

**ONTARIO
REGIONAL
INJURY
DATA
REPORT**

Evidence
Informed
Practice
Recommendations

Overview

In April, 2013, the Ontario Injury Prevention Resource Centre released the Ontario Regional Injury Data Report. The report presented the most common causes of injury in each Ontario region (Central East, Central West, Eastern, South West, Northern and Toronto) in terms of emergency room visits, hospitalizations and deaths. The regional reports contained recommendations pertaining to the most common causes of injury in each respective region. The following document is a compilation of all evidence-informed practice recommendations prepared for each region. By combining each of the evidence-informed recommendation sections into one document, injury prevention practitioners will have access to prevention strategies for the most common causes of injury across the province, in addition to the strategies provided in the individual regional reports.

In accordance with the most common causes of injury in Ontario, evidence-informed practice recommendations have been prepared on the following topics: falls, off-road vehicles, on-road vehicles, pedestrian incidents, unintentional poisoning, suffocation and breathing related incidents, sports and recreational injuries, suicide, and violence.

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Evidence-Informed Practices for Prevention of Falls

Overview

Falls are a major contributor to unintentional injury. In fact, fall-related injuries account for 31% of the total estimated cost of injuries in Canada, or \$6.2 billion (SMARTRISK, 2009). Injuries can happen at any age and fall prevention across the lifespan is an important goal for public health and injury prevention practitioners. Research indicates that children and older adults¹ are at the greatest risk for falls (IMPACT, 2005). Among children, falls are responsible for more than 60% of hospitalizations and emergency room visits (Khambalia et al., 2006). Among adults aged 65 and over, falls account for 85% of injuries resulting in hospitalizations and are related to 40% of nursing home admissions (Scott, 2012). This report will present information on fall risk factors across the lifespan and evidence-informed practice recommendations for fall prevention. There is an emphasis on risk factors and recommendations for children and older adults, as these groups are most at risk for debilitating injury due to a fall.

Understanding Risk Factors

As we age, changes occur in individual behaviour and environmental-related risks. For this reason, it is important to describe risk factors according to life stage.

Fall Risk Factors by Age

Children

The following characteristics define the population of children at increased risk for falling (IMPACT, 2005; McKay et al., 2011):

- Boys (greater risk than girls)
- Younger children (age 0-6)
- Low socioeconomic status

The following factors apply to all children and increase fall risk:

- Natural curiosity that leads to environmental exploration

¹ As a number of sources were synthesized in preparing this document, the age range used to define children and older adults varied, thus, it has not been defined in our summary. Please refer to the original sources for information regarding the specific ages in each study or resource.

- Playing on equipment that is too tall or improperly maintained
- Playing near windows, stairs or furniture

Teens

Risk factors for falling include (Ontario Injury Prevention Resource Centre, 2008):

- Increased risk taking behaviour combined with a sense of being 'invincible'
- Alcohol and drug use
- Unsafe work conditions
- Participation in sport and recreational activities

Younger and Middle-aged Adults

Risk factors for falling in this age group are related to (Ontario Injury Prevention Resource Centre, 2008):

- Individual differences in risk-taking behaviour
- Alcohol and drug use
- Unsafe work conditions
- Environmental hazards such as snow, ice, uneven sidewalks, unsafe stairs

Older Adults

Fall risk factors in older adults tend to be described in four categories (Scott, 2012):

Biological

- Mobility impairment
- Chronic health conditions
- Visual impairments
- Acute illnesses

Behavioural

- History of falling
- Fear of falling
- Interaction of multiple medications
- Lack of exercise
- Poor nutrition

Social/Economic

- Living alone
- Lack of social support
- Lack of appropriate transportation

Environmental

- Building maintenance
- Home hazards (e.g., lack of grab bars)
- Presence of floor mats or uneven surfaces

Evidence-Informed Practice Recommendations

In order to address specific risk factors at different life stages, the most effective fall prevention strategies differ by age group. Resources for fall prevention research have been allotted according to the segments of the population that are at the highest risk and account for the greatest burden. Thus, evidence-informed recommendations are widely available for children and seniors. The research is not as comprehensive for younger and middle-aged adults. The best available research evidence is summarized in the following recommendations, according to life stage.

Children

Evidence-informed recommendations for fall prevention in children tend to relate to two main themes, home hazards and playgrounds.

