination of programming across jurisdictions.

c. Progress is unlikely to be attainable without some commitment of funds to achieve these objectives, particularly point 2. Historically, injury has been lost in a sea of diseases that recruit more attention from funding agencies in health. One of the goals mentioned in many documents from other countries is to make funding for injury better reflect the scope of this health-compromising issue. Achieving this same goal in Canada would seem an essential part of any strategy to promote progress in injury research and prevention. It is apparent, however, this is going to require substantial lobbying for some difficult decisions to be made by those in the health sector that allocate research funds.

   In Australia, placing injury within an economic framework worked well to 'sell it' to health departments. The same may prove true in Canada. Also, this framework makes the importance of focusing on injury prevention and control readily apparent to non-government stakeholders who are prepared to invest in health promotion in order to prevent the need for larger rehabilitation payouts later (e.g., insurance companies).

   Many stakeholders have pointed out that much of the money for road safety research does not derive from health funds. Hence, there is much less competition for transportation funds per se. As long as injury monies come primarily from health funds there is going to be substantial competition for these funds. Waiting for injury to be recognized as a significant health issue has not worked well thus far. Clearly designating it as a health issue may produce more equitable distribution of research funds. Based on an analysis of international events, this seems a necessary step for advancements in injury research and prevention.

d. Making a sustained, long-term commitment to injury is an integral part of achieving success. This is not the first time that hope for a focus on injury has emerged in Canada. Indeed, there have been many efforts over the past years to mobilize and coordinate research and prevention efforts on a national level. Unfortunately, there have been insufficient resources (individuals, money, infrastructure support, etc) to sustain these efforts. Frustration is high among stakeholders who have watched these efforts wax and wane. Strong leadership and long-term commitment of money to address this issue are essential to ensure progress on a national strategy to address the burden of injury in Canada.

e. For more progress to be made, the following initiatives should be taken:

i. Use the media more effectively in order to raise awareness of injury (scope of the problem, preventability) and prevention strategies and, generally, to focus national attention on the issue. Routinely, the media focuses on intentional injury. However, unintentional injury could just as easily become a topic they report about daily. 'State of the nation reports' have raised awareness of environmental issues in Canada. This strategy may achieve the same benefits for injury research and prevention. Perhaps assigning an agency the task of reviewing progress in injury (just as the Environment Commission does for environmental issues) may help to sustain public interest and promote progress in injury.

ii. Make better use of network-based communications to contact other researchers in order to share ideas, obtain advice or updates about projects, and overcome discipline-based barriers to research. For example, DPNET is a national network of Developmental Psychologists in Canada who all share a keen interest in research. Routinely, queries relevant to research are posted (e.g., questions about measures, methodological issues, statistics). This mechanism of communication has helped researchers to identify other researchers with whom they share common interests or different but complementary expertise, which fosters creative collaborations. At this time, injury research in Canada is very fragmented and not very inter-disciplinary. Thus, mechanisms to foster discussions and knowledge exchange will likely aid in moving towards greater adoption of inter-disciplinary approaches to injury research.

8) VIEWS ON INTER-DISCIPLINARY APPROACHES TO INJURY RESEARCH AND PREVENTON

In every country surveyed, key informants talked about the trend toward interdisciplinarity in injury research. Several positive aspects of this approach were mentioned, although challenges in developing the approach also emerged in these discussions. The following points arise from discussions with key informants, as well as a review of published literature on the benefits and challenges of inter-disciplinary research (see Reference listing).

Positive aspects include:

(1) Bringing together individuals from different disciplines is essential to address a complex, multi-determined issue like injury prevention. However, not all types of injury necessitate such an approach.

(2) Opportunities for mutual instruction and knowledge expansion arise from working as an inter-disciplinary team member.

(3) Working as a team results in shared responsibility for progress, and mutual support to sustain momentum.

Challenges include:

(1) The need to find ways to speak the same language so that there is a common understanding of the key issues to be addressed and how to best address them.

(2) The need to respect the skills and knowledge of others. It goes without saying that subtle communications implying a lack of appreciation of other viewpoints substantially undermine inter-disciplinary work. Several informants had such experiences working in inter-disciplinary teams.

(3) Often, progress is slower because of the need to address points 1 and 2 and find ways to productively work together as a team. An effective team leader was mentioned as very important for the success of an inter-disciplinary team.

(4) As a strategy to obtain funding, some agencies 'force' investigators to join artificial and poorly conceived interdisciplinary groups. Many stakeholders questioned the evidentiary basis for this research approach and felt that this was not necessary and should not be a requirement for funding.

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10)**APPENDIX A**

List of key informants who were initially contacted and asked to complete a questionnaire via email:

*Amy Zierler (CA)

Susan Baker (USA) – did not participate

Danilo Blank (BRA) – did not participate

* Mike Hayes (UK)

* Diane Hudson (USA)

* Wolf Kirsten (GER)

* Lucie Laflamme (SWE)

* Bodil Langberg (SWE)

* John Langley (NZ)

Rita Mezei (CA)

* Robyn Norton (AUS)

Eleni Petridou (GRE) – did not participate

Toni Plasencia (SPA) – did not participate

Barry Pless (CA)

* Yousif Rahim (NOR)

* Fred Rivara (USA)

Wim Rogmans (NETH)

*Carol Runyan (USA)

Ian Scott (AUS)

Jo Sibert (EU) – did not participate

David Sleet (US) – did not participate

Leif Svanstrom (SWE)

Liz Towner (UK) – did not participate

Ann Tursz (FRA) – did not participate

Heather Ward (UK)

Lynne Warda (CA)

* designates those who completed a telephone interview following completion of the questionnaire

11)**APPENDIX B**

EMAIL INITIALLY SENT TO LIST OF KEY INFORMANTS

Background Information about this Canadian Initiative

The Canadian Institutes for Health Research (CIHR) has funded an initiative called Listening for Direction on Injury (LFDI). Using a participatory process with broad stakeholder representation (researchers, practitioners, etc) the LFDI committee has the objective of developing a research strategy that will facilitate and support interdisciplinary research programs leading to the reduction of injury in Canada. I am contacting you to learn more the process that led to injury prevention and control moving forward to gain in priority status is in your country.

Specifically, I would like to gather your views about the following questions/issues (see below).

Many often people assume they have little information to share but you have been carefully selected based on publications and reports you have prepared. Hence, I would very much value your opinion regarding the questions/issue outlined below.

My objective is to prepare a general report about what has gone on internationally to move the issue of injury prevention forward in various countries around the world. It is hoped that learning this type of information will help us make informed decisions as we work to move this important issue forward in Canada.

Issues/Questions to be addressed

1) What would you say was the **single critical factor/event/initiative/report** that served to move Injury Prevention & Control (IPC) forward in your country? If there was no single event, what were the precipitating events?

2) Was there a `champion' that made the difference to moving IPC forward?

How did this person/group achieve this outcome?

3) What advice would you give to groups, such as those part of the LFDI in Canada, about how to move IPC forward in their own country?

Is it all a matter of allocating more research money to the topic?

Is it more a matter of 'critical mass' of researchers?

Does one need public outcry to redirect the attention of politicians towards IPC?

Does one need a lead agency to take charge?

4) What do you see as the most serious barriers/challenges to moving this issue forward?

5) One common assumption is that 'interdisciplinary research is the most likely approach to achieve the greatest advancements in IPC'.

Have you found this to be the case in your country?

What is your opinion on this important matter?

Do you have any first hand experience working as a member of an interdisciplinary team on IPC?

What have the challenges and benefits been?

6) Is there anyone else you suggest I contact who can provide additional information on the issues outlined above or who could help me learn more about how the issue of IPC moved forward in your country?

(Please provide contact information if you can: email address, etc)

7) Are there any particular reports on this topic that you can suggest I review?

(Please indicate how I can access these)

THANK YOU so much for participating in this information gathering process. Unless you indicate otherwise, you will be listed as a 'key informant' in the final report that will be sent to the Canadian Institutes of Health Research in the fall of 2003.

APPENDIX D.2

Unintentional Injury Prevention – Priorities for Research, Capacity Building, and Knowledge Translation

August 2003

Barbara A. Morrongiello, Ph.D., C. Psych

This report was prepared as part of the Listening for Direction on Injury initiative sponsored by the Canadian Institutes of Health Research and the Canadian Injury Research Network.

NOTE:

This report has been modified from its original format for inclusion as an appendix in this document. The table of contents has been removed. In addition, various sections have had white-space removed to conserve space. Those wishing to view the report in its original format, can download it from:

www.injurypreventionstrategy.ca

Modified from Original Format for this Appendix by:

Philip Groff

1) Definitions

Injury is defined as damage to the body resulting from the transfer of physical energy (mechanical, thermal, electrical, radiant, chemical) or from the absence of essential energies (e.g., heat)1. This report is concerned with unintentional injuries, that is, those that do not result from violence. Children are defined as individuals 1 through 12 years of age, young workers are defined as teens and young adults who have recently entered the workforce, and older adults are defined as those 65years of age or older. Risk factors are elements (e.g., behavior patterns, environmental conditions) that predispose people to poorer health.

2) Scope of the Problem and Burden of Injury

The World Health Organization predicts that, by the year 2020, injury will become the greatest single reason for loss of healthy years of human life2. Injuries pose a significant threat to the health and well being of Canadians throughout the life cycle. For all ages, injury is ranked fourth in terms of leading causes of death, surpassed only by cancer, cardiovascular disease, and respiratory disease3. Of all diseases, unintentional injuries rank second for years of potential life lost4. Each year, at least 13,000 Canadians die of injury and an additional 200,000 are admitted to hospital because of injury3. In Ontario, for example, the 2002 Chief Medical Officer of Health Report notes that one resident is injured every minute of every day, resulting in more than 2000 daily injuries. The burden of injury is reflected not only in the staggering statistics but also in health care costs. Direct and indirect costs of injury have been estimated to be $14.3 billion per year5. Indeed, a report to the National Academy of Sciences aptly describes injury as the "neglected disease of modern society."6

3) Scope of This Report

This report is limited to unintentional injuries affecting non-Aboriginal Canadians in select high-risk groups, including children, young workers, and older adults; unintentional injury among Aboriginal peoples in Canada will be addressed in a separate report. It should be acknowledged that motor vehicle collisions are the leading cause of death for young drivers, particularly at 18 and 19 years of age, and among males7. These statistics leave little doubt that young drivers constitute a high-risk group. At this time, however, graduated licensing systems are in operation in six provinces, encompassing 80% of the population, and preliminary evaluation studies show these programs to be highly effective. Hence, progress is being made to address this burden of injury issue and time is now needed to determine how well this approach works and whether there are remaining substantive research issues in this area. For these reasons, this high-risk group was not selected for inclusion in this document. It should be acknowledged, however, that future research evaluating graduated licensing programs may indicate substantive research issues remain to be addressed for this high-risk group.

4) Research Priorities

In this section a number of research issues and priorities are identified (NOTE: italics and bold are used to designate these priorities). This list is not intended to be exhaustive. Rather, it is intended to highlight important issues and priorities

for research that will likely lead to new injury prevention initiatives and control measures among select high-risk populations in Canada (i.e., children, young workers, older adults).

There are numerous approaches to defining research priorities. Probably the most common approach is to focus on those types of injuries that occur most frequently at certain ages or to particular risk groups. Alternative approaches include: (1) focusing on those types of injury that appear to be increasing and about which limited information is available (e.g., dog bites8), (2) focusing on those injuries that are likely to be severe and/or lead to fatalities (burden of harm) when an individual interacts with a particular hazard (e.g., suffocation in young children), (3) focusing on cross-cutting issues relevant to injury control for a variety of types of injury (e.g., parent supervision), and (4) focusing on understudied injuries to investigate their nature and scope of injury (e.g., farm injuries among youth). In addition, issues of cost-effectiveness (both monetary and burden of suffering), amenability to prevention, and the evidence regarding effective prevention are often secondary considerations in formulating priorities.

In the US, for example, the National Center for Injury Prevention and Control (NCIPC) of the Centers for Disease Control (CDC) recently incorporated all four of the latter approaches in developing their National Research Agenda, focusing on: residential fires (severity of injury), falls among the elderly (frequency of injury), dog bite injuries (increasing rates of injury), caregiver supervision of children (a cross-cutting issue for child-injury prevention), poisoning among children and the elderly (frequency, severity), and rural injuries (limited knowledge about nature and scope).9 In the UK, a recent research agenda for childhood injury prevention included residential fires (severity, frequency, amenability to prevention, prevention evidence), falls (frequency), and scalds (burden of suffering, amenability to prevention, state of prevention knowledge)10.

In preparing this document, the frequency and severity of injury were the primary considerations in identifying research priorities for unintentional injury in Canada. However, cross-cutting issues were also identified because of their broad application across the high-risk populations of interest.

Cross-Cutting Research Issues

a) The Need for A Systematic Approach to Research

The Centers for Disease Control considers four main "phases" of research: (1) Foundational research covers basic studies that delimit and quantify the nature and scope of the injury problem (e.g., what types of injuries are occurring, to whom, etc); (2) Developmental research includes studies to identify determinants of risk taking and risk factors for injury, as well as preliminary testing of potential interventions to address these determinants and risk factors; (3) Efficacy/Effectiveness studies address whether interventions reduce risk taking and/or injuries; and (4) Diffusion research leads to identification of the best strategies for implementing, disseminating, and promoting uptake of "best practices" interventions. Each successive phase builds on the findings of the previous phase.

Applying this rubric to development of the current agenda, it is clear that advancements in injury prevention and control for any of the identified high-risk Canadian populations will require a comprehensive approach to research in order to ensure that interventions are based on a thorough empirically-based understanding of the determinants of injury risk. Historically, the majority of injury research has been Foundational research, focusing on quantifying the nature and scope of the injury problem. However, it is necessary to gain a thorough understanding of the determinants of risk taking and injuries in order to develop effective targeted interventions. Hence, it is essential to broaden and strengthen the evidentiary basis for action by focusing more on Developmental research, which can then lead to Efficacy/Effectiveness research and, ultimately, to Diffusion research.

b) Sex Differences

For each of the high-risk groups discussed in this report males are at greater risk of injury than females. The reasons for this sex difference are not definitively known and may well vary across the life span (e.g., sex differences in risk-exposure rates, similar exposure rates but sex differences in behaviors in risk contexts). Research on the determinants of children's risk-taking behaviours, for example, indicates that females are concerned primarily about the likelihood of injury, whereas males are willing to accept some risk of injury and they focus more on evaluating the potential severity of injury11. In addition, boys demonstrate a larger optimism bias than girls, meaning that they believe that they are less likely than comparably skilled peers to experience injury12. Whether similar sex differences in attitudes and beliefs apply to differences in injury risk among male and female young workers or older adults remains to be determined. Suffice it to say, there are two implications of the robust finding that males experience more injuries than females:

- Research on the determinants of injury risk must consider the possibility that determinants will differ for males and females.
- The nature and/or intensity of interventions to reduce risk behaviors and/or injuries may need to differ for males and females.

Further research identifying ways males and females differ in behaviors, cognitions (e.g., risk perceptions and appraisals), feelings (e.g., exhilaration versus fear in risk contexts), attitudes and beliefs (e.g., preventability of injury, attributions for injury) relevant to injury risk is needed and, when differences are found, consideration should be given to development of sex-specific tailored interventions to reduce injuries.

c) Risk Compensation

"Risk compensation" refers to the notion that, in reaction to environmental or product design changes intended to decrease injury risk, individuals will respond with greater risk taking13. For example, drivers travel at faster speeds in vehicles equipped with airbags or when wearing seat belts14-16. Parents of young children reduce precautions for lighters equipped with safety mechanisms17-19. In reaction to school-age children wearing safety gear, parents report greater tolerance for children's risk taking and a strong belief that

injuries are completely prevented by the safety gear20. One study examining the impact of bicycling safety courses on child behavior reported increased risk taking following education21.

The notion of risk compensation has recruited considerable interest, and sparked numerous debates, among professionals interested in injury prevention and control. There is some evidence supporting the notion and other evidence contradicting it13.

Owing to the importance of this issue, further systematic study of risk compensation is needed in order to determine if, and under what conditions, environmental and product design changes that are intended to decrease injury risk actually lead to increased risk taking. Critical questions that merit attention include:

- Does skills-training (e.g., bicycle-training courses for children, on the job training for workers, swimming lessons for children) result in individuals engaging in increased risk taking or being allowed to do so by caregivers, and what is the underlying mechanism responsible for this effect (e.g., Does training produce changes in perceptions of injury risk with that activity, or, in individual's appraisals of their personal vulnerability for injury?);
- How does wearing safety gear (e.g., children wearing helmets, workers with protective wear, older adults with hip protectors) influence perceptions of risk and actual risk-taking behavior, and
- Are there certain types of individuals (e.g., those having the personality trait of sensation seeking) who are more likely to show risk compensation?

d) The Need for Change in our Approach to the Study of Injury-Risk

Historically, injuries have been studied as isolated and discrete events, with a primary focus on identifying individual and/or environmental risk factors that correlate with injury. This approach has merit but is limited in scope. Injuries occur in a social-societal context and these contextual factors can contribute substantially to injury risk. Bicycle helmet legislation, for example, did not result in an immediate dramatic increase in helmet use in all jurisdictions and across all ages of riders. Why? In part, because social (e.g., peer and family influences) and societal norms and attitudes about the importance and efficacy of helmets were slow to change (e.g., insufficient marketing of the bike law and merits of helmets in certain jurisdictions). And, the fact that we still see differential usage as a function of age (i.e., lower usage among teens and adults than young children) suggests that age-related differences in societal norms and attitudes remain to be addressed.

A broader and more comprehensive approach to the study of injury/risk would consider not only individual and environmental risk factors, but also the contribution of social-contextual factors to injury risk and the interactions among these diverse factors. Placing injuries within a broader social-ecological context promises to yield a more comprehensive understanding of the behavioral and non-behavioral factors that influence injury risk. This comprehensive approach to the study of injury will generate essential knowledge for the development of injury prevention and control initiatives that target multiple levels of the

determinants of risk (individual, family, neighborhood, community, organizations, society); for a more extensive discussion of social-ecological approaches to research see Bronfenbrenner22.

Adopting a social-ecological approach to injury research is consistent with a Population Health framework. Simply put, a Population Health framework acknowledges that a variety of factors, operating at different levels of influence (individual, family, community, culture/society), have an impact on individual health, including factors such as social status, income, physical environments, biology and genetic endowment, personal health practices and behaviors, culture and social environments. Thus, according to a Population Health framework, a comprehensive strategy to reduce injuries necessitates comprehensive research and a wide variety of approaches to intervention.

Some disciplines (e.g., Psychology, Sociology) have adopted a social-ecological approach to research for many years. This approach examines social and contextual process variables (e.g., families, neighborhoods) and interactions among factors operating at different levels (e.g., children within family contexts, families within neighborhood and community contexts, neighborhoods within societal contexts). Consequently, social scientists have much to offer research on the determinants of injury risk, as well as injury prevention and control. A social-ecological approach, for example, can provide insights into family and neighborhood characteristics that relate to injury risk, and advance our understanding of how child x parent characteristics interact to influence child injury risk. Social scientists are also skilled in identifying broader societal norms and/or public policies that merit attention and change. In addition, social scientists can help elucidate psychological precursors (e.g., attitudes, beliefs, cognitions, emotions) that lead to risk taking and decision making that elevates risk of injury. They can provide insights into psychological factors following injury (e.g., attributions about injuries, neighborhood norms valuing risk taking) that elevate the risk of individuals repeating risk behaviors that lead to injury. They can address important aspects of family and peer socialization influences on risk taking and attitudes toward safety/risk, factors that influence injury risk across the lifespan. In sum, there is much to be gained by finding ways to recruit social scientists to the study of injury, particularly if we wish to reposition research on injury within a more comprehensive, social-ecology (population health) framework.

To make greater progress, a broader approach should focus not only on identifying risk factors that elevate the likelihood of injury, but also on identifying protective factors that moderate injury risk. Not all children in low-income areas experience injuries. What differentiates those children who do and do not experience injuries in the same environmental-risk settings (e.g., child attributes, family norms about safety, caregiver supervision)? These questions orient researchers to look not only for risk factors but also for protective factors that can moderate injury risk. If one cannot decrease risk factors, one may be able to increase protective factors, producing the desired outcome (reduced injuries)

but via different processes. (see footnote 10) Hence, a focus on risk and protective factors in research can support a more varied and comprehensive approach to injury prevention and control initiatives.

e) Addressing Disparities in Injury Risk

As is true of most diseases, there is a strong relation between injury and economic prosperity23-24. People who live in poverty are at greater risk of injury, particularly children and youth under 18 years of age25 -27. Notably lacking, however, are rigorously conducted studies examining how such effects are produced. For example, is child-injury associated with poverty primarily as a result of greater exposure to hazards, or are there parenting factors (e.g., differences in child rearing or supervision practices), family factors (e.g., value placed on risk taking), or community factors (e.g., social norms about child independence) that co-vary with economic status and elevate injury risk for children living in poverty? Research is needed to identify the processes by which economic status influences injury rate. A thorough understanding of such processes is essential for developing prevention strategies that address income-related disparities in injury.

In Canada there is also a gap in knowledge about variations in injury risk as a function of ethnicity and cultural heritage. The only group identified as high risk is Aboriginal Canadians. However, there may be disparities in injury risk among other ethnic and culturally diverse groups too. In the United States, for example, research indicates significant variation in injury rates for different ethnic groups even after controlling for economic status. Such information can provide important insights into family, community, and broader cultural influences that affect injury risk (e.g., norms about safety, value placed on wellness, tolerance for risk taking, differences in child rearing practices). Research examining variation in injury risk related to ethnic and cultural diversity may help in identifying risk and protective factors for injury.

f) Addressing the Issue of Attributions for Injury Reductions

Analysis of injury rates over time reveals decreases in injury rates in a number of areas (e.g., child pedestrian injuries, cycling injuries, workplace injuries). The question remains, however, as to the basis for these changes. Many have argued, for example, that decreased physical activity among children is the primary cause for reduced pedestrian and cycling injuries. Others attribute the positive gains to safety promotion interventions (e.g., increased traffic calming measures, education programs). Similarly, changes in health-care practices over time may have a role to play in explaining these gains. For example, spiraling health care costs may result in fewer children being admitted to hospital for observation following a head injury than was the case years ago, and advances in medicine

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[1]Risk and protective factors need not be complementary and dependent (i.e., opposing sides of the same issue such that lack of the presence of a risk factor constitutes a protective factor). They can be completely independent factors. For example, risk factors may include environmental hazards. Protective factors may include peer norms valuing safety.

and the ability to assess directly for brain injury may result in fewer children requiring hospitalization. Recent evidence in the US, for example, illustrates the impact that changes in trauma care can have on mortality data 28. The point is that any number of factors can contribute to explain reductions in injury over time, and many of these factors have little to do with injury prevention and control measures per se. Hence, it would be informative to develop techniques that allow one to more directly determine those factors that best account for declines in injury over time.

Research Issues for Specific High-Risk Populations

In the following section the focus is on: (a) children (pre-school, school age), (b) young workers, and (c) older adults. For each of these populations, there is: (i) a brief statistical summary highlighting the burden of injury for that group, (ii) a brief overview of what is currently known or the subject of ongoing research, and (iii) suggestions for next steps in research. In addition, examples are given (see section iv) illustrating an inter-disciplinary approach to a specific research issue.

a) Children

i) Burden of Injury

Injuries are the leading cause of death among young people between the ages of 1 and 19 years of age, accounting for about 20% of all hospitalizations in North America within this age range3. At all ages throughout childhood, males experience more frequent and severe injuries than females29.

Motor-vehicle related injury is a leading cause of death for pre-school and school-age children. This type of injury is not discussed below for pre-school children, however, because a great deal is known already about how to prevent these injuries (i.e., children need to be properly restrained in vehicles). Hence, the primary focus for pre-schoolers in this report is injury risk in the home environment. For pre-school children, many injuries occur in and around the home, whereas for school-age children many injuries occur when they are participating in activities outside the home30. Not surprisingly, epidemiological data highlight different injury risks at different ages in these different contexts.

Pre-school children

Pre-schoolers are at risk for: drowning, suffocation and choking, fires/burns, poisoning, and falls29. Drowning most often occurs when young children are left unattended in bathtubs or near swimming pools31-32. Falls often occur off beds, down stairs, and from heights when climbing (e.g., on furniture). It is a well recognized fact that focusing on environmental modifications to prevent access to hazards (e.g., fencing for pools, gates for stairs) and/or interventions to increase caregivers' child-safety behaviors, particularly supervision, hold the most promise for decreasing these types of injuries. Indeed, in many high-risk situations, supervision is the only effective intervention.

More research is needed to:

- Identify ways to promote caregivers' in-home hazard reduction practices.

- Examine relations between caregiver supervision and child injury risk, including how parent, parenting, and child characteristics interact to influence injury risk.

The state of knowledge about each of these two research topics is characterized below.

(1) Promoting home hazard reduction among parents of pre-school children

ii) What is currently known or under investigation

Although legislated changes in behavior have reduced child injuries in a number of areas (e.g., infant safety seats have reduced child injury rates33), evaluations of programs targeting parents' behaviors and promoting home hazard reduction (i.e., home safety education, increased use of safety devices, environmental modifications to the home) have produced mixed results34.

Systematic reviews of home visiting programs conclude that such programs can be effective for reducing the rate of childhood injuries34-37. However, generalization of the findings is compromised by a variety of characteristics of the programs that have been implemented to date (e.g., most programs have targeted mothers of children at risk for injury38). Hence, the extent to which home visiting interventions reduce child injury risk among broad segments of the population is as yet unknown. Some ongoing programs (e.g. A Million Messages in Edmonton Alberta, contact person Lacey Hoyland; the Chilliwack (BC) Safe Baby Project; and the Creating Safety Homes project of the Algoma Health Unit) will provide important information regarding the impact on parent attitudes, knowledge, and/or behaviors of having visitors who are scheduled to come to the home for one reason (e.g., well baby visit, parent support) also provide information about child safety. Broadening the scope of the practices of home visitors can be very cost-effective, however, evaluations of these programs is an essential next step.

Counseling (e.g., during well baby visits) and/or the provision of free safety devices have not consistently produced noteworthy changes in parents' behaviors39-41. However, campaigns that provide, install, and maintain safety devices are more likely to achieve positive results than those in which parents have to obtain the safety device themselves33, and counseling by physicians is more effective than by others.

One key barrier to motivating caregivers to adopt home-safety practices is that relatively little is known about the key determinants of parents' implementation of home safety practices. Hence, most interventions that target in-home safety have not been based on a sound theoretical or evidentiary foundation. Research on parents' attitudes toward safety, beliefs about injuries, and determinants of their practices is particularly critical for program planning, especially to target specific ethnic, cultural, or economic groups. A recent study, for example, revealed significant variability, as a function of type of injury (e.g., falls versus drowning), in the determinants that best predicted parental home-safety practices (e.g., maternal beliefs about injury severity predicted engaging in home-safety practices for preventing drowning but did not systematically relate

to safety practices to prevent falls)42. Application of these findings may now lead to more effective programs to promote home hazard reduction among parents of pre-school children.

Hence, a comprehensive understanding of the determinants of parents' risk and safety behaviors for pre-school children in the home is essential for the development of effective programs to promote parents' in-home safety practices.

Resources that are currently available have not been evaluated, including home safety kits, child passenger assessment clinics, and a variety of strategies implemented as part of the Ontario Early Years Injury Prevention initiative. Empirical research should determine their effectiveness for reducing home hazards and/or child injuries among pre-school children. (see footnote 11)

A recent Canadian study confirms that an education campaign involving the media, retail stores, and community partners, addressing scald and burn prevention strategies, and targeting parents of young children (Safe Kids Week 2001), was effective both in increasing knowledge and promoting behavior change43. If replicated with similar results, and if the self-report data can be independently confirmed, this study suggests that this approach to injury prevention is effective for parents of young children.

iii) Next Steps in Research

A variety of strategies have been developed to address home hazard reduction among pre-school children. However, many of them have not been rigorously evaluated and there exist a number of research gaps, including:

Recent research indicates that determinants of parents' home-safety practices vary according to the type of injury42. These findings should now be empirically tested in injury-specific interventions to promote home-safety practices among parents of pre-school children. In addition, systematic research is needed to explore those approaches to message framing that best motivate parents to act on the information they have received (see Rothman & Salovey44). For example, are parents more likely to engage in safety-promotion practices on behalf of their child following 'health gain' (benefits) or 'health loss' (costs) messages?

Resources currently in use for hazard reduction at home need to be rigorously evaluated (e.g., home safety kits; Safety content of the Nobody's Perfect parenting program), including identification of the optimal timing for their distribution to parents (e.g., pre-natally, when the child first starts walking, immediately after a near-injury). Similarly, decisions that take cost-effectiveness into consideration necessitate analyses of the impacts of widely-implemented community programs that have never been evaluated (e.g., child passenger assessment clinics, Baby Basics classes).

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[11] An RCT evaluation of home-safety kits is ongoing at the BC Injury Research and Prevention Unit (called the Chilliwack BabySafe Program), with results expected in the spring of 2004.

Prior research suggests that there is a substantial gap in health-care providers' communications to parents about safety40, even though a number of studies indicate that such communications can sometimes positively influence parents' home-safety practices41. Research identifying ways of motivating health-care providers to focus more on safety during well-baby or sick-baby visits, as well as ways to remove barriers to such message delivery is needed. In addition, more information is needed about ways of improving health care providers' dissemination of home-safety information to parents of young children.

Research that systematically relates child injury risk to aspects of home design, landscaping, and/or urban planning may provide insights into ways that features elevate child injury risk.

(2) Supervision

The role of supervision in child injury risk is of such vital importance that CDC has listed it as a priority area, breaking with the tradition of targeting specific types of injury45. Supervision has implications for virtually every type of injury that threaten the well being of pre-schoolers at home. Links between caregiver supervision and child injury risk are based largely on indirect evidence (e.g., children in single-parent homes are at elevated risk of injury46) or logical arguments47. There have been no controlled, empirical studies examining the relationship between supervision and injury48. Hence, the extent to which supervision functions as a risk or protective factor for injury, and how such effects are achieved, remain to be determined.

ii) What is known or under investigation

We know surprisingly little about natural patterns of supervision, the factors that influence supervision decisions, and what the actual requirements for supervision are at different ages. In fact, despite its significance for child neglect and injury, there are surprisingly few studies that directly address parental supervision49-54. Moreover, the majority of studies of supervision suffer from parents' self-reports and mono-method bais55-56. It must be acknowledged that how parents behave (or report their behaviour) when they know they are being studied may bear little relation to how they typically behave in natural settings. Hence, we need to achieve a better understanding of supervision as a psychological and behavioral construct, and it is essential that ecologically valid methods be used in this research, as recently reported57.

In ongoing research Morrongiello and colleagues are currently focusing on (1) measurement issues (i.e., testing the reliability and validity of a questionnaire measure of supervision, The Parent Protectiveness and Supervision Questionnaire for parents of pre-schoolers; comparing self-reports of supervision with naturalistic observations of supervision58; (2) gathering data on natural patterns of home supervision and risk exposure (e.g., the nature and scope of supervision provided to pre-school children at home on weekdays and weekends59; (3) how often parents use older siblings to supervise younger children, under what circumstances, and how this relates to child injury risk60; and (4) developing a taxonomy of supervision styles that relates to child-injury risk50.

iii) Next Steps in Research

Important questions for research on the relation between supervision and injury risk include:

How best to measure supervision (e.g., Do questionnaire measures of protectiveness have sufficient predictive validity for understanding child injury risk? Are caregiver self-reports reliable and valid? Can children reliably report about supervision they are receiving?)

What are normative patterns of supervision at different ages, and how does variation in supervision relate to child injury risk (e.g., Can we develop minimal standards for supervision of children at different ages? Can we identify `risk patterns' of supervision that relate to child injury risk at different ages?);

What are the determinants of parents' decisions about the level and type of supervision appropriate for children (e.g., Do they focus mostly on environmental risk or child characteristics in making supervision decisions?), and what types of experiences and factors influence decisions about supervision (e.g., Does supervision change following child injury? Do media reports of injury risk affect supervision? How does supervision change as children gain skills naturally or as a result of skill training programs such as swimming lessons or bicycle training courses?)

How does use of products that parents believe increase safety influence parental supervision? For example, placing babies in bathtub rings increases the need for supervision but parents may assume it decreases the need for supervision, leading to inadequate supervision to prevent child drowning.

What are important ways that child and parent characteristics interact to influence child-injury risk (e.g., Do male and female caregivers supervise children differently? Does caregiver supervision vary systematically for boys versus girls? Hyperactive children experience many more injuries than non-hyperactive children, but why does this occur? Do parents differentially supervise these two groups of children?)

