

**COMMUNITY-BASED INJURY PREVENTION:  
RECOMMENDATIONS FOR VANCOUVER'S NORTH  
SHORE**

by

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## **ABSTRACT**

**Background:** Injury is a major cause of hospitalization and death across all age groups in Canada, British Columbia and Vancouver's North Shore. Injury prevention saves lives, reduces disability and reduces the economic burden on our health care system. **Methods:** In this study, I reviewed the components of community-based injury prevention strategies and investigated the barriers to implementing a community-based injury prevention program on the North Shore. **Findings:** Lack of surveillance, awareness, accountability, coordination, resources and evaluation pose significant barriers to the implementation of an injury prevention strategy on the North Shore. Successful community-based injury prevention models require community participation, multidisciplinary collaboration and adapting interventions to local context. The Safe Communities model is discussed as a framework for community-based injury prevention. A comprehensive community-based injury prevention strategy is recommended to reduce the local burden of injury on Vancouver's North Shore.

**Keywords: Injury Prevention; Community-based; Safe Communities**

**Subject Terms: Injury Prevention**

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# 1: INTRODUCTION

Injuries are the result of physical damage to the human body caused by acute exposure to intolerable levels of energy including thermal, mechanical, electrical, or chemical energy (Christoffel & Gallagher, 2006). Injuries can have both fatal and non-fatal consequences leading to premature death and disability.

Injuries are divided into two categories: unintentional injuries resulting from involuntary actions and intentional injuries resulting from purposeful actions. Unintentional injuries include but are not limited to: trauma from falls, burns, suffocation, motor vehicle crashes and poisoning. Intentional injuries, on the other hand, include such events as: homicides, suicides, intimate partner violence and child and elder abuse. While injuries have been distinguished based on intent, this categorization is not always simple; the intent of injuries or deaths caused by shaken baby syndrome or drunk driving, for example, is often unclear. What is consistent, regardless of intent is the use of prevention. Prevention measures can be effective in reducing injury rates regardless of intent.

The prevention of injuries at the national and provincial level has been demonstrated to be cost effective. For example, \$1.00 spent on child safety seats saves \$32.00, \$1.00 spent on bicycle helmets saves \$29.00 and \$1.00 spent on poison control saves \$7.00 (SMARTRISK, 2001). In addition to saving thousands of health care dollars, investment in injury prevention, such as mandatory seatbelts and bicycle helmet laws, has shown positive results in decreasing morbidity and mortality rates (SMARTRISK, 2005). Even with moderate success, prevention efforts targeted at the

most common injuries will be economically efficient while, more importantly, significantly decrease injury related death and disability.

Using a cost benefit analysis stresses the economic efficiency of prevention and can be useful in mobilizing important political stakeholders; however, this type of analysis ignores the significant emotional and psychological stresses that are avoided with the implementation of injury prevention measures. Many non-fatal injuries result in permanent debilitating disabilities and impairments such as blindness, spinal cord damage and brain damage (Krug Sharma & Lozano, 2000). In the United States, it is estimated that traumatic brain injury alone results in approximately 80 000-90 000 cases of long-term disability per year (Thurman et al, 1999). Living with long term disabilities negatively impacts one's quality of life. It has been demonstrated that three years following an injury causing event, 80% of survivors continue to present with functional impairments and 6% continue to be dependent in their activities of daily living (Anke, Stanghelle, Finset, Roaldsen, Pillgram-Larson & Fugl-Meyer, 1997). Additionally many injury survivors report declining social networks and feelings of loneliness (Anke et al, 1997). Furthermore, psychological and emotional stresses are common following injury. Winston et al (2002) have found that 80% of children and their parents experience acute stress disorder following involvement in a traffic collision; many continue to express symptoms of post-traumatic stress disorder long afterwards.

Compared to many other health conditions, injuries are largely disregarded. This has been attributed to the misperception that injuries are "accidents;" in other words, random, unavoidable, uncontrollable acts with no known cause (Nova Scotia Health Promotion and Protection, 2004). This description is false. Injuries can be distinguished from 'accidents' in that 95% of them are predictable and thus prevention measures can be introduced (BC Ministry of Health, 1998). The inappropriate designation of injuries as

accidents leads to the common ignorance of the magnitude of the injury problem and the misconceptions that injuries are inevitable. The majority of the population does not recognize the potential of risk in their everyday lives, thus measures are not being taken to prevent potential injuries (SMARTRISK, 2001, Krug, et al, 2000). A broad based, public health approach to injury prevention will save lives, reduce disability and reduce the economic burden to our health care system.

## **2: PUBLIC HEALTH**

The public health approach aims to improve health and reduce inequities at the population level (Health Canada, 2001). Public health tools including advocacy, surveillance, research, needs assessments, education and intervention implementation and evaluation, play a role in reducing the burden of injuries.

By focusing on a range of determinants that impact health, the public health approach has been largely effective in combating infectious diseases and should be applied to the same degree in order to tackle unintentional injuries. Epidemiological studies demonstrate that injuries are multifactorial; in addition to individual behaviours and attitudes, social and physical environments play a significant role in injury-causing events. Interventions based on the public health approach, developed with collaboration between health and other government sectors, the private and non-profit groups as well as the local population, is required in order to understand and address the complex issues related to injuries (Health Canada, 2001).

The public health approach has four steps:



Figure 1: The steps of the public health approach (World Health Organization (WHO), 2009)

1. Surveillance: An accurate description of the problem, as well as key population demographics is necessary in order to determine the magnitude, scope and characteristics of the problem (WHO, 2007; Health Canada, 2001). The health of the population is consistently measured over time and across jurisdictions in order to uncover trends (Health Canada, 2001). This step is important in injury prevention strategies to determine appropriate objectives and priorities.
2. Identify Risk and Protective Factors: The risk factors that increase the probability of becoming injured and the protective factors that decrease the likelihood of becoming injured are identified in order to understand why certain injuries are affecting certain populations more than others (Thygeson, et al, 2008).
3. Develop and Evaluate Interventions: Using the identified risk and protective factors, interventions with the greatest potential to positively influence health are developed

and implemented. Following implementation, rigorous evaluations are necessary to determine effectiveness (Thygeson et al, 2008).

4. Implementation: During the implementation stage, broad based implementation of the program is encouraged. As communities differ based on social and cultural demographics, they are encouraged to adapt these interventions to meet their own unique needs. The effects of the intervention at the community level must also be monitored and evaluated (WHO, 2009).

### **3: PURPOSE**

With a population of approximately 190 000 residents, the North Shore of Vancouver consists of 5 municipalities: The City of North Vancouver (CNV), The District of North Vancouver (DNV), the District of West Vancouver (DWV), Bowen Island, and the Village of Lion's Bay (Vancouver Coastal Health (VCH), 2005). The North Shore population is currently aging; in DWV 23% of the population is over the age of 65 whereas 13% of the Metro Vancouver population is above the age of 65. The life expectancy on the North Shore is 83.1 years for women and 80.0 years for men. It is estimated that in the next 20 years the North Shore's senior population will increase by 54% while the population of youth and school aged children will decrease by 18% (Statistics Canada, 2008; VCH, 2005).

On the North Shore of Vancouver, many initiatives are in place, both within and outside of the Vancouver Coastal Health authority (VCH), addressing the issues of safety and injury prevention. An inventory of injury prevention initiatives and a gap analysis was undertaken by the author and presented to the North Shore Family and Community Health department of VCH in September 2008. The results demonstrated that a lack of coordination between organizations has resulted in overlaps of interventions aimed at preventing certain injuries in specific demographics and large gaps in all other areas. There is currently no coordinated unit overseeing the many injury prevention interventions. Generally, there is little focus on injury prevention both at the level of the health authority and within the community. Many organizations are unaware of the significance of injuries on the North Shore and thus injury prevention is not a priority.

An integrated and coordinated injury prevention strategy is now necessary for the North Shore to use the information provided to them effectively. An injury prevention strategy based on coordination, collaboration and communication is essential in order to amalgamate existing activities and eliminate duplication of efforts. All stakeholders should be involved in improving and coordinating the good work that is already in place and further reducing the burden of injury within the community. A comprehensive strategy would be essential to guide effective planning, implementation and evaluation of all injury prevention efforts within the North Shore.

The primary aim of this project is thus to recommend a comprehensive injury prevention framework that can be applied on the North Shore of Vancouver.

Secondary aims include:

1. To understand the extent of injuries in Canada, British Columbia and the North Shore
2. To identify challenges to effectively preventing injuries on the North Shore
3. To identify the components needed for an effective community-based injury prevention strategy
4. To review the effectiveness of the World Health Organization Safe Communities model and the Safe Communities Canada model



## 4: METHODS

In order to understand injury prevention, this project included extensive literature reviews:

1. Local, provincial and national databases were reviewed in order to identify injury trends and priorities
2. Literature reviews were conducted in order to understand underlying models, frameworks and theories as they apply to injury prevention
3. Literature reviews were conducted to comprehend the necessary components of community-based injury prevention strategies and to identify the effectiveness of community level models used nationally and internationally

Semi-structured Interviews were conducted with North Shore community stakeholders to gain further understanding of the barriers of implementing injury prevention programs within the North Shore. Respondents were asked questions regarding the opportunities and challenges present on the North Shore related to the implementation of a community-based injury prevention strategy. The results were transcribed and coded according to both a-priori and emerging codes. Stakeholders interviewed include representatives from:

- North Shore Health Service Delivery Area
- Vancouver Coastal Health
- City planners and engineers
- North Shore Safety Council
- North Shore Search and Rescue
- Fire Departments
- Police Departments

## **5: THE CURRENT STATE OF INJURY PREVENTION**

### **5.1 Canada**

Injuries are a serious public health concern in Canada. Unintentional injuries are the leading cause of death for Canadians between the ages of 1 and 44, the fourth leading cause of death for all Canadians and the second leading cause of potential years of life lost (Public Health Agency of Canada (PHAC), 2006a). Additionally, suicide is the second leading cause of death from age 15-35, while homicide is the fourth leading cause of death from age 15-24 (PHAC, 2006b). In 2003, injuries accounted for 13,906 deaths and 226,436 hospital admissions in Canada (PHAC, 2006a). These preventable injuries cost an estimated \$14.7 billion per year in Canada, of which 70% of injury related health costs are caused by falls, motor vehicle collisions and poisonings (SMARTRISK, 2005; SMARTRISK, 1998).

Certain populations have been identified as being at an increased risk of injury. The rates of injury in Aboriginal and First Nation peoples, for example, are significantly higher when compared to the general population (Health Canada, 1999). Furthermore, noticeable differences in injury rates are apparent when comparing different age groups and genders. Injuries are the leading cause of death in youth and account for 70% of youth deaths in Canada (SMARTRISK, 2005). In 2002, 414 deaths in children aged 0-14 occurred as a result of injury and for each death, 86 children were hospitalized and hundreds of children were seen in hospital emergency rooms (SMARTRISK, 2005). In 2001 1,591 deaths due to injuries occurred in youth aged 15-24, of which, almost half were related to motor vehicle collisions (SMARTRISK, 2005). Over a third of the

population hospitalized as a result of injury is seniors, the majority of which are fall related (SMARTRISK, 2005). With the exception of falls, males are more likely to die from all other causes of injury than females (SMARTRISK, 1998).

Canada's child injury rates are ranked 18<sup>th</sup> out of the 26 Organization for Economic Cooperation and Development (OECD) nations and child injury rates in Canadian children are approximately double that of Sweden, the top ranking country (SMARTRISK,2005). Other high income countries demonstrate similar trends to those seen in Canada; injuries are the fourth leading cause of death with the most common injuries being motor vehicle collisions and falls (OECD, 2005). Deaths due to motor vehicle collisions are more common in men and deaths due to falls are more commonly seen in the elderly and young children in the other OECD countries, further demonstrating their similarities with Canadian trends (OECD, 2005).

Canada has introduced a national computerized surveillance system that analyzes injury related emergency room data, the Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP). Currently, the majority of hospitals participating in this project are pediatric centers and thus 90% of the data is related to injuries in children 19 years of age and younger (PHAC, 2007). The data obtained through CHIRPP is comprehensive and provides information not usually available, such as the activity and location of the injury causing event (PHAC, 2007). Such data is useful for all injuries. CHIRPP should therefore be expanded. Surveillance, however, is simply the first step in the public health approach. Canada does not have a comprehensive national injury prevention program targeting all types of injuries and all demographics. In 2005, the Canadian Collaborating Centre for Injury Prevention and Control (CCCIPC) developed such a strategy based on evidence-based practice, partnerships, integration, leadership development, public policy development, knowledge translation, community

development and public information (CCCIPC, 2005). This extensive strategy is yet to be implemented. Many provinces have been progressive in developing their own provincial level initiatives despite a lack of strong federal leadership.