What are the most efficacious ways to promote changes in supervision, and are there 'critical moments of opportunity' when these interventions yield maximal gains (e.g., Would a positive focus, such as 'doing all you can for your child', promote greater compliance than a fear-evoking focus, such as 'look what happens when children are inadequately supervised'? Would an intervention following injury elicit greater compliance than one not linked to injury?)

iv) An example of an interdisciplinary team approach: Studying relations between parent supervision and child injury risk

Surveillance data (e.g., CHIRPP form) could be modified to gather information about supervision at the time of injury (who was supervising, nature and scope of supervision- watching, listening, checking intermittently, etc). Inquiring about supervision does not necessarily lead to 'blaming the (parental) victim' as some have argued, but can help to identify relations between supervision and child-injury risk. Epidemiologists could analyze these data to identify "risky" patterns of supervision (i.e., those associated with injuries of different grades of severity

for different age children); this approach to identifying risky patterns of supervision has recently been applied successfully in a study of minor home injuries to toddlers, resulting in a useful taxonomy of supervision behaviors relevant to child-injury risk52.

Research collaboration between epidemiologists, psychologists, public health specialists, and medical care providers could then lead to development of a supervision-focused intervention program that is delivered to caregivers whose child presents in an Emergency Department for an injury that occurred when a risk-pattern of supervision was reported. The program could focus on both behavioral changes and attitudinal shifts regarding supervision and injury prevention. Formative evaluation of the program could identify the processes contributing to its success as well as the components in need of further refinement and/or research development.

School-age children

Once children begin elementary school they are allowed increased independence and spend more time outside the home, resulting in a shift to predominantly pedestrian injuries, falls, particularly from playground equipment, and sports/recreation injuries (e.g., bicycling).

(1) Pedestrian Injuries

Children are among the groups at highest risk of pedestrian injury. Not surprisingly, increased exposure to roadways and driveways is associated with increased risk among children; the greater the number of streets crossed, the higher the risk of child pedestrian injury61.

ii) What is currently known or under investigation

Among children under the age of five, the most common location of injury is driveways and parking lots62-63. In contrast, for children 5 to 9 years of age, which is the group at greatest risk of pedestrian injury, the most common site of injury is on public roads. Specifically, children in this age range often show midblock dash/dart-out and intersection dash behaviors, which contribute substantially to injury risk.

Throughout childhood, boys experience more frequent and severe pedestrian injuries than girls, despite the fact that the rate of exposure to traffic is comparable for boys and girls64-65. Hence, behavioral risk factors most likely differentiate between boys and girls. Few studies have addressed this issue, but some evidence suggests that boys are less attentive, more impulsive, and poorer in judging traffic speed in comparison to girls66.

Pedestrian injuries are a complex problem and no single intervention approach is likely to be sufficient. The two most common approaches include education programs to improve the pedestrian behavior of children and environmental interventions (e.g., reduce traffic volume, traffic calming measures) to reduce risk exposure; given the multitude of factors that contribute to child pedestrian injury, the case for adopting both approaches has been strongly argued recently67-68.

Evaluations of pedestrian education and training programs have produced mixed results, some programs improved children's road crossing behaviors and others did not69-70. Moreover, there is nothing known about the characteristics that differentiate successful from unsuccessful programs, or whether improvements in safe crossing behaviors actually are associated with decreased risk of pedestrian injury. Suffice it to say, pedestrian safety education programs can change street crossing behavior in children, and this is very likely to be associated with decreased risk of pedestrian injury. Further research is needed, however, to identify program characteristics that are effective in improving children's pedestrian behaviors.

Several pedestrian training programs in other countries (e.g., Let's Decide Walkwise in the UK; Streets Ahead in Australia) have recently been evaluated and proved effective in improving street crossing behaviors among young children. In addition, programs in the US and Netherlands that focus on providing both parents and children training in pedestrian crossing also have demonstrated improvements in behaviors71-72. One such education program in Canada, Kidestrian, has been included as part of community-based safety programming by the Trauma Prevention Council in Southwestern Ontario. This program involves training parents as teachers/coaches of young children, and emphasizes the specific skill of teaching children how to cross safely from between parked cars. Formal evaluation of the program is needed. In particular, it would be informative to know whether the program effectively teaches children how to manage crossing between parked cars, and if these skills result in reduced injury rates.

There is considerable evidence confirming the value of environmental modifications to decrease child pedestrian injury. For example, in a number of Scandinavian countries in which the emphasis has been on environmental modifications, large-scale community evaluations have demonstrated that traffic calming measures are highly effective in reducing pedestrian injury73-74. In the UK, reducing speeds to 20 mph resulted in a 70% reduction in child pedestrian injuries in those districts75. Hence, there is considerable knowledge of the environmental modifications that reduce child pedestrian injury.

iii) Next Steps in Research

A variety of gaps in research exist, including:

There is a need for better understanding of the behavioral, cognitive, and psychological factors that differentiate boys and girls in pedestrian injury risk, and that most elevate risk of pedestrian injury. Understanding such differences may help to identify those determinants that most necessitate targeted interventions to reduce child pedestrian injury risk.

Further research is needed to help identify those aspects of education/training programs that are most effective for eliciting behavioral change to promote safer pedestrian behavior among children. Similarly, research is needed to confirm the assumption that improvements in pedestrian crossing skills are associated with decreased risk of pedestrian injury among children.

Relatively little is known about the role that parents play in child pedestrian injury risk, although a number of studies highlight the potential importance of this factor. For example, a study in the US suggests that parents have unrealistic expectations about their children's street crossing abilities76. Whether this actually leads to decisions that elevate children's risk of pedestrian injury remains to be determined. There is some evidence that parents' presence can be associated with increased, not decreased, risk of child pedestrian injury, suggesting that research is needed to determine how parent and child behaviors interact to influence injury risk in pedestrian situations77. Finally, interviews with children about modeling of risk behaviors they observe suggest that parents' unsafe street crossing behavior can negatively influence children's pedestrian behavior78, although behavioral evidence confirming this child-reported finding is needed. In sum, more systematic study is needed to explore parent influences on children's risk of pedestrian injury so that interventions can address this potential risk factor.

Research is needed to foster the development of programs that promote safer walking by children. For example, the Walking School Bus program in the UK is a program in which an adult walks from home to home, picking children up along the way, as they proceed towards school.

Research is needed to help develop age-appropriate street-crossing guidelines to assist educators and parents regarding appropriate expectations of children of different ages, and the circumstances that are likely to increase child pedestrian injury risk and necessitate closer supervision. Research relating developmental level (cognitive, perceptual, motor) to the tasks involved in street crossing would address these issues.

Research is needed to identify ways to increase the extent to which drivers yield to pedestrians, comply with speed-reducing measures, and, generally, show greater tolerance for road sharing both with pedestrians and cyclists.

Research relating severity of child pedestrian injury to vehicle design may prove informative for identifying engineering interventions that could reduce child injury.

Falls

Throughout childhood, of all types of injuries, falls pose a significant health threat, accounting for one third of all injury-related emergency visits by children31. Falls on playgrounds account for 75% of playground injuries that receive medical attention79-80. Moreover, emergency department records show that injuries from playground falls are proportionately more severe than injuries attributable to other causes during the early school years81. Hence, preventing falls in children, particularly on playgrounds, merits significant attention.

ii) What is currently known or under investigation

There is accumulating epidemiological data indicating that heights less than 1.5 m and impact absorbing surfaces are associated with less frequent and severe fall injuries82-83. There is also increasing evidence that resurfacing alone may be insufficient to prevent fall injuries84. Based on these findings, standards limiting

equipment height to 1.5 m and resurfacing (rubberized impact absorbing surface, wood chips, granite sand) are being advocated. However, there are no published studies assessing the differential effectiveness of the various surfacing options recommended or establishing the impact of standards on playground injuries.

Upgrading playgrounds to meet these height and resurfacing standards is costly. Not surprisingly, therefore, compliance with standards is often relatively poor for public playgrounds. For example, in Kingston, Ontario in 1994, only 15% of 117 public playgrounds conformed to Canadian Standards Association guidelines79. Similar poor compliance rates have been found for Boston, Atlanta, and Montreal85-87. Whether compliance has improved over the past few years, particularly with the intense promotion of he CSA standard of 1998, remains to be determined. However, even playgrounds that have been modernized to comply with standards have high fracture rates from falls88. Hence, regardless of whether or not recommended playground standards are met, as long as children behave in ways that elevate risk of falls, they are likely to experience injuries on playgrounds.

Taken together these numerous findings suggest that, in addition to environmental modifications to playgrounds, programs that target behavior change on playgrounds also may contribute to reducing injuries on playgrounds. One such intervention program focused on children in grades K-3 and produced significant decreases in risky behaviors on playgrounds, though the focus was not on fall-specific behaviors per se89. More recently, focusing on children in grades 3 through 6, and targeting fall-risk behaviors specifically, significant decreases in fall-risk behaviors were obtained, and these effects persisted 3 months after program delivery73. Hence, the existing research indicates that the prevention of children's falls on playgrounds will need to focus not only on environmental modifications but also on targeting individual behavior change. Preliminary data indicate that both behavioral and environmental approaches to intervention are proving effective but further systematic research to confirm these conclusions is needed.

Finally, there is surprisingly little known about factors that influence children to engage in injury-risk behaviors during play. A few studies indicate that peers can influence risk-taking decisions during play74-75, and individual differences in attitudes and beliefs about injury also are implicated11-12, 93. However, further systematic research examining the determinants of children's risk taking is needed, with particular attention to the ways in which social-contextual factors interact with individual attributes to elevate injury risk.

iii) Next Steps in Research

A variety of gaps in research exist, including:

Empirically establish the impact of standards on playground injuries, including the differential value of the various surfacing options and the equipment height recommendations; a project under the direction of Dr. Andrew Howard is currently addressing this issue.

Evaluate the impact on injuries and risk taking of other environmental modifications, such as signage designating age of users and clearly indicating

what constitutes misuse of equipment, or a board posting injuries recently experienced and how they occurred.

Further rigorous testing of the effectiveness of the two recently developed programs that report success in decreasing risk behaviors on playgrounds among pre-school children89 and school-age children73.

It should be noted that there is an ongoing evaluation of the ThinkFirst Curriculum Program in Toronto (contact: Dr. Michael Cusimano, cusimanom@smh.toronto.on.ca). Also, the Risk Watch School Program is currently being revised for Canadian content and should then be evaluated (contact: Brenda Enchin at SmartRisk in Toronto). Both of these are school-based programs that aim to increase risk awareness and appraisal skills among school-age children with the ultimate goal being to decrease injury-risk behaviors during play and recreation activities. A non school-based program developed at the University of Guelph, entitled Peril, is available on CD and seeks to enhance risk analysis skills through a series of challenging computer games. This program remains to be evaluated though it has been field tested to confirm children's interest and satisfaction with the game (contact person is Dr. Barbara Morrongiello, bmorrong@uoguelph.ca).

More systematic examination of how injuries are occurring on playgrounds and of injuries as a function of type of equipment is also needed so that relevant risk factors can be identified (e.g., age x equipment, risk behaviors x equipment) for future interventions.

Draw on the results of research on parents' understanding of playground injury risk (e.g., SafeKids Canada Canadian Playground Safety Survey, 2000) to develop programs to increase supervision on playgrounds.

Systematic research on factors influencing children's risk taking during play is essential for a thorough understanding of the determinants of injury that merit attention in prevention programming for school-age children.

Increase knowledge of the long-term consequences of concussions and minor head injuries due to falls.

Develop a safety standard for home-playground equipment.

iv) An example of an interdisciplinary team approach: Preventing falls on playgrounds

A handful of descriptive studies suggest that fall rates vary with type of playground equipment94. However, there is very limited research on this topic. Knowledge of such information could be used to develop age-appropriate norms for different pieces of equipment, identify risk behaviors specific to each piece of equipment, and develop targeted prevention strategies for those behaviors and pieces of equipment producing the most frequent and/or severe injuries. An interdisciplinary team could address this research topic in any number of ways. The following illustrates one example.

First, surveillance specialists, health care providers, and Parks and Recreation could work together to establish rates of fall injuries at various ages for common

playground equipment (e.g., slides, swings, climber), with attention to identifying specific risk factors leading to falls on different pieces of equipment, such as design features (e.g., design of railings on steps of slide, distance between railings on climber, etc) and behaviors (e.g., jumping off equipment, inappropriate standing on equipment, etc). These data could be used to identify risk behaviors, high-risk ages, and design shortcomings for each piece of equipment. These data would support development of a multi-faceted and interdisciplinary approach to prevention. Engineers could address design issues; public health and health care providers could assist with education of parents about supervision and age-appropriate equipment, and raising public awareness about falls on playgrounds; psychologists and public health providers could address the challenge of changing risk behaviors and raising awareness among children of fall-risk behaviors, appropriate versus inappropriate use of equipment, etc. Finally, Parks and Recreation might be involved by enforcing new regulations and guidelines for equipment use that develop as a result of this research.

(3) Sports and recreation injuries

i) Burden of injury

Recent research highlights the burden of injury associated with sports and recreation activities, and the dilemma that arises with increasing advocacy of more exercise as part of a healthy lifestyle95-97. Hence, to realize the full health benefits of exercise and an active lifestyle, attention to injury prevention needs to be part of planning for these activities.

Not surprisingly, sports and recreation injuries are common among school-age children. It has been estimated that children 5 to 12 years of age spend 18 hours per week engaged in physical activity98. Recent estimates indicate that these activities (organized and informal) account for about 17% of hospitalizations for injury and 19% of emergency room visits to CHIRPP affiliated hospitals99.

ii) What is currently known or under investigation

A recent systematic review of sports and recreation injuries highlights research questions that merit attention, as well as best practices for prevention100. Generally, the quality of relevant studies was found to be relatively poor, with significant gaps in research reported for all types of sports reviewed (alpine skiing, baseball, basketball, bicycling, football, ice hockey, rugby, and soccer). Hence, research on sports and recreation injuries is also needed to achieve greater injury prevention and control among school-age children.

iii) Next Steps in Research

In addition to the need for national surveillance and standardized operational definitions of types of injuries so as to enable comparisons across studies, there are gaps in research on all types of influences on injury risk, including:

- Community influences (e.g., assessing the impact of education/awareness campaigns on compliance with recommendations for safety gear and/or practices among children, parents, coaches),
- organizational influences (e.g., determining if extent of coaching experience and/or training influences injury among child participants; assessing if stiff penalties curtail aggressiveness during play and/or risk behaviors that can elevate injury risk during play),
- environmental influences (e.g., evaluating the impact of artificial and natural turf surfaces on the nature and scope of injury),
- equipment influences (e.g., evaluating the impact of different cleat and shoe designs on lower-extremity injuries),
- familial influences (e.g., evaluating how parents influence aggressive play, use of protective equipment, etc, and if these influences vary with child age or child sex)
- individual influences (e.g., evaluating the impact of strength training and conditioning on injury).

Furthermore, initiatives in other countries that seem promising and target high-risk recreation activities that males and teens particularly favor should be evaluated. For example, in the UK they have implemented the Adventure Activities Licensing Scheme, which provides an inspection system to check the safety standards of providers of adventure activities (caving, climbing, watersports, trekking) to young people. A pilot program that began in 2001, Summer Activities for 16 Year Olds, focuses on teaching risk assessment and risk management by participation in adventure activities, the aim being to develop transferable risk assessment skills101.

b) Workers

i) Burden of Injury

In 1998, there were 798 work-related fatalities and 375,360 work-related time-loss injuries, with significantly more males than females represented in these statistics102. Work-related injuries arise from multiple causes (e.g., hazardous exposures, overexertion, poor ergonomic designs, etc) and vary tremendously with industry. Hence, there is considerable variation in the nature and extent of industrial injury, and interventions will likely need to vary by industry. In addition, because multiple injuries often result, it is difficult to judge the accuracy of reports on the frequency of specific types of injury. With these limitations in mind, statistics gathered by the Association of Workers' Compensation Boards of Canada indicate that, for 1996-1998, the leading types of injuries were: sprains/strains, followed by contusion/crushing/bruising injuries, cuts/lacerations/puncture injuries, and fractures102.

Although workers at all ages may be exposed to hazards on the job, young workers are emerging as a particularly high-risk group for traumatic occupational injuries in Canada; Statistics Canada estimates that about 40% of youth between 15 and 19 years of age are employed. Injury rates for young workers have been shown to exceed those of their older adult counterparts in a number of studies103-107. Similar trends are evident in other countries too, including the UK101 and the US. For example, in the US, analysis of occupational fatalities between 1980 and 1995 indicate those 25 years and younger consistently experience elevated rates of injury105, 108, and they remain a high risk group even though fatal workplace injuries have shown a general decline (3% / year) between 1980 and 1996, presumably due to improvements in workplace safety109. Similarly, in a review of over 3 decades of research Laflamme and Menckel110 found an inverse relationship between age and injury, confirming greater risk among younger workers and decreasing risk with age. Young males are particularly at risk for workplace injury: the rates of injury among males 15 to 24 years of age have been higher than the rates of injury among males 25 years and older, and are consistently higher than among female workers100.

Whereas some observers might argue that young workers comprise only a small segment of the workforce and therefore do not merit special research initiatives, the knowledge gains resulting from targeting this high-risk group will likely spill over to other segments of the workforce. For example, many types of interventions aimed at improving workplace safety for young workers are likely to result in decreases in injury to older segments of the workforce (e.g., engineering and ergonomic-based changes, organizational policy initiatives, training programs). In addition, today's young workers become tomorrow's older workers. Hence, programs that successfully improve risk awareness and appraisal skills, and promote positive attitudes toward safety, will yield gains across the lifespan for these workers. In addition, a history of musculoskeletal injury-related conditions is a strong predictor of future injuries and slower subsequent recovery111. Hence, a variety of sources of information suggest that this may be a critical period for injury prevention. In short, investing in injury prevention among young workers is likely to pay dividends throughout their working lives.

Young workers are at high risk for injury for a variety of reasons, including:

- They lack of work experience, safety training, and appreciation of workplace injury risk.
- They receive inadequate supervision on the job, and are often unfamiliar with their rights as workers127.
- In addition, their need for challenges coupled with their reticence to ask questions and make demands of their employers (e.g., for safety/protective gear) can lead them to take on tasks for which they are ill prepared and/or incapable of performing safely112.

During adolescence, the level of physical development can vary substantially, particularly among males between 15 and 19 years of age. Such variation in

physical strength and size can lead to differential risk (e.g., adult-sized youth may be given adult tasks despite inexperience on the job). Injury statistics, for example, indicate that young workers are at particular risk for injuries when working in construction, manufacturing, retail trade, and service (especially those employed in eating establishments where burn injuries occur frequently).

Organization-based deficiencies also can differentially elevate risk to young workers. For example, numerous US reports indicate that young workers typically fail to receive adequate prevention and safety training on the job113-115 and the training resources are often poorly suited to youth. In addition, there is accumulating evidence that injury risk varies inversely with time on the job116-121. Because the initial stages of employment are a recognized 'high risk' period for injury and young workers often work part time and change jobs often, this too may increase their vulnerability to injury.

In sum, to achieve greater injury control among those in the workforce, significant progress is likely to be made by focusing on young workers and the organizations that employ them.

ii) What is currently known or under investigation

It is noteworthy that an extensive search of the literature published between 1980 and 1999 revealed only one evaluated intervention study that addressed injury prevention among young workers122. Such limited progress in prevention reflects our limited understanding of the determinants of injury risk for young workers and highlights the need for research that addresses this gap in knowledge.

One program currently being implemented in BC (begun in 1996) is the Student WorkSafe program. This program (3 modules, 5 hours total), delivered by teachers to high school students (Grades 10-12), introduces students to safety and health issues in the workplace (e.g., hazard recognition, tasks appropriate for the age group). In 1998 the curriculum was extended downward fto children in kindergarten to grade 9 in the hopes that accumulated repeated communication of these messages would result in increased knowledge of and attention to safety issues, including better risk-appraisal skills. No evaluations of the programs were found. A similar program, Live Safe/Work Smart, was implemented in Ontario high schools in 2002.

Of course, one question that must be addressed is whether school-based programs are the most effective approach to injury prevention for young workers. The fact is that `workplace norms' about safety (i.e., attitudes towards safety and risk, beliefs about injury), probably substantially influence the behavior of young workers at the worksite123-124. Hence, school-based programs need to be part of a broader approach to prevention for this risk population; they are unlikely to be sufficient in and of themselves. And, in certain industries such as farming, other targets for prevention are likely to be found (e.g., family farming practices). (see footnote 12)

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[12] In 1997, in the US, the National Institute for Occupational Safety and Health (NIOSH) convened an Institute of Medicine expert panel to review available knowledge on the

The BC Workers' Compensation Board is also using injury data to develop targeted prevention activities for young workers and making recommendations for technology changes that will reduce risk for young workers in different settings. They also implement an annual public awareness campaign to raise awareness of young worker safety issues among employers, families, and youth just entering the workforce.

iii) Next Steps in Research

Numerous research priorities merit attention to promote workplace safety among young workers, including:

- There is a strong need to improve national-level surveillance and develop operational definitions of workplace injury that can be uniformly applied across jurisdictions and contexts (e.g., Should an injury to a youth working on a farm be designated a chore and home injury, or a workplace injury? Should low back pain be attributable to the workplace or not?). Moreover, this database needs to provide sufficient information so that the most pressing needs can be identified (whether based on age, months on the job, type of injury, type of industry, part-time versus full-time, etc), and injury risks can be examined as a function of organizational policies. By doing so, best practices and the differential impact of policy initiatives can more easily be examined; extensive information about surveillance needs for studying workplace safety is provided in several recent reports102, 126-127.
- There is considerable speculation about barriers to safety among young workers but little systematic research. For example, young workers are often part-time employees. What factors influence the motivation and capacity of organizations to implement organizational interventions (e.g., training programs) to protect worker safety and health for part-time employees? What barriers stand in the way of young workers using safety/protective equipment that is available to them? Saari (1990) argues persuasively that technological advancements are essential but insufficient to address issues of workplace safety. Hence, expanding the focus to consider organizational and personal barriers to safety is essential for a comprehensive approach to understanding workplace safety128.

Related to this second point, research is needed to identify factors that place young workers at an elevated risk of injury. Risk arises from an interaction of

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safety and health implications for working youth and to make recommendations for research and prevention. The resulting report in 1998 (*Protecting Youth at Work: Health, Safety, and Development of Working Children and Adolescents in the United States*) led to development of the Promoting Safe Work for Young Workers: A Community Approach program, which reflects lessons learned from three community-based health education research projects on young worker issues. The report about this program provides communities a step-by-step guide in effective ways to raise awareness of young worker safety issues, going well beyond a school-based approach to address this issue (e.g., involving local employers, job trainers, community groups, media, health department, youth program coordinators, etc). This program may also prove useful to address similar workplace safety issues among young Canadian workers[125].

work conditions (e.g., physical conditions, job characteristics, organizational policies) and individual responses to these conditions, but we have very limited understanding of how these domains of influence interact and lead to injury.

To address this particular gap in knowledge, we need systematic research that examines workplace injury as a function of societal risk factors (e.g., norms about workplace safety, tolerance level for injury in different industries), family risk factors (e.g., economic status, attitudes toward workplace safety and health, modeling of risk-taking practices); characteristics of the organization (e.g., policies, value placed on safety); workplace characteristics (e.g., training issues, supervision issues, hazard exposure); job-related characteristics (e.g., hectic and speed-demanding tasks, exposure to hazards, operating dangerous equipment); and worker characteristics (e.g., physical attributes such as size and strength; psychological attributes such as attitudes towards safety and risk taking, risk perception and appraisal skills; cognitive attributes that may influence understanding of risk and safety information; and emotional attributes which may influence their tolerance for risk and willingness to ask questions).

Environmental risk factors for injury are obvious and often easy to identify. However, the influence of other factors (e.g., individual, social-peer context, organization, family, societal characteristics) to injury-risk in the workplace remains to be studied and requires targeted research; for an excellent overview of the importance of a safety culture within organizations see Guldenmund129. Among older workers, a number of organizational factors have been found to relate to injury rates123, including: safety training on a regular basis, empowerment of workers with regard to safety, and shared responsibility for monitoring unsafe workers' behaviors. In contrast, only one study addressed the relation between perception of safety climate at work and injuries among young workers124. Results indicated that perceived safety climate was inversely related to the number of self-reported minor injuries among young workers in the restaurant industry. To address this gap in knowledge most productively will require multi-level systems research, that is, research that examines the impact on injury of differences in injury-relevant attitudes and beliefs among workers and employers (e.g., why is protective gear available but not used by all workers?), practices and policies operating at organizational levels (e.g., taking advantage of variations in injury rates between worksites doing similar tasks may help to identify "best practices"), and legislative initiatives that may apply in different industries and/or work environments (e.g., legislated fall-prevention practices in construction may also apply in some manufacturing environments). In particular, policy analysis has a considerable role to play in advancing our understanding of workplace injury risk and identifying 'best practices'of injury prevention.

Many programs targeting young workers are based in schools. However, they may be insufficient to prepare youth to manage risks presented in the workplace environment. Research addressing risks at multiple levels will provide important information on the key determinants of risk and the adequacy of school-based programs to prepare workers to manage such risks when they enter the workplace.

It should also be noted that NIOSH in the U.S. has addressed workplace safety issues, including those pertaining to young workers, for quite some time. In 1996, working with over 500 partners, it created a National Occupational Research Agenda (NORA) to guide the research activities in occupational safety and health, identifying 21 priority areas, including traumatic injury. A thorough review of the evidenced-based prevention programs and resources that have been developed by NIOSH to address young workers' safety is beyond the scope of this paper, but is likely to provide relevant information about non-school based initiatives that are applicable to Canadian youth in the workforce (www.cdc.gov/niosh).

Finally, occupational injury control requires prevention research that is multi-factorial (e.g., education, training, engineering, policy/organizational initiatives, enforcement), targets multiple levels (e.g., individual, social-peer context, management, organizational milieu, family, society), and also is tailored to young workers. Social marketers and advertisers have known for years that communicating audience-specific information promotes attention, retention, and can effect behavior change. Applying the same principles to injury prevention programs may increase effectiveness/efficacy. The importance of message framing (i.e., how one presents health information) to effect behavior change has been demonstrated in a variety of health research but has received limited attention in safety research44

iv) An example of an interdisciplinary team approach: Preventing musculoskeletal injuries to young workers

Musculoskeletal injuries are frequent and costly. The following 2-step project illustrates one research approach to advancing our understanding of the factors contributing to these injuries among young workers (step 1) and developing an intervention to prevent such injuries (step 2).

Epidemiologists can analyze any available, relevant data to identify key workplace settings or tasks for which these types of injuries are prevalent among young workers; detailed information may suggest specific risk factors for injury. Social scientists can then conduct focus groups with representatives from these different sectors (e.g., manufacturing, health care, agriculture, transportation, construction, forestry, etc), including injury survivors, in order to solicit information about potential risk factors in these various settings (NOTE: risk factors will likely span a variety of levels of influence including: environmental, individual, social/peers, organizational, etc). Medical-care providers may provide additional unique information about risk factors based on treatment of such injuries; information about severity of injury, for example, may disclose those settings/tasks that pose the greatest risks, or identify workplace standards that are inadequate and need revision.

Once risk factors are identified, an interdisciplinary team can work with employers and unions to address injury-prevention issues in these high-risk settings at multiple levels, including: design issues (e.g., engineering, ergonomic, and bio-mechanic specialists), organization-based issues, including policy (e.g., policy analysts, industrial-organizational psychologists), risk factors in the immediate workplace social environment (e.g., psychologists, sociologists), and

individual risk factors (e.g., psychologists for cognitive and psycho-social issues, medical care providers for physical/strength issues, public health professionals for education and training issues). Cost-effectiveness research (e.g., economists) on safety interventions would be conducted as part of this multi-component intervention in order to identify tradeoffs, gains, and costs so that informed decisions about specific components of this prevention approach could be made in its future applications. (see footnote 13)

c) Older Adults

i) Burden of Injury

Unintentional injury is a serious health problem among older adults in Canada. The highest incidence of injury is falls, accounting for 75% of all injuries among persons aged 71 years and older130. Approximately 30% of community-living adults 65 years or older experience at least one fall per year131. Among older adults in long-term care facilities, one in two individuals experiences a fall each year, and 10 to 25% of these falls are sufficiently serious to require medical treatment132. The estimated direct and indirect health-care costs for falls among older adults is $2.8 billion133. Among older adults, therefore, the most pressing need in the area of injury prevention and control is designing and targeting interventions to reduce falls.

ii) What is currently known or under investigation

There are a variety of validated tools for assessing risk for falls among older adults (see Tool Repository at www.injuryresearch.bc.ca).

Risk factors for falls among older adults include:

- A previous fall; even though this is probably the strongest risk factor, a recent review concluded that health-care providers do not quiz patients about falls often enough, thereby missing opportunities for preventive intervention134;
- Use of benzodiazepine medications (e.g., to treat insomnia, anxiety) 135-136;
- Physical limitations (e.g., balance and gait deficits, visual impairments);
- Mental impairments (e.g., dementia)137-138; and
- Environmental hazards within the home (e.g., clutter, poor illumination, unsecured rugs, lack of stair railings or bathtub grab bars)135, 139-141; and outside it. Several studies report that about half of falls among seniors occurs outside the home, often when walking familiar routes142-143. Hence, to maximize effectiveness of 'hazard reduction' strategies one will need to address both home and outdoor settings.

A variety of approaches are currently being implemented to reduce falls among older adults, including residents in long-term care facilities144 and community dwelling residents145. Systematic reviews cite the following strategies:

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[13] One example of such an inter-disciplinary and comprehensive approach to injury prevention can be found at the AUTO 21 website (http://www.auto21.ca/home_html).

Hip protector/energy shunting (effective to reduce fractures but there are a variety of compliance-compromising issues and the appliance is costly)146-148

Exercise training (expensive if the program is delivered by a Physical Therapist, effective for increasing physical activity and mobility/gait, but not necessarily associated with a decrease in falls or hip fractures)149,

Vitamin D and Calcium supplements (inexpensive, no significant side effects, associated with a decrease in hip fractures following 10 months of treatment, and also with a reduction in non-vertebrate fractures following 2 months of treatment)150,

Environmental modifications (e.g., bed alarms are associated with fewer falls in long-term care facilities151- however, modifications can be costly and compliance is usually low),

Education (this strategy has not been demonstrated to be effective when used alone, but it is considered a key component of any multifaceted approach). (see footnote14)

iii) Next Steps for Research

A number of issues arise in research on falls among older adults, including:

How to define falls. For example, whether or not minor falls, such as stumbles, are included can substantially influence research conclusions (for an excellent example of this, see Wolf et al., 1996) 152.

Monitoring falls among community-dwelling older adults depends on self-reports, which can introduce any number of biases into the data (e.g., misremembering falls, intentional under-reporting of falls). Although the assumption is that any inaccuracy in reported falls in these studies reflect only under-reporting errors145, it is equally plausible that individuals may over-report falls in an effort to 'help the researchers'. Studies are needed to establish the validity of self-report measures of falls.

The relation between risk reduction and fall rates must be assessed directly, not assumed. Several studies have shown that reducing risk factors does not necessarily reduce fall rates because falls are multi-determined events149, 153; and

Barriers to implementing fall prevention programs, particularly among community dwelling older adults, are diverse (e.g., gender, ethnicity, socio-economic status, attitudes toward safety) and may limit the effectiveness of such programs. Thus, key aspects of the socio-ecological context within which older adults reside, as well as barriers affecting compliance and program acceptance, must be considered in designing and evaluating programs. For example, results of a recent study on ways to promote acceptance of a fall reduction intervention

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[14] A complete compendium of Canadian initiatives is provided in *Listing of Initiatives for Falls Prevention Among Seniors*. A report prepared by the Federal/Provincial/Territories Committee of Officials for the Ministers Responsible for Seniors, 2001.

among community dwelling older adults revealed greater acceptance when the emphasis was on remaining independent longer versus needing assistive devices154.

There is a plethora of research currently underway to address fall prevention among older adults in Canada and internationally. Nonetheless, a variety of research questions are still outstanding, including:

The consensus is that multifaceted interventions are most effective. However, the relative contribution of the various components needs to be determined so that one can determine the best combinations of strategies and cost-effective decisions can be made.

There is a trend toward developing tailored interventions so that the most relevant risk factors can be directly addressed. More systematic research is needed comparing the costs and benefits of tailored versus generic interventions to reduce falls among older adults. Tailored interventions might prove cost-effective, or necessary, only for high-risk groups or those particularly noncompliant.

For exercise interventions, further research is needed to: identify those strategies that are most effective for reducing falls, to identify strategies appropriate for individuals with specific balance or mobility problems, and to develop guidelines regarding the most appropriate frequency and intensity of exercise.

For home-environment modification strategies, further research is needed to: identify barriers to compliance (e.g., costs, aesthetics & design issues), best practices to promote readiness for change (e.g., focusing on well-being enhancement versus ability-loss), and whether there are critical 'moments of opportunity' (e.g., just after a fall or near-fall experience) during which motivation and compliance are maximized.

For education strategies, although there is little evidence of effectiveness alone, most studies have had insufficient sample size to rigorously address the efficacy of this approach to fall prevention.