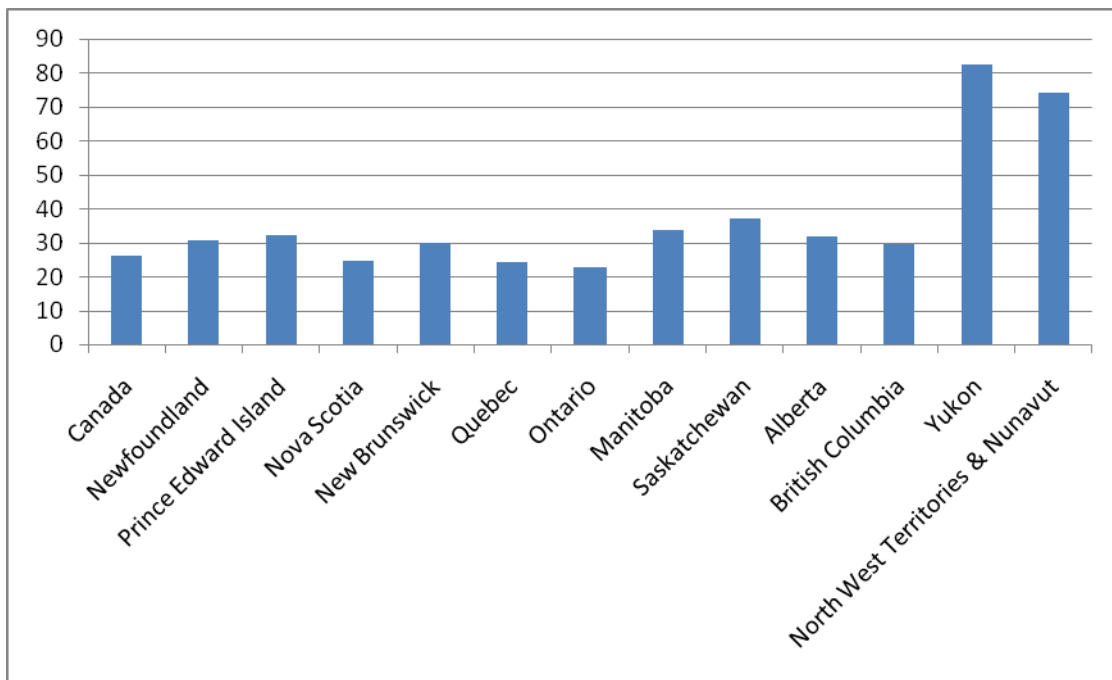
Canada has much to learn from other countries that have developed and implemented national comprehensive injury prevention strategies. By working within existing health departments, injury prevention will continuously be competing for dwindling financial resources. The United States has been successful in establishing a separate national centre for injury research and control (SMARTRISK, 2005). Britain, on the other hand has developed a decentralized approach with leadership assigned at regional and local levels (SMARTRISK, 2005). Britain's approach proved difficult to sustain; national interest in the program deteriorated and without national support, regional and local interest waned soon after (SMARTRISK, 2005). A national level injury prevention agency, like that seen in the United States, can enhance the sustainability of a national injury prevention strategy.

## **5.2 British Columbia**

In British Columbia, injuries account for \$2.1 billion, of which falls are the most costly injuries accounting for 36% of the economic burden of injuries, followed by motor vehicle crashes (21%) and poisoning (11%) (SMARTRISK, 2001). Similar to the trends seen nationally, injury is the leading cause of death in children and youth in British Columbia (BC Ministry of Health, 2007). Between 1987 and 2000, the leading causes of death due to unintentional injury in children and youth between the ages of 0 and 24 in British Columbia were motor vehicle traffic followed by drowning and poisoning (BC Ministry of Health, 2007). These mortality rates were significantly higher in males than females (BC Ministry of Health, 2007). During the same time period, the leading causes

of death due to unintentional injury in adults in British Columbia were falls followed by poisoning and motor vehicle collisions (BC Ministry of Health, 2007).

British Columbia's injury related mortality rate is slightly higher than the national average (refer to table 1). Age standardized mortality rates in Yukon, the North West Territories and Nunavut are more than double that of British Columbia, whereas Ontario, Quebec and Nova Scotia all have lower rates when compared to British Columbia (PHAC, 2009).



**Table 1: Unintentional Injury death rate by province, age standardized per 100,000 (PHAC, 2009)**

British Columbia currently does not have a comprehensive injury prevention framework. The British Columbia Injury Research and Prevention Unit (BCIRPU), however, provides several services necessary for successful injury prevention at the provincial level with a goal of reducing the societal and economic burden of injury in British Columbia (BC Ministry of Health, 2008). BCIRPU has an extensive provincial surveillance system, which includes analyses and reports from mortality, hospitalization

and emergency department data (BCIRPU, 2006b). In British Columbia, the BCIRPU manages CHIRPP (BC Ministry of Health, 2008). The collection, analysis and interpretation of injury data from ten emergency departments in the Fraser Health Authority, Interior Health Authority and Northern Health Authority was successfully piloted from 2000-2003 as the Emergency Department Injury Surveillance System (EDISS); data from this system continues to be collected, but there is no evidence to suggest that it has been expanded to all health authorities (BCIRPU, 2006b).

The BC Ministry of Health has recently developed a matrix like framework in order to address the core functions of public health; injury prevention has been identified as one of the core public health programs (BC Ministry of Health, 2005). The core functions framework is currently being implemented within each health authority across the province in order to increase the consistency and quality of public health services and ultimately improve the health of the population (BC Ministry of Health, 2008). As part of the core public health functions improvement process, the BC Ministry of Health has published an evidence review paper in 2007 and a model core program paper in 2008 for unintentional injury prevention. The model core paper outlines the roles of each level of government. The provincial Ministry of Health is responsible for strategic planning of provincial strategies, and advising the Minister on provincial level injury prevention policies and legislation (BC Ministry of Health, 2008).

### **5.3 North Shore**

On the North Shore, injury is also a major cause of hospitalization and death across all age groups. The leading cause of death due to unintentional injury in this community is falls, followed by motor vehicle collisions and unintentional poisonings (BCIRPU, 2008).