Given a previous fall is highly predictive of a subsequent fall, research to identify ways to increase risk assessment among health care providers can substantially increase opportunities for fall prevention strategies to reach high-risk individuals.

iv) An example of an interdisciplinary team approach: Preventing falls among older adults

Owing to the diversity of causes of falls, preventing falls among older adults will require an interdisciplinary and multi-factorial approach. Engineers and product design specialists can address risk factors in the home environment (e.g., stair design, chair height), those related to personal use products (e.g., slippers), and those that exist in long-term care facilities (e.g., flooring surfaces). Public health and health care providers can play a significant role in dissemination and education, particularly about issues related to medication-related risks for falls. Psychologists can address behavioral risk factors and risk appraisal issues, and ways to promote compliance with fall prevention recommendations. Physical

therapists can address mobility and strength training issues. Occupational therapists can address transfer issues (e.g., getting in and out of bathtubs) and safety in activities of daily living. A community-wide, multi-factorial, inter-disciplinary program that incorporates these features constitutes a comprehensive approach to fall prevention among older adults.

5) Infrastructure Gaps

a) To address injury prevention and control in Canada a well trained, highly motivated workforce is essential. Capacity building has been, and continues to be, a pressing problem, as it has been in many other countries (e.g., UK, Australia)155. The following recommendations aim to promote capacity building and advanced training in a variety of sectors.

Students

i) Offering research fellowships to graduate students will provide opportunities for students to explore and develop interests in injury-related research, particularly if fellowships are multi-year, not one year, awards. The Ontario Neurotrauma Foundation (ONF) recently implemented such a training program; they ensured mentorship experiences for the student recipients by requiring the applicants to have sponsorship by a faculty member who is already engaged in research on injury. In the case of ONF, successful applicants were selected based on evaluation of both the student's and the sponsor's scholarly history, as well as the merits of the proposed project.

In addition, capacity could be enhanced by extending this training opportunity to provide Summer Research Stipends for Undergraduates, particularly those in Honours Programs who are more likely than non-honours students to seek graduate training.

Along these same lines, post-doctoral fellowships could also be designated for injury researchers.

ii) Another approach to promoting graduate training in injury follows from a model of funding that operates in the US, namely: providing 'training grants' to groups of individuals who have a history of significant contribution to the injury field and would like to collaborate in training graduate students. In contrast to (a), in this case the money is allocated to the group of researchers, who then select trainees who they wish to financially support to work on research. One merit of this approach, as compared to (a), is that it is well suited to 'recruiting' students to work in the injury area, whereas (a) is well suited to funding students who already have designated injury as an area of interest.

iii) Students often have limited means to develop interests if their institution does not offer training in a program of interest. Offering distance education courses relevant to injury research and/or prevention could be a way of providing students the opportunity to expand their interests and expertise in the area of injury regardless of the institution where they are pursuing their graduate or undergraduate work. In order to eliminate redundancy, and because distance education courses take time and money to prepare, it might be best to charge one or two academic institutions with this task, and financially support these efforts, requiring these institutions to coordinate courses and content

coverage. This approach could even lead to some special degree/certificate designation, such as 'Specialist in Injury Research' or 'Specialist in Injury Prevention'.

It is interesting to note that there are a variety of resources that have been used for 'short courses' on injury. In Australia, the Monash University Accident Research Centre offers a short course and uses a textbook titled Injury Research and Prevention: A text 156. There is also a book directed to practitioners (Community Based Injury Prevention: A Practical Guide, prepared by the National Safety Council of Australia) that documents 10 community projects that were successful in reducing injury. In the U.S., Injury Prevention: Meeting the Challenge has been widely used. Hence, there are resources already available that can be adapted in developing courses for distribution in Canada.

Note: The Canadian Collaborative Centres for Injury Prevention and Control are just beginning pilot testing of the Canadian Injury Control Curriculum, which is an adult-education curriculum designed for community practitioners that might be applicable also as an introductory course for health care professionals and allied services.

Researchers

i) Established researchers could benefit from advanced training opportunities. For example, sponsored workshops on advanced multiple regression techniques, growth curve modeling, and designing randomized clinical and community trials (RCT) would help investigators to broaden the scope and nature of their research on injury. It would also allow investigators to bridge to other disciplines more easily, thereby promoting truly collaborative inter-disciplinary research.

In the U.S., for example, the National Institutes of Health sponsors a 2-week program on RCT design each summer, with all costs covered by NIH and participation based on a stringent application and selection process (N = 30 nationally); this skills-building workshop allows behavioral and social scientists to develop the expertise needed to successfully pursue clinically-relevant applied research that has traditionally been conducted by those trained in epidemiology and/or health science disciplines. Hence, in Canada, this type of initiative could assist in recruiting behavioral and social scientists to work in the injury area.

ii) Very few researchers have training or experience in working as members of an interdisciplinary team. Workshops to promote interdisciplinary research could address this issue, which comprises not only learning about different disciplinary tools and methods (statistics, research design, etc), but also coming to appreciate different conceptual approaches to the same issue. There are only a few institutions in Canada that offer inter-disciplinary training at the graduate level (e.g., Dalhousie). These institutions might be asked to offer national workshops on working on inter-disciplinary teams.

iii) Offering Personnel Awards (e.g., fellowships involving release from teaching) to highly productive researchers could produce substantial returns to the injury field, particularly if the release is for the implementation of more applied initiatives (e.g., developing a prevention program, developing and implementing a program evaluation of a community initiative, working with a work

organization to develop safety policies). The fact is that academics have much to offer those interested in injury prevention. However, the typical University reward system does not look favorably on time invested in community service initiatives. Hence, a fellowship that sanctions such activity would directly address this barrier to more collaborative work between researchers and practitioners interested in injury prevention and control.

Injury Stakeholders/Practitioners & Community Skills Enhancement

i) Offering Fellowship Awards (i.e., partial release from job, e.g., 1 day/week) to practitioners, such as front line public health workers, and employees of safety organizations, would give these individuals the time needed to develop their research skills (e.g., take courses in program evaluation) and/or collaborate with a researcher on a community/prevention initiative. The more individuals within a service organization who have research skills, the more likely it is that the organization will become involved in research and appreciate the importance of evaluation in prevention.

ii) One of the most formidable challenges in injury prevention is the evaluation of program initiatives. Often community organizations do not have individuals on staff trained in program evaluation. Workshops to teach program evaluation (or a distance education course to do so) could be developed and offered to injury stakeholders nationally. For example, the BC Injury Research and Prevention Unit conducts workshops on program evaluation, including the provision of an excellent manual for participants. The content of these workshops and the manual might be adaptable to become a distance education course or web-based resource that could be made available to injury stakeholders nationally. In addition, an organization, such as the Program Evaluation section of the Canadian Psychological Association, or the Canadian Evaluation Society could be approached to have members across Canada provide individualized assistance for stakeholders just acquiring these skills.

b) In addition to workforce gaps, there are also gaps in surveillance that limit progress in injury research and prevention. Accurate and timely injury data (both national and local) are essential for identification of injury problems, designing programs to address these problems, and evaluating the effectiveness of prevention programs. Issues in surveillance include: data coding or classification schemes (e.g., type of injury, injury severity), linking diverse data sources (e.g., workers; compensation data, hospital emergency department records, coroner records, physician office visits, etc), developing accurate estimates of exposure rates (i.e., denominator estimates), and how best to collect and code detailed information concerning the circumstances of injury that might be relevant to identifying hazards and determinants of risk. In addition, although the historic focus has been on fatal and disabling injuries, which are relatively infrequent, extending the focus to less serious injuries that could have more serious repercussions may provide further insight into the range of risk factors

leading to injury, and may also lead to interventions earlier in the cycle of injury. (see footnote 15)

6) Knowledge Translation

Knowledge translation activities are critical for advancements in injury control. Put simply, the ultimate goal of research on injury risk is to reduce the burden of injury. For this to occur there must be interest and expertise to support the translation of research findings into program initiatives and to rigorously evaluate these programs. Moreover, the process of knowledge translation does not stop once effective programs are developed. Dissemination of information about these programs is an essential next step and, ideally, one wants to implement those dissemination strategies that will be the most successful in promoting program uptake and implementation.

There are two aspects of knowledge translation that merit discussion:

Program Development and Evaluation Research: There is an urgent need for evidenced-based prevention programming. Specifically, a high priority should be placed on translating empirical findings into programs that address injury prevention and control in Canada, and rigorously evaluating these programs so that modifications can be made to maximize their effectiveness.

Program evaluation research could include:

- Evaluating the efficacy of programs (e.g., decreased risk taking, increased protective gear usage, decrease in frequency or severity of injury).
- Assessing the relative contribution of individual components in a multi-factorial intervention.
- Conducting cost-effectiveness studies to demonstrate the relative economic benefits of an intervention. (see footnote 16)

Diffusion Research: There is a need for systematic research to identify those strategies for dissemination (i.e., the spread of knowledge from its source to target audiences) that most effectively promote the uptake and implementation of proven-effective injury prevention and control programs among key Canadian stakeholders.

Diffusion research could include the following:

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[15] Because there are currently ongoing discussions and meetings (e.g., Sept. 2003) of a National Injury Surveillance Planning Group who will address these issues, this topic will not be developed further here.

[16] It should be acknowledged that one could further divide this category of research into Development Research (i.e., translating findings into programs) and Evaluation Research. For example, there is increasing recognition of the difficulties in translating research findings into clinical practice and programming[157]. To address these difficulties in Development Research, the US government has recently funded a very large project, Translating Research into Practice (TRIP), to evaluate different strategies of maximizing speed and effectiveness in translating research into programs.

- Investigating the processes whereby effective prevention innovations most quickly come to the attention of stakeholders (e.g., journal articles, conferences, targeted mailings, education outreach, etc), and how these processes vary across different stakeholders (e.g., consumer level versus policy level dissemination – see, for example, Grimshaw, Shirran, Thomas et al., 2001158). Assessing the relative effectiveness of different formats and channels for communicating information.
- Investigating the factors that influence program adoption (or rejection) by stakeholders (e.g., barriers to adoption might include lack of understanding, incompatibility with current practices, cost-effectiveness considerations); these factors can then be addressed by using tailored dissemination strategies.

In sum, there is a strong need both for evidenced-based programming and for evidenced-based dissemination strategies. Hence, research should provide the basis for decisions regarding both types of knowledge transfer activities.

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APPENDIX D.3

Background Paper on Suicide for Integration in the Intentional Injury Background Paper

August, 2003

Brian L. Mishara, Ph.D.

This report was prepared as part of the Listening for Direction on Injury initiative sponsored by the Canadian Institutes of Health Research and the Canadian Injury Research Network.

NOTE:

This report has been modified from its original format for inclusion as an appendix in this document. Sections have had white-space removed to conserve space. Those wishing to view the report in its original format, can download it from:

www.injurypreventionstrategy.ca

Modified from Original Format for this Appendix by:

Philip Groff

The Burden of Suicide

Completed Suicides

According to the World Health Organization (WHO, 2002), there are more suicides throughout the world than all other deaths by violence, including all acts of war, terrorism and murder. They estimate that in 2000, 815,000 people died by suicide, which makes suicide the thirteenth cause of death worldwide. In persons aged 15-44 self-inflicted injuries is the fourth cause of death and the sixth cause of incapacity and health problems. Suicide rates vary considerably between countries and generally increase with age, with men and women over age 75 having the highest suicide rates when one examines worldwide statistics. Apart for a few notable exceptions, such as China, more men die by suicide than women; there is on average three deaths by suicide by men by each suicidal death by a woman.

Rates vary greatly between countries. For example, the WHO reported that Canada's suicide rate ranked in the middle of 22 western industrialized countries. The 1998 data for Canada indicates an overall age-standardized suicide rate of 14 suicides per 100,000 population. This compares to rates ranging from 3-4 per 100,000 population in Greece to 22 per 100,000 in Finland. However, it is important to note that international comparisons must be interpreted with caution since methods of identifying causes of death vary from country to country.

When we examine male and female rates, Canada is again in the middle of rates for western industrialized countries. Canada's male suicide rate is 18 per 100,000 males, with other western industrialized countries varying from 5 per 100,000 in Greece to 35 per 100,000 in Finland. For women, Canada's rate is 5 per 100,000 with rates from 1 per 100,000 in Greece to 9 per 100,000 for women in Finland. The age-standardized rate of 14 per 100,000 population in 1998 (Langlois & Morrison, 2002) (the most recent year for which statistics are available), reflects the 3698 deaths by suicide of Canadians aged 10 or older. Rates for both men and women in Canada have remained relatively stable over the past ten years. Canada has not experienced the decline in suicide rates that have occurred in many other developed countries, including the United States, the UK, Norway and Sweden. Some contend that declines have occurred more often in countries with active national suicide prevention programmes. Canada does not have a national strategy in suicide prevention.

Suicide is the leading cause of death in Canada for men aged 25-29 and 40-44 and for women aged 30-34. Suicide is the second leading cause of death for both men and women in young people aged 10-24. The first leading cause of death in young people is motor vehicle accidents, and unlike suicide, motor vehicle fatalities have been declining in recent years. Because of the decline in motor vehicle fatalities and a lack of decline in suicide rates, in some areas, for example the Province of Quebec, deaths by suicide outnumber deaths by motor vehicle accidents for young people.

Age-specific suicide rates in Canada show trends that differ from most developed countries where suicide rates increase with advance in age for both

men and women. Canadian suicide rates are highest for middle-aged men 30-44 and women age 44-59.

It is generally accepted that official rates underestimate the true incidence of suicide. There are cases where accidental deaths are not identified as suicides and, particularly with the elderly, some suicides are classified as natural deaths.

Quebec has the highest age-standardized suicide rates of all Provinces with an overall rate in 1998 of 21 per 100,000 population age 10 or older, followed by Alberta with a rate of 16 per 100,000. However, some of the Provincial differences may be due to underreporting in some provinces. For example, Quebec reported only 3% of deaths as being due to "undetermined" causes, compared to Ontario and Manitoba which have much lower reported suicide rates but have 16% and 24% of deaths reported as "undetermined" causes. The highest suicide rates in Canada are in the Yukon and Northwest Territories. However, due to the small population, annual rates fluctuate quite a bit. Still, the high rates in these Territories (26 in Yukon and 56 in the Northwest Territories per 100,000) reflect the existence of disproportionately high suicide rates among the Canadian Aboriginal population.

Suicide Attempts

The vast majority of people who attempt suicide do not die by their attempts. It is generally reported that there are over 100 suicide attempts for each completed suicide (Health Canada, 1994; WHO, 2002). However, the proportion of attempts to completed suicides decreases significantly among the elderly to 2 or 3 attempts for each completed suicide (Langlois & Morrison, 2002). In Canada, in 1998-1999, 23,225 hospitalizations were classified as suicides and intentional self-inflicted injuries. Of those hospitalized for suicide attempts, less than 2% died and the rate of reported attempts involving hospitalizations was 87 per 100,000 population. Although men complete suicides more often than women, women are more often hospitalized for attempts. However, recent population surveys in Quebec asking people about previous attempts indicate that the frequency of self-reported attempts may be equivalent in men and women (Santé Québec, 1995). There is high rate of recidivism with 10% of women and 8% of men discharged following a suicide attempt having been hospitalized at least once for a previous attempt in the year preceding their hospitalization. The World Health Organization estimates that about 10% of those who attempt suicide will eventually die by suicide.

Methods

The most common method for completed suicide is suffocation in Canada (39%), principally by hanging, followed by poisoning (26%), then firearms (22%). Women are approximately twice as likely to die by poisoning and men are about 4.5 times more likely to use firearms. Those who are hospitalized for non-lethal suicide attempts generally (83%) used poisoning and 10% were hospitalized for cutting or piercing.

Suicidal Ideation

According to population surveys, as many as 10.6% of the population seriously consider suicide at some point in their lives (Santé Québec, 1995). These data, combined with the data on suicide attempts, indicates that the vast majority of persons who considered suicide do not attempt and even among those who attempt, a relatively small proportion eventually die by suicide. Most people who are desperate enough to consider suicide do not act upon these thoughts and intentions; they find other ways of dealing with their difficulties.

Costs

Although it is difficult to quantify the devastating impact of the premature loss of a life by suicide, there are several estimates of the direct costs of suicide, including estimates of potential years of life lost. According to a Statistics Canada report (Langlois & Morrison, 2002), in 1997 suicide ranked third after cancer and heart disease in potential years of life lost for men and suicide tied at four with congenital abnormalities for women, after cancer, heart diseases, and motor vehicle accidents. Persons admitted to hospital for suicide attempts stay an average of 7.1 days, which resulted in over 160,000 hospital days for a year. A New-Brunswick study estimated the average cost for a suicide death to be 850,000$. (Clayton & Barceli, 1999).

Risk Factors

Researchers generally view suicide as a rare but disastrous outcome of a combination of risk factors, including personal predispositions, environmental situations and the social context (Health Canada, 1995). Most persons who die by suicide suffer from psychiatric problems, notably mood disorders such as clinical depression and schizophrenia (Harris & Barraclough, 1997; Roy, 1986; Beck et al., 1985). However, recent studies have shown that only a small proportion of persons with these serious psychiatric difficulties, for example only 3.4% of persons with major depression, will eventually die by suicide (Blair-West et al., 1999). Half of people hospitalized in Canada for a suicide attempt had a previous diagnosis of a mental illness, including depression, manic-depression, schizophrenia, personality disorder or alcohol and drug dependency syndrome. The risk of suicide is associated with many social situations that are also related to a wide range of other injuries. Suicide has been related to poverty, unemployment (Harris & Barraclough, 1997) loss of a loved one, interpersonal conflicts with parents and friends (Kaltiala-Heino et al., 1999), break-up of a romantic relationship, difficulties with the justice system and work problems (Cavanagh et al., 1999). Generally these risk factors and crisis situations are seen as only part of the portrait that describes the aetiology of suicide.

As with many other forms of intentional injuries, alcoholism and drug abuse are associated with suicidal risk(Murphy & Wetzel, 1990). In fact, over half of persons who died by suicide, had consumed alcohol or drugs at the time of their death. Having access to a preferred means of suicide increases the likelihood that a death by suicide will occur. Homes in which there is a gun are 6 times more likely to have a suicide occur than homes without a gun. Control of access to the common medication acetaminophen (Tylanol) in England (Hawton, 2002)

resulted in reduced poisoning deaths, and putting up barriers on popular bridges used as suicide sites, such as the Bloor Street Viaduct in Toronto, have effectively prevented suicides.

There is a wide range of protective factors, which decrease the likelihood of suicide, including having a confident, having support from family and friends and, for some, religious practice. Recent studies indicate that there are genetic, neurological and neuro-chemical variables related to increase risk of suicide(van Heeringen, 2003). Furthermore, suicidal behaviour may increase and decrease depending upon the acceptability of suicide in a society as well as the availability of suicide prevention services, such as crisis centres and help lines (Mishara & Daigle, 2000).

Priorities for Research on Suicide in Canada

On February 7-8 2003, a workshop was held in Montreal on suicide-related research in Canada with the participation of 43 practitioners, researchers and representatives of non-governmental organizations, Aboriginal communities, as well as the Canadian Institutes of Health Research and Health Canada (CIHR, 2003). The participants identified six broad themes and over 50 specific research questions they felt were important as well as 12 crosscutting research priorities (See Appendix I). The report on that workshop includes an extensive list of topics and themes, which, if unlimited financial resources were available and there was a small army of researchers ready, willing and able to conduct studies on all the questions enumerated, would make for a fairly complete research agenda for the next 25 to 50 years. However, research funding and the number of available researchers are limited in Canada and will most probably remain so. The topics and research questions in the report were not prioritized. They effectively describe a broad research agenda, which leaves room for pretty much anyone interested in suicide research to study whatever topics they like.

For the purpose of discussion at the National Consultations on Priorities in Injury Prevention Research, the following section considers the proposed suicide-related themes and many of their crosscutting research priorities with the objective of examining how a limited number of research priorities may be determined based upon the workshop report, the nature of current available resources, perspectives for developing additional resources, as well as challenges related to the burden of injury of suicide in Canada. This analysis is particularly coloured by a desire to integrate suicide research with other research on injury prevention as part of a National programme of research on injury.

One of the fundamental challenges in determining research priorities is to determine the extent to which those priorities should be driven by the practical needs for reducing the short and medium term burden of injury and to what extent research priorities should be concerned with fundamental research questions whose practical implications for injury prevention may not be evident, at least not in the immediate future. Another consideration is the extent to which Canadian research on suicide should be unique. If other countries are conducting cutting edge research in an area, would it be better to develop different research priorities in Canada or develop collaborative studies with other countries where research on the same topics are ongoing?

Evidence-based practices

One of the primary questions in suicide prevention is: what works? What constitutes effective prevention programmes, intervention activities and postvention (after a death by suicide), which will decrease the incidence of suicides and suicide attempts and their negative effects? There have been several extensive reviews and meta-analyses of evaluations of interventions, ranging from clinical treatments, public education, professional and volunteer training to societal level interventions, policy changes and strategies for improving knowledge transmission. The American Foundation for Suicide, in collaboration with Morton Silverman, director of the National Suicide Prevention Technical Resource Centre in the United States, is currently undertaking an extensive review of evidence-based practices, which should be completed in 2004. An example of a Canadian review of evidence-based practices is the work by Jean-Jacques Breton and colleagues on youth suicide prevention programmes (Breton et al., 2002). To date, virtually all reviews and analyses of evidence-based practices have concluded that we need to develop more research in order to conclusively determine what constitutes "best practices."

Research evaluating and testing interventions and programmes in suicide prevention face considerable methodological and ethical challenges. For example, clinical trials involving non-treatment placebo conditions are generally considered unacceptable in research on suicide (it is not considered ethical to fail to treat persons identified at risk of suicide in order to compare their outcomes to people receiving treatments). Also, we often do not have enough evidence about what is an effective current practice to include control condition, which involves an accepted treatment. One paradoxical example is the evaluation of new medications. Because of the fears of having control group members commit suicide, the vast majority of medications used to treat suicidal clients have never been subjected to scientific evaluation with suicidal people. Suicidal participants in drug trials are generally excluded out of fear that they may kill themselves during the course of the investigation. Another methodological challenge is the fact that most actions to prevent suicide occur in an open-system context where the target population has numerous opportunities to have their suicide risk increased or decreased by a host of other experiences, including using other resources, getting help from friends, consulting chat groups encouraging people to kill themselves and being influenced by media depictions of suicide.

In the context of a National Injury Prevention Research Strategy, it would be useful to determine the extent to which practices used to prevent other injuries may be applicable to suicide prevention. For example, media campaigns have been an important component in programmes to reduce drinking and driving and to encourage drivers to wear seat belts. It would be interesting to know to what extent similar practices may be used or adapted for use in suicide prevention.

Another example of collaborative practices would be the evaluation of suicide prevention help lines. In this area, a Canadian research team (the Centre for Research and Intervention on Suicide and Euthanasia, at the University of Quebec at Montreal) has been contracted to evaluate the United States national

suicide help line network. There are help lines available for virtually all forms of intentional self-injuries and some unintentional injuries. Perhaps it would be of value to compare suicide help lines with other telephone crisis lines. One may ask whether or not these various help lines are effective and if certain approaches and telephone intervention styles are more or less effective with different client populations and different types of problems. It would be interesting to develop collaborative projects involving a wide range of injury prevention help lines in order to determine similarities and differences in current practices as well as to develop models of what constitutes the best approaches to take with different client populations.

Improving and Expanding Data Systems

Data on injuries by suicide, including completed suicides and suicide attempts, are generally considered incomplete, with a lack of standardized ways of identifying cases as well as the presence of reliability issues concerning the quality of data and potential misclassifications. This is true for classifications of deaths by suicide but even more so in hospital classifications of suicide attempts and community analysis of the extent of suicidal behaviours which do not come to the attention of health-care providers.

This is an obvious area for developing transdisciplinary collaborative research with other areas of injury prevention. Besides developing common data, which are both reliable and valid across provinces, it would be important to expand the nature and type of data collected on suicide injuries and deaths, including the development of a national survey study with emphasis upon suicidal behaviours. The development of better national data sources would allow for more sophisticated analyses of the aetiology of suicide as well as better identification of high-risk groups. The involvement of Coroners throughout the Provinces would be crucial in the development of more standardized data collection. There are indications from Provincial Coroner's meetings that they are open to this possibility. Such an effort would involve the development of a consensus on common language and terminology as well as criteria for identifying and reporting suicides and suicide attempts.

Mental Health Promotion

The majority of research on variables related to suicide focus upon risk factors. We know quite a lot about how to increase the risk of suicide. However, we know much less about protective factors and resiliency over the lifespan. Most research focuses upon the minority of people who kill themselves or attempt suicide. We know relatively little about the vast majority of people who live through circumstances just as difficult but who find other means of dealing with their problems and do not attempt to end their lives. Research topics in mental health promotion may include the study of protective factors, risk factors and resiliency at different stages in life, care for the caregivers, social competence, shame, stigma and perception of mental illness. Positive psychology and the effects of social support in suicide prevention and their enhancement should also be considered. Furthermore, one can include a wide range of programmes aimed at developing better community capacity, as well as community-based initiatives and educational programmes to develop protective factors such as coping skills.

It would be interesting to determine the extent to which mental health promotion and promotional approaches in injury prevention for both intentional and unintentional injuries may be of use as models for promotion in suicide prevention. It is likely that the capacities involved in promoting mental health may also be useful in promoting skills related to other types of injuries. For example, the programme Zippy' Friends offered by the British charity Partnership for Children teaches young children how to cope with everyday adversities and how to ask for and use help. This mental health promotion program develops skills, which may be protective against suicide later in life, has been extensively evaluated in Denmark and Lithuania. However, those same skills may also result in fewer injuries from bullying and family violence. One can also speculate that if those skills last a lifetime they may help reduce injuries at many other stages later on. For example, one could even hypothesize that people who are more open to asking for help would be less likely to suffer hip injuries in the old age because they may be more open to using physical aids when their mobility is compromised and to ask for help rather than insisting they try by themselves and end up putting themselves in risky situations.

Multidimensional and Transdisciplinary Models for Understanding Suicide-Related Behaviour

There have been significant recent advances in the area of biomedical research on suicide, notably in the genetics and neuro-chemistry of suicidal behaviours. There has also been a proliferation of publications reporting empirical studies in the social sciences. However, there have been very few recent theoretical writings aimed at understanding suicidal behaviour. Moreover, current models for prevention and intervention are very often lacking an explicit theoretical basis. We know a lot about "determinants" of suicide based upon studies in different disciplines, from the biomedical to the psychosocial and spiritual. However, we have little in the way of models and theories integrating knowledge from these different areas and attempting to make sense of the empirical findings to understand the mechanisms by which the various "determinants" influence suicidal behaviours.

It is also possible to develop integrative models that are not limited to suicide behaviours but which include other forms of intentional, and perhaps even unintentional injuries. Theory development is one of the most difficult challenges for researchers. Transdisciplinary theorizing calls for "renaissance scholars," people who have a broad range of knowledge and interest. An alternative to requiring theoreticians to master several disciplines, would be to encourage transdisciplinary research teams to focus on the elaboration of theoretical models. There are many facts about suicide that are in need of explanation. Basic data on regional variations, age groups differences, provincial differences, relationship to substance abuse and misuse, and so forth, could benefit from the development of a better theoretical understanding of the relationships to suicide and their implications for suicide prevention.

Understanding the Full Spectrum of Suicidal Behaviours

Research suggests that people who die by suicide have different characteristics than people who attempt suicide. However, most intervention and prevention strategies view suicidal behaviours as part of a continuum from suicidal thoughts and ideations to suicide intentions to suicide attempts and completed suicides. Furthermore, there are a number of actions that can result in a premature death, some of which are clearly intentional and others whose intentionality is the object of intense debates. Those behaviours include attempts disguised as accidents, assisted-suicide, deliberate self-harm, the hastening of death through life-threatening and self-injurious behaviour, suicidal ideation and threats, and risk-taking behaviour. There is a need to develop operational definitions and models for these terms, starting with the basic concepts of "suicide" and "suicide attempts."

Since it is intentionality that is often used to distinguish between suicidal and non-suicidal self-harm behaviours, it is important to clarify the concept of intentionality in the context of understanding the full spectrum of intentional and unintentional injuries. Several researchers include categories such as "sub-intentional suicides", risk-taking behaviours and life-threatening behaviours in order to clarify actions in the grey area where it does not appear that the behaviours are clearly intentional or unintentional. Theory development in the context of all forms of injuries would be useful for our understanding of suicidal behaviours and the full spectrum of related behaviours. Furthermore, a complementary contemporary challenge is to develop a better understanding of the similarities and differences between suicide, euthanasia and assisted-suicide.

Suicide in Social and Cultural Contexts

The incidence of suicide in Canada varies dramatically as a function of institutional, regional, social, spiritual, cultural and political contexts. It is important to develop new knowledge about how these contexts impact upon the incidence of suicidal behaviours and to determine what constitutes best practices in suicide prevention. This is particularly true for aboriginal groups.

The issue of understanding social and cultural context is a crosscutting theme for all areas of injury prevention. Research considering the impact of social and cultural contexts on acute care, rehabilitation and non-intentional injuries may clarify our understanding of the important role of these contexts for broad range of prevention and intervention activities.

Infrastructure Issues

One of the major issues in developing transdisciplinary and integrative research on suicide is the lack of communication and collaboration between certain disciplines and stakeholders who have not traditionally collaborated. In the area of suicide research, there has been a major gap in collaboration between traditional institutional settings, such as hospitals and community agencies, such as volunteer-based help lines. It is true that there are notable exceptions where there is tremendous collaboration in research and intervention between community organizations and traditional settings. However, there is a need for greater collaboration in this area. The interdisciplinary research teams at the

Centre for Research and Intervention on Suicide and Euthanasia at the University of Quebec at Montreal and at the McGill Group for Suicide Studies are examples of settings where different disciplines collaborate on transdisciplinary projects involving a variety of both community and traditional institutional settings. Funding mechanisms encouraging the development of such collaborations could have a significant catalyst effect.

A second infrastructure challenge is the development of a critical mass of competent researchers interested in the area of suicide. Compared with other industrialized western countries, there are relatively fewer publications in scientific journal of empirical investigations on suicide by researchers whose affiliation is in Canada. An analysis of empirical research on suicide cited in PSYC-INFO and MEDLINE from 1998 to 2002 indicated that 110 of the 2648 empirical studies published in PSYC-INFO (4.2%) and 79 of the 3209 studies in MEDLINE (2.5%) had an author with a Canadian affiliation. When population size is controlled, this represents proportionally 27% fewer publications than the US, 46% fewer than Australia, 65% fewer than Sweden and 77% fewer publications than Finland. Canada and the United Kingdom share the lowest rates of empirical publications of suicide research when adjustments for population are made.

It is important to stimulate researchers from different disciplines who are involved in other areas of injury research to including suicide among the behaviours they study. Perhaps one of the most effective methods of interesting researchers in the area of suicide is to ensure that dedicated funds are made available by announcing special competitions in this area. The Scandinavian countries and Australia, which have much higher empirical research productivity than Canada, all have government sponsored national suicide research initiatives.

Past Successes

There have been few national initiatives in Canada, which have led to a reduction in suicidal behaviours. One noteworthy exception is the Canadian Gun Control Legislation, which may be related to a decreased frequency of the use of firearms in suicide deaths. However, since the overall suicide rates in Canada have remained relatively stable, we cannot know if there has been a substitution of methods. At local levels, however, there are numerous examples of successful initiatives, which have led to a reduction in suicidal behaviours. In the area of controlling access to means, the construction of a barrier at the Bloor Street Viaduct in Toronto appears to have eliminated deaths by jumping from that bridge and it does not appear that there has been substitution at other bridges.

There are numerous examples of intensive initiatives in a microenvironment that appears to have been quite successful. For example, the comprehensive suicide prevention programme in the Montreal Police Force (Mishara, 2002) involving a series of complementary activities and services for all of the 4178 Police personal, is probably responsible for the fact that after having an average of 2 deaths by suicide each year up until the programme began, there has not been a single death by suicide in the 5 years since the programme was initiated. There are also

examples of aboriginal communities who successfully lowered their suicide rates by programmes involving decreased alcohol and drug problem use and increased community solidarity and an emphasis on traditional cultural values. However, there is a dire need for more and better evaluations of current practices in order to verify when successes have occurred.

Current Opportunities

There is a tremendous amount of interdisciplinary research in the area of suicide in the Montreal area and there are notable examples of interdisciplinary research elsewhere in Canada including Toronto, Calgary and the Vancouver region. There is also an increased interest on the part of governmental funding agencies to determine the effectiveness of the programmes they finance. Furthermore, the Provincial Coroners and Medical Examiners meet regularly and are interested in developing better standards for the reporting of suicide deaths. It is evident that new funding initiatives will result in the development of more research projects. However, the nature of those funding structures will determine the extent to which research follows priorities that will be established as well as the extent to which a broader injury prevention approach is taken rather than a more limited approach, focused solely upon suicide.

Not all forms of research on suicide lend themselves to collaboration with other intentional and non-intentional injury prevention researchers. However, there are many commonalities between suicide research and other injuries. For example, many of the genetic and biochemical mechanisms related to suicidal behaviours are explained using the constructs of impulsivity or disinhibition. These dimensions of human behaviour can also be related to other injury behaviours. The cultural and psychosocial factors related to increased suicide risk, including lack of social support, poverty and unemployment, are also related to a wide range of other injuries. Similarly, the importance of cultural attitudes concerning the acceptability of different behaviours is another area where suicide researchers may be able to learn from other injury prevention programmes. For example, we have witnessed marked decreases in the acceptability of drinking and driving. Perhaps these same methods for changing attitudes can be applied to changing the acceptability of suicidal behaviours. Numerous additional examples can be given. There are many opportunities for transdisciplinary collaborative work in suicide research as well as collaborations with other researchers involved in other aspects of injury prevention.

Knowledge Translation

As part of the preparation for the Workshop on Suicide-Related Research in Canada, held in February 2003, a survey was undertaken of various stakeholders in which they were asked what types of knowledge they would like to have developed by future research in suicidology. One of the surprising findings from this survey was the fact that many of the research questions proposed could already be answered on the basis of existing research knowledge. This highlights the fact that, to date, there are few systematic efforts at developing knowledge translation of suicide research. However, before developing knowledge translation activities, it is important to determine the best means to implement knowledge translation with various end users. There is a need for the

development of models of knowledge translations in suicidology for various target populations and end users. One of the most important areas of knowledge translation is the development of models of "best practices" in a wide range of areas. These may include practices in the assessment and identification of suicide risk in hospital and individual practice settings, how to intervene on the telephone in help lines and crisis centres with suicidal callers, means of preventing recidivism in suicide attempters who are hospitalized and models of potentially successful media campaigns in suicide prevention.

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Appendix I

Cross-cutting Priorities, Suicide Research Themes and Research Questions from the Workshop on Suicide-Related Research in Canada held Feb 7-8, 2003 in Montreal

Cross-cutting Research Priorities

• developmental perspectives across the age-span, with attention to all age groups

• development of consensus related to common language and terminology

• community-based approaches

• ethical challenges and guidelines

• Aboriginal peoples

• sex and gender differences

• sexual identity

• health care system challenges

• knowledge development, translation, implementation and utilization, including best practices

• participatory approaches, e.g., where the population being studied is also involved in setting the objectives of the research and implementing the study

• stigma and discrimination, e.g., their impact on suicidality, help-seeking, availability/accessibility of services and the experience of bereavement by suicide

• suicide is more than a health issue, e.g., it goes beyond the conventional boundaries of health policy and programming

Potential Suicide-Related Research Themes

1) Data Systems: Improvement and Expansion

Potential Research Questions

• Reliability studies, e.g., biases, misclassification, quality of data

• Standardization of questionnaires, e.g., terminology, variables

• Community and between-community analysis, e.g., inter-regional and intra-regional.

2) Evidence-based Practices

Potential Research Questions

• What methodologies are most appropriate for assessing the effectiveness and impact of interventions, e.g., indigenous knowledge, qualitative and quantitative?

• How can we ensure knowledge translation and impact, e.g., translating knowledge of protective factors and evaluating effectiveness of changing professional practice?

• What is the effectiveness of bereavement interventions for bereaved individuals, families and communities?

• What services need to be developed for disadvantaged groups, including adolescents, Aboriginals?

• What constitutes the effectiveness of prevention/promotion and their component, e.g., programs, activities and policy?

3) Mental Health Promotion

Potential Research Questions

• Aboriginal communities: evaluation of role model/wellness

• barriers to funding

• different models of delivering mental health promotion, e.g., the internet

• early, intermediate and long-term interventions

• increased mental health promotion compared to health promotion, e.g., devaluing of mental health relative to other areas

• logic models

• reliable longitudinal data

• new and improved detection and screening

• reasonable outcome areas

• research and policy development

• synergistic effects of multiple strategies

• training and support of mental health programs

• what is "a good enough life"?

4) Multidimensional Models for Understanding Suicide-Related Behaviours

Potential Research Questions

• Mediating factors between mental health and suicide, e.g., why do some people

with depression commit suicide and others not?

• Understanding inter-regional variations and mediating factors, e.g., why do some communities have higher rates?

• What accounts for gender differences in suicide-related rates?

• What are the implications of multidimensional models for multidimensional

approaches and responses, e.g., neurobiology of suicide?

• What incentive models account for inter-regional variation?

5) Spectrum of Suicide Behaviours, including Suicide Attempters

Potential Research Questions

• reasons for wide regional variation, e.g., rates and geographical definitions

• differences across the age span and age groups

• differences between communities in remote and rural areas, e.g., in services

• differences in fluctuation over time, e.g., seasonal, sociopolitical, war

• study of intention of suicidal behaviour, e.g., range from wish to die, to extinguish

intra-psychic pain

• link between gender, depression and attempts, including sexual identity

• aftermath of the suicide attempt, e.g., how professionals/hospitals react and treat

attempters; follow-up for attempters in the community

• choice of means for suicide and the implications for prevention

• relationship and differences between end-of-life decisions, e.g., understanding the

similarities and differences between suicidal behaviours and end-of-life decisions

involved in euthanasia and assisted suicide

• role of substance misuse as proximal correlates

• relationship of traumatic childhood experiences to suicide attempters

• understanding the mechanisms in people with repeated suicide behaviours, e.g.,

predictors

• nature of self-injurious behaviour in relation to suicide

• operationalizing definitions of terms and concepts across languages and cultures

• efficacy of interventions with attempters to prevent completions

• engaging attempters in interventions, e.g., to facilitate help-seeking

• developmental influences related to the concepts of suicide and death

• cross-cultural views of assisted suicide

• biomedical mechanisms of impulsivity and aggression.

6) Suicide in Social and Cultural Contexts.

Potential Research Questions

Research questions concerned with the theme of culture must emphasize variability

across groups in suicide rates, attitudes, and values towards suicide or suicide

recovery and what constitutes best intervention practices. Examples include:

• what cultural values and practices influence the stigmatization of suicide and

attitudes toward suicide recovery?

• what cultural factors are responsible for different suicide rates?

APPENDIX D.4

Background Paper On Family Violence for Integration in the Intentional Injury Background Paper

August, 2003

Theresa Knott, MSW

This report was prepared as part of the Listening for Direction on Injury initiative sponsored by the Canadian Institutes of Health Research and the Canadian Injury Research Network.

NOTE:

This report has been modified from its original format for inclusion as an appendix in this document. Sections have had white-space removed to conserve space. Those wishing to view the report in its original format, can download it from:

www.injurypreventionstrategy.ca

Modified from Original Format for this Appendix by:

Philip Groff

Sources of data estimating the incidence of various forms of abuse are typically generated through reports to the police, child welfare agencies, hospitals, and other governmental bodies, in addition to, retrospective household surveys of victims and empirical studies. Estimates may shift due to changes in legislation and charging policies, in addition to level of public awareness and high-profile cases of family violence often litigated in the media.

I. SPOUSAL VIOLENCE

Burden of Illness

During the year 2000 18% of all violent crime reported to the police in a subset of 166 police departments involved spousal violence. Estimates of spousal violence in Canada indicate that women comprise the majority of all victims (85% of 34,000 reports to police) while men account for 15%.17 Offences for which women are disproportionately represented are kidnapping/hostage taking and sexual assault, 99% and 98% respectively. In both male and female victims of spousal violence current spouses are perpetrators of the reported offence, 63% and 66% respectively.

Pattern of Injury

In 2000 common assault represented the most frequent form of spousal violence for both men and women, 63% and 59% respectively followed by Assault 1 & 2, uttering threats and criminal harassment.18

According to Uniform Crime Reporting Statistics (UCR2), of all cases of spousal violence reported to the police during the twelve month period in 2000, 47% resulted in minor injuries (requiring no medical treatment or some first aid), 45% did not result in any injury to the victim, 2% of spousal violence victims died or suffered serious bodily harm and 6% remain unknown.1 General Social Survey data (1999) classify pattern of injury and document that 40% of women and 13% of men who disclose spousal violence over a five year period between 1994-1999 experience physical injuries, while 11% of women and 2% of men are hospitalized.2

Trends

UCR2 data indicate an overall upward trend of spousal violence between 1995 and 2000 accounting for a 27% increase among female victims and a slightly less notable increase among men.1 Similarly, both the General Social Survey, 1999 and the Violence Against Women Survey, 199319 report an increase in spousal violence between 1993 and 1999 with women disproportionately represented among victims.

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[17] Canadian Centre for Justice Statistics, Incident Based Uniform Crime Reporting (UCR2). Survey reported in Family Violence in Canada: A Statistical Profile: 2002. Based on data from 166 police departments and represent 53% of total crime in 2000.
[18] Statistics Canada: Canadian Centre for Justice Statistics: A Profile of Criminal Victimization, Results of the 1999 General Social Survey 85-553-XIE.
[19] Violence Against Women Survey, 1993.

Populations at Risk

Women are disproportionately represented in national estimates of spousal violence. The 1993 Violence Against Women Survey found that 29% of all women in a marital relationship had experienced spousal violence.

Not only are women at greater risk of spousal violence, but among female victims of spousal violence, young women under 25 years of age, who are separated experience the greatest risk.2 Separated women under the age of 25 are killed at a rate of 113.4 women per million separated couples as compared to women age 55 years and older who are killed at a rate of 9.5 women per million separated couples in 1999. Separated young men similarly assume elevated risk for spousal homicide.

Marital status, gender and region of Canada influence the occurrence of spousal violence with a larger proportion of victims residing in urban regions (Sacco, Johnson, & Arnold, 1993) and Western provinces.1 Epidemiological data and empirical investigation inform us that prior history of spousal violence is a risk factor contributing to further episodes of violence. Data gathered from the General Social Survey, 1999, Violence Against Women Survey, 1993, UCR2, 2000 and The Homicide Survey, 200020 and compiled in the Spousal Violence After Marital Separation report21 demonstrate the pattern of re-victimization. 40% of women and 32% of men formerly in an abusive relationship report current spousal violence.

Aboriginal women in Canada are disproportionately represented among groups of women reporting spousal violence. General Social Survey data (1999) indicate that aboriginal women are 3 times more likely to be victimized in cases of spousal violence than are non-aboriginal women.

Behavioral Risks for Injury

Risk factors for spousal violence include estrangement, husband's access to firearms (Campbell, Webster, Koziol-McLain, Block, Campbell, & Curry et al., 2003), unemployment and substance abuse among husbands (Barnett & Fagan, 1993; Wekerle & Wall, 2002) men's attitudes toward aggression (Stith & Farley, 1993; Straus, Gelles, & Steinmetz, 1980) common-law rather than marital relationships, and young age (General Social Survey, 1999).

Data compiled in the GSS, 1999 indicate that the emotional consequences of spousal violence include, but are not limited to fear, anger, and diminished self-esteem. Short and long term psychological consequences include depression, anxiety, somatization & PTSD, relationship problems, and substance abuse (Campbell & Soeken, 1999; Gelles & Straus, 1990; Jaffe, Wolfe, Wilson, & Zak, 1986; Mertin & Mohr, 2001).

The financial costs of spousal violence have been estimated at $408 million annually (Greaves, Hankivsky, & Kingston-Riechers, 1995). This figure includes health costs, social services, education and loss of employment revenue. Day

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[20] Statistics Canada, Canadian Centre for Justice Statistics, Homicide Survey, 2000.
[21] Hotton, T. (2001). Spousal violence after marital separation, Juristat, 21:7 Ottawa: Canadian Centre for Justice Statistics (Cat. # 85-002).

(1995) estimates that the health-related costs of spousal violence is over $1.5 billion annually. 48% of women and 7% of men abused in the 5 years preceding the survey used some form of social service (GSS, 1999).

II. CHILD MALTREATMENT

Burden of Illness

1998 Canadian Incidence Study of Reported Child Abuse and Neglect (CIS) documents a rate of 21.52 investigations of child maltreatment per 1,000 children in Canada.22 Child welfare professionals in Canada conducted 135,573 child maltreatment investigations during a 3-month period in 1998. 45% of all investigations were substantiated, 22% suspected and 33% unsubstantiated. Physical abuse accounted for 31% of all child maltreatment investigations, 40% were due to reports of neglect, 19% emotional abuse and 10% sexual abuse investigations.

Uniform Crime Reporting data (UCR2) indicate that during 1999 children and youth represented 24% of assault victims among a subset of crimes reported to164 police departments. Children and youth accounted for an alarming 60% of victims of sexual assault reported to this subset of police services.

Canadian Institute for Health Information report that among the 11, 740 child hospitalizations for assault during the six-year period between 1993 – 1999, 2,158 or 18% involved child battering or other maltreatment.23 Children under one are disproportionately represented in this category accounting for 45 per 100,000 injuries resulting from maltreatment.

Pattern of Injury

CIS (1998) data reveal that the most frequent form of substantiated physical abuse was inappropriate punishment (69%). Fondling occurred in 68% of substantiated sexual abuse cases while failure to supervise leading to physical harm was the most frequently cited form of substantiated neglect (48%). Exposure to family violence occurred in 58% of substantiated cases of emotional maltreatment.6 Physical harm was reported in 13% of all child maltreatment investigations. 69% of cases in which physical harm was reported involved bruises, cuts and scrapes, 24% existing health conditions, 5% involved head trauma, 4% involved burns and scalds and 3% were due to broken bones.

Homicide Survey data indicate that younger children (ages 1-11) were most likely to be killed by parents. More specifically, 92% of infants, 97% of 1-3 year olds and 93% of 4-6 year olds were killed by parents.4 Data reflecting the years 1974-1999 indicate that children and youth were more likely to be killed by fathers (52%, 6% stepfathers) than mothers (42%, 1% stepmothers). However, children under 3 years of age were most likely to be killed by mothers (Trocmé & Brison, 1998). Among infants and children ages 1-6 the most common form of homicide between 1991-1999 was death by strangulation. Children 7-11 and youth 12-17 were most likely to be killed by shooting. Following strangulation

[22] See Trocmé et al. (2001).
[23] Canadian Institute for Health Information, Hospital Morbidity Database, 1993-1996.

as a method of homicide in children ages 1-3 and 4-6, children in this category were also overrepresented among victims of beatings when compared with other age groups.

Trends

The 1998 Ontario Incidence Study of Reported Child Abuse and Neglect24 (OIS) was conducted as part of the CIS.6 Comparative data between the 1993 OIS25 and the 1998 OIS reveal that child maltreatment investigations increased 44% and substantiation rates of all maltreatment types doubled. Cases of substantiated physical abuse increased from 4,200 in 1993 to 8,000 in 1998, a 90% increase. Emotional maltreatment experienced the most dramatic increase rising from an estimated 1,000 in 1993 to 8, 700 in 1998 – 870%.

Researchers suggest that inclusion of the maltreatment type, witnessing domestic violence, in the 1998 OIS may account for this trend. Rates of sexual abuse decreased 44% between 1993 and 1998 dropping from 3,400 in 1993 to 1,900 in 1998. Cases of neglect have doubled from an estimated 4,400 in 1993 to 8,900 in 1998.

Comparison data from the U.S. National Incidence Study-226 and National Incidence Study-327 document an increase in all substantiated maltreatment types. Between 1986 (NIS-2) and 1996 (NIS-3) incidence of all maltreatment virtually doubled based on endangerment standard findings.

Similar to Canadian data, National Child Abuse and Neglect Data System (NCANDS) results indicate a similar decrease in rates of sexual abuse, a 39% reduction in reports from 1992 to 1999.28 Clinicians and researchers alike have postulated that such a trend may indicate increased social awareness, efficacy of treatment programs or policy deterrents, or that victims and families may be less likely to report.

Populations at Risk

Risk factors noted in NIS-3 indicate that children in large single parent families with incomes below $15,000 experienced heightened risk of maltreatment and serious injury. Female children were more likely than males to experience sexual abuse while males were disproportionately represented among victims of emotional neglect and suffered more serious injuries than females.

Canadian incidence data (1998) indicate that boys account for 51% of investigations while girls account for 49% of maltreatment investigations. Girls age 4-7 are disproportionately represented among investigations of sexual abuse while males accounted for the largest proportion of physical abuse investigations.

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[24] See Trocmé et al. (2002).
[25] See Trocmé et al. (1994).
[26] See Sedlak, A.J. (1991).
[27] See Sedlak & Broadhurst (1996).
[28] U.S. Department of Health and Human Services, Children's Bureau, Child Maltreatment (2000): Reports from the States to the National Child Abuse & Neglect Data System. Washington, DC, U.S.

46% of all investigations involved children who live in a home with a single parent and the likelihood of maltreatment substantiation increased as the number of children in the home increased. In cases of reported neglect, almost half of investigations involved families who were unemployed. This is in contrast to the approximately 50% of families who are employed full time in cases of reported physical or sexual abuse.

At least one caregiver functioning concern was noted in 73% of maltreatment investigations with alcohol/drug abuse noted most frequently. Previous CPS investigation increased the likelihood of subsequent investigation.

III. ELDER ABUSE

Burden of Illness

Awareness of the existence of the abuse of older adults was heightened after a 1990 Canadian survey documented that 4% of elderly Canadians have experienced some form of abuse (Podnieks, 1990). Domestic abuse, institutional abuse, self-neglect or self-abuse comprise the 3 main categories of abuse against the elderly while physical abuse (may include sexual abuse), psychological and financial abuse represent 3 maltreatment types.

UCR2 data indicate that homicides of the elderly in Canada account for 6% of the total volume of homicides occurring in 2001. During the 12-month period in 2001 there were 35 homicides of Canadian seniors overall, however, when examining the ratio of homicides committed by a family member this number is reduced to 19.

Among the Canadian elderly, women and men are almost equally as likely to be victims of violent crime, 49% and 51% respectively. However, among victims of violent crime perpetrated by family members, women are the most likely targets of family violence, 38% and 21% respectively.

Pattern of Injury

Common assault is the most frequent form of family-related violence against older Canadians.29 Non-family related incidents of violent crime perpetrated against seniors similarly involve common assault as the most frequent form of violence. 2001 UCR2 data indicate that physical force was the most frequent form of violence used 60%, 46% of elderly victims suffered no injuries and 38% suffered minor injuries. In 4% of cases, major injuries or death occurred and women were slightly more likely to appear in this category.

Between 1974 and 2001 the most common cause of death for family and non-family homicide reported by the Canadian Centre for Justice Statistics was beating 29%, shooting 28% and stabbing 23%.

Perpetrators of family violence against elderly women are most likely to be spouses, 38% and adult children, 34%. Elderly men are most likely to be victims of family violence perpetrated by an adult child 46%, followed by a spouse, 21%.

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[29] UCR2 data: Canadian Centre for Justice Statistics, Incident Based Uniform Crime Reporting Survey reported in Family Violence in Canada: A Statistical Profile. 56% of total crime – volume represents data gathered from 154 police departments.

Homicide survey data (2000) indicate that senior men are most often killed by an adult son 43%, while women are most often victims of spousal violence 53%.4 Overall, older men are more likely than women to be victims of homicide, 11 per million and 6 per million respectively. However, in cases of family perpetrated violence men and women are almost equally represented in homicide rates (5 per million and 4 per million respectively).

Institutional abuse rates are difficult to assess given the absence of large-scale Canadian prevalence or incidence studies.

However, a Canadian telephone survey of RN's and RNA's conducted in 1993 documents that nearly one-half of nursing professionals in institutional settings report the occurrence of some form of abuse against seniors.30 85% of respondents indicated that abuse occurred in hospital settings while 36% report that abuse took place in nursing homes or long-term care settings.

Trends

In examining trends of homicides against Canadian seniors, Homicide Survey data indicate that family and non-family related homicide have generally declined between the years 1974-2001.4 Fluctuation of rates of family and non-family homicide are evident when examining rates longitudinally from 1976-2001. Overall, older men have experienced a decline from 39 per million in 1976 to 11 per million in 2001. While older women were killed at a rate of 17 per million in 1976 and 6 per million in 2001.

Populations at Risk

Previous victims of family violence experience heightened risk of reoccurrence. Tracked from 1991-2001, Homicide Survey data reports on previous history of violence against a senior and documents that in 31% of homicides against an elderly Canadian a history of violence with that victim existed. These findings are similar for men and women (30% and 33% respectively). Beaulieu & Tremblay, (1995) have indicated that factors such as having an economically dependent adult child and social isolation are risk factors in the perpetration of senior abuse. Level of caregiver stress is similarly associated with the abuse of seniors (Coyne, Reichman & Berbig, 1993). The influence of transgenerational family violence and psychopathology of the abuser have also been investigated as factors contributing to abuse of the elderly. McDonald & Collins (2000) suggest that the dynamics of dependency between seniors and adult children require further investigation.

IV. YOUTH VIOLENCE

Burden of Illness

The following estimates capture both youth as victims and perpetrators of criminal code offences in Canada.

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[30] College of Nurses of Ontario (1993). Abuse of clients by registered nurses and registered nursing assistants: Report to council on results of Health Canada, *Monitor Survey of Registrants*, 1-11.

1999 General Social Survey data indicate that 40% of youth in Canada were victims of crime in the 12 months preceding the survey. Using these same data, it is evident that female youth report sexual assault more often than females in any other age category. During the 12 months preceding the 1999 GSS, there were 111 reports of sexual assault per 1,000 female youth aged 15-19 as compared to 75 per 1,000 young women 20-29 and 33 per 1,000 females 30-39.

During 1999 approximately 100,000 youth between the ages of 12-17 were charged with a criminal code offence. Among the total volume of criminal code offences committed in Canada during 1999 youth in this same age category comprise 21% of all charges (reported in Family Violence in Canada, 2003). Youth ages 12-17 are most often the perpetrators of violence against their similarly aged and slightly older cohorts.

Pattern of Injury

Youth aged 15-19 have the highest rate of hospitalization for intentional injuries when compared with other age groups under 20.7 Harm statistics of violence perpetrated against youth indicate that among youth between 10-19 the most common cause of intentional injury requiring hospitalization is physical fight, brawl and rape.7 In cases of family perpetrated sexual assault, teenage girls between 11-14 are the most likely victims.13 2001 UCR2 data also indicate that family members are the most common perpetrators in cases of youth homicide. Canadian Centre for Justice Statistics similarly report that during 1999 family members were the most frequent perpetrators of homicide against youth. Cause of death in cases of youth homicide indicate that among youth 12-17, shooting is the most frequent method of family perpetrated homicide.4

Trends

Data from the UCR2 Trend Database indicate that between 1995-2001 rates of sexual assault perpetrated against youth by family and non-family members has decreased marginally while physical assault has increased. Youth in the 12-14 and 15-17 age categories experienced a sharp increase in family perpetrated physical assault between 1997 and 2000.

Trend data on youth as perpetrators of crime indicate that in general criminal offences among youth have decreased over the last decade according to UCR2 1999 data. However, while incidents of violent crime perpetrated by youth have decreased marginally since 1997 when examining trend data of the violent crime subset of cases over a ten-year period between 1989-1999 youth are being charged 41% more often than 10 years ago.

Populations at Risk

According to data documented by the General Social Survey, 1999, teenage females between 12-17 are the most likely victims of sexual assault when compared with women in all other age categories.2

Among perpetrators of youth crime, youth between the ages 15-18 are most often charged with violent offences and property crimes when compared with other age categories.

RESEARCH PRIORITIES

Over the last decade there has been a substantial increase in the number of studies, which track the incidence and prevalence of child maltreatment. While this body of research is essential in documenting a baseline rate of victimization, studies evaluating the usefulness of intervention programs with victims have been infrequent. MacMillan (2000) and Wolfe & Wekerle (1993) point to methodological problems in existing evaluation studies of child maltreatment intervention. Evidenced-based treatment programs for victims of family violence are needed, particularly specialized models for treatment of children exposed to family violence.

While federal dollars are spent educating the public of the existence of elder abuse, Canadians remain unaware of the specific dynamics underlying abuse against seniors and the number of cases existing now in Canada. No large-scale study examining the incidence (number of cases during a given time period) of elder abuse in Canada exist. Further, abuse occurring in institutional environments has not been as rigorously investigated as has abuse occurring in domestic settings. Research on abuse against seniors has historically been hindered by confusion among researchers concerning definitions of abuse. Definitional conflict not only impacts negatively on identification and treatment, but contributes to confusion among legislators and prosecutors. Continued development of screening and assessment instruments is required. In an attempt to determine effectiveness, evaluation of existing treatment programs and prevention efforts is necessary. A standardized maltreatment taxonomy is needed as are national incidence studies.

With respect to crime perpetrated by youth, Youth Court Survey Data in 1998/199931 indicates that violence among adolescent girls 12-17 has increased slightly. While violent crime perpetrated by youth overall has declined in recent years, there is some indication that the proportion of crime perpetrated by girls has increased. Recent high-profile cases of female adolescent crime contribute to the public perception that girls are significantly more violent than in previous years. Researchers Doob& Sprott (1998) and Reitsma-Street, (1993) provide some clarification of the state of crime among adolescent females. Pepler & Craig (1999) identify the dynamics involved in female bullying, risk factors, consequences and treatment. Continued compiling of incidence data is required to determine if the problem of girls committing violent crime is improving or deteriorating. Intervention programs targeting groups potentially at risk and the continued use of school based educational initiatives is needed. See Health Canada overview at:

http://www.hc-sc.gc.ca/hppb/familyviolence/pdfs/2003femagr_e.pdf

Canadian and American incidence data on child maltreatment document a decrease in rates of reported child sexual abuse. Researchers and clinicians have speculated about the factors contributing to this decline. Currently, there is no evidence to pinpoint a specific factor or series of factors responsible for this decline. Empirical evidence informing families and treatment providers of the

[31] Statistics Canada: The Daily, May 29, 2000, Youth Court Statistics.

factors known to reduce the occurrence of child sexual abuse is essential to the development of a standardized injury prevention protocol.

PAST SUCCESSES

Canada has made steady progress in responding to family violence through initiating community based programs, government level initiatives, research and evaluation efforts. Numerous multi-sectoral community and research based family violence initiatives exist in Canada.

The National Clearinghouse on Family Violence has provided a vital information dissemination service since 1982 informing Canadians of best practices in the prevention and treatment of family violence. Family violence fact sheets are available on the NCFV website http://www.hc-sc.gc.ca/hppb/familyviolence/

The Family Violence Initiative (FVI), a Federal program initiated in 1988, collaborates with numerous federal departments such as Statistics Canada, Canada Mortgage and Housing Corporation, Department of Justice, Status of Women and others. Using an multi-sectoral approach the FVI works to promote awareness of family violence, support prevention efforts and research, collaborate with the justice system, and ultimately to reduce family violence in Canada. An example of an FVI prevention initiative is the FVI/Canadian Institute of Child Health resource kit: "Caring Communities, Child Sexual Abuse Prevention".

Human Resources and Development Canada supports NLSCY (National Longitudinal Survey of Children and Youth), a national database tracking health characteristics of Canadian children and youth. See: http://www.hrdc.gc.ca/sp-ps/arb-dgra/nlscy-elnej/home.shtml

Transition houses and shelters play a vital protective role and provide a temporary safe haven for thousands of women and children in Canada. It is estimated that during 2001/2002 101, 248 women and children were housed in shelters. Canada Mortgage and Housing Corporation have initiated a Shelter Enhancement Program mainly to refurbish existing shelters as well as provide some funding to increase bed volume. Shelter beds and supportive housing is also funded by the Homelessness Initiative.

Collaboration between various professional groups and government programs to promote sensitivity to family violence. For example, the initiation of training programs for police, health care workers and professionals working closely with children and youth. An example of a professional development initiative is the Put the Children First: Train the Trainers Program funded jointly by Health Canada and Canadian Council on Children and Youth. An additional professional aid is "A Handbook for Health and Social Service Providers and Educators on Children Exposed to Women Abuse/Family Violence," http://www.hc-sc.gc.ca/hppb/familyviolence/html/children_exposed/english/inside_cover.htm

Collaboration between the Federal government and SSHRC (Social Sciences and Humanities Research Council) to establish regional academic centres for research into family violence.

Health Canada funding for National Incidence Studies of Reported Child Abuse and Neglect (Ontario Incidence Study, 1993, 1998; Canadian Incidence Study, 1998). See: http://www.hc-sc.gc.ca/pphb-dgspsp/publicat/cisfr-ecirf/index.html

CIS Cycle II data collection underway Oct/03.

Differential Response in Child Welfare: A multi-track response system in the field of child protection. (See Trocmé, Knott, & Knoke, 2003). Multi-track child protection systems are more common in the U.S. than in Canada with Minnesota initiating the first evaluation. Alberta's "Alternate Response Model" is currently underway. See:

http://www.crv.gov.ab.ca/CRV.nsf/(Search)/Alberta+Response+Model-Overview

http://www.iarstl.org

CURRENT OPPORTUNITIES

Continue primary, secondary and tertiary prevention efforts. Primary prevention involves public awareness campaigns through use of radio, television and other media to achieve the goal of stopping family violence before it starts. Encouraging parents to use non-violent means of discipline is an example of primary prevention. One of the largest public awareness campaigns was the prevention efforts informing the public of "Shaken Baby Syndrome". Secondary prevention involves the provision of direct services to targeted high risk groups. Tertiary prevention efforts are aimed at families in which violence has occurred. The aim is to prevent the recurrence of family violence and minimize the negative consequences associated with violence. An example of prevention at this level is education for families regarding the consequences of children's exposure to spousal violence. Prevention initiatives should be culturally sensitive, address issues of disability, violence in same-sex relationships, involve diverse faith communities and address the needs of aboriginal communities.

INFRASTRUCTURE GAPS

Over the last decade substantial progress has been made identifying family violence research priorities, enhancing public awareness and providing services to victims. In spite of these gains, family violence continues to be a major social issue with devastating interpersonal and societal costs.

Resource allocation and funding structures neglect to accommodate marginalized groups such as abused seniors. For example, recent trend data indicate that shelter beds are increasingly used by abused seniors in Canada. However, there are few shelter services, which focus on the needs of older women experiencing family violence.

Second stage housing and long-term affordable/supportive housing for women and children fleeing family violence is needed.

In both responding to family violence and developing injury prevention protocols, better integration and collaboration across the various levels of government and community is needed. Increased partnerships, cross-

disciplinary initiatives and the development of an integrated response system are essential.

Committed funding to sustain a national research structure.

Priorities:

Examine the effects of family violence over time

Provide reliable annual incidence data

Track pattern of injury

Develop specialized injury prevention protocols

Translate research knowledge into practice: establish an evidence base of empirically validated treatment protocols

Support use of identified "best practices" in treatment

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APPENDIX D.5

Acute Injuries Research in Canada

September 2003

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This report was prepared as part of the Listening for Direction on Injury initiative sponsored by the Canadian Institutes of Health Research and the Canadian Injury Research Network.

NOTE:

This report has been modified from its original format for inclusion as an appendix in this document. The executive summary and table of contents have been removed. In addition, various sections have had white-space removed to conserve space. Those wishing to view the report in its original format, can download it from:

www.injurypreventionstrategy.ca

Modified from Original Format for this Appendix by:

Philip Groff

1.0 Burden of Acute Injury in Canada

In every country, injury is a major cause of death and disability. Unintentional injuries represent the leading cause of death of Canadians between the ages of 1 and 34 (Health Canada 1997) and are responsible for more productive years of life lost than cancer, stroke, and heart disease (Bandiera et al.1999; Campbell 1992).

Injury that does not result in hospitalization is difficult to track in every country. In 1995, it was estimated that there were 2,048,220 unintentional injuries resulting in non-hospitalization in Canada (Angus et al, 1998). Approximately 40% were due to falls, 10% due to motor vehicles and the remainder due to sports and recreational activities, drownings, fires, cycles, water and rail transport, air and space, natural and environmental and other mechanisms.

It has been estimated that for every death from injury, there are at least 21 hospitalizations for injury and 350 visits to emergency departments (CIHI, 2003). In those older than 65, injuries are more likely to result in fatality, likely due to pre-existing co-morbidity and the acute response to trauma. Motor vehicle collisions are more likely to result in hospital admission and be fatal than falls. Most people dying from drowning never make it to hospital. The following table represents data collected from the National Ambulatory Care Reporting System (NACRS), The Ontario Trauma Registry Minimal dataset (OTR MDS) and the Ontario Trauma Registry Death Dataset (OTR DDS) as reported for Ontario in fiscal 2001/2002 (CIHI, 2003). NACRS is mandated by the Ministry of Health in Ontario. Although data reporting, especially from NACRS is still likely not yet complete, and not all types of injuries are presented in the table, the trends are revealing:

Selected Injury Types	Total ER visits	Total Hospitalizations	Total deaths	Hospitalizations per death	ER visits per death
FALLS	327,184	40,244	965	42	339
MOTOR VEHICLE	86,411	8,257	836	10	103
ASSAULT	35,311	2,178	114	19	309
FIRE/FLAMES	4,860	419	88	5	55
SUICIDE/SELF INFLICTED	4,178	1,233	722	2	6
DROWNING	477	94	88	0.5	2
OVERALL	1,093,882	66,085	3,145	21	348

Table 1: Injuries leading to medical attention in Ontario during Fiscal 2001/2002 (Source: CIHI, 2003)

1.1 Acute Trauma Leading to Hospital Admission

The National Trauma Registry (NTR 2003) also reports data from fiscal year 2000/2001. The NTR reports 198,040 acute care admissions due to injury resulting in an age standardized rate of 610 hospitalized cases per 100,000 population and a total of over 1.9 million hospital days. Males comprised 54% of cases and mean length of stay increased with increasing age. Three percent of patients died and 81% of these were over age 65 years. Although those over 65 years make up 13% of the population, they account for 38% of hospitalizations due to injury. In 2000/2001, the highest injury admission rate was in the Territories (1,026 per 100,000) and the lowest was in Quebec (520 per 100,000). Alberta, New Brunswick, British Columbia and Manitoba had rates higher than the national average. Prince Edward Island had the oldest mean and median age of admission (56, 60 years) and the Territories the youngest (38, 35 years). The older one gets, the more likely that co morbidity exists. (See appendices for diagrams – Source CIHI, 2003, NTR Report)

In 2000/2001, the most common causes of hospitalization due to injury in Canada were unintentional falls (56%), motor vehicle collisions (14%), being struck by objects or colliding with another person (5%) and assault (4%). Unintentional falls were the most common reason for admission at all ages except the 20-34 year age group where motor vehicle causes were slightly more common (27% versus 24% for falls). Falls were by far the most common cause in those aged 65+ years (85%). Slipping, tripping and stumbling account for most falls at all ages except in those under the age of 20 where falls from one level to another (e.g. playground) were the most common reason. (See Appendix 1 – Source CIHI, 2003: NTR Report).