Like Canada and British Columbia, until the age of 65 in each age group, males are more likely than females to be hospitalized and more likely to die due to injuries, whereas, in the senior population more females are seriously affected by falls. Overall on the North Shore, motor vehicle collisions and falls account for the majority of deaths and hospitalizations across all age groups (BCIRPU, 2008).

Currently several injury prevention initiatives are implemented on the North Shore through VCH, the North Shore Health Delivery Service Area (HSDA) as well as local organizations. There is however no local injury prevention team encouraging collaboration and coordination among the different agencies.

The model core program paper in unintentional injury prevention recognizes the important role that local governments play in enacting and enforcing local by laws and policies and the importance of essential community organizations such as fire departments, police departments, schools and sports organizations (BC Ministry of Health, 2008). The model core program paper identifies six components that are necessary for unintentional injury prevention programs within health authorities:

- i. Strategic planning and priority-setting
- ii. Advocacy and public policy
- iii. Community development and community capacity building
- iv. Knowledge transfer and public education
- v. Enforcement
- vi. Surveillance, data collection and evaluation

VCH is currently undergoing an extensive gap analysis of these particular areas to determine what the current status of injury prevention is at the health authority level and what needs to be done. The North Shore HSDA similarly has gone through this gap analysis process as a part of VCH.

## **6: INJURY PREVENTION FRAMEWORKS**

Like all prevention frameworks, injury prevention can occur at three levels: primary, secondary and tertiary. Primary prevention interventions attempt to prevent the initial damaging transfer of energy, while secondary prevention interventions attempt to reduce the damage once the injury causing event has occurred and tertiary prevention interventions are in place to provide treatment and rehabilitation to the injury survivor (Peek-Asa, Dean, & Kraus, 2005). Interventions intended to reduce the burden of injuries must be broad. Strategies that incorporate interventions at the social, economic, political, cultural, educational and environmental levels will be most effective at the population level. While primary prevention of all injuries may be unachievable, programs, policies and initiatives that protect the most vulnerable organs, such as the brain and spinal cord, may significantly reduce the resulting damage of injuries (SMARTRISK, 1998).

Theory allows program planners to develop appropriate injury prevention interventions addressing “why” “what” and “how” injury events occur and also to determine the reasons for these interventions’ successes or failures (Gielen & Sleet, 2003; Trifiletti, Gielen, Sleet & Hopkins, 2005). Research and understanding of injuries and injury prevention has been dominated by several competing frameworks, each bringing a different perspective to the issues. All of the approaches are relevant; however, a combination of approaches and perspectives will probably be most effective in addressing injury prevention.

Historically, the medical/health education paradigm, with its strong ideology of individualism, was the primary model used in public health sciences. Following the



Lalonde report (1974) in Canada, investigation of public health problems focused on the identification of individual behavioural factors, whereas social context was largely ignored. The medical model understands that individual behaviour is a strong predictor of injury and thus education is considered the best safety promotion tool (Hanson, Vardon & Lloyd, 2002). Educational strategies increase awareness of injury potential and risk reducing behaviours in order to change attitudes regarding risk and safety. Injury prevention strategies have often relied heavily on the educational component in order to address the suspected lack of knowledge surrounding injuries (Christoffel & Gallagher, 2006).

Several behaviour change theories have been shown to be effective in reducing injuries. The Health Belief Model (HBM) explains and predicts the acceptance of health related recommendations (Janz & Becker, 1984). It is based on five constructs: (1) perceived susceptibility to negative health conditions, (2) perceived severity of the health condition (3) perceived benefits associated with the particular actions, (4) perceived barriers to taking these actions and (5) self efficacy (Frankish, Lovato & Poureslami, 2006). Safety practices in parents have been successfully addressed using interventions based on the HBM. Interventions combined a focus on the belief that one's child is susceptible to injury combined with improvement in one's self confidence in performing the positive behaviour (Gielen & Sleet, 2003; Aldoory & Bonzo, 2005).

The Stages of Change model, based on the premise that behaviour change is a process has also been used in order to address injury prevention. According to this model, an individual goes through five stages as they attempt to change their behaviour: pre-contemplation, contemplation, preparation, action and maintenance (Glanz, Rimer & Su, 2005). Knowing what stage an individual is in allows the planner to develop the most appropriate intervention. The ability of abusive men and abused women to change

their behaviours has been explained using the Stages of Change model. For example, abused women may move from the pre-contemplation stage, where they do not consider their partner's behaviour as problematic to the action stage where they take protective action (Gielen & Sleet, 2003).

The Extended Parallel Process Model (EPPM) explains how fear appraisals can be used in public health messages to motivate action. Research in Australia is currently assessing the use of the EPPM in road safety television advertisements (Fry & Dann, 2002). EPPM explains that risk messages include two components: a threat component and a recommended response. As long as the perceived efficacy in performing the recommended response is higher than the perceived threat, the risk can be controlled (Witte, 2004). If used improperly, this model can backfire by increasing the feeling of helplessness when facing injuries perceived as unpredictable and unpreventable. When coupled with strong self-efficacy messages, however, the fear component of the EPPM has been useful in increasing attention to the risk of injuries (Aldoory & Bonzo, 2005).

The individual accountability associated with the medical model and behaviour change theories averts the attention from larger systemic and societal problems. Individual behaviour does play a role in injuries; however, often the injury causing events are outside of the control of the individual. Focusing solely on individual behaviour in such a scenario enables both the individual and the society to avoid taking responsibility. In isolation, behaviour change theories neglect to address broader influences in relation to injury. Instead, there needs to be an acknowledgement of both the internal and external influences on injury.

Several frameworks exist that concentrate their efforts on external factors. The bioengineering framework focuses on the modification of injury causing agents in order to reduce the potential for harm (Hanson et al, 2002). Engineering solutions can either

be passive, requiring no action from the individual, or active, requiring individual cooperation. Generally, passive interventions, which avoid the need for individual behaviour change, are more effective over the long term (Hanson et al, 2002). In addition to engineering strategies, an environmental approach increases safety through alterations of the physical environment. Both the engineering and environmental approaches protect the entire population. Rather than targeting a specific demographic, the risk itself is targeted enhancing safety for all. The development of new laws and regulations as well as increased enforcement of existing laws is effective in reducing injury-related mortality and morbidity (Christoffel & Gallagher, 2006; Klassen, Mackay, Moher, Walker & Jones, 2000). A systems approach to injury prevention focuses on the risk factors within the system (Hanson et al, 2002). Such an approach works upstream to correct system weaknesses, such as environmental, organizational or social factors, in order to avert an injury event (Hanson et al, 2002).