1.2Major Acute Trauma

In 2002, the National Trauma Registry reported data on patients hospitalized for major injury (Injury Severity Score ISS>12) from 30 facilities in 7 provinces for fiscal year 2000/2001. During this period there were 8,784 severely injured patients who accounted for 138,000 hospital days in those facilities reporting data. The majority (72%) were male and the most common type of injury was a head injury (53%). Blunt injuries (93%) far outweighed penetrating injury (4%), 2% had a burn; 14% died with a quarter of those dying in the emergency department. For the whole group, motor vehicle collisions accounted for 49%, followed by unintentional falls (28%) and homicide and assault accounting for 8%. However, for seniors (65+) unintentional falls (61%) were twice as common as motor vehicles (30%). Forty-nine percent of the injuries occurred on roads, 20% at home, 7% in a recreational or sport setting and 4% in an industrial setting. Of those who died (n=1272), motor vehicles (44%), unintentional falls (32%) and suicide and self inflicted injury (7%) were the most common causes.

1.3Economic Burden of Acute Injury

The economic costs associated with injury are impressive in every country of the world. Health Canada's 1998 report, The Economic Burden of Illness in Canada, estimates that direct and indirect costs associated with illness, injury, and premature death in Canada amounted to $159.4 billion in 1998 (Martin 2003,

www.ebic-femc.hc-sc.gc.ca) with about $13 billion (8.2%) due to injury. Approximately a third of these costs were direct costs. In 1993, the estimated total cost was $156.9 billion, and 11.1% or $14.3 billion resulted from injury (Herbert 1998; Martin 2003). In another study, in 1998, the total annual cost was reported at $8.7 billion (Angus et al 1998). Angus et al estimated that almost half of these costs were direct and included expenditures on hospitals, drugs, physician care, and care in other institutions. Lost economic output associated with mortality and morbidity due to long-term disability was responsible for the largest share of indirect costs and hospital cost was the largest contributor of direct costs.

COST CATEGORY	MOTOR VEHICLE	FALLS	DROWNING AND SUFFOCATION	POISONING	FIRES	OTHER	TOTAL
DIRECT COSTS							
Hospitalized Cases	70.1	675.2	1.2	13.5	2.5	172.5	935
Non-Hospitalized Cases	305	1723.5	9.9	102.8	12.8	1,129.9	3283.9
TOTAL DIRECT COSTS	375.1	2,398.7	11.1	116.3	15.3	1,302.4	4,218.9
Morbidity costs	329.4	1,140.6	13.3	81.0	18.3	1,164.1	2,746.7
Mortality costs	966.3	64.6	134.2	203.0	109.4	294.2	1,771.7
TOTAL INDIRECT COSTS	1,295.7	1,205.2	147.5	284.0	127.7	1,458.3	4,518.4
TOTAL COSTS	1,670.8	3,603.9	158.6	400.3	143.0	2,760.7	8,737.3

Table 2 (from Angus et al, 1998): Total Economic costs ($Millions) resulting from unintentional acute injury, distribution by major cause of Injury, Canada, 1995-1996.

1.4Specific Examples of Important Areas

1.4aChildhood Injury

It has been estimated that almost one thousand children were killed due to unintentional injury in Canada in 1997 (Pickett et al. 2003). For every death, between 19 and 40 children were hospitalized and between 300 and 670 presented to emergency departments for treatment due to injuries (in Brownell et al. 2002; Pickett et al. 2003, CIHI 2003). Factors that are thought to put youth at higher risk for injury include high-speed driving, alcohol and drug use, being less inclined to use safety restraints, risk-taking behaviours and activities, and peer pressure (Wesner 2003). A secondary analysis of youth in grades 6, 8, and 10 based on Canadian injury data from the 1993-1994 Health Behaviour in School-Aged Children Survey determined that 36% of the youth experienced at least one injury during that year, and 55% of those children lost at least one day of school or their usual activities due to injury (King et al. 1998). When extrapolated to the Canadian population, more than 600 000 injuries are experienced by youth annually and over 750 000 days of school are missed due to injury annually. Osmond and colleagues' (2002) description of severe pediatric trauma with an injury severity score (ISS) of over 4 treated at the Children's Hospital of Eastern Ontario, a lead trauma hospital for Eastern Ontario, over a four year period beginning in 1996 demonstrated that most injured children were males, and most were between the ages of 10 and 14 years. The most common mechanisms of injury were due to motor vehicle traffic, falls, child abuse, and sports (Osmond et al. 2002). The most severe injury in 65% was to the head and neck (Osmond et al. 2002). Pickett and colleagues (2003) performed one of the few studies investigating injuries in infants, a population in which they thought injuries could be almost entirely prevented by the undivided attention of a responsible caregiver. Their epidemiological analysis of emergency-based surveillance data determined that the leading causes of injury in this population are falls, ingestion injuries, and burns. It is estimated that between 60-90% of childhood injury-related deaths are preventable, particularly those of children. Childhood injury therefore represents a good opportunity for Canadians dedicated to injury prevention and control.

Canada's mortality rate for youth injury is significantly higher than the rate in several other developed countries (Sibbald 2001). UNICEF's report, Child Deaths and Injury in Rich Nations, ranks injury mortality rates for children in a standardized fashion based on World Health Organization mortality data compiled from 1991 to 1995. Canada is ranked 10th out of 26 nations, with a rate of 9.7 death per 100 000 children aged 1 to 14 years that is about twice that of Sweden. The report concludes that injuries are the leading cause of death in children in all developed nations. The most prevalent cause of death was related to motor vehicle incidents. Alcohol is involved in 40 to 60% of crashes resulting in injury (in Bandiera 1999). Child injury thus presents an important focus for making major impacts into the health of Canadians if only what is already known about injury were implemented.

Dueck and colleagues (2001) estimated the cost of pediatric trauma care and determined the predictors of higher cost and resource use. Their retrospective

chart review of all children suffering trauma injuries with an ISS of 4 or more over 6 years at the regional trauma centre in Kingston found that the total direct costs were $1 675 734 for the 221 children in their sample. This represents a mean cost of $7583 per patient, and is in keeping with other reports of direct costs in the literature, which ranges from $5000 to $25 000 per hospital stay (in Dueck et al.2001; Harris et al. 1996; Imami et al. 1997; Levy et al. 1994; MacKenzie et al. 1988). Indirect costs and lifetime costs

1.4bTraumatic Brain Injury

Traumatic brain injury (TBI) may result in significant impairment of an individual's physical, cognitive and psychosocial functioning. TBI results primarily from falls, motor vehicle collisions, sports injury and acts of violence and is twice as likely to occur in men as in women (NIH Consensus panel, 1999). Although the actual incidence and prevalence of Neurotrauma in Canada has not been well documented in any study to date, it is estimated that less than one in five patients seen in emergency departments with TBI is admitted. In 1996/97 the rate of hospital admission for TBI was 70.9 per 100,000 and males accounted for 66% of admissions. One quarter of admissions for TBI were in children under age 15 and approximately a quarter were in the 15-34 year age group (CIHI 1999). In Ontario, falls account for 49% of TBI admissions and motor vehicles account for 29% (CIHI OTR 2002). However, unintentional falls account for 81% of TBI admissions in those older than 65 and 55% for those less than 15 years. Amongst those 15-34 years, motor vehicle collisions account for 50% of cases of TBI (CIHI, 1999). An age peak for the 15-24 age group may partly be explained by an increase in alcohol and drug use at this stage in life (Torner et al 1999).

TBI is responsible for more trauma deaths than injury to any other region of the body, accounting in most countries for 50% or more of all trauma deaths (Thurman 1999, Torner, 1999). Two percent of the US population live with lifelong disabilities from TBI. Approximately 1 in 4 adults with TBI is unable to return to work one year after injury (CDC, 1991). Mild TBI is significantly under diagnosed and the societal impact is therefore great. Given the large toll of TBI and the absence of a cure, prevention is of paramount importance.

In Canada, there are no data available regarding the economic burden of traumatic brain injury. Costs associated with traumatic brain injury include acute care, rehabilitation, continued medical care, ongoing support to survivors and loss of potential income and productivity. For individual U.S. patients with severe brain injury, medical costs are approximately $436,000 at the time of injury, with additional costs ranging from $32,000 to $63,000 each year (Sallee et al, 2000). A 1999 report to the U.S. Congress estimated that the annual economic burden of traumatic brain injuries was approximately $38 billion in 1985 (Thurman et al, 1999). The Brain Injury Association of the United States estimated the annual cost of traumatic brain injury in the U.S. to be $48 billion. Of this total amount, approximately $32 billion was attributed to hospitalizations and $17 billion to fatal brain injuries (Brain Injury Association of USA, 1999). Torner et al (1999) estimate that TBI causes tremendous indirect costs, likely 10 times greater those of direct costs.

2.0 Research priorities in Acute Injury

The initial management of trauma patients in dedicated trauma centres by multidisciplinary teams means that participants bring their own experiences and sets of evidence to the trauma room. The broad scope of trauma with its information disseminated in multiple speciality journals means that the development of evidence-based approaches to acute injury management necessitates the synthesis of information from a variety of sources and disciplines. An additional impetus to identifying the most pressing research questions pertaining to acute care of injured patients comes from the impediments to studying this population. Trauma presents a relatively brief window of time for patient enrolment and surrogates are often needed to provide informed consent.

In order to more effectively use injury research resources, Nathan and colleagues (2003) and Rivara and colleagues (2002) have outlined research questions for which systematic reviews are needed. Both groups used Delphi designs to arrive at consensus among experts in the fields of trauma care and injury prevention on the most important research topics for study. Nathans and colleagues (2003) surveyed traumatologists from the USA and Canada to develop research priorities for systematic reviews and later asked them to rate the importance of these priorities. The research issue of highest priority pertained to management of traumatic brain injury despite the absence of neurosurgical or neurological respondents. The Injury Fact Book "Preventing Injuries in America-Public Health in Action" (2002) lists traumatic brain and spinal cord injuries as the only anatomically-based priority areas for research and prevention. The experts (n=28) in trauma care in the Nathans study ranked the following sixteen topics as the most important to which effort and funding be directed (after Nathan et al. 2003):

Rank	Category	Topics
1	Brain Injury	Intracranial pressure monitoring & survival
		Cerebral resuscitation therapeutic endpoints
2	Resuscitation	Therapeutic endpoints to guide resuscitation in hemorrhagic shock
3	Spinal Cord Injury	Screening cervical spine injury in the comatose patient
4	Resuscitation	Hemodynamic monitoring during resuscitation
5	DVT Prophylaxis	Identifying patients most likely to benefit from prophylaxis
		Low molecular weight heparin versus sequential compression devices to reduce incidence of DVT
6	Trauma Systems	Functional outcomes and survival in rural trauma patients stabilized in local centre prior to transfer versus those directly transferred

7	Nutrition	Effects of early aggressive nutritional support on infections and length of hospital stay
8	Extremity Injury	Diagnostic and therapeutic interventions for pelvic fractures
9	Extremity Injury	Effects of early femoral fracture fixation on pulmonary complications, survival and hospital length of stay
10	Alcohol-related Injuries	Interventions to reduce subsequent injuries
11	Spinal Cord injury	Mean arterial pressure and functional outcome in patients with partial or complete spinal cored injuries
12	Pulmonary	Pain management strategies and pulmonary complication rate in elderly patients with rib fractures
13	Pulmonary	Early versus late tracheostomy and length of ICU stay
14	Vascular injury	Effect of delayed operation on mortality for blunt traumatic thoracic aorta injury
15	Brain injury	Resuscitation with hypertonic saline
16	Transfusion	Transfusion with leukodepleted red blood cells and risk of infections complication and organ failure

Table 3. Acute injury research topics (after Nathans et al. 2003).

In contrast, Rivara and colleagues (2002) surveyed 34 injury prevention experts and concluded that issues such as fires, motor vehicle and violence were most important. There is clearly a difference in how different experts view the important issues. Those not involved in the care of patients generally view priorities in process terms such as "motor vehicle crashes", whereas those involved in the care of patients generally view the priority in terms of the anatomic region of injury such as a "humeral fracture". If true interdisciplinary impact is to be realized in Canada, these disparate paradigms views will have to be reconciled.

In June and July, 2003, we surveyed 20 Canadian multidisciplinary experts from all regions of Canada regarding priority research themes. The following priority themes arose:

Category	Research Theme
Group A	
Injury Surveillance	
Injury prevention	
	Evaluation of injury prevention initiatives/interventions
	Prevention initiatives in primary care and emergency

	medicine
	Injury prevention in sports and play
Falls	
	Epidemiology of falls in the elderly
Motor vehicles	
	Improving child motor vehicle safety
	Graduated licence systems
	Passenger restraint systems
	Childhood injury
Alcohol-related injury	
	Survey of injuries
	Integration with other alcohol-related research
Risk and Injury	
	Understanding risk perception for various age groups and mechanisms of injury
	Risk-related behaviours and injury in youth
Childhood Injury	
	Motor vehicle safety
	Preventing injury in children
Self-Inflicted injury	
	Suicide prevention
Group B	
Neurological injuries	
	Acute management of brain injury
	Optimal airway management of head injured patients by paramedics
	Acute management of spinal cord injury
	Rehabilitation of spinal cord injury
	Peripheral nerve injuries
Trauma systems	
	Pre-hospital management strategies
	Emergency department management strategies
	Optimal pre-hospital transportation strategies

Abdominal injuries

Hand-held sonography to supplement initial physical examination of Injured patients

Wound Healing

Resuscitation of Shock

Group C

Policy Studies

Gun Control

Table 4 Acute injury topics identified by Canadian experts in Acute Injury (July 2003)

Carrico and colleagues (2002) in the "Post Resuscitative and Initial Utility of Life Saving Efforts" (PULSE) trauma workgroup working within the framework of the US NIH and its limited funding for trauma research also identified acute injury research topics that require emphasis. In addition to describing topics that Nathans et al (2003) identified, Carrico and colleagues (2002) call for more research funding and a coordinated trauma research program housed in a centralized federal "home" for trauma research analogous to that for HIV in the US. In addition, they outline a set of priorities for basic science and clinically driven research with a focus on the already injured person. For example, studying mechanisms of cell injury following microcirculatory dysfunction could help find the ideal resuscitation fluid.

Strategy	Rationale	Focus
Formation of an infrastructure	Facilitate bench to bedside	Laboratory studies from simple to complex systems
Clinical and translational studies of trauma resuscitation	Clinically oriented, multiinstitutional, multidisciplinary, trauma research consortium Improved and coordinated trauma research registry Animal models	Optimal fluid resuscitation Haemorrhage control Ventilatory and oxygenation support Management of primary and secondary central nervous system injuries including evaluation tools, clinical /outcome studies and rehabilitation research
Basic Pathophysiology	Microcirculatory dysfunction Endothelial cells	Develop of new materials Clinical trials Adaptive responses

	Ischemia-reperfusion Functional genomics Physiologic system interactions	
Technologies and devices	Anatomic and physiologic Evaluation of Injury Systems for reliable pre-hospital data analysis Therapeutic interventions and treatment strategies Simulation Telemedicine	Haemorrhage control Cerebral protection Virtual skills Improved communication and teaching

Table 5: Pulse Trauma Work Group Priorities (Source Carrico et al, 2002)

This report clearly represents the biomedical paradigm of addressing the problem.

Carrico's report is revealing in detailing causes of death from injury: 40% die before reaching the hospital and nearly 80% of all trauma deaths occur within 48 hours of the injury. The PULSE group recognizes that any strategy that is going to impact the injury problem is going to require more effective prevention.

2.1Reflecting on Opportunities in Canada

A true opportunity for Canadians exists in aligning these disparate paradigms. Large university-affiliated trauma centres in Canada are almost located in the major provincial centres of government, industry and commercial activity. This unique linkage across Canada means that multidisciplinary experts (e.g. psychology, sociology, evaluation, epidemiology, engineering, jurisprudence etc) and policy makers and programmers in injury prevention already exist in large numbers – however, as demonstrated by the themes described above, live with different views of the world (paradigms) and as a result must work in different "worlds". A literature search done for this paper focusing on research in acute injury prevention and control in Canada showed that in fact, there is a vibrant well-published group of researchers. These researchers are largely within university trauma centres, however significant numbers exist in units like psychology, psychiatry, gerontology and engineering. An organized infrastructure that brings these people together would provide for a true synergy not as readily possible internationally.

3.0 Success in injury prevention

Bicycle safety represents an excellent example of a successful intervention made possible by the concerted efforts of a number of groups working towards a common priority: experts in engineering, medicine, nursing, epidemiology,

education, policy, public health, and law enforcement are some of the many who have made an impact here.

3.1Improving the safety of Bicyclists

Bicycle-related head injuries constitute one of the greatest sources of risk for morbidity and mortality among school-age children. Over 650,000 people in North America receive emergency department treatment for bicycle-related injuries each year (Jacques 1994). About 0.2% of those injuries resulted in death (Jacques 1994). The annual mortality rate for bicycle-related injuries in children in Canada, 1990 to 1992, was 6 per 100,000 with a concomitant annual hospitalization rate of 51 per 100,000 children (in Macpherson et al. 2002). Pediatric bicycle-related head injuries are a major reason for emergency department visits and hospital admissions (Cushman et al. 1990). A study of 880 consecutive pediatric hospital head injury admissions found that falls were the most common cause of injury (Weiss 1987). Of 10 000 Canadian children hospitalized because of bicycle-related injuries between 1994 and 1997, 35% of them were because of injuries to the head (in Macpherson et al. 2002).

Bicycle-related injuries often entail injury to the brain, with the majority of injuries resulting in an impact to the front of the head (Ching et al. 1997). Pediatric brain injuries can result in cognitive and behavioural deficits, leading to children's poor readjustment to the community and academic setting (Asikainen et al. 1996; Cattelani et al. 1998; Fay et al. 1994; Jaffe et al. 1992; Massagli et al. 1996; Mazaux et al. 1997). The extent of post-injury behavioural and cognitive deficits has been correlated with injury severity (Asikainin et al. 1996; Asikainin et al. 1998; Levin and Eisenberg 1979; Massagli et al. 1996), age at time of injury (Asikainin et al. 1996; Asikainin et al. 1998), as well as pre-morbid educational status (Asikainin et al. 1996). The long-lasting neurobehavioural deficits make it apparent that rehabilitation of brain-injured patients must continue beyond the hospital stay.

Although continued psychological rehabilitation may promote a better outcome in patients, it is obvious that a more active role by society to prevent or reduce this morbidity may provide the greatest chance for reducing the mortality and morbidity associated with bicycle-related injuries. Previous studies have alluded to an increased protection for cyclists against head injuries through helmet use. Five ecologic studies, summarized in a Cochrane Collaboration systematic review, have provided evidence that increased helmet use resulting from education or legislation is associated with a significant decrease in bicycle-related head injuries (in Leblanc et al. 2002; Thompson et al.2001). Helmets reduce the risk of head injury by 86%, brain injury by 88%, and severe brain injury by at least 75% (in Nykolyshyn et al. 2003).

Bicycle helmets provide a good example where groups working in isolation and with single facet approaches will not have the same success as multifaceted approaches. Despite the studies showing the efficacy of helmets in reducing pediatric head injuries has been demonstrated, many children still are not wearing them (Nykolyshyn et al. 2003; Weiss 1986). For example, Nykolyshyn and colleagues (2003) performed a prospective survey of cyclists in two urban Alberta centres and found that only 55% of cyclists were wearing helmets, and

only 75% of them were wearing the helmets correctly. Even in an affluent Michigan county where the cost of helmets was determined not to be a deterrent to helmet purchase, 44% of children owned a helmet but only 17% of children wore their helmets (Jacques et al. 1994).

When this knowledge is combined with educational initiatives for the public and policy makers, legislation can be enacted. Legislation of helmet use while cycling which was based on earlier studies and public opinion has proven to be a successful injury prevention initiative that has reduced the incidence of acute injury in the cycling population. For example, in October 1990, following the death of two children in bicycle-related incidents, Howard County Council in Maryland made bicycle helmet use mandatory (Dannenberg et al. 1993; Gielen et al. 1994). Evaluation of the impact of the law revealed that helmet use increased from 4% prior to the passage of the law to 47% after its passage (Dannenberg et al. 1993). Neighbouring counties in which no such law was introduced saw in increase in helmet use to no more than 20%. Leblanc and colleagues (2002) measured rates of bicycle helmet use in Halifax in the two years preceding and three years following the introduction of provincial legislation mandating helmet use while cycling. The rate of helmet use rose after legislation was enacted from 36% in 1995 and 38% in 1996 to between 75% and 86% from 1997 to 1999. The proportion of cyclists with head injuries in 1998/1999 was half of that in 1995/1996. Macpherson and colleagues (2003) reviewed the data from the Canadian Institute for Health Information and identified all Canadian children who were hospitalized due to bicycling-related injuries from 1994 to 1998. The bicycle-related head injury rate was found to decrease significantly in provinces where legislation had been adopted compared to those provinces and territories where it had not been adopted.

4.0 Barriers to the development of acute injury research programs

Our (2003) recent study identified the limitations that were perceived by experts surveyed that exist in Canada to address acute injury themes in research. A universal barrier here and internationally is a lack of funding for research. As Bandiera and colleagues (1999) point out, cardiovascular disease, cancer, and acquired immunodeficiency syndrome programs received 10, 20, and 38 times more federal funding per year of life lost than motor vehicle injury research. Carrico et al (2002) have reported that the NIH support ratio (millions of dollars per years of potential life lost per 100,000 population) is 3.51 for HIV, 1.65 for cancer and 0.10 for trauma. Approximately 20 prevention programs are operating based on government funding of $600 000 (in Bandiera et al. 1999). Many, such as Think First, are entirely supported by private donations.

Other barriers identified include:

- Policy Issues
- Public policy
- Replacing infrastructure more important to government than funding motor vehicle collision research
- Infectious diseases higher priority

- Slow process for legislative change
- Linking researchers, programmers and policy makers
- Uncoordinated approach to prevention
- Methodological Issues
- Poor preventive measures in place
- Poorly designed and controlled studies to make recommendations
- Large population at risk – hard to make effective contact with so many
- Difficult methodology to implement (sample size and feasibility limitations)
- Data Issues
- Limited data sources
- Limited linkage to intervention studies
- Limited small scale data available
- Costs of retrieval excessive
- Privacy issues
- Researcher Issues
- Lack of critical mass of individuals working cohesively
- Different domains of practice that have operated separately
- Not many researchers doing research in this area
- Need for researcher and student personal salary support
- Difficulty with networking between disciplines

Experts also wrote that there seems to be an "uncoordinated approach to prevention" between research groups at Canadian universities; others noted that there is a "lack of critical mass of individuals working cohesively," in part due to "different domains of practice that have operated separately." Some found it difficult to network with other experts or find collaborators who have similar interests or expertise. This lack of coordinated approaches also extended to policy makers and programmers who deliver community based injury prevention. These persons are often isolated from researchers or cannot interpret research into effective interventions.

5.0 Some other Opportunities for Acute Injury Research in Canada

The increased recognition of injuries as being amenable to characterization, description, and study rather than random occurrences has legitimized acute injury research. For example, Brownell and colleagues' (2002) examination of injury rates in Manitoba clearly demonstrates that geographic and socio-economic patterns of injuries are not indiscriminate but are strongly influenced by such factors as socio-economic status, age, gender, and urban versus rural residence. The British Medical Journal has banned the inappropriate use of "accident" when describing injuries (Davis and Pless 2001). The Montreal Declaration formed at the World Injury Conference in 2002 challenged in Article

11 that "all States shall respect and protect the right to safety. Accordingly all States shall formulate injury prevention and safety promotion policies (Pless 2002).

Our study (2003) also identified opportunities for acute injury research. Experts thought that the formation of collaborative networks of researchers from different disciplines would help promote quality acute injury research. One expert hoped to "bring together groups who identify the burden of the problem, those who provide acute care, those who provide ongoing care and those who could prevent the problem." The Institute of Medicine of the National Academy of Sciences has recognized the need for injury research to be interdisciplinary if it is to be effective in its report, Reducing the Burden of Injury: Advancing Prevention and Treatment. The formation of Canadian databases such as the National Trauma Registry, the Canadian Hospitals Injury Reporting and Prevention Program, and the Canadian Agricultural Injury Surveillance Program have also been deemed to be essential first steps in promoting injury research and control. The group identified a number of content opportunities that exist: brain injury, spinal cord injury, wound care improvements, education and policy studies, systems that respond to mass casualty situations and patient care pathways.

Respondents to our survey (2003) saw the following as necessary first steps to address opportunities that exist for Canadians in acute injury research.

Centres of Excellence in acute injury and injury prevention research be established

Funding is increased for acute injury evaluation and injury prevention programs

Collaborative networks of individuals and centres interested in acute injury, research and injury prevention/control are established to promote interdisciplinary approaches and facilitate collaborative approaches to injury study in Canada

5.1 Coordination: A structure

The most severely injured patients either die or usually get transferred to a specialized, large regional trauma centre which has a breadth and depth of expertise in trauma. Our major trauma centers and approach to trauma are centered on the acute care of these patients. These centers place a tremendous amount of funds and energy at providing these patients and their families with the care they require at the time of injury and beyond. The centres are often the focus of attention in media reports of injuries and they often have a close link with the communities they serve. The centres are foci of activity after the injury event and go on caring for these persons and their families, often for years after the event. Either directly, or indirectly through the patients and families they have served, these trauma centers have natural linkages with communities, non-governmental and governmental organizations and persons whose role it is to enact programming and legislation for prevention of injury. These centres tend to be affiliated with medical schools and therefore with research universities across the country. Within these universities are a cadre of researchers within fields like sociology, psychology, public health, education, public policy and engineering – all of relevance to advancing and translating our knowledge of

injury and its prevention and control. A lot of our clinical knowledge and research surrounding the clinical care of the traumatized patient emanates from trauma centres like these. Significant amounts of basic biomedical research, and increasingly other forms of research, directed towards the problems that these people face is also done within these centres within Canada and abroad. Despite their success at caring for these patients, they have not in general exploited their potential as the centres of collaborative networks within the universities and regions they serve to make changes that will impact their communities and country in terms of acute injury prevention. All of these centres and their administrators support the notion of prevention, but since the centers are primarily funded for the care of the injured, few presently realize to act as truly integrated multidisciplinary centres of prevention and its study. With the proper structures and funding in place, these organizations could easily enhance their roles as the major facilitators and hubs of research on injury and its control across Canada. Coordinating these regional centres and disparate groups in treatment surveillance, research, programming and policy would be a national centre devoted to injury prevention and control.

5.2 Knowledge Translation

Roberts (2001) has argued that "injury research will contribute to the reduction in the burden of injury if it informs the actions we take for injury prevention. The information we need is that which would steer us towards effective and cost effective action and away from action that is harmful, useless, or of low cost effectiveness." Unfortunately, research on effectiveness and cost effectiveness of interventions to prevent injury are rare. This gap of information is largely due to the barriers such as those identified above. With effective networks guiding development of interventions and Canada's excellent and developing surveillance systems of injury Canadians can seize an opportunity with regards to the evaluation of interventions and their translation into effective care plans and policy. This unique opportunity is also consistent with the broader emphasis in Canada in promoting research toward translation and use of knowledge.

The opportunity for knowledge translation provides an opportunity of linking researchers with programmers and policy makers. In effect, this represents an opportunity to close the gaps between disparate groups addressing different aspects of the injury problem. Ultimately, Canadians have the most to gain. Rivara and Grossman estimated that if all measures of known efficacy in injury prevention in 1991 were implemented a further decrease of 31% in mortality could be achieved (Rivara and Grossman 1996). Implementing a Canadian national strategy that links researchers, clinicians, policy makers and prevention programmers to implement what we already know about prevention could yield huge impacts for Canadians in relatively short order.

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APPENDIX I

Acute Trauma leading to Hospital Admission (source: CIHI 2003)

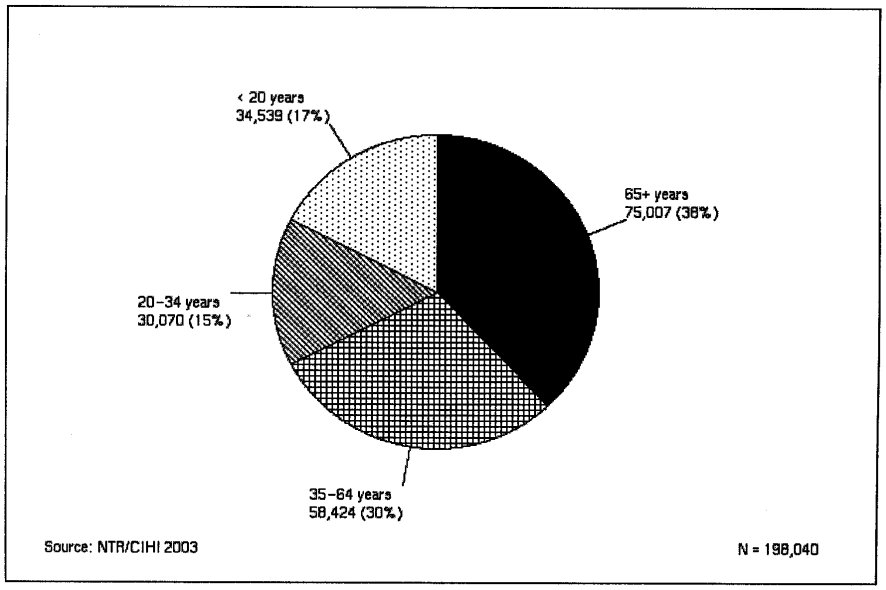

Figure 10: Injury Admissions by Age Group, 2000/2001

Injury Admission by Age group (Source, CIHI: NTR 2003)

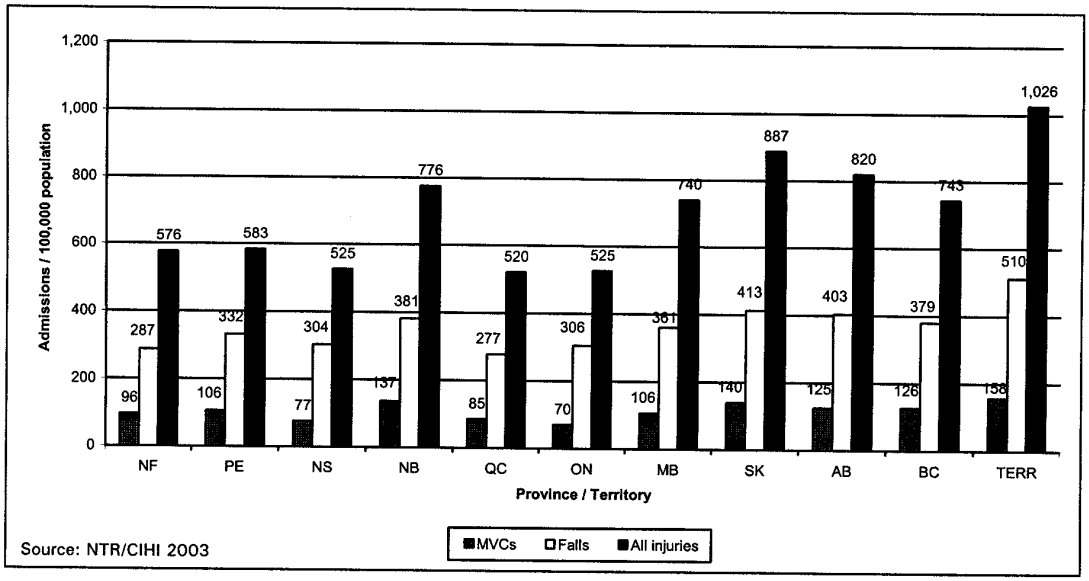

Figure 4: Provincial Age Adjusted Hospitalization Rates for All Injuries, MVCs, and Falls, 2000/2001

Note: Admission rates were age standardized using the 1991 Canadian population.

Provincial rates of hospitalization for Injury (Source, CIHI, NTR 2003)

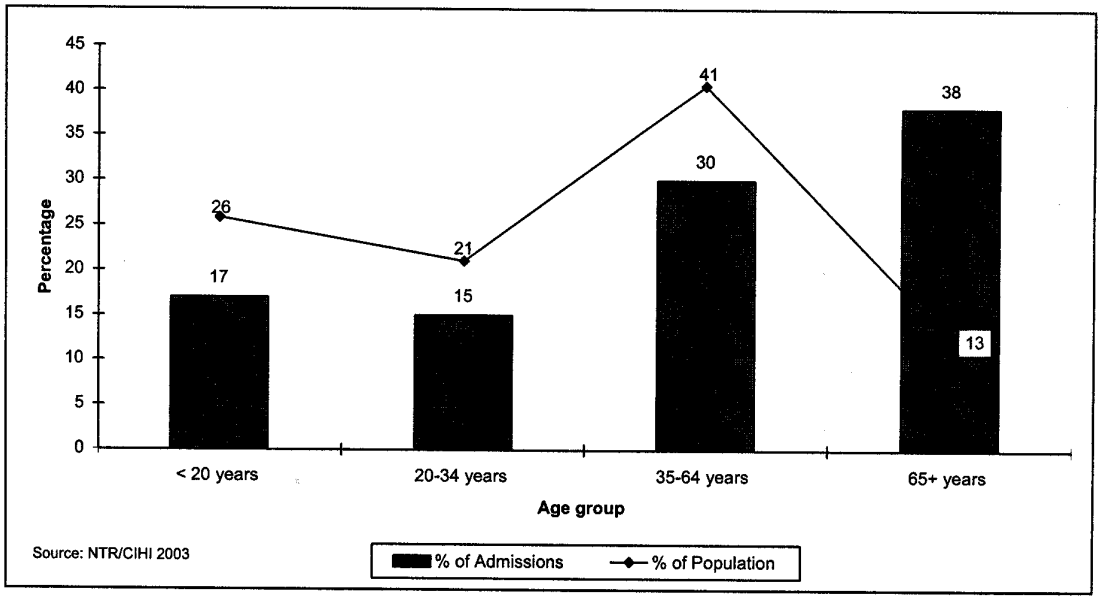

Figure 11: Percentage of Admissions and Population by Age Group, 2000/2001

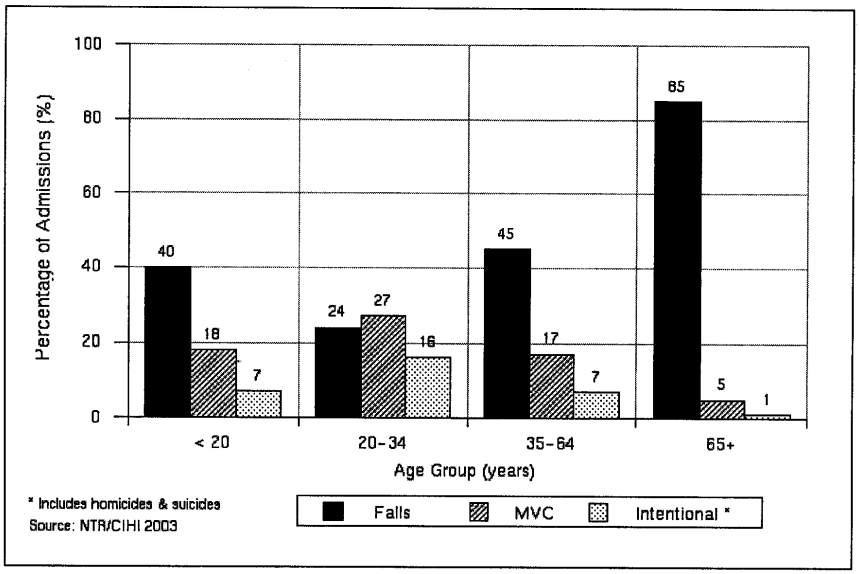

Figure 9: Percentage of Admissions due to Unintentional Falls, Motor Vehicle Collisions, and Intentional Injury by Age Group, 2000/2001

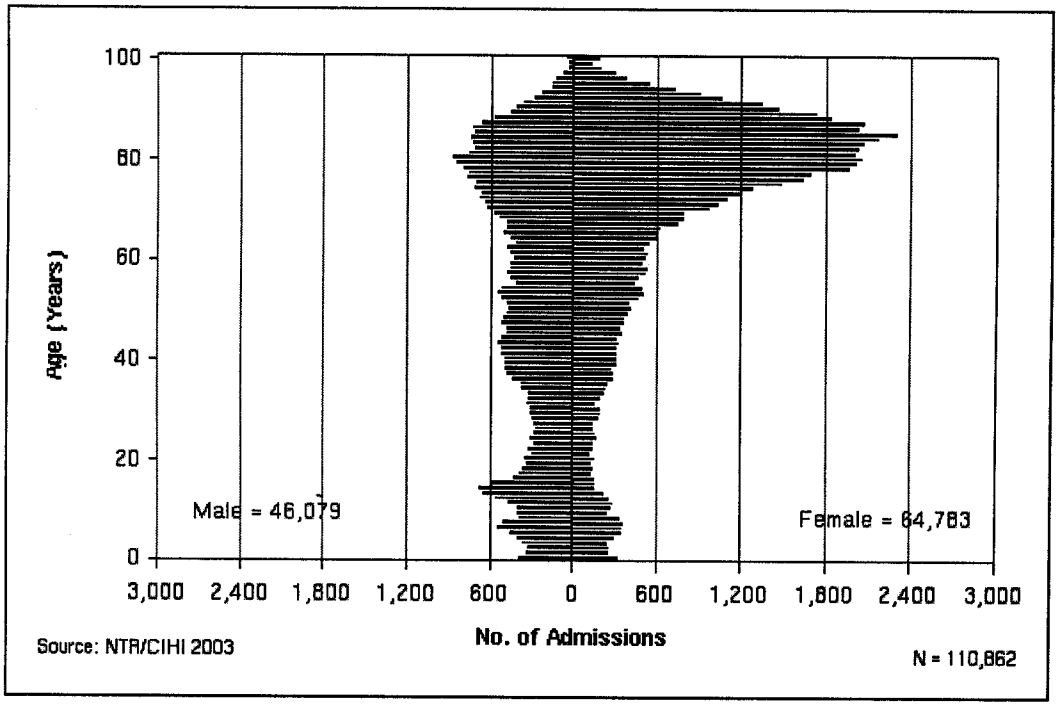

Figure 17: Unintentional Falls by Sex and Single Year of Age, 2000/2001

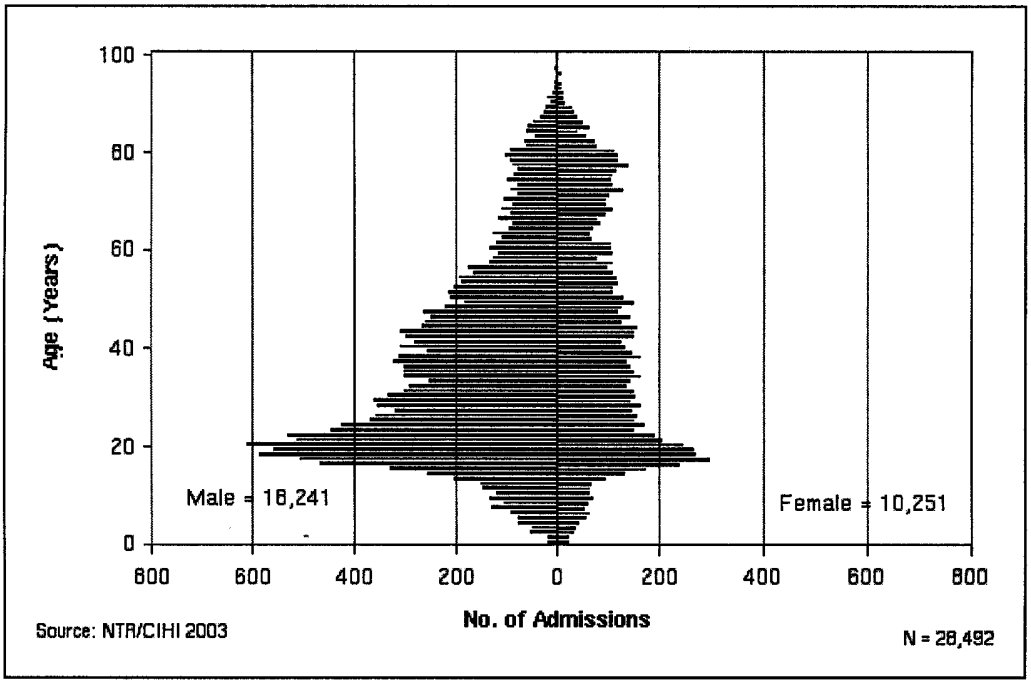

Figure 19: Motor Vehicle Traffic and Non-traffic Incidents by Sex and Single Year of Age, 2000/2001

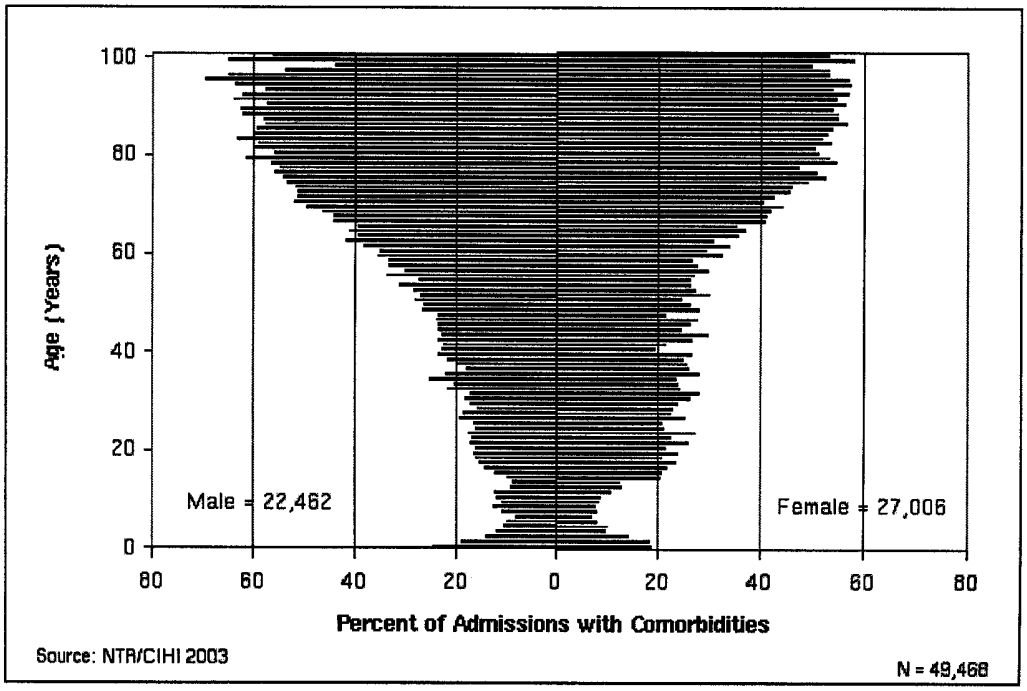

Figure 27: Percentage of Injury Admissions with at Least One Comorbidity by Sex and Single Year of Age, 2000/2001

APPENDIX D.6

Post-acute care and rehabilitation of injury

September 2003

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This report was prepared as part of the Listening for Direction on Injury initiative sponsored by the Canadian Institutes of Health Research and the Canadian Injury Research Network.

NOTE:

This report has been modified from its original format for inclusion as an appendix in this document. Figure 1 had to be removed. Various sections have had white-space removed to conserve space. Those wishing to view the report in its original format, can download it from:

www.injurypreventionstrategy.ca

Modified from Original Format for this Appendix by:

Philip Groff

Background and definitions.

The following definitions are provided to clarify the concepts and terms used in this paper.

Conceptual Framework for Health and Disability

The International Classification of Functioning, Disability and Health (ICF) (WHO, 2001) will be adopted as the conceptual framework for this paper. The ICF (see figure 1) embeds disability within environmental factors. Environmental factors are defined as "the physical, social and attitudinal environment in which people live and conduct their lives" (WHO, 2001, page 12).

Using this model, we accept that the individual's abilities cannot be judged outside the context of their environments, and that the objective of any rehabilitation program is to maximize the individual's ability to function in and control their environments. The model thus encourages the integration of both streams of rehabilitation – the biomedical and the social – and provides a suitable framework for describing and integrating rehabilitation research. In our view, optimal rehabilitation following injury should address both these spheres (Stineman, 2001).

Injury

In this paper we have defined injury as the effects of energy (kinetic, electric, etc.) exposure. This document therefore focuses on physical injuries and their rehabilitation. Primary mental health disorders are not addressed in this paper.

The consequences of injury may not be permanently resolved during a single course of rehabilitation. For example, previous back pain is highly predictive of back pain onset (von Korff, 1993) with recurrence rates now described as high as 35 per cent at six months (Carey, 1999) and 75 per cent at one year (van den Hoogen, 1998). Similarly, people who experience fracture after a minimal trauma fall (fragility fractures) face up to a nine-fold greater risk of sustaining a second, usually more debilitating, fracture such as a hip fracture (Brown, 2002). Yet preventive measures are rarely undertaken as part of the post-acute care of incident fragility fractures (Hawker, 2003; Papaioannou, 2000, Hajcsar, 2000). It is our position that any discussion of rehabilitation after injury should consider a broader, more holistic range of factors, including whether there might be a need for preventive interventions.

Post-acute care

Romanow (2002) defines post-acute care as care which is delivered during a "window" period of 30 days after discharge from hospital or after day surgery. Research suggests this is a critical stage in the successful transition from "care" to "home." Rehabilitation efforts may begin during this time period and continue well beyond the 30-day "window." In some cases, the injured person has never been in contact with the acute care system, and their post-acute care begins at the point where they have completed the initial medical management of symptoms related to their injury.

Rehabilitation

Rehabilitation is defined as a multi-disciplinary and comprehensive process aimed at enabling an individual to function in their environments through biomedical and/or social interventions(Stineman,2001; Brandt, 1997). The rehabilitation process spans a wide range of interventions – from regeneration of function at the tissue level (i.e. facilitating neuroplasticity after stroke), to capacity building in the individual (i.e. exercises designed to increase strength and flexibility of an injured limb), to social interventions aimed at reducing barriers to meaningful activities (i.e. improving attitudes and beliefs about certain disabilities).

Our view of rehabilitation embraces the biopsychosocial framework of the ICF. We regard both individual and social interventions as influential, and maintain that the individual must continually be contextualized in their environment(s).

Note: For the purposes of this document, rehabilitation focused on the regeneration of tissue function (nerve stimulation of the spinal cord, neuroplasticity of the brain following stroke, neochondrogenesis) will not be emphasized. A separate working group is focusing its attention in this area for another cross-cutting initiative at CIHR (Personal Communication, Dr Carol Richards) and will be including the regenerative aspects of injury rehabilitation as part of that position paper. We do recognize the need for that work, and look to their suggestions for directions in this area.

Description of the burden of injury in the post-acute care/rehabilitation phase.

Measuring the public health impact of injuries

Our ability to measure the impact of injuries on the health of populations has advanced substantially in the past 40 years. The historical emphasis has been on measuring causes of death and determining what proportion of population mortality can be attributed to injury. But research is yielding important new perspectives on the public health impact of injury. Through enhanced surveillance and monitoring, it is now possible to calculate the burden of non-fatal injuries, and also to integrate the consequences of injury into estimates of population burden. Research which measures the effects of non-fatal injury and quantifies the consequences – both economic and human – suggests that injuries are indeed a major public health problem in Canada.

Population surveillance across a broad range of measures is giving us insights into the comprehensive impact of injuries. For example, we know that for every death due to injury, there are at least 10 injury-related hospital admissions and approximately 200 injury-related emergency department visits (Segui-Gomez, 2003).

Research that focuses on the post-acute consequences of injury is extending and amplifying our understanding of burden. For example, injury accounts for six per cent of all deaths in the developed economies but injuries are also responsible for eight per cent of life years lived with disability, and 12 per cent of disability-adjusted life years lost to all causes of death (Murray, 1997; Murray,

1996). The additional information incorporated in these broader indicators of the health consequences of injury increases the estimate of the population burden of ill-health arising from injury.

Surveillance and monitoring of disability in Canada

The capacity already exists to monitor the incidence, prevalence and consequences of disability in the Canadian population through survey measurement programs conducted by Statistics Canada.

The National Population Health Survey is an effective source of information on the prevalence of disability, on trends in disability over time, and on how disability impacts on quality of life.

The Survey of Labour and Income Dynamics provides important information on the impact of disability on the labour market in working aged populations. This survey also measures the consequences of disability on the economic well-being of households.

Three cross-sectional national disability surveys (the 1986 and 1991 Health and Activity Limitation Surveys and the 2001 Participation and Activity Survey) provide data on the prevalence of various disabilities, as well as other measures. These include employment profiles of Canadians with disabilities, their income levels, their participation in Canadian society, and what supports exist to help them. (Cossette 2002).

Despite the strengths of these national measurement programs, more work is needed to routinely measure and describe disability according to cause. About 15 per cent of Canadians report that their activity is limited to some degree, according to existing surveillance, but there is much less information from population surveillance on the causes of disability (for example, unintentional vs. intentional injury) and activity limitation. Information is also lacking on the severity and duration of disability by specific cause.

Monitoring of the utilization of rehabilitation services in Canada

While capacity exists to monitor the prevalence of disability in the Canadian population, very little information is available on how people with disability utilize rehabilitation and/or support services.

The routine reporting of hospital admissions by cause has been a standard feature of the monitoring of the publicly-funded acute-care hospital system in all Canadian provinces for many decades. More recently, the Canadian Institute for Health Information (CIHI) has consolidated provincial hospital admission data associated with injury in an annual National Trauma Registry. As indicated in the sample table below, this source of information is valuable in understanding the distribution of injury admissions by geography, age, gender and cause. With the application of additional tools, these admissions can be further classified by the severity of the presenting injury and the estimated resource requirements needed to provide acute care in institutions.

Causes of Injury Admissions, by Age

Canada, 1999-2000

Source: National Trauma Registry, CIHI, 2002

	Admissions	Percent of Total
Ages 20-34		
Motor Vehicle Collisions	8,253	26.3%
Falls	7,112	22.7%
Assault-Related	3,673	11.7%
Struck by Object	2,446	7.8%
All Other Causes	9,878	31.5%
Ages 35-64		
Falls	24,456	42.7%
Motor Vehicle Collisions	10,243	17.9%
Over-exertion	3,168	5.5%
Struck by Object	2,882	5.0%
All Other Causes	16,525	28.9%
Ages 65+		
Falls	62,006	84.8%
Motor Vehicle Collisions	4,153	5.7%
Other/Unspecified	1,674	2.3%
Over-exertion	1,127	1.5%
All Other Causes	4,151	5.7%

Over the past five years, CIHI has led the development of a national reporting standard for recording the provision of rehabilitation services which includes a measure of functional status. This is an important development as it creates the potential for a regional or provincial jurisdiction to measure both the process and the outcomes of rehabilitation services. While the reporting standard has been developed to be appropriate for institutional and community service provision, currently the National Rehabilitation Reporting System, which is using this new standard, is targeted only at rehabilitation services provided in institutional settings.

In summary, there is a very limited capacity in Canada to describe the full range of rehabilitation services provided to injured Canadians. There are promising developments in the documentation of utilization in institutional settings, and these developments include measures of functional status. However, we have only a limited understanding of the provision of publicly-funded rehabilitation services to injured Canadians in community settings (although some provinces have more developed capacity than other provinces in this regard), and we have almost no information on the provision of rehabilitation services provided by privately-funded providers. There is substantial work to be done in this important component of a national information system.

Priorities in Research in the areas of post-acute care and rehabilitation.

The need for research in the post-acute care/rehabilitation of injuries is present. Within that we are suggesting the following areas be considered for prioritization.

1. Better measurement of rehabilitation sensitive outcomes.

Research which measures outcomes such as number of emergency room visits, injury-related mortality and lost days at work are insensitive to the status of those moving into the post-acute and rehabilitation phase. Measures are required at the individual level of functioning and disability (WHO, 2001; Segui-Gomez, 2003; Finch, 2002). They must also be sensitive to the relatively small effects likely to be encountered when comparing rehabilitation techniques in a complex setting.

The last two decades has seen the growth in the number of measures that can describe people's health at various levels – for example, general health, health specific to a disorder or health issues related to an individual (Segui-Gomez, 2003; Beaton, 2003; McHorney, 1999; Brandt, 1997). In many cases, multiple scales are available – for example, there are more than 30 instruments designed for use in persons with upper limb disorders, 13 of them relating to shoulder disorders alone (Beaton, 2000). Most have some demonstration of their validity and reliability (Finch, 2002). Except in areas where there is a defined need and gap (some are identified below) research resources should not be focused on the development of new scales.

Even so, research into ways to improve measurement in rehabilitation is still both vital and worthwhile. We suggest the following priorities in no particular order:

- In order to improve how we use existing measures, qualitative and/or quantitative research is needed concerning the interpretation of health status scores (Guyatt, 1994; Testa, 2000) and their application at the individual level (McHorney, 1995; Jacobson, 1991). Examples would be methodological work on benchmarking scores for meaning at an individual level (e.g, Berg Balance scale < 45 was predictive of falls (Berg, 1992)), or defining the best methods for quantifying and modeling the highly individualized results of rehabilitation (Rogosa, 1982; Colllins, 1991).
- We also recommend development and/or testing of measures to fill the gaps in instrumentation around the ICF framework in this population, or testing

the pathways between various measures in the ICF (Whyte, 1997). We have three suggestions in this area. First, in the area of work, there is a necessity to move measurement beyond "return to work.". Some instruments exist to measure how individuals are doing within their work roles (Lerner, 2002), but more work is needed to test and compare these measures. Second, few measures exist which quantify avenues to a positive outcome beyond a change in state. Some individuals overcome limitations that cannot change through a process which various researchers (Ockander, 2003; Medin, 2003) have observed, and which Neill (2002) has described as "transcendence and transformation." Other individuals figure out ways to avoid or to work around their limitations. (Gignac 2000, Beaton, 2001). To date, neither of these possibilities is easily quantified for inclusion in an outcome study despite their legitimacy as indicators of a successful rehabilitation outcome. Finally, rehabilitation research could advance methods to integrate mediators and moderators of effect into outcome and effectiveness studies. Such mediators and moderators could include coping styles, depression, sense of empowerment and efficacy, social support, etc.

- Research should be done to improve the use of technology for data collection and dissemination. Encouraging rehabilitation service providers to collect patient-based data has to be balanced with efforts to reduce the burden of that collection (using technology to assist) and providing methods for feeding information back to the clinician so they can gain clinically useful information from the data they enter (e.g., automated report generation, graphic representation of findings) (Jaglal, in press). Research that facilitates this linkage should be encouraged (Stineman, 2001).
- Finally, rehabilitation research should address the issues of measurement in population-based studies. This includes providing feedback about which measures are the best (i.e. most valid, reliable and interpretable) and should therefore be used in representing the burden of injury in population-based studies. This could include the integration of health status measures into longitudinal population based studies (Segui-Gomez, 2003). The CIHR is currently planning a new longitudinal cohort which would provide an opportunity for such research.

2. Effectiveness of rehabilitation interventions.

Demonstrating the effectiveness of a rehabilitative intervention is a necessary but challenging task (Whyte, 2003; Whyte, 1997). The challenges come from many sources. First, rehabilitation is almost always multi-disciplinary, so several co-interventions would need to be monitored or controlled during a trial. Second, even care delivered by a single provider encompasses a variable admixture of interventions that shift daily, depending on the needs of the individual client. Rarely can a study in rehabilitation be conducting using just a single provider. Obtaining data from a single setting would overcome some of this, but is nearly impossible, due to the numbers needed to achieve the effect size usually encountered in a rehab study. And third, even a specific intervention is in itself multi-layered, expanding the image of a "black box" of care to what Whyte (2003) has termed a "Russian Doll." These layers, from micro to macro, could include: the individual's life situation (disability and context); the treatment

modality itself, the care provider or providers, the facility or setting, the funding structure, and the social and political environment. Each layer has the capacity to influence the essence of the treatment being offered (Whyte, 2003). Studies to control these variables are challenging to design, although some suggestions are offered by Stineman (2001) and Whyte (2003).

Effectiveness research must also balance internal and external validity. In an environment of evidence-based practice and professional accountability, a tightly controlled, internally valid randomized controlled trial (RCT) may put undue pressure on a clinician to implement the trial's results – even when there is little evidence that the intervention will work in the complex "real world" of clinical practice (Goldfried, 1998). Clinical replication of findings from the RCT to ensure generalizability could be requested before publication. Furthermore, in rehabilitation, with its inherent focus on an individualized program addressing client needs, some professional groups are challenging the hierarchy that places the RCT as the dominant and most valuable source of evidence on effectiveness (CAOT, 1997) (See Appendix C).

Even as we acknowledge these complexities, clear priority areas still emerge:

- There is a need for methodological research to discern the best fit between specific research questions and study designs in the area of effectiveness. Such research could promote a theory-based research approach (Whyte, 2003), or be mixed-method designs or qualitative inquiry aimed at gaining a better understanding injury-related rehabilitation issues and outcomes. We also need effectiveness designs that can incorporate flexibility in the client's program (Powell, 2002), the treatment setting (Czaja, 2003) or the outcome (e.g., resolution or adaptation). They could emphasize the identification and management of key prognostic factors/confounders that could lead to focusing studies on subgroups more likely to benefit, and allowing more realistic sample sizes in studies of effect.

Effectiveness studies directed towards the most burdensome injuries:

- Youth & young adults (< age25): Injuries related to risky behaviours claim a large proportion of the morbidity in youth and young adults. Catastrophic disorders such as spinal cord injury and traumatic brain injury are more prevalent in this age group. Reduction of risk is paramount for preventing both primary and subsequent injury. Monti (1999) showed that the period immediately after the initial injury was especially opportune – for example, motivational interviews taking place in this time frame were effective in reducing alcohol-related risk behaviours in young persons presenting to the emergency department with alcohol related injuries. The application of this or similar approaches to other post-injury situations merits attention.
- Working population: Determining effective care for the most burdensome work-relevant disorders (musculoskeletal disorders largely affecting the back and upper-limbs) remains a priority, though successful biomedical and social interventions are already emerging (Buchbinder 2001; Loisel, 1997; Lindstrom, 1992). Recognition is given to the fact that efforts to reduce chronicity in injured workers – secondary prevention – could also afford

primary risk reduction to others in that workplace (e.g., access to lifting devices in long term care facilities).

- Seniors: Reducing the personal and social burden of fall-related injuries in the elderly must remain a high priority, especially since such injuries are expected to rise to unprecedented levels with the aging of Canada's population over the next two decades (Brown, 2002). One in every three persons over the age of 65 experiences a fall each year, and 10 per cent of those falls result in serious injury (Tinetti, 2003). Studies are required to investigate how best to utilize available evidence on the prevention of falls (Scott, 2001) and to examine the use of hip protectors to prevent the fracture after a fall. The current need is in how best to deliver an effective, integrated system for preventing hip fractures, and how effective that system is in achieving that goal (Jaglal, in press). A recent workshop led by Khan (2003) brought together different disciplines to develop a transdisciplinary approach and research agenda for preventing hip fractures. Along with the three approaches described above, it also underscored the need for sociocultural interventions – for example, shifting public awareness of, and attitude toward, bone health and aging. At the individual level the sociocultural interventions might be individual needs assessments in the context of the person's personal environment, and efforts to increase the person's readiness to accept and adopt risk management behaviours.

Other areas: In addition to the examples above, effectiveness research may also focus on different types of injury. It should, however, be prioritized based on the potential to reduce the greatest burden.

The past two decades have shown enormous growth in the ability to apply technology to reduce disability, particularly after catastrophic injuries. Research is needed to develop new applications, but also to evaluate their effect on human function and injury prevention. Examples might include studying barriers and facilitators to the use of adaptive technology by persons with disability and assessing the impact of adaptive technology on their quality of life. Another is the use of simulated environments to assess carry over from a rehab setting to a "real world" setting.

3. The organization and delivery of rehabilitation service in the treatment of injury

In addition to the importance of research on the effectiveness of existing or new rehabilitation modalities in restoring function following injury, we should also examine the effectiveness of current practices in the organization and delivery of rehabilitation services. The focus should be whether such practices actually reduce disability following injury. Many approaches used in health services research are well suited to such an examination – for example, geographic differences in models of care can be studied for evidence of differences in outcomes. Various models for organizing care span a continuum – from institutional acute care, to community rehabilitation. There are also models which integrate medical and rehabilitation care in enhancing early return to role participation, for example, in the safe and timely return-to-work of injured workers (Loisel, 2003; Loisel 2002, Durand 2001).

One valuable approach developed in the field of health services research examines practices or procedures that vary widely in utilization across population groups. The approach has been used to examine variation in intensity of rehabilitation services in the treatment of musculoskeletal injuries (Payne, 2003) or the relationship between the intensity of care and the recovery of function (Cote, 2002) in complete populations. This body of research finds a consistent and unsettling pattern of variation in the intensity, and cost, of therapeutic intervention in these disorders that does not seem related to severity of injury (as indicated by pain) or to treatment outcomes.

4. Policy research in disability programs and services

There are two primary policy domains relevant to the health and well-being of persons with disability and worthy of prioritization in a research program: a) policies influencing the finance, organization and delivery of rehabilitation services and the impact they have on the burden of disability in the Canadian population, and b) the role of disability insurance programs in protecting citizens from the social and economic consequences of disability.

a) Research on policies affecting the finance, organization and delivery of rehabilitation services

In addition to the research priorities described in sections 1-3 above, there are substantial gaps in our knowledge about how insurance finance policies influences the organization and delivery of rehabilitation services. Research is needed to identify what impact these structural features have on the social and economic consequences of injury.

While provincial health insurance programs provide first-dollar insurance for the provision of acute care services (physician care and institutional acute care) in the treatment of injury, the provision of insured coverage for rehabilitation care is highly fragmented within provinces. In addition, the definitions of insured and uninsured care differ substantially across provinces.

In Ontario, for example, Dr. Alina Gildiner has documented a fundamental shift in Ontario over a 15-year period from a rehabilitation service system which was largely publicly funded and publicly managed to one now dominated by private insurance payers (Gildiner, 2001). This change has occurred in the context of a fragmented policy-making environment, with policy responsibility residing in three Ontario government ministries: the Ministry of Health (which oversees public health care insurance), the Ministry of Finance (which has jurisdiction over automobile casualty insurance), and the Ministry of Labour (which has administrative responsibility for workplace injury compensation). Uncoordinated policy initiatives within each of these jurisdictions, focused on reforms to improve both the efficiency and effectiveness of service delivery in rehabilitation, have resulted in a dramatic shift from public finance and delivery of rehabilitation services to an almost entirely privately financed and managed rehabilitation system. Gildiner's work suggests that this change has increased inequities in access to rehabilitation services. She also notes that the distinctly private nature of service delivery has led to a substantial deterioration in the availability of information which can be used to monitor the quality of care and equity of access.

b) Disability Insurance Programs

Programs that provide income protection in the event of disability in working-age adults can be divided into social insurance programs (which are financed from premiums paid by workers and employers) and social assistance programs (which provide "last resort" assistance to persons with disability who have no other source of income.) Currently, national disability insurance programs disburse approximately $20 billion in benefits to disabled Canadians. Public programs include workers' compensation benefits ($5 billion), Canada Pension Plan disability benefits ($4 billion), public automobile insurance programs ($1.8 billion) and provincial social assistance programs ($3 billion). Private insurance sources include employment-based long-term disability insurance ($8 billion) and private market automobile insurance (Current Disability Issues in Canada, 2002; Campolieti, 2000).

The fragmentation of Canada's disability income system has resulted in substantial inequities. People with disabilities in similar situations are entitled to very different levels of income replacement and standards of entitlement, depending on which programs they qualify for and where they live. For example, workers' compensation programs pay much higher income replacement rates than CPP, auto insurance or private disability insurance. Similarly the only recourse for persons without access to explicit entitlement to social insurance disability benefits is social assistance. The proportion of people with disabilities on social assistance who once worked and were covered by various insurance programs may be as high as 50 per cent. Some 250,000 people in Canada may be receiving social assistance as a result of the fragmentation of the disability income system.

The administration of disability insurance benefits in the context of this fragmented disability income system is frustrating to claimants, and also to health care providers who are frequently responsible for contributing to the assessments of disability status. Payers of disability income support frequently try to limit their own costs by shifting claimants to other programs.

There are a number of linked research priorities in the area of the economic consequences of disability arising from injury. First, much more information is needed on the incidence of economic hardship following a disabling injury, and also on other social and economic consequences of disability. Second, there is a compelling need to closely examine the inequities and inefficiencies arising from Canada's fragmented disability income system and to examine policy options for the reform and integration of the administration of these different programs (Standing Committee on Human Resources Development and the Status of Persons with Disabilities, 2003).

5. Facilitating the development and use of strategies to promote risk-reducing and health-promoting behaviours.

There are many reasons why rehabilitation professions should take on a role in risk reduction. First, the time after an injury could provide those "teachable moments" where the motivation to change behaviour could be optimal (Monti, 1999; Barnett, 2003). Second, risk reduction could improve the course for the current disorder, but also reduce risk for other disorders with common risk

factors. Finally, the rehabilitation team is well suited to integrate and evaluate approaches that are linked to the theories of successful behaviour change (Prochaska, 1982; Miller, 1991), and self-efficacy (Bandura, 1997). It is believed that these kinds of change offer a greater likelihood of success and carry over to other behaviours (Medin, 2003). Research, including an economic evaluation, is needed to evaluate the role of post-acute care and rehabilitation in risk reduction and health promotion.