It is difficult to grasp the big picture when analyzing an injury event through the lens of any one framework. Sustainable injury prevention strategies acknowledge the many influences on individual behaviour and injury events. Approaches that rely completely on education, for example have been criticized as ignoring more effective passive engineering protection or legislation (Christoffel & Gallagher, 2006). Injury prevention experts have determined that in order for any injury prevention intervention to produce successful results, it should be based on an underlying theory of behaviour change and combine at least two of the three “E”s of injury prevention, namely: Education, Engineering/Environment and Enforcement/Legislation (Klassen et al, 2000).

A Social Ecological Model provides an effective framework to plan and evaluate multiple components of injury prevention initiatives within the context of the whole system (Hanson et al, 2002). By using a Social Ecological Model, the intricate

relationship between individual, social, community and societal factors are considered in planning interventions (Thygerson, et al, 2008). Comprehensive multifaceted approaches using a combination of interventions across different levels of the Social Ecological Model are necessary to produce effective and sustainable results (BC Ministry of Health, 2007; Thygerson et al, 2008).

The public health approach to injury prevention considers the whole population. Epidemiologists realize that health outcomes are complex. They are not caused by one factor, but a combination of several factors. The epidemiological triangle is a model that helps explain this phenomenon by demonstrating the intersection between the host, agent and environment. Epidemiological concepts used to understand infectious diseases can be modified and applied to injuries. In injury research one considers the host (the individual who has been injured), the environment (the physical, social or political environment in which the host lives), the agent (energy including thermal, electrical or chemical energy causing bodily harm) and the vector (vehicle which transfers the energy to the host) (Peek-Asa, Dean & Kraus, 2005). With an understanding of the interaction between these factors, appropriate interventions can be introduced to prevent injuries.

|                          | <b>Host</b>   | <b>Agent</b>  | <b>Socio-Cultural Environment</b>  | <b>Physical Environment</b>   |
|--------------------------|---|---|--|---|
| <b>Pre-Injury Phase</b>  | Intoxicated driver<br>Fatigued Driver<br>Pedestrian crossing street<br>Elderly pedestrian<br>Pedestrian with osteoporosis | Speeding automobile<br>Worn tires<br>Momentum of automobile                     | Unenforced speed limit laws<br>Inadequate investment in crosswalks                 | Poor street lighting<br>Slick pavement<br>Potholes<br>Inadequate signage<br>Nighttime |
| <b>Injury phase</b>      | Pedestrian wearing headphones<br>Hearing impaired pedestrian<br>Part of pedestrian's body struck by vehicle               | Impact of automobile with pedestrian<br>Portion of vehicle impacting pedestrian | Good Samaritan laws  | Hospital nearby with specialty trauma care<br>Part of body impacting ground           |
| <b>Post Injury Phase</b> | Ability of victim to recover<br>Post-injury care received<br>Psychological coping of victim in aftermath of event         | Severity of physical injuries<br>Severity of post-event psychological impact    | Health insurance<br>Access to rehabilitation services<br>Family and social support | Rehabilitation facility   |

**Table 2: The Haddon Matrix: pedestrian injury (Barnett, Balicer, Blodgett, Fewes, Parker & Links, 2005)**

The Haddon matrix is a commonly used framework within injury prevention that uses the public health approach. The Haddon matrix examines the epidemiological interactions between the host, the agent, vector and both the physical and socio-cultural environment conditions. These factors are analyzed according to pre-injury phase, injury phase and post-injury phase in a table (table 2). The time frame used in the Haddon matrix corresponds with the three levels of prevention. This model was developed to analyze and plan prevention interventions for motor vehicle collisions and has since been used to plan interventions targeting several types of injuries (Christoffel & Gallagher, 2006). The Haddon matrix allows a planner to analyze an injury event from different angles and choose the most effective and efficient intervention (Christoffel & Gallagher, 2006).

The gap between what is known about the prevention of injuries and what is actually being done on the ground to prevent them is enormous (Christoffel & Gallagher, 2006). The theories presented above, while shown to be effective are often not utilized

on the ground. Public health tools are necessary to effectively close the gap between knowledge and action.

## **7: COMMUNITY BASED APPROACH TO INJURY PREVENTION**

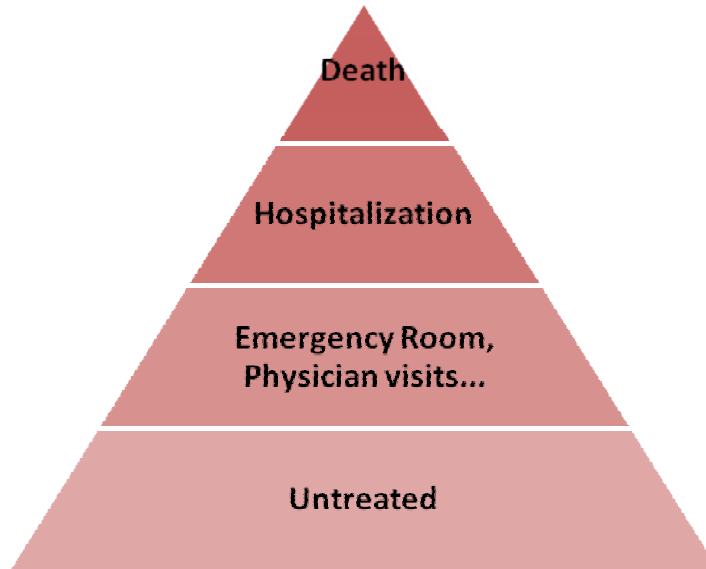
The community-based approach to injury prevention emphasizes community participation and multidisciplinary partnerships among local stakeholders in order to implement effective broad based interventions. If integrated into practice, communities in the Vancouver region have much to gain by implementing evidence-based injury-prevention strategies.

The success of community-based health programs are supported by several theories. The community organization model emphasizes the active participation of community members in developing, evaluating and solving health and social problems (Glanz, Rimer & Su, 2005). Community leaders understand the local culture and are thus able to ensure that injury prevention programs are tailored to meet the specific needs of the community (Gielen & Sleet, 2003). Additionally, the involvement of local residents enhances their capacity to address health related problems and instills a sense of community ownership and control of the program (BC Ministry of Health, 1998). Furthermore the empowerment model is based on the theory that involving the community in all stages of planning the intervention will enhance community capacity. Finally, the Health Promotion Framework addresses both behavioural and environmental change and thus can prove to be valuable in addressing injury problems (Gielen & Sleet, 2003). This approach is consistent with the conventional concept of the 3 E's of injury. It acknowledges that effective programs must intervene to change environments and products in addition to individual behaviour and community norms (Gielen & Sleet, 2003).