Gaps or needs that are priorities

Different gaps or needs were identified while reviewing the literature and formulating priorities. Many were cross-cutting across the areas of priority and are described here as prevailing gaps that might prevent us from improving rehabilitation after injury.

Continuity of care.

Transitions from acute care to post-acute/rehabilitative care should be as seamless as possible. Unfortunately waiting lists for rehabilitation beds, outpatient therapy or counseling services could hinder recovery, leading to greater costs to the health care system. Access to available care seems to vary, depending on factors other than client need (Foster, 2003). The implementation of the Romanow Report (Romanow, 2002) will influence the access to community care, and changes in the system should be evaluated. Efforts to model and evaluate effective seamless transitions – for example from acute care to rehabilitation – should be prioritized.

Shifts in funding structures, political environments.

In an ideal system, access to needed care should be robust enough to weather shifts in policy. Recently the funding of Whiplash Associated Disorders has come under scrutiny by the automobile insurance sector. In Saskatchewan, a shift in funding structure resulted in a shift in the pattern of recovery for persons with whiplash associated disorders (Cassidy, 2000). Similar research which tracks the impact of funding or political changes on recovery should be undertaken.

Research capacity: the need for networks.

There is a paucity of PhD level rehabilitation personnel in many regions of Canada. In addition to the Canadian Research Consortium in Rehabilitation, other networks are emerging fostered by a gradual increase in the critical mass of rehabilitation researchers (see Appendix B for preliminary list of networks). Many professional programs for Occupational Therapy (OT) and Physiotherapy (PT) are now Master's entry level programs which afford students greater exposure to research. PhD programs are emerging, which promise an increase in the number of PhD level rehabilitation specialists. With this growth in scientist-leval personnel, opportunities for salary support, mentorship and networks with other researchers will be necessary. Organizations such as CIHR, CIRNet and SMARTRISK could play a role in facilitating such collaboration in the injury sector, with a special emphasis on rehabilitation and secondary prevention as well as primary prevention.

Past successes in research related to post-acute care/rehabilitation after injury

The 2001 Volvo Award for low-back pain clinical studies went to Buchbinder (2001) who evaluated a public education campaign aimed at improving knowledge and attitudes about low back pain, thus reducing back pain related disability (secondary prevention). The campaign was successful and speaks to the power of social interventions in the post-acute phase and secondary prevention. Another example is the Sherbrooke model for back pain rehabilitation that is now widely used after a positive trial led by Dr. Patrick Loisel (1997). The trial found that the most effective care involved an integration of the person in his/her environment (work) with a combined worksite ergonomic evaluation and physiotherapy.

Prevention programs are being developed in the area of fragility fractures. The first low-trauma fragility fracture could be coined "the lucky break" (Jaglal, in press) because it identifies those people who are at high risk for a more serious fracture. In those found to have underlying osteoporosis (OP), effective care is available to reduce that risk. Programs like "WristWatch" at University of British Columbia (See Appendix D) screen wrist fracture patient (over age 50, low trauma injuries) for underlying OP. They then actively work with the family physician to ensure there is an investigation for OP. WristWatch s a controlled trial and is reporting improved rates of investigation for osteoporosis (87% versus 26% in control). (See Appendix D for brief summary of the program.)

Finally, the impact of advances in technology that have allowed for innovative designs of assistive devices, mobility aids, prosthetics, environmental controls, and treatment equipment cannot be underestimated. Several examples, such as the Sunnybrook Centre for Independent Living, afford access to these technologies.

Current Opportunities

Several opportunities exist where research could contribute to improving post-acute/rehabilitation care for those with injuries. A non-exhaustive list is provided below.

Prevention of second fractures after a fragility fracture.

As described above, ample good quality evidence is available to support efforts to reduce the risk of a second fracture after a fragility fracture (of the wrist, shoulder, hip or vertebrae). Medical interventions for strengthening bone(Brown, 2002), fall prevention strategies (Scott, 2001); and the utilization of hip protectors to cushion the blow during a fall, are all evidence-based interventions for high risk individuals. Jaglal et al have developed a model for integrated care (Jaglal, in press). What is now needed are studies looking into the effects of implementing such a strategy.

Integrated workplace based interventions.

Studies replicating the Sherbrooke model of care for low-back pain (Loisel, 1997) and possibly applying it for use with other disorders would provide further opportunities for research.

Studies to apply models for behaviour change.

One point emphasized in this brief is the contextualized nature of health/disability and the impact that has on efforts to change behaviours. Opportunities exist to use current theoretical frameworks for behavioural change to evaluate if psychosocial factors such as "readiness for change" (Prochaska, 1982) or self-efficacy (Bandura, 1997) are useful for models of behaviour change in more long–lasting conditions.

Knowledge Translation

Effective knowledge translation is a program of research in itself, and should be approached in collaboration with experts in this area. Post-acute care and rehabilitation covers a wide spectrum of injuries and populations. It is important to establish priorities about which are the most important messages to share, and with which groups, such as policy-makers, public, providers, or patients.

In post-acute care and rehabilitation, the dispersion of providers across the community, the diverse delivery systems and funding structures, and the multidisciplinary nature of the care could be barriers to formulation of a common message and its translation.

Reporting the results of studies examining the effectiveness of rehabilitation has been criticized in terms of the quality of the reports (Dijkers, 2002). This means that consumers would have difficulty integrating that knowledge into a systematic review or into clinical practice as even a high quality trial would be rated "weak". Guidelines for reporting, such as the CONSORT statement for randomized controlled trials (Begg, 1996), should be followed when available.

Conclusion:

This brief has summarized our understanding of the future directions in rehabilitation research related to injury prevention and control. It is a full slate of exciting opportunities ranging from use of state-of-the-art technology to overcoming societal barriers. It focuses on three areas: catastrophic injuries in the young, work-relevant musculoskeletal disorders in the working aged group, and fall-related injuries in the elderly. Its recommendations are congruent with other organizations also involved in rehabilitation research namely the National Institute for Disability and Rehabilitation Research (NIDRR), and the National Occupational Research Agency (NORA) (see Appendix A for summary of their priorities and areas of focus). We submit this for your consideration and feedback, and at the same time would like to recognize the many people, both named (see Appendix E) and unnamed, who helped us with this brief.

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Appendix A: Research priorities in other jurisdictions

The following lists the research priorities for two organizations with an intersecting interest in rehabilitation after injury. They are provided as a point of reference and comparison, but were not used to decide on priorities in our brief.

National Institute on Disability and Rehabilitation Research (NIDRR), 1999-2003. (Source: www.ed.gov/offices/OSERS/NIDRR/Programs/core_area.html).

The NIDRR is a nationally funded institute in the United States. It is responsible for coordinating the funding of disability and rehabilitation related research. The following are listed as the areas of focus for research within the NIDRR long range plan for 1998-2003:

- Improve employment outcomes in people with disability by funding research in to a wide spectrum of employment and disability issues.
- Health and function: medical rehabilitation, health and wellness program, systems research, new and emerging disabilities.
- Technology for access and function including biomedical engineering research, telecommunications, universal design.
- Independent living and community integration
- Associate disability research including disability statistics, outcome measurement and other types of disability research that support more general disability research.
- Knowledge dissemination and utilization
- Capacity building for rehabilitation research and training
- Strategies for research management that will be employed by NIDRR to improve the way they process and manage their funds and sponsored projects.

NIOSH-NORA:

In the late 1990s, the US National Institute of Occupational Safety and Health convened a very broad consensus process on research priorities for protecting and enhancing the health of workers in the United States. Among the 21 themes identified, a specific focus on the social and economic consequences of workplace injury was emphasized. Within this theme, attention is recommended on understanding the family impacts of injury, understanding who bears the social and economic consequences of injury and understanding the full economic costs of injuries. Further information on the NORA process and priorities can be reviewed at: http://www2.cdc.gov/NORA/default.html

Appendix B:

Preliminary list of networks for rehabilitation research in Canada.

Canadian Research Consortium of Rehabilitation

Contact: Dr Sandy Olney - School for Rehab, Queen's University

Greater Toronto Area Rehabilitation Network. (GTA Rehab Network)

Contact: http://www.gtarehabnetwork.ca/home.asp

Ontario Rehabilitation Technology Consortium

Contact: Dr M Milner, Bloorview MacMillan

Reseau provincial de recherche en adaptation-readaptation. REPAR , Province of Quebec

Contact: http://www.fmed.ulaval.ca/repar/

International Collaboration On Repair Discoveries. ICORD, Vancouver British Columbia

Contact: http://www.icord.org/

(Rehabilitation Network: RehabNet – Under review National Centres of Excellence)

Appendix C: CAOT position statement on evidence based practice. (CAOT, 1997)

Joint Position Statement on Evidence-based Occupational Therapy (1997)

Source: http://www.caot.ca/default.cfm?ChangeID=166&pageID=156 Reproduced from the website.

Last accessed: Sept 6, 2003.

By the Canadian Association of Occupational Therapists (CAOT), the Association of Canadian Occupational Therapy University Programs (ACOTUP), the Association of Canadian Occupational Therapy Regulatory Organizations (ACOTRO), and the Presidents' Advisory Committee (PAC)

This joint position statement reviews the background, information, responsibilities and challenges required for evidence-based occupational therapy. It is hoped that this will be of use to those who require knowledge of how evidence is used by occupational therapists. Those interested may be occupational therapy students, practitioners, educators, researchers and regulators, as well as clients, administrators, payers and other health, social service or education workers.

Background

Occupational therapists continually make decisions to determine how to proceed with their clients (Mattingly & Fleming, 1994). Decisions are formed using information from the client, occupational therapists' experiences with previous clients, research findings and expert opinion from a variety of sources (Belenky, Clinchy, Goldberger & Tarule, 1986; Clark, Scott & Krupa, 1993; Dubouloz, Egan, von Zweck & Vallerand, 1999;Kirby & McKenna, 1989). Guidelines for critically evaluating information from diverse sources may be found in a number of disciplines (e.g. philosophy, history, medicine and law). Occupational therapists are urged to adhere to evidence-based practice since consumers, payers and practitioners want services based on the best available evidence regarding their effectiveness. Occupational therapists believe that evidence-based practice is a major element of what is now described as best practice.

Occupational therapists have tended to take evidence-based medicine as a starting point for evidence-based occupational therapy (Law & Baum, 1998). In evidence-based medicine, epidemiologic criteria are used to critically evaluate research evidence related to specific medical treatments. (Rosenberg & Donald, 1995). Treatment

decisions are based on this critical evaluation as well as professional judgment using the previous experience and knowledge of the client. (Sackett, Rosenberg, Muir Gray, Haynes & Richardson, 1996). Strict adherence to the procedures of evidence-based medicine may limit the occupational therapist who strives to

enable occupation using a client-centred, occupation-focused approach.
Information required for evidence-based occupational therapy

Congruent with enabling occupation, the production, retrieval, review, and evaluation of information is viewed as a joint responsibility of the client and therapist working in a collaborative relationship (Canadian Association of Occupational Therapists, 1997). Moreover, the focus is on information regarding occupational performance issues relating to the quality of life of individuals; or the empowerment of groups to achieve realization of their occupational performance potential through lessening the effects of barriers to achievement in areas such as employment, housing, leisure or self-care.

The client provides expert knowledge crucial for determining meaningful occupational priorities. The client's perspective on medical, developmental and social barriers to occupational performance is included as important information for understanding and taking action on issues. Also important are the client's subjective evaluation of present capacities, knowledge of personal and environmental resources and limitations, desired outcomes, acceptability of specific plans and criteria for success.

The occupational therapist provides knowledge of client, environment and occupational factors relevant to enabling occupation. Ideally, this evidence is derived from a critical review of the research literature, expert consensus and professional experience. The occupational therapist uses this information to assist the client to name and prioritize occupational performance issues. The client is encouraged to discover new ways of viewing occupational performance problems, implement accurate methods to assess present capacities, and consider suggestions for use of personal and environmental resources. The client then, with the therapist, formulates targeted outcomes, and commits to specific intervention plans and methods of evaluating desired outcomes (Egan, Dubouloz, von Zweck & Vallerand, 1998; Fearing, Law & Clark, 1997).

Responsibilities

Evidence-based occupational therapy demands that both the client's knowledge and the occupational therapist's knowledge be used in decision making. The individual, group, agency or organizational client must be given every opportunity to articulate and share knowledge. The occupational therapist must use all reasonable means to continually expand his or her professional knowledge base through review and critical evaluation of related research, professional literature and continuing education. The client must have regular opportunities to contribute whatever knowledge can be brought to the decisions required. Occupational therapy clients have the right to know why specific methods are used. Occupational therapists are responsible to ensure that evidence used in decision making is made explicit to clients.

Outside the client-occupational therapist interaction, occupational therapy education programmes are responsible for preparing future therapists for evidence-based occupational therapy practice. Regulatory organizations are responsible for protecting the public from incompetent practitioners. Competent practice includes reasonable efforts to base decisions on a critical review of the evidence, whether it be from the scientific literature, expert consensus or

professional experience. Professional associations are responsible for facilitating evidence-based continuing education programmes and assisting occupational therapists to practice evidence-based occupational therapy through such actions as the promotion of research, publication of evidence, and the sponsorship of easy-to-read reviews of evidence in common practice areas.

Challenges

Challenges and opportunities abound in developing evidence-based practice. Occupational therapists and clients must work together to identify what they mean by best practice in enabling occupation. Funding arrangements and policy must be structured to support the time and resources required for evidence based occupational therapy. Occupational therapists, clients, administrators, regulators, the public at large and the professional and academic community must assume an active role in advocating change. The net result is that clients and payers are the benefactors of occupational therapy services which are based on the best available evidence.

Glossary

Best practice: a term used in business, health and education referring to procedures which are believed to result in the most efficient provision of a product or service. Occupational therapists believe that evidence-based practice is a major element of what is now described as best practice.

Occupational therapy clients: individuals or groups who receive occupational therapy services. They may include persons with occupational problems arising from medical conditions, transitional difficulties or environmental barriers, families and caregivers of such persons, or organizations wishing to promote the health of their members.

Enabling occupation: the process of facilitating, guiding, coaching, educating, prompting, listening, reflecting, encouraging, or otherwise collaborating with people so that they may choose, organize, and perform those tasks and activities of everyday life which they find useful and meaningful in their environment (CAOT, 1997).

Evidence-based medicine: medical intervention which is based on the results of the most scientifically sound research applicable to the problem at hand, considered in light of patient characteristics and clinical judgment.

Evidence-based occupational therapy: client-centred enablement of occupation based on client information and a critical review of relevant research, expert consensus and past experience.

Payers: agencies who provide reimbursement for occupational therapy services.

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Appendix

The Evidence-based Joint Position Statement has been prepared with the input of the Canadian Association of Occupational Therapists (CAOT), the Association of Canadian Occupational Therapy University Programs (ACOTUP), the Association of Canadian Occupational Therapy Regulatory Organizations (ACOTRO), and the Presidents' Advisory Committee (PAC). The latter three organisations are made up ofthe representatives of the occupational therapy academic programmes, the provincial regulatory organisations, and the provincial professional associations, respectively.

The participation of these groups represents a desire to reach a broad common understanding on this topic; it does not imply the explicit endorsement of each constituent of these consortiums.

Position statements are statements on political, ethical and social issues that impact on client welfare or the role and practice of occupational therapy, or that affect the Association. They are frequently time-limited and persons wishing to use them more that two years after publication should confirm their current status by contacting the CAOT Director of Professional Practice by e-mail: practice@caot.ca

Note: Status of this position paper confirmed with CAOT (Darlene Toal-Sullivan, Director of Professional Practice, CAOT) September 15, 2003.

Appendix D : Summary of WristWatch Program, Vancouver, British Columbia.

Prepared by: Dr Karim Khan MD PhD, Ms Maureen Ashe BScPT, PhD Candidate.

WristWatch: An Early Warning System

What is WristWatch? WristWatch is an early warning system aimed to target patients at risk for osteoporosis and future fracture. It is a simple, inexpensive and innovative program that identifies a high risk population for osteoporosis then alerts both the patient and medical professionals to initiate assessment. The ultimate goal by starting early intervention is to prevent more a serious osteoporosis sequelae (such as a hip fracture).

Background - Osteoporosis is a condition that leads to painful, disabling fractures. Over 1.4 million Canadians have osteoporosis and it costs Canada over $1.3 billion annually. We know from past studies that a low-trauma or fragility wrist fracture (defined as a fracture sustained from standing height or less) often occurs years before a more serious hip fracture. However, other research consistently shows that less than 20% of people at risk for osteoporosis are being investigated. Therefore, we see this as a missed opportunity to provide patients with information related to exercise, diet, calcium and vitamin D and if necessary to start on effective drug therapy.

Significance of WristWatch Although we know that this is an important area (secondary prevention), there has been relatively few programs in Canada to address this gap in care. Alberta and Ontario have commenced similar programs with the aim of incorporating recommendations into clinical pathways following a fragility fracture. Specifically in Toronto, a full-time position has been created to target patients at risk following a fragility fracture. Here in BC, our program is important because it is the first that aims to impact the care gap and we have promising preliminary results that a simple intervention could have far reaching consequences at both an individual and a population level. In no way is WristWatch trying to suggest that British Columbia has a substandard quality of care for secondary prevention of osteoporosis. This missed opportunity has been reported in many other countries including the US, Australia and the UK. Since our initial study began last year we have expanded the target population to include any upper extremity or hip fracture. To very important areas which also show a care gap. Finally, another phase of this study is to examine specifically why these patients are not being investigated for osteoporosis. Recently we have sent over 500 questionnaires to both family physicians and Orthopedic Surgeons in Prince George and Victoria to inquire about their specific barriers to osteoporosis investigation in an “at risk” population.

The WristWatch Program: In its present form, WristWatch is a controlled trial comparing usual care of wrist fracture with an intervention that improves patient awareness and physician recognition of the osteoporosis. Currently we are working with 4 fracture clinics at Vancouver Hospital and Health Science Centre and 1 clinic at Richmond Hospital. All potential patients who meet the criteria are allocated into either the intervention group or the control group. Both groups are telephoned at 4-6 weeks and at 6 months. At 6 months a Diagnosis and Management questionnaire is administered.

Inclusion Criteria: Women and men over 50 years old who present to the fracture clinic with a low -trauma wrist fracture. At this point we have excluded anyone

who is living in an extended care facility or who is unable or unwilling to give consent.

Intervention: Upon enrolling at Fracture Clinic the patient is given a package containing 2 items:1)a letter from their Orthopedic surgeon stating that she/he has had a low-trauma fracture and should return to the family physician to be followed up for osteoporosis investigation. 2) a letter from the Orthopedic surgeon directly to the family physician referring the patient back for osteoporosis assessment. Within 1 week the family physician is faxed a letter. At 6 weeks the patient as part of the study is called for study data collection and given a reminder call to return to the family physician.

To date, 80 people have been enrolled in the program. Forty have completed the 6 month Diagnosis and Management Questionnaire, which documents if osteoporosis was investigated and what best practices were offered to the patient.

Results to date: Only 26% of patients in the "usual care" group are being investigated for osteoporosis. With our simple intervention we were able to get 87% of the patients to be investigated by their family physician. In addition, we found that the intervention has been easy to integrate into the existing fracture clinics. Similar programs could be introduced to fracture clinics or emergency departments in other hospitals in BC. We have discussed plans to commence this type of intervention at Royal Columbian Hospital, Vernon hospital, Peace Arch Hospital and Abbotsford Hospital.

Funding: WristWatch has been funded through a generous grant from the Vancouver Foundation. In addition, I have received funding from the BC Medical Services Foundation and the UBC Department of Family Practice.

Take Home Messages:

By identifying those at risk early on, more painful and disabling osteoporotic fractures (such as hip fractures) can be prevented.

By preventing these more serious injuries, it is hoped that both health care costs and personal burden associated with osteoporosis can be significantly reduced.

WristWatch is a simple inexpensive intervention that educated the patient and alerts the physician to investigate for osteoporosis in a "at risk" population.

This program can be easily introduced into other hospitals.

A full time position for a health care professional (to target patients within a hospital setting for secondary prevention of osteoporosis) should be considered.

Appendix E: People who provided feedback during the preparation of this brief.

Thanks to the following people for providing direct input into this brief.

Dr Geoff Fernie, Toronto Rehabilitation Institute, Toronto

Dr Carol Richards, Universite Laval, Quebec.

Dr Aileen Davis, Toronto Rehabilitation Institute

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Dr Susan Jaglal, Department of Physical Therapy, University of Toronto

Ms. Maureen Ashe, B,ScPT, PhD Candidate, University of British Columbia

Dr Karim Khan, University of British Columbia

Hospital-University Education Committee – Rehabilitation Research Subcommittee – University of Toronto.

Dr Claire Bombardier, University of Toronto

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Dr Carlos Ammendolia , Institute for Work & Health

And many others who in less formal ways, contributed to this work.

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APPENDIX D.7

Casebook of Potential Interdisciplinary Research on Injury

July 2003

Dorcas E Beaton, B.ScOT, MSc, PhD

Cameron Mustard, ScD

This casebook was prepared as part of the Listening for Direction on Injury initiative sponsored by the Canadian Institutes of Health Research and the Canadian Injury Research Network.

NOTE:

This casebook has been modified from its original format for inclusion as an appendix in this document. Individual cases have been merged. Various sections have had white-space removed to conserve space. Those wishing to view the casebook in its original format, can download it from:

www.injurypreventionstrategy.ca

Modified from Original Format for this Appendix by:

Philip Groff

Casebook Example #1

Prepared by Rob Brison

General Injury topic area: Study of Minor Head Injuries

Primary Content area: Acute Care

Primary Research Question: Do all persons with minor head injuries require a Cat Scan of the head as part of their clinical evaluation in the Emergency Department? (work being done by Dr. Stiell and colleagues inc. Brison)

Populations at Risk:

A. By Lifecycles where this topic area might be a priority:

1. youth:
    a. differentiation between head injuries resulting from intentional and unintentional means in children under 2
    b. sports related injuries in adolescents
2. adults
    a. sports related injuries
    b. MVC related injuries
3. elderly
    a. falls in the elderly are often associated with head injury

B. By other demographic variables

There are likely to be gender differences in the pattern of occurrence of head injuries and hence in the likelihood of important anatomic brain injury. This may suggest variation in the need for prevention and treatment by gender.

Changes to current practice by setting should be investigated as part of this research program. If highly sensitive criteria can be developed for identifying patients with important brain injuries requiring CT and neuro-surgical intervention, then only these patients would require urgent referral and transfer from rural settings. This would have economic impacts/cost benefit.

Description of Primary Research Program and Patient Population:

This research program is developing a clinical decision rule to identify those patients with minor head injury who do not require a CT scan of the head as part of their assessment (because a CT would not provide useful clinical information). This study identifies all adults presenting to the emergency department with a minor head injury (period of loss of consciousness or amnesia/disorientation) but with a Glasgow Coma Score of 15/15. Information is collected on symptoms and signs as well as some information mechanism of injury. The outcome of "clinically important head/brain injury" is made based on both CT results and with follow up over two weeks. Variables potentially predictive of this outcome include information on symptoms and signs as well as on mechanism of injury and patient age. Their utility in predicting patients who have little or no chance of the outcome is assessed using log-linear modeling as well as recursive partitioning.

Potential for Collaboration with Others:

A. By LFDI Content Area.

1. Unintentional Injury: these data may well be an important source of descriptive information on the patterns of occurrence of these head injuries. Researchers in the public health realm of injury prevention often have difficulty accessing emergency room data that would be helpful initially in identifying mechanisms of injury for head injury that are important to address or target populations at greatest risk. Should mechanism of injury prove to be important in predicting the presence/absence of a brain injury on CT, then the expertise of unintentional injury researchers might well assist Acute Care researchers in developing better decision rules that would incorporate this information. Further, should information on injury mechanism prove to be important in this and other settings in making patient care decisions, this information is more likely to be recorded and hence make ED data more useful to researchers in Injury Prevention from any domain.
2. Intentional Injury: again these emergency room data, if coded accurately would be a useful source of data for those working in intentional injury. There may be potential for examining the presentation of head injuries in very young children as sentinel injuries for identifying child maltreatment.
3. Acute Care of Injury: in addition to answering the primary study question, short term follow up of these patients could be used to describe the natural course of symptoms in persons with these injuries. (This is in fact not well understood for head injuries and for many other injury patterns). A better understanding of this may enable ED physicians to

provide more useful discharge information and instructions to patients, and better direct evidence based utilization of subsequent health care services.

4. Post Acute Care: Patients with minor head injury who have no evidence of brain injury requiring neurosurgical intervention are discharged directly from the ED. Some of these persons in fact have evidence of minor hemorrhage on CT but not of a degree that requires hospital based intervention. Little is known of long-term sequelae in these patients. It would be unreasonable to believe that there is no gradation in severity of these injuries such that only those with an injury severe enough to require hospitalization would have measurable long-term disability. Access to this ED based study sample for long term follow up would likely be of great benefit to rehab researchers in head injury from many disciplines.

B. List Specific Disciplines that might participate in the collaboration

Acute Care disciplines

- emergency medicine
- neuro-surgery
- diagnostic radiology
- prehospital care

Unintentional Injury

- injury epidemiology
- health care economists
- surveillance and medical records participants

Intentional Injury

- epidemiologists
- those involved with research into assault: psychologists, social workers

Post Acute Care

- rehab specialists
- neuro-surgery
- psychiatry / psychology
- potential for neuro-physiology (eg. Use of functional MRI in identifying key areas of neural damage in head injury and the role of drugs in treating their sequelae.)

CASEBOOK EXAMPLE 2

Prepared by Michele C. Battié

General Injury Topic Area: Prevention of extended disability from work-related soft tissue injury

Primary Content Area: Unintentional injury disability prevention, acute care and rehabilitation

Primary research question: What is the influence of contextual factors on recovery following work-related soft tissue injury? More specifically, what is the extent to which workplace organizational factors and individual expectations of recovery and return to work influence the outcomes of pain, function and timely and sustained return to work following work-related soft tissue injury?

Population at Risk:

A. By lifecycle where this topic area might be a priority:
    1. working age adults (approximately 18-65 years of age)

B. By other demographic characteristics:
    1. aboriginal populations – included in the general workforce
    2. gender – both included
    3. urban/rural – both included
    4. socioeconomic status – wide range included along with a broad spectrum of job/occupational categories

Description of Primary Research Program and Patient Population:

While the majority of persons with work-related soft tissue injuries experience limited disability and return to work quickly, a small portion experience long-term disability and have their lives greatly affected. They also account for the majority of workers' compensation costs. There has long been an interest in identifying individuals at high risk for prolonged disability, but previous research has demonstrated that predicting recovery and successful return to work is a complicated and challenging task involving multiple factors. Adding to the complexity are the conflicting findings from the scientific literature on factors associated with return to work, which are particularly apparent for soft tissue injury claims, such as those involving the back and upper extremities. Further clarity is needed on the prognostic value and interrelationships of factors found

to be associated with recovery and sustained return to work in earlier exploratory studies, including more confirmatory studies on independent cohorts to validate the observed associations and obtain better estimates of effect size.

It is believed that work disability arises from complex interactions between individuals and their work environments. We are expanding on recent work which has attempted to broaden the scope of contextual factors influencing work disability by examining workplace organizational policies and procedures, labor-management relations and injured workers' expectations of recovery as influential factors in work disability.

The associations of these factors with recovery outcomes of interest will also be examined in a larger context of selected medical, demographic, work-related and psychosocial variables, which will be investigated as possible modifiers and confounders of the effects observed on outcomes.

A prospective cohort study design is being used with independent cohorts for exploratory and confirmatory analyses to evaluate the association between the prognostic factors of interest and the outcomes of pain, function, and timely and sustained return to work after adjusting for the confounding effects of other important predictors. The study cohorts have been formed from individuals claiming work-related soft tissue injuries entering a regional rehabilitation centre for assessment or rehabilitation.

Potential for Collaboration with Others:

A. By LFDI Content Areas:

1. Unintentional Injury Prevention:

   Some of the factors implicated in the development of long-term disability also may have relevance to injury occurrence rates. In addition, findings could influence relevant business organizational policies and procedures and workplace safety and health considerations associated with disability prevention.

2. Intentional Injury:

3. Acute Care:

   New insights into factors associated with and potentially influencing recovery and sustained return to work in injured workers could assist primary care providers and others in future disability risk assessment. Such information could also assist in the development of new targeted interventions aimed at curbing disability progression.

4. Post Acute Care:

   Similarly, the information gained from the study could assist in the development of more successful rehabilitation strategies targeting factors influencing disability progression to promote return to function.

B. List specific disciplines that might participate in the collaboration

Primary care

Medical specialty disciplines, (e.g., Orthopedics, Rheumatology, Occupational medicine

Rehabilitation

Epidemiology

Biostatistics

Psychology

Sociology

Business management and organizational psychology

Workplace safety, industrial hygiene and ergonomics

Casebook Example #3

Prepared by Michael Cusimano

General Injury topic area: Injury Prevention

Primary Content area: Unintentional Injury

Intentional

Acute Care

Post-Acute Care or Rehab

Primary Research Question: Do children exposed to a comprehensive educational curriculum delivered over three years have fewer injuries than those not involved in the educational program?

Populations at Risk:

A. By Lifecycle where this topic area might be a priority:

1. youth: children and adolescents primarily but a longitudinal component of the study will bring the follow up into young adulthood

B. By other demographic characteristics

1. aboriginal populations - included

2. gender – both sexes
3. urban/rural – both are included and all socioeconomic and ethnic groups
4. others – there are likely to be differences in injury related to sex and socioeconomic status and this may suggest targeted interventions in the future. Changes to how education is delivered in the community and what effects this education might have on the broader community would be important to study.

Description of Primary Research Program and Patient Population:

This research program is randomizing groups of schools to receive a comprehensive curriculum on injury prevention immediately or in a delayed fashion. The curriculum is delivered in a progressive fashion over a minimum of six sessions each year for three consecutive years. Teachers are instructed in the curriculum and it meets provincial curriculum expectations mandated by the ministry of education. Outcome measures include knowledge change, behavioural intentions and injury. It provides information on knowledge translation and knowledge application by consumers, populations of schools and community behaviour.

Potential for Collaboration with Others:

A. By LFDI Content Area

1. Unintentional Injury: These data will be an important source of information on the anatomic patterns of injury, geographical and temporal patterns of injury. They will be of interest to public health personnel, school educators and policy makers. This will help guide curriculum developers and policy makers regarding educational interventions in similar areas of health promotion. It will provide information to those in Acute injury regarding educational strategies at reducing injury. Ample opportunities exist for collaborative work to study the psychology of child behaviour, the development of risk behavior, the role of the class and the home environment in contributing to unintentional and intentional injury and other areas by virtue of the sample size of 50,000 children and over 700 schools in more than 130 communities.
2. Intentional Injury: The project will not distinguish between unintentional and intentional injury but like in unintentional, there is abundant opportunity for collaborations with a number of different researchers ranging from education, sociology, child development and psychology to epidemiology and surgery.
3. Acute Care of Injury: Types of injuries sustained and mechanisms of injury will be of interest to acute care researchers and practitioners. Economists interested in cost-benefit of interventions will find the study an excellent area for collaboration.

4. Post Acute Care: The natural history and effects of injury on children and how they recover from these is poorly understood. As well the effect and impact on caregivers of these children is also poorly understood and would be of interest to rehabilitation professionals.

B. List specific Disciplines that might participate in the collaboration

Injury Prevention

- Epidemiologists
- Psychologists
- Sociology
- Social work
- Educationalists
- Policy makers
- Schools and teachers
- Parent-teacher organizations
- Child development
- Behaviouralists
- Advocacy organizations

Acute care disciplines

- Emergency medicine
- Pediatrics
- Radiology
- Surgical specialists
- Family medicine
- Economists
- Nursing – emergency, inpatients, homecare, public health, and others

Post-acute care

- Pediatrics
- Surgical specialists
- Physiotherapy
- Speech therapy
- Child-care specialists
- Teachers

School boards
Sociologists
Social workers
Psychologists
Policy makers
Ministries of health and education

Casebook Example #4

Prepared by Brian Mishara

General Injury Topic Area: Cross-cutting Topic Involving the Areas of Unintentional Injury, Intentional Injury, Acute Care, Post-Acute Care/Rehabilitation

Primary Research Questions: Understanding the role of alcohol in injuries and injury prevention.

Population at Risk:

Persons in all age groups who consume alcohol are at risk, including adolescents, adults and the elderly. Alcohol consumption is related to a wide range of intentional and unintentional injuries.

Description of Primary Research Programs and Patient Populations:

There exist numerous studies relating alcohol to increased risk of unintentional and intentional injuries for a wide range of populations. For example, alcohol is related to increased risk in almost all accidental injuries, including car accidents and on the job injury. In the intentional injury area, alcohol is involved in all forms of abuse and violent behaviors and over 50% of people who die by suicide had consumed alcohol just before their death. However, studies to date have focused on the role of alcohol in a specific type of injury or a specific population at risk and we are not aware of an integrative multidisciplinary program of research focusing upon the mechanisms by which alcohol increases risk of injury, identification of the extent of risk and the involvement of alcohol in a wide range of injury treatment settings and understanding the role of alcohol in the rehabilitation process.