An injury prevention strategy should be supported by partnerships with all relevant agencies within the community. Partnerships are useful in enabling different interest groups to work together towards a common goal. Multiagency collaboration allows for the development of diverse and innovative programming by coordinating the expertise of different areas (Thygerson et al, 2008). An injury prevention team should be developed to coordinate prevention efforts within the community and share resources and data to expand and improve upon current initiatives (WHO, 2007; Thygerson et al, 2008).

Understanding the extent of injuries at the local level is essential in developing effective interventions. The major objectives of community level injury surveillance are to determine a pattern of injuries and monitor the impact of prevention efforts. Injury surveillance allows planners to understand the magnitude of the injury problem and identify high risk groups. It is estimated that for every death, there are dozens of hospitalizations, hundreds of visits to emergency rooms and thousands of doctor's appointments (WHO, 2007). Information such as emergency room visits, disability due to injury or visits to health care providers outside of the hospital setting is not available for all injury categories and all age ranges. The following injury pyramid represents the differences in incidents and severity of injuries.





**Figure 2: Injury Pyramid (BCIRPU, 2001)**

Accurate surveillance data, required to determine priorities and evaluate the success and cost effectiveness of injury prevention strategies, should include details such as the location where the injury occurred, the time of day in which the injury occurred, the time of year that the injury occurred and the activity that the individual was partaking in at the time of the injury (WHO, 2007; ICECI Coordination and Maintenance Group, 2004). The currently available data is incomplete according to these standards and therefore conclusions made are limited and subject to reservations regarding their ultimate accuracy.

The planning stage of any injury prevention program is vital for the success of the intervention - inadequate planning has been attributed to ineffective injury prevention and control programs (Howar, Jones, Hall, Cross & Stevenson, 1997). When developing an injury prevention strategy within a community, planners may choose between two approaches: a strategy which is broad targeting the population as a whole, or one that is specific, aimed at a high risk subgroup within the population or a specific injury issue. A broad-based approach to injury prevention does not target a specific problem but instead is intended to improve the safety of the entire community by focusing interventions at

environmental and behavioural determinants (WHO, 1998). On the other hand, the problem-oriented approach focuses on a specific injury-related issue based on community priorities (WHO, 1998). Regardless of the approach chosen, interventions should be theory based to enhance their design, analysis and interpretation (Nilson, 2007). Both specific and broad approaches to injury prevention are useful and a combination of the two should ideally be implemented within a comprehensive community level injury prevention plan.

Long term sustainability of interventions is necessary for efficacy; however, many community programs do not plan for the long term sustainability nor understand how to develop sustainable programs (Christoffel & Gallagher, 2006; Nilson et al, 2005; Nilson, 2004). The success of an injury prevention strategy is highly influenced by the availability of financial resources. Programs that are inadequately funded are unable to develop extensive interventions limiting their ultimate impact (Nilson et al, 2005). An infrastructure must be in place that is able to maintain the program beyond the end of a grant cycle or during times where internal funding is diminished due to competing priorities (Cassady et al, 1997). During times of limited funding, rather than continue focusing on large scale programs, smaller targeted programs which require less financial resources has been shown to be advantageous (Nilson et al, 2005). Additionally, “champions” are often influential in bringing forward injury prevention issues; however, programs that rely heavily on a small number of people are compromised if key individuals choose to leave (Nilson et al, 2005). Partnerships with political decision makers and representatives from local agencies on the other hand, are essential in ensuring program durability. Furthermore, the local context should be considered when planning programs; those that are adapted to the social and economic context and

evolve in response to changing local situations are more likely to be sustained over the long term (Nilson et al, 2005).

Regular evaluations of interventions are vital to the success of an injury prevention strategy. It provides the opportunity for planners to get a sense of the impact that their interventions are having at the community level and helps determine the next steps (BC Ministry of Health, 1998). Initially, planners will need to determine the extent of injuries in the community as well as the current injury prevention efforts in place within the region to serve as baseline data (WHO, 2007). Historically, community based injury prevention interventions have lacked rigorous evaluations and therefore there is currently a lack of evidence to support a community based approach to injury prevention (Spinks et al, 2004; Klassen et al, 2000). In order to overcome this shortfall, current community injury prevention initiatives must design and undergo properly conducted evaluations in order to guide the development of future community based interventions. In the meantime, several components have been consistently identified as essential for community based injury prevention programs namely: a) community participation, b) multidisciplinary collaboration and c) adapting interventions to local context.

Injury prevention has not been recognized as its own distinct entity and has not been developed as a profession. Therefore, there is no standard established template to be used in order to guide injury prevention strategies. Programs that are beneficial in improving the safety of communities are complex and must take into consideration contextual factors (Nilson, 2007). Successful interventions are multifaceted, comprehensive and based on available evidence and theory (Nilson, 2007).

## **8: BARRIERS TO IMPLEMENTING AN INJURY PREVENTION PROGRAM ON THE NORTH SHORE**

In order to identify current challenges to the effective implementation of an injury prevention strategy on the North Shore of Vancouver, interviews were conducted with local stakeholders including: local fire departments, police departments, recreational coordinators, public health officials, and municipal planners and engineers. Several themes were identified based on these interviews including: insufficient availability of injury data, a lack of awareness of the importance of injuries, an absence of accountability for injury prevention, inadequate resources to support injury prevention infrastructure and a lack of evaluation of current programming.

### **8.1 Lack of Surveillance**

While VCH currently does not have an injury surveillance system necessary to identify causes and factors associated with injury, one is in development. Data therefore must currently be collected from a variety of sources including VCH, BCIRPU, the British Columbia Coroners Report and British Columbia Vital Statistics. Other sources which may be useful include emergency room statistics and data from first responders including: police, fire and ambulance. Compiling data from several sources is not ideal as it may result in overlaps and/or inconsistencies in the results leading to difficulties in accurately analyzing the data.

Approximately half of interviewees identified the lack surveillance as a problem for the development of adequate programming. They felt that relevant data is inaccessible. Without this information, respondents are unable to identify priority areas

needing attention and cannot track the issues to determine the effectiveness of their programs.

## **8.2 Lack of Awareness**

Without adequate surveillance, the community is not alerted to the necessity for injury prevention. Many respondents were completely unaware of the magnitude of injury and felt that it was “off the radar.” Due to the lack of adequate data, it is not recognized as a critical issue and rather than develop long term sustainable programming, quick, reactive solutions are being implemented. The interviewees felt that the community as a whole was unaware of the issues related to injuries. When compared to other health related problems, the burden of injuries is unknown by local politicians and municipal workers. Without awareness, it is easy to understand why injury prevention has not been in the forefront of public health within the North Shore. Currently the North Shore is not focused on injury prevention. The few respondents from the community who are concerned and want to do something are unaware of the priority areas.

## **8.3 Lack of accountability**

Several respondents identified a lack of accountability as a major barrier for injury prevention initiatives on the North Shore. Currently injury prevention programs are “on the edge of people’s desk(s)” – injury prevention does not have its own committee or team: it is an add-on to many other programs and therefore does not get the attention it deserves. Without someone being mandated to take on a leadership role within injury prevention at the local level, it is difficult to put together an organizing committee and develop necessary interventions. Within the health authority, stakeholders feel that

there is a lack of support and direction from their superiors. Without the commitment of the health authority decision makers, injury prevention will not become a priority issue.

#### **8.4 Lack of Coordination**

In addition to a lack of leadership, organizations currently conduct similar injury prevention interventions in isolation. There is little collaboration or coordination between community agencies. Interventions would be more efficient and effective if developed in partnership with various organizations. While the North Shore has “interagency” committees tackling several community issues, including safety, injury has not been identified as a priority issue and no interagency committee has been developed. An interagency committee would be effective in combating the current lack of communication identified by local stakeholders. Without this sharing of information, cooperation and coordination will not exist between agencies. Many interviewees felt that the development of a coordinated, interagency injury prevention team on the North Shore is necessary to move forward and develop effective interventions. Stakeholders felt that the solutions to injury problems lie within the community.

#### **8.5 Lack of Resources**

The majority of respondents identified a lack of resources as a critical barrier. The main types of resources discussed included financial and personnel. Often funding for injury prevention programs were a “one shot deal” threatening sustainability. Health prevention funding is limited and many different prevention groups are competing for the same pool of money. Some programs have been lucky enough to obtain corporate sponsorship. Further exposure and increased awareness is necessary to increase such funding for future programs. In addition to a lack of funding, there is a lack of qualified personnel to carry out the programs. A lack of injury prevention specialists, as well as

high staff turnover, makes developing and implementing programs within the community difficult. In order to run effective interventions, a motivated and engaged staff is necessary.

## **8.6 Lack of Evaluation**

Finally, several respondents recognized that the current programs are rarely being evaluated. Presently no method is in place to measure the effectiveness of the current injury prevention interventions. Evidence based interventions require constant evaluation to ensure that they are being implemented as planned and that they are producing the intended results. Evaluation presents valuable information for program planners to use in order to improve upon the interventions and further reduce the burden of injury within the community. Currently, most injury prevention programs do not include an evaluation section within their budget and therefore there are limited funds to carry them out. Ideally, an evaluation framework should be developed during the planning stage of the program and funding for the evaluation should be included in the budget.

## **9: THE SAFE COMMUNITY MODEL**

### **9.1 The World Health Organization's Safe Community Model**

The World Health Organization's Safe Community Model was introduced in 1989 following a 23% reduction in total injury rates in a pilot project in Sweden and has continued to show effective results around the world (Spinks et al, 2004; Hanson, 2002). This model is a broad based, collaborative community level injury prevention framework with an emphasis on empowerment and community involvement (Spinks et al, 2004; Kopjar et al, 2000). The Safe Community model is not an actual program, but an organizational strategy. Rather than provide a "recipe" for effective injury prevention programs, the Safe Community Model encourages the local community to be involved in defining its problems and finding the appropriate solutions (Hanson, 2002). Ongoing commitment to injury prevention and organizational infrastructure for sustainability are essential for a community to be designated a WHO Safe Community (Hanson, 2002).

There are six indicators in the World Health Organization Safe Community Model (Safe Communities Canada (SCC), 2007):

#### The Indicators of International Safe Communities

1. An infrastructure based on partnership and collaborations, governed by a cross sectional group that is responsible for safety promotion in their community
2. Long-term sustainable programs covering both genders and all ages, environments and situations
3. programs that target high risk groups and environments and programs that promote safety for vulnerable groups
4. Programs that document the frequency and causes of injuries
5. Evaluation measures to assess programs, processes and the effects of change
6. Ongoing participation in National and International Safe Community Networks



Evaluations of safe communities worldwide have demonstrated positive results when measuring awareness of injury prevention, safety related behaviour and reductions in injury related hospitalizations (Coggan et al, 2000). Such results should encourage other communities to apply this framework. However, because only a few evaluations are publically available, it is important to understand which characteristics are associated with the success of this model. It has been suggested that the combination of top-down with bottom-up approaches is the defining characteristic of the safe community model (Day, 2002). While this model requires local political support and organizational collaboration, priorities are set and the program is implemented with the involvement of local citizens (Day, 2002). The capacity of the local community is developed and their ability to tackle future problems is enhanced. The safe community model does have its limitations; specifically this concept is merely an organizational structure that does not propose the use of evidence or theory in the development of interventions (Kopjar, et al, 2000). A community should try to use proven interventions in order to further enhance their chances of success, but with a limited base of evidence to choose from, this is not always a simple task.

## **9.2 Safe Communities Canada**

In 1996, Paul Kells founded the Safe Communities Foundation, after the tragic loss of his son, Sean, in 1994 (SCC, 2009). In 2006, the Safe Communities Foundation took on a new name, *Safe Communities Canada*, a new logo and a new motto, Dream, Dare, Do (SCC, 2009). Since inception in 1996, *Safe Communities Canada* has designated 55 Safe Communities in Canada, 42 of whom remain active members of the national network of Canadian Safe Communities. Furthermore, currently 5 candidate communities are in the process of completing the designation process. Meeting *Safe*

*Communities Canada's* requisites is a stepping stone towards international designation as a WHO Safe Community. *Safe Communities Canada* has methodologically designed its process for designation to be in line with the international model. Several of the requirements of designation as a Canadian Safe Community, therefore, overlap with the requirements of the WHO. The eight criteria that are common to both *Safe Communities Canada* and the WHO Safe Community model include: community infrastructure, community participation, sustainability, program variety, priority populations, program evaluation, impact and effectiveness, and community engagement (SCC, 2007).