The author of this casebook's research area on the topic of suicide, suggests that the role of alcohol in this area is controversial. Some believe that consuming alcohol compromises one's judgment and thus increases the risk of attempting or completing suicide. Others suggest that alcohol is consumed once a decision to commit suicide is made as a means of guaranteeing a "successful" suicide. The

issue is whether or not people's suicide risk is increased by consuming alcohol or whether people already at risk tend to then consume alcohol. A separate related issue is the study of the suicide risk of alcoholics, which is quite high.

The primary challenge of this research program would be to understand the commonalities in the aetiology of various injury behaviors as they are related to alcohol consumption, both chronic consumption by alcoholics, and acute alcohol intoxication (including effects of low level of consumption).

This understanding may involve a number of trans-disciplinary approaches. It is important to understand the physiological and biological effects of alcohol on a wide range of human characteristics, including psychomotor behaviors, moods and emotions, cognitive functioning and reasoning. These physiological effects may be related to (they may for example be tempered or increased by) situational factors, as well as cultural beliefs and practices. Thus, an anthropological perspective may help clarify the topic as well as sociological, psychological and psychiatric analyses. Although the different age groups and topics one may examine appear to be diverse and often unrelated, there are numerous questions that may help in our understanding of different populations and problems. For example, the role of suicidal intentions (perhaps even differentiating between intentional self-injury, sub-intentional self-injury) in falls by the elderly may be examined. In this way, theories of suicide may be integrated with studies to understand the mechanisms involved in injuries related to falls in the elderly and alcohol consumption by older persons.

Very often, alcohol consumption is not systematically assessed in acute care settings treating injuries. Alcohol consumption patterns and problems of alcoholism are not regularly assessed as part of an evaluation of suicidal persons who appear in emergency departments and many injuries are treated without bothering to investigate blood alcohol level or investigate alcohol consumption. Similarly, the role of alcohol as a possible impediment to rehabilitation has not been fully explored.

The objective of this research program would be to develop an integrative trans-disciplinary approach to understanding the role of alcohol in all injuries at all stages of the process from primary prevention to rehabilitation.

The specific disciplines which might collaborate range from all the medical disciplines, including emergency medicine, to epidemiology, economy, sociology, anthropology, psychology, psychiatry and neurophysiology.

Casebook Example #5

Prepared by Brian Mishara

General Injury Topic Area: Prevention of repeated attempts and completed suicides in persons who are brought to an emergency department for a suicide attempt.

Primary Content Area: Intentional injury and acute care

Primary Research Questions: How can we decrease the risk of repeated attempts and deaths by suicide in persons seen in emergency departments for a non-lethal suicide attempt?

Population at Risk:

Persons who have previously attempted suicide constitute a high risk group for eventually dying by suicide and attempters are much more likely to attempt again than non-attempters.

Description of Primary Research Program:

Despite the fact that persons who are seen in emergency departments for a suicide attempt constitute a primary high risk group for eventually completing suicide, there is little systematic follow up or evaluation of the effectiveness of hospital interventions in preventing a future attempt or a completed suicide. In France, there are specific guidelines for treating suicide attempters in emergency settings and these guidelines have been the subject of voluntary "clinical audits" to determine the extent to which they are followed. Although some Canadian hospitals have some guidelines, there are no universally accepted criteria for determining what are the best preventive actions for suicide attempters in emergency settings. Most persons seen in hospital for a suicide attempt do not appear for their first outpatient appointment and there is little follow up once the person is discharged. In cases where rehabilitation for the physical consequences of the attempt are necessary, the emphasis is generally limited to physical rehabilitation with little integration with psychiatric or psychosocial prevention activities.

Although there have been some studies of programs for attempters seen in emergency situations, we know very little about what is most effective in preventing a future attempt. In England, there is some evidence that their «green card» programmes, which allow attempters easy access to telephone services and future hospital care may be useful. However, very little systematic follow up exists for suicide attempters in Canada.

One example of a possible project is the pilot programme involving a collaboration between the Montreal Metro (underground) System, Brian Mishara and the CRISE research centre, Suicide Action Montreal (the regional suicide prevention centre) and several hospitals has been recently proposed to ensure an integrative collaborative follow-up of persons whose suicide attempts in the metro are intercepted. This programme and its evaluation was developed based upon research findings indicating that 10% of people who die by suicide in the metro have previously tried to kill themselves in the metro and there is little systematic follow-up once attempters are sent to an emergency department.

The first goal of this trans-disciplinary research program could be to determine what constitutes best practices for preventing future suicidal behaviour in suicide attempters who are seen in emergency settings. Furthermore, it is essential to better understand the attitudes and behaviours of hospital staff and the possible effect of those attitudes and behaviours upon outcomes with suicidal persons

Potential for Collaboration with Others: It is important to analyze the extent to which best practices in the treatment of unintentional injury can and can not be used in the case of intentional injuries such as suicidal behaviour. Since it is the same persons (for example, emergency physicians) who treat both unintentional and intentional injuries, it is important to understand any differences in the approach, attitudes and behaviours in the treatment and follow up process when the injury is intentional and unintentional. Similarly, it is important to examine if models used for other areas of intentional injury (for example, spouse abuse, child abuse) may help identify best practices with suicide attempters. Besides the involvement of all those in the acute care setting, there is an important need to integrate the activities of medical post-acute care with psycho-social preventive practices with suicide attempters.

Disciplines involved range from epidemiology to all medical personnel involved in emergency care, including all professions involved in rehabilitation of physical injuries, and the disciplines of sociology, psychology, anthropology and economics

The overall goal would be to generate a best practices model which could be made available to emergency departments throughout Canada and which would involve the collaboration of other community agencies. This model would have to be tested and thoroughly evaluated to determine its effectiveness in comparison with current practices. Furthermore, it is important to understand the necessary structures and actions one needs to undertake in order to have the model accepted by practitioners and organizations and implemented as planned.

Casebook Example #6

Prepared by Nico Trocme

General Injury topic area: Child abuse injuries

Primary Content area: Intentional

Primary Research Question: What factors predict severe injury due resulting from recidivist incidents of child abuse?

Populations at Risk:

A. By Lifecycle where this topic area might be a priority:

1. youth:

B. By other demographic characteristics

1. aboriginal populations

2. gender
3. urban/rural
4. others: poor children are at highest risk of being reported as abused, but not clear to what extent poverty is associated with severe recidivist abuse.

Description of Primary Research Program and Patient Population:

There is very little research examining injuries due to child abuse amongst populations of abuse children (most research to date examines injured children who may or may not have been abused). Child abuse policies and services are designed first an foremost to prevent severe injuries resulting from recidivist incidents. Reporting laws & investigation protocols are designed around an urgent response model predicated on the assumption that failure to respond rapidly could put children at significant risk of sever injury or death. In fact, severe harm is documented in only 3% of investigations. A better understanding of risk factors could lead to more cost-effective and less intrusive triage models.

We currently are examining characteristics associated with injury in a national sample of 7,672 investigations of child abuse involving children 0-16. Data were collected from child protection workers during the child abuse investigation. Initial models have disappointing predictive power.

Potential for Collaboration with Others:

A. By LFDI Content Area

1. Unintentional Injury:

   Could expand the work to child neglect (responsible for as many deaths as abuse) in collaboration with unintentional child injury researchers.

2. Intentional Injury:

   Collaboration across disciplines and sectors (hospital SCAN teams, coroners & police) using common data collection tools may provide the severe injury cases needed to identify risk factors in the broader child protection population.

3. Acute Care of Injury:

4. Post Acute Care:

   Across all content areas, this program could benefit from gains in other areas with respect to methodological approaches to assessing risk.

B. List specific Disciplines that might participate in the collaboration

Social Work
Psychology
Medicine
Criminology

Casebook Example #7

Prepared by Lynne Warda

General Injury topic area: Prevention of Falls among Community Living Seniors

Primary Content area: Unintentional Injury

Primary Research Question: Does a community-based exercise program increase physical activity and reduce falls among community living seniors?

A pilot health promotion project was developed to promote physical activity and prevent falls among community living seniors in a target community area, based on a review of the literature on best practices for falls prevention. A preliminary program evaluation is being conducted as follows.

Primary objectives - To evaluate the Steppin'Out with Confidence pilot project in terms of meeting program goals and objectives, which include: increasing public and professional awareness and knowledge of falls, falls prevention, and related community resources; building community capacity in falls prevention; reducing environmental hazards related to fall prevention; increasing physical activity among community dwelling seniors; and creating program resources that can be used in other Winnipeg community areas.

Secondary objectives – To document project partners and assess partners' perceptions of the program, to explore program sustainability, and to assess barriers to participation.

Populations at Risk:

A. By Lifecycle where this topic area might be a priority:

1. youth – falls in the home and community have been identified as a priority
2. adults – falls in the workplace, home and community have been identified as a priority

3. elderly – falls in the home and community have been identified as a priority

B. By other demographic characteristics

1. aboriginal populations: falls in the home and community have been identified as a priority. Fall risks in the physical environment differ from nonaboriginal populations, particularly on-reserve, as well as access to treatment, rehabilitation, and culturally appropriate community programs.
2. gender: female seniors have traditionally been targeted, however falls are a significant burden to the health system for both genders at all stages of the life cycle
3. urban/rural: risks for falls associated with the physical environment (home, community) differ for urban and rural communities, as well as access to treatment, rehabilitation, and community programs. These differences could be evaluated and addressed in a research program.
4. others: certain patient populations are at higher risk for falls and/or fractures due to metabolic/bone disease, medication, mobility, cognition, etc.

Increasing physical activity throughout the life cycle has been shown to prevent disease and chronic illness as well as reduce the potential for falls and other injuries, and aid in the management of other risk factors. Therefore the role of exercise and balance training in falls prevention and injury rehabilitation could be studied in any of these populations. Opportunities to combine community projects targeting the same population make better use of limited resources and provide more efficient service to the community, in terms of health promotion, acute treatment, mental health, and rehabilitation.

A research program in this area could identify and address significant risk factors by target population or community. The core intervention – group exercise, balance training, and motivational tools to increase physical activity (pedometer program) – could be adapted and evaluated in a variety of settings (e.g. school, workplace, church) and populations. Tools to identify and correct risks in the physical environment could also be evaluated in a variety of settings and populations.

<u>Description of Primary Research Program and Patient Population</u>:

The Steppin'Out with Confidence program consists of exercise classes, leadership training for peer class instructors, a pedometer program, and a structured multidisciplinary clinical assessment. The purpose of the program is to promote physical activity and prevent falls among community living seniors and to create a toolkit of initiatives that can be implemented in other community areas of Winnipeg. This initiative is being piloted and evaluated in a population of community living seniors.

The following table summarizes how each component of the evaluation relates to the program goals and objectives.

	Exercise Class Evaluation (1)	Leadership Training Evaluation (2)	Steppin Out Evaluation (3)	Clinical Assessment Evaluation (4)	Other Evaluation Components
Primary Objectives					
• increasing public and professional awareness and knowledge of falls, falls prevention, and related community resources	Y	Y	Y	Y	Partner interviews, resource log
• building community capacity in falls prevention	Y	Y	Y	Y	Partner interviews
• increasing physical activity	Y	Y	Y	Y	
• creating resources that can be used in other Winnipeg community areas.	Y	Y	Y	Y	Staff interviews, resource log
Secondary Objectives					
• to document project partners					Partner log, program records and staff interviews
• to assess partners' perceptions of the program					Partner interviews
• to explore program sustainability	Y	Y	Y	Y	Partner interviews, staff interviews
• to assess barriers	Y				

1 - focus groups, participant survey, class log analysis

2 - focus group, leadership training log analysis

3 - participant log analysis, records analysis, group events survey, focus groups

4 - clinical assessment tool analysis, clinical assessment follow-up analysis, team interviews

Potential for Collaboration with Others:

A. By LFDI Content Area

1. Unintentional Injury: the role of exercise and balance training in the prevention of falls in seniors as well as other age groups could be formally studied using rigorous experimental designs; structured environmental and clinical assessment tools could be evaluated in other settings (e.g. personal care homes), in other populations (e.g. younger women with osteoporosis or individuals at higher risk for falls and/or fractures), or could be adapted and evaluated for other injury types (e.g. fires/burns).
2. Intentional Injury: the exercise program could be evaluated as a means to educate seniors about elder abuse and/or suicide/mental health and related community resources, identify high risk clients, and/or evaluate the role of class participation in improving mental health and/or improving access and appropriate utilization of community resources.
3. Acute Care of Injury: the client cohort could be followed prospectively to examine the effectiveness of exercise and balance training in reducing the number and severity of falls. The exercise class could be evaluated as a discharge post-injury intervention (e.g. early mobilization, increasing compliance, reducing secondary or subsequent injuries, reducing health system utilization, etc.).
4. Post Acute Care: the client population could be followed longterm to examine the roles of exercise, balance training, and peer support in rehabilitation from injury (e.g. falls, head injuries) and other serious disease (e.g. stroke, MI, etc.).

B. List specific Disciplines that might participate in the collaboration

Unintentional Injury

- exercise physiology, physical education, recreation studies
- educational psychology
- sociology, gerontology, family studies
- injury epidemiology, health economists
- ergonomists, interior/environmental designers, housing specialists
- public health
- pharmacy (university/community)
- primary care, family physicians

Acute Care disciplines

- emergency medicine
- nursing
- orthopedics
- gerontology
- pharmacy (university/community)

Intentional Injury

- epidemiologists
- those involved with research into elder abuse: gerontology, psychology, social work
- mental health disciplines

Post Acute Care

- exercise physiology, physical education, recreation studies
- rehabilitation sciences
- physiotherapy
- occupational therapy
- psychiatry/psychology

Casebook Example #8

Prepared by Stephen Robinovitch

General Injury Topic Area: Hip Fracture Prevention

Primary Content Area: Unintentional Injury

Primary Research Question: How do bone characteristics and fall mechanics associate with hip fracture etiology?

Lifecycles where this topic might be a priority:

1. youth:
    a. Determine the optimal time to intervene with load-bearing exercise to maximize bone accrual in adolescence, with the idea that more bone growth in adolescence will leave more bone in old age.
    b. Determine ways and means of teaching safe landing responses in youth.

2. adults:
    a. Caring for elderly parents and grandparents
    b. Preparation for old age
3. elderly:
    a. excessive bone loss (osteoporosis), falling, and hip fracture are common in the elderly population (this is the primary target lifecycle)

Description of Primary Research Program and Patient Population: This research program will retrospectively document bone characteristics and fall mechanics of elderly patients (aged 65 years and older) who experience a fall and a) do not fracture their hip (controls), or b) do fracture their hip and are admitted to hospital (cases). Bone characteristics, including bone mineral density (BMD) as measured by DEXA, and bone strength and bone mineral content (BMC) as measured by pQCT will be measured within one week of hip surgery on the affected side and within four weeks of time of fall in patients who do not fracture. Fall mechanics, including activity at time of the fall, fall direction, location of impact, and the presence of any fall protective responses will be documented through an interview of the patient if cognitive status will allow, or through a proxy who witnessed the fall if cognitive status of the patient is inadequate. Binary logistic regression will be used to determine bone and fall characteristics that are associated with an increased risk of hip fracture during falling. Long term follow-up of hip fracture patients will identify those individuals who experience a second hip fracture (in the contralateral limb) and the circumstances surrounding the second fracture.

Potential for Collaboration with Other Content Areas:

1. Unintentional Injury: Data collected in this study could potentially assist other investigators interested in unintentional injury prevention. For example, researchers developing safe landing environments may be interested in the data collected about fall mechanics, while those involved in knowledge transfer and osteoporosis prevention may be interested in the outcome data (number of falls that result in hip fracture, predisposing risk factors for hip fracture). In addition, the primary research program would be strengthened through collaborations with those working in the areas of finite element analysis and mechanical testing of the proximal femur. Such work would describe the strength of the proximal femur for different populations and under different conditions of bone mass and fall characteristics. Collectively this knowledge will provide a state-of-the-art description of the proximal femur and how it fractures in-vivo and in-vitro, which can then be used to develop the most effective prevention techniques.
2. Intentional Injury: This research program has the potential to help identify cases of elderly abuse. By documenting the fall mechanics that lead to fracture we will accumulate a database of "typical" falling patterns among elderly. Cases where the fall initiation and fall mechanics do not match the norm would point out warning signs of violence toward the elderly.

These cases may need further investigation to assess risk of violence. The database would also be helpful for documenting the prevalence of violence among elderly individuals and the perpetrators of this violence.

3. Acute Care: Data linking hip fracture to bone and fall characteristics may be used by orthopaedic surgeons who treat hip fractures to find the best treatment protocols. The success of surgical procedures could be documented through long term follow-up of the hip fracture patients. This would be useful in identifying the best treatment options for different types of risk factors. For instance, knowing the direction of impact may help surgeons to identify linkages between fracture type and fall direction/site of impact. Furthermore, long term follow-up will identify risk factors for second hip fracture and will provide guidelines to direct prophylactic interventions at the time of first hip fracture.
4. Post Acute Care: The bone and fall history of patients will be useful for the rehabilitation team in identifying the most effective rehab plan. If falling was the reason for the hip fracture a different treatment will be prescribed than if low bone mass was the reason for fracture. Long term follow-up of patients could provide useful data on effective rehabilitation protocols.

APPENDIX E

Injury and the Institutes

In this appendix we describe briefly some of the specific aspects of injury research that will be of particular interest to each of several CIHR Institutes, in alphabetical order.

Institute of Aboriginal Peoples' Health

Injury is the leading cause of death for Aboriginal people of all ages. First Nations and Inuit and those living in rural and remote areas of Canada have higher rates of injury and need special strategies to address the circumstances leading to injury. As noted in the Health Canada Report, *Unintentional and Intentional Injury Profile for the Aborginal People in Canada 1990-1999*:

> Aboriginal people face many risks of unintentional and intentional injuries. Although there have been some improvements in the rates of injury in the Aboriginal population, they are still high, especially relative to those of the general Canadian population. Injuries account for a large number of premature deaths in First Nations people. Motor vehicle accidents and drug poisoning cause many deaths, while suicide is rampant, and tends to occur at a young age. There is a glimmer of hope, however, with many communities and organizations are [sic] taking action to prevent injuries and reduce their accompanying burden in the Aboriginal population.(page iv)

The need to support this hope with research funding has already been reflected in the research priorities of this Institute.

Institute of Aging

Unintentional injury is a major cause of morbidity and death for Canada's seniors this being most often associated with falls and motor vehicle crashes.

Falls are by far the most common cause of injury and injury-related deaths for seniors. They are responsible for over three times more injuries than motor vehicle crashes, and nearly 10-fold the number due to intentional injuries.[7] Falls are the underlying cause of 84% of injury-related hospitalizations in this age group, over 75% of injury-related deaths, and approximately 40% of admissions to nursing homes.[18] Falls also lead to social isolation (fear of failing) and loss of independence of seniors. Consequently, reducing the incidence of fall-related injury has been identified as a critical national health priority [7], and a priority research topic for the CIHR Institute of Aging.[19] About 30% of community-dwelling seniors, and 50% of seniors who reside in long-term care facilities, fall at least once every year.

In terms of numbers, cost, and influence on quality-of-life, the most important injuries related to falls are hip fractures, over 90% of which occur during impact from a fall.[20, 21] In 1996, hip fracture was the second leading cause of hospitalization for Canadian seniors,[22] with over 23,000 cases annually, at an

estimated cost of $1billion.[23, 24] Within one year after a hip fracture, approximately 25% of seniors affected will die, 20% will have moved into a long-term care institution, and 40% will be unable to walk independently. Based on 1995 data, Health Canada estimated that a 20% reduction in hip fractures would lead to 7,500 fewer hospital stays, 1,800 fewer permanently disabled Canadians, and cost savings of approximately $138 million each year [7]. Improvements in prevention would also represent an excellent investment, as fracture incidence is expected to increase 4-fold by the year 2041, given the aging of the population and the fact that risk for hip fracture increases exponentially with age.[23, 24]

Motor vehicle crashes (occupant and pedestrian) are the second-leading cause of injury and injury-related death in seniors.[25, 26] Accordingly, there is a critical need for research to improve our understanding of the risk factors and outcomes for crash-related injury in seniors, and to bridge the gap between what is known and what is being adopted by individuals, care facilities, health service providers, and government. Based on driving time, the crash rates of older drivers rival those of high-risk younger drivers. Furthermore, older drivers are more likely than younger ones to be killed or seriously injured in a crash. For those who survive, hospitalization is longer and recovery is less complete. Risk factors for crash-related injury in seniors include age-related changes in vision, reaction time and coordination, but are mostly health-related, such as dementia, cardiovascular disease, respiratory disease, neurological conditions and diabetes. Identification of the medically at-risk driver is an important safety enhancing strategy. Conservative estimates, based on the prevalence of cognitive impairment in seniors and the number who continue to drive, suggest that the removal of a cognitively impaired older driver from the road would result in an $18,600 cost saving.[28] Progress has occurred in the development of screening tools to identify medically at-risk drivers.[27, 28] However, additional work is required to improve and validate these tools for use by the medical and law enforcement communities, and to develop educational materials for physicians and peer counsellors regarding driving and alternative transportation options for the elderly. Research can also lead to the development of compensatory driving strategies to reduce safety risks and limit the negative impact of loss of driving privileges of the older individual, which include increased dependence, loss of self-esteem and increased need for community support.

Institute of Cancer Research

Cancer is a metabolic disease caused by cellular genetic machinery gone awry. External factors that trigger the development of cancer are most often those that interact directly with the genetic material. Physical injuries are not associated with the development of cancer however, cancer patient are at higher risk of injury at different stages of their disease and treatment. Patients recovering from surgery, undergoing chemotherapy or radiation therapy, or on pain medication, are often weak and may experience moments of confusion and disorientation. In these situations patients are more likely to fall and injure themselves.

Following treatment, cancer patients, like victims of unintentional injury, may be left physically handicapped. During the course of their treatment they may have

undergone an amputation that requires extensive rehabilitation, or an ablation of an organ that requires life-long special care.

Some patients with cancer also confront issues related to self-inflicted injury and suicide. Potentially significant numbers of persons faced with terminal illness may intentionally take their own lives, sometimes by means such as motor vehicle crashes that appear to be unintentional. Bereaved caregivers/relatives of patients who have died of cancer frequently experience depression and are prone to suicide, particularly in midlife.

Institute of Circulatory and Respiratory Health

While it is obvious that many intentional and unintentional injuries result in trauma to circulatory and respiratory systems there also is substantial opportunity for synergy in the conduct of interdisciplinary research by those investigating the effects of critical injury and those researching non-traumatic acute cardio-respiratory illness.

There are basic physiological mechanisms leading to cellular and organ dysfunction that are shared within shock states, whether they stem primarily from cardio-respiratory collapse from trauma, ischaemia or sepsis. Disease states including sepsis, ARDS and multiple organ dysfunction may result from traumatic or non-traumatic illness. Hence, there are likely to be substantial similarities in physiology and in investigational and treatment modalities for these patients. Similar animal models are appropriate for the investigation of traumatic and non-traumatic critical illness. In pre-hospital and in-hospital clinical care settings, there are certainly opportunities to investigate similar approaches to the assessment and care of critically ill patients. Finally, it is probable that measurement of socio-economic costs, assessing the management of care and quality-of-life of those disabled by critical illness or injury will be similar. This provides opportunities for collaborative research in the post-acute care delivery for these patients.

Institute of Gender and Health

The mandate of the CIHR Institute of Gender and Health (IGH) supports research that addresses how sex (biological-genetic dimensions) and gender (social-cultural dimensions) interact with other socio-cultural, bio-physical, and political-economic factors to influence health, and create conditions that differ with respect to risk factors or effective interventions for males and females throughout the lifespan. Epidemiological data highlight substantive sex differences in and gender influences on the incidence of injury. For example, males, from about 2 years of age and throughout most of the life span, experience more frequent and severe unintentional injuries than females. For intentional injuries, there are also striking sex differences; during adolescence, females attempt suicide more often than males, while males succeed more often than females. Moreover, data on family violence often reveals males as victimizers and females as victims. Research focused on identifying the underlying factors (e.g., cultural, social, psychological and behavioural) that contribute to these sex differences and gender influences in injury incidence are of keen interest to IGH.

New studies will advance our understanding of injury determinants, best practices for prevention, and rehabilitation strategies.

Institute of Genetics

The role of genetics in injury is not well understood. There are, however, a number of lines of research suggesting that the link between genetic endowment and various risk factors for injury needs further investigation. Increasingly, in recent years there have been research findings suggesting a genetic component to such behavioural determinants of injury as risk taking behaviour,[31-33] sensation seeking and substance abuse,[34-36] aggression and impulsivity.[37, 38] In addition, specific genetic risks for such injury mechanisms as suicide are under investigation.[39] Finally, a number of genetic disorders such as hemophilia,[40] in themselves, present additional risk factors for injury, and challenges to injury prevention and control strategies.

The stated priorities of the Institute of Genetics include research on all aspects of genetics related to human health and disease, and genetics-related interventions including health promotion, disease prevention and health services delivery. Research on injury of the types described above clearly fits within these priorities. Further investigation of the role of the human genome in injury outcomes, and the potential role of genetic research in prediction, prevention and control of injury are areas of interest to this Institute.

Institute of Health Services and Policy Research

This Institute has broad interests in areas with potential impact on the demands on the Canadian health care system, and on the way health care services are organized, regulated, managed, financed, paid for and delivered. Virtually all aspects of injury research 'fit' within this broad system-focused mandate. Injury-related work focused on prevention (given the major impact of injury treatment as a system "demand" or "load" factor), capacity and organization of the system for, and quality of, acute response to injury, and the rehabilitation of injury, are all highly relevant.

Institute of Human Development, Child and Youth Health

Injury is the leading cause of death among young people 1 to 19 years of age. Child injury patterns outline different injury risks at different developmental stages and in different contexts. For example, pre-schoolers are often injured in the home as they are exploring their environments, whereas school-age children are most frequently injured when playing outside the home, often with peers. Teens, amongst children and youth, are most at risk of being injured in car crashes, athletics and intentional self-injury. Often, 'risk behaviours' play a role (e.g., speeding, drinking and driving, not wearing a seat belt.) Such developmental variation in the nature, type, and context of injury highlights how intimately 'injury' fits within the mandate of this institute. Research on developmental factors and determinants of injury is essential for development of effective injury prevention and control measures. Both types of research are consistent with the broadest aim of this institute: to support research relevant to promoting children's health and well being. In fact, behavior risk factors for

injury are likely relevant as risk factors for other illnesses in youth including substance abuse and sexually transmitted diseases.

Institute of Infection and Immunity

Research in injury prevention and control shares a number of unique features with the research foci of the Institute of Infection and Immunity. At the biological level, host responses to infection and injury share many similarities. Studies on immune and regenerative mechanisms such as those involving stem cells are central to understanding responses to infection and injury. Immune responses, cytokines, antibodies and blood cells all relate to injury. Infection and sepsis are common in the trauma patient and frequently result in the use of antibiotics with the inherent complications of antibiotic resistance. Sepsis in the trauma patient is a common cause of morbidity and mortality. Injury causing inflammation and tissue damage may result in a need for tissue repair, an area likely to benefit from current research in regenerative medicine and cellular homing mechanisms. Nanomedicine also may have future applications in the repair of tissue damage.

Institute of Musculoskeletal Health and Arthritis

As the Institute responsible for research in both the treatment and prevention of important and common conditions and diseases relevant to six research "focus areas": arthritis, bone, skin, muscle, oral health and musculoskeletal rehabilitation, IMHA has a very significant interest in musculoskeletal (MSK) and/or Oral Injury. Injury, of course, is a leading cause of pain, disability and chronic diseases such as osteoarthritis. Injury is also a common cause of cosmetic and functional problems of the skin, as well as chronic pain and disability of the jaw and teeth.

IMHA has already developed two major overlapping research themes of relevance to the injury initiative. One of IMHA's three research priority areas is entitled "Tissue Injury, Repair and Replacement", which is intended to encompass any topic and any pillar of research that would span the spectrum from prevention of such injuries of the musculoskeletal system or teeth, to the optimal treatment (repair and replacement) and rehabilitation of those injuries. A second IMHA research priority is aimed at "Pain, Disability and Chronic Disease" - treatment and prevention.

Some MSK injuries are due to "macrotrauma" resulting from events such as motor vehicle crashes, while others are due to "microtrauma" (repetitive strain injuries, including work-related and sports-related microinjuries). IMHA has demonstrated willingness to support research into causes, cures and prevention strategies for any or all of these. IMHA has encouraged multidisciplinary approaches to solving these problems and supports research on knowledge translation strategies transcending any of their six focus areas of research and both of the injury-related research themes noted above

Institute of Neurosciences, Mental Health and Addiction

Suicide is the leading cause of death in Canada for men aged 25-29 and 40-44 and for women aged 30-34. It is generally accepted that these rates underestimate the

true incidence of suicide. The link between suicide and mental illness is widely documented, with most researchers identifying mental illness as a risk factor for suicide. Addictions such as alcohol and drugs are also associated with suicidal risk, and contribute substantially to the incidence of many types of unintentional injury (e.g, boating-related injuries, motor-vehicle injuries, falls in the elderly). In sum, the topic of injury prevention and control is one that quickly leads to a discussion of mental health and alcohol/substance use/abuse, which clearly falls within the mandate of this institute.

Accidental eye injury is one of the leading causes of visual impairment and blindness in Canada with an estimated 100,000 eye injuries occurring each year. The leading causes are household chemicals, sports accidents, fireworks, UV overexposure (welding arcs, tanning studios) and so on.

Trauma to the brain, spinal cord and peripheral nerves constitutes the leading cause of death from all forms of injury. Conservative estimates suggest that 2% of the adult populations of industrialized countries are permanently disabled due to brain injuries. Prevention of the primary and secondary events that cause neurological disability is also clearly within the mandate of this institute.

Institute of Nutrition, Metabolism and Diabetes

A number of causes and consequences of injury have direct relevance to the Institute of Nutrition, Metabolism, and Diabetes; there are important gaps in injury research relating to diet, digestion, excretion, and metabolism, including basic science, prevention, treatment, and rehabilitation research. First, several gastrointestinal (GI) disorders are in fact injuries, namely foreign body ingestion and aspiration, and caustic injuries to the upper GI tract. Choking and upper GI tract injuries are an important cause of hospitalization and death for infants, toddlers, and seniors, as well as patients with impaired cognition, brain injury, and other swallowing disorders. Primary prevention measures and diagnostic and therapeutic modalities deserving study include food labelling and packaging (e.g. hot dogs), hazardous consumer product labelling and packaging, choking first aid maneuvres, cardiopulmonary resuscitation and basic lifesaving training, imaging techniques to detect non-opaque foreign bodies, and noninvasive treatment methods.

There are numerous research gaps related to the care of the seriously injured or burned patient, which have application to other critically ill patients. These include: advancing knowledge of nutritional factors in wound healing, infection, and sepsis; glucose regulation and the effects and control of hyperglycemia in brain injury, sepsis, and wound healing; understanding, preventing, and managing Syndrome of Inappropriate Antidiuretic Hormone Secretion (SIADH) and other electrolyte disorders in trauma and brain injury; refining optimal nutritional management of the severely injured or burned patient, including identifying predictors of metabolic and fluid requirements and advancing noninvasive feeding methods; defining metabolic needs in the rehabilitation of spinal cord injury and multiple trauma patients, and studying the relationship between nutritional and metabolic factors and repair and recovery.

Finally, current strategic research initiatives within the Institute may have a direct impact on injury; this should be measured and evaluated. Health

promotion and healthy lifestyle interventions directed at optimal body composition may have an effect on the incidence and severity of falls for seniors and others. Potential areas of research synergy include: exercise and nutrition in early childhood and their potential lifelong benefits on obesity, bone health, and falls in later life; behaviour change interventions that may also be effective in reducing injury risks; and research on the influence of policy on lifestyle choices and changes that may also relate to injury risks.

Institute of Population and Public Health

Injury poses a significant threat to the health of Canadians. Injuries are influenced by a range of social and environmental factors that operate at the individual, community and population level. There is substantial evidence that population-level interventions can markedly reduce injuries of various types, via policies and community programs that change knowledge, attitudes and practices, and alter environmental factors that contribute to their occurrence.

The prevention and control of injury have their basis in public health approaches. Interventions to control the impact of injury include: health promotion policies and strategies (individual, community, and population based); health determinants; identification of health advantage and health risk factors related to the interaction of environments (cultural, social, psychological, behavioural, physical, genetic); disease and disability prevention strategies at the individual and population levels (e.g. control of global or local injury or disease outbreaks); identification of health advantage and health risk factors related to genetic, social and physical environments that influence infection and immunity or injury; clinical research and health outcomes research; design and implementation of health services delivery; development and implementation of health technologies and tools; development, regulation, and function of the immune system and its response to injury or infection; ethics issues related to research, care strategies, and access to care (e.g. clinical trials in developing nations, immigration policy and practice).