The following ten steps required for designation as a Canadian Safe Community are based on the four attributes of leadership, priority setting, sustainability and community engagement:

**Leadership:** "A Leadership Table comprised of specific community organizations and individuals to assume a position of leadership focused on injury prevention and safety promotion" (SCC, n.d).

Step One:

The Candidate Community must create a formal Safe Community Leadership Table. Membership at this table will include: local government, public health, police, fire, emergency services, educational institutions, local businesses, health and safety organizations and any other individuals and organizations which are taking a position of leadership on issues of injury prevention and safety promotion in the community.

Step Two

The Safe Community Leadership Table must adopt formal Terms of Reference, appoint an executive with co-chairs or equivalent, and present a succession plan.

Step Three

The Safe Community Leadership Table must document that it has made a concerted effort to involve all community stakeholders in its formation. (SCC, 2007)

**Priority Setting:** "Intervention programmes based on systematic processes and methodologies for establishing priorities" (SCC, n.d)

Step Four

The Safe Community Leadership Table must initiate and complete a formal safety priority-setting exercise which conforms to the model adopted by Safe Communities Canada.

Step Five

Activities focusing on injury prevention and safety promotion in the community which are championed by The Safe Community Leadership Table must reflect the safety priorities established by this exercise.

Step Six

The Safe Community Leadership Table must demonstrate that it has built an assessment process into all activities it champions.(SCC, 2007)

**Sustainability:** “An operating budget which demonstrates sustainability and administrative capacity” (SCC, n.d)

Step Seven

The Safe Community Leadership Table must create and fund a budget to oversee its operations. This budget should demonstrate a reasonable expectation of continuing sustainability.

Step Eight

The Safe Community Leadership Table must retain or receive (in-kind support) the services of a paid coordinator to administer its initiatives.(SCC,2007)

**Community Engagement:** “A comprehensive and thoughtful plan to inform the community of injury prevention and safety promotion priorities of The Safe Community Leadership Table, and to involve community members in its intervention strategies” (SCC, n.d)

Step Nine

The Safe Community Leadership Table must develop a comprehensive strategic plan to inform the community-at-large of its injury prevention and safety promotion priorities.

Step Ten

The Safe Community Leadership Table will commit to play a meaningful role in the safety and well-being of its community, and in the activities of Safe Communities Canada and to participate in the national network as a designated member of Safe Communities Canada (SCC, 2007)

*Safe Communities Canada* designed the Attributes of a Canadian Safe Communities such that they evolve into the previously mentioned Indicators of International Safe Communities.

Designation as a Safe Community in Canada offers several benefits. Candidate communities have access to the resources available on the Safe Communities website. The priority setting exercises are facilitated through the use of structured templates or, if

preferred, a member of the Safe Communities network can facilitate the event. Once designated as a Safe Community, *Safe Communities Canada* provides a onetime grant of \$5000 at the community's official launch ceremony, an official email address, assistance with the development of a website and help with branding and design of logos, letterheads and business cards. In addition to being a part of a network of national and international communities, a designated Safe Community has access to various workshops, conferences and courses provided by *Safe Communities Canada*.

Published literature regarding the effectiveness of *Safe Communities Canada* is limited; however, annual National Report Cards demonstrate that *Safe Communities Canada* is effective in changing attitudes and behaviours regarding injuries in communities across Canada. The National Report Card is based on annual on-line surveys completed by the communities in order to determine their compliance with the Attributes of Canadian Safe Communities. This process evaluation is essential as these attributes are related to the effectiveness of community-based injury prevention programs. The information obtained by the National Report Card is used to benchmark the effectiveness of the entire *Safe Communities Canada* program and allows each community to see how they compare. The impact that *Safe Communities Canada* has on injury rates may be difficult to obtain due to limitations in surveillance. Currently a longitudinal study of several Safe Communities in Ontario is underway to obtain information regarding the effectiveness of the framework. Worldwide, the designation of a Safe Community demonstrates the community's understanding that in order to effectively prevent injuries and promote safety in a community setting, local organizations and citizens work together.

## **10: RECOMMENDATIONS**

Injury prevention needs to become a priority within VCH and within the community at large in order for the effective implementation of injury prevention interventions. A leader in injury prevention who will be responsible for overseeing injury prevention efforts across the North Shore must be hired. Without such a person, injury prevention will continue to be under represented.

With leadership and vision, the North Shore must develop an injury prevention team. Such a team should involve all local stakeholders working together in order to create meaningful and effective community based interventions. By increasing communication between local organizations, an injury prevention team can enhance collaboration and coordination of different programs increasing their efficiency and effectiveness.

Access to injury data continues to be a struggle for those working in the front lines. Injury surveillance needs to be improved at the local level and information obtained from the system must be disseminated to local injury prevention partners. The BCIRPU is able to assist local communities in obtaining relevant local data. The data should then be used in order to identify priority areas needing attention and develop programs targeting these priorities.

The core functions framework in unintentional injury prevention is a good framework that was developed for use at the health authority level. The components identified in the model core program paper are essential for successful injury prevention; however, it has not yet been used or evaluated. The Safe Communities model is

currently the most well known community based injury prevention framework and is used around the world. The ten steps required to be designated a Safe Community are necessary to develop an effective injury prevention plan. *Safe Communities Canada* provides a framework with which to work with in order to develop a locally appropriate plan. This model does not guarantee success, but it forces a community to come together, agree on their priorities and collaborate in order to develop their own injury prevention program. Programs developed within this strategy; however, will not be effective unless they are developed with the use of appropriate theory and then adapted to meet the local needs of the North Shore community. The North Shore should combine the six components highlighted in the model core program paper with *Safe Communities Canada's* framework. The BCIRPU is an excellent provincial resource which is mandated to help support community injury prevention initiatives and should be contacted to assist in the development of an injury prevention strategy on the North Shore.

With collaboration between the health authority and local governments and organizations, injury prevention needs to become a priority on the North Shore. A comprehensive, evidence-based strategy which builds on the successes of current programs and is based on the community's priorities is needed to ensure that the North Shore remains a safe place in which to reside.

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