Home Hazards

1. Parents are largely responsible for ensuring that children are not exposed to fall risks. Research indicates that educating parents about fall risks in their homes can help to prevent falls in children. This has been referred to as ‘anticipatory guidance.’ Paediatricians and family practice physicians can provide this guidance through their interactions with new parents. Other health professions can interact with parents through home visits or public education programs (IMPACT, 2005).
2. Windows and stairs are common locations for falls. Window guards, which prevent a window from being opened wide enough for a child to fit through, are an important fall prevention strategy (must comply with fire safety standards) (IMPACT, 2005; MacKay et al., 2011). Similarly, stair guards are also recommended. Pressure mounted stair gates (as opposed to wall mounted) should not be used at the top of stairs because they loosen over time. Research indicates that socioeconomic status and parental knowledge are barriers to the use of both window and stair guards. Community programs that provide and install window and stair guards help increase their use.
3. Other high-risk areas in the home include change tables, furniture placed near windows or balconies, and car seats set down on top of furniture (Parachute, 2013). Parents should be informed of these risks and the steps that can be taken to prevent falls, such

as active supervision, keeping one hand on a child while using a change table, placing all furniture away from windows and balconies and setting car seats down on the floor (never on top of furniture).

Playground Hazards

1. Playground falls are related to the height of the equipment, the surfaces in place to absorb a fall, and the quality of adult supervision. The Canadian Standards Association (CSA) has compiled a list of guidelines for playground safety related to heights and surfaces. Evidence indicates that having a maximum height of 1.5 metres for play equipment can reduce paediatric emergency room visits by 45% (IMPACT, 2005; MacKay et al., 2011). Thus, the CSA recommends that structures not exceed 1.5 metres. Safe Kids Canada (now part of Parachute) has recommended following the 'five and five rule'; a child under the age of five should not play on equipment taller than five feet. In terms of surfacing, research shows that wood chips and sand are the most effective surfaces for absorbing falls and preventing injury (McKay et al., 2011). CSA recommendations specify depths and surface types depending on the height of the equipment.
2. In addition to a playground's physical characteristics, active supervision is extremely important for fall prevention. Supervising at a close distance and ensuring play equipment is appropriate for children's' ages and abilities are fundamental to preventing injuries due to falls.

Teenagers

Fall risks for teenagers relate to developmental characteristics at this stage of life, and involvement in sport or recreational activities. Recommendations to reduce fall risk include:

1. Interventions that address risk-taking behaviour and promote developmental assets or "the building blocks of healthy development"(Search Institute), including risks involving alcohol and drug use.
2. Interventions that educate teens about proper use of equipment and fall risks during sports/recreational activities (Ontario Injury Prevention Resource Centre, 2008).

Younger and Middle-Aged Adults

For younger and middle-aged adults, fall prevention recommendations include (Ontario Injury Prevention Resource Centre, 2008):

1. Interventions addressing risk-taking behaviour, especially related to alcohol and drug use.
2. Interventions addressing safety during sports and recreational activities (e.g., proper use of equipment).
3. Education about safety outdoors.
4. Education about the importance of life long participation in physical activity.

Older Adults

Fall prevention in older adults has been extensively researched. The overarching recommendation for fall prevention programming is that an older adult should be assessed for fall risk and prevention should be tailored to reducing or minimizing the impact of those risks (American Geriatric Society, 2010). There are many easily administered and validated assessments available to identify high-risk individuals (e.g., Five-step Test, Timed-up-and-go Test, Scott Fall Risk Screening Tool). More information on assessments can be found in the Canadian Fall Prevention Curriculum (Scott et al., 2007). After an assessment is conducted, the risk factors to target during an intervention can be determined. As mentioned, interventions should match the identified risks of the individual. Interventions have been implemented in both community and residential settings.

Recommended strategies for a *community* level multifactorial intervention include: assessment and modification of the home environment for individuals with a high risk of falling, exercise programs that improve balance and gait training, appropriate use of assistive devices such as anti-slip shoes, proper medical attention for any foot problems, management of visual concerns, management of postural hypotension, and stopping or minimizing the use of psychoactive medication (American Geriatric Society, 2010). Similarly, components of a multifactorial intervention in a *residential* setting include: environment modification, creation of a multidisciplinary team, creation of individual fall prevention plans for those at high risk, assessment of appropriate use of assistive equipment, vitamin D supplementation where required, and exercise programming (American Geriatric Society, 2010).

Fall prevention strategies should form part of an overall plan for communities or facilities that reflects a comprehensive approach to fall prevention. Two of the most widely recognized evidence-informed plans for fall prevention include the BEEACH model, and the Stay on Your Feet program.

1. The **BEEEEACH model** (Scott, 2012) identifies seven factors that are necessary to bring about behaviour change and ultimately prevent falls in all settings.

Behaviour change is the common goal of fall prevention strategies. All individuals involved in the program (adults, staff, etc.) must buy in for this to happen. **Education** involves increasing awareness of the issue, increasing understanding that prevention is possible and promoting effective strategies. **Equipment** describes the importance of having access to and properly using assistive devices such as mobility aids or hip protectors. **Environment** refers to the assessment and modification of environmental hazards to reduce fall risk (e.g., remove tripping hazards such as floor mats). **Activity** describes the importance of participating in physical activity and social situations to maintain good physical and mental health. **Clothing and footwear** are important considerations because sometimes they can contribute to loss of balance (while dressing), tripping (pants too long) or slipping (slippery soles on shoes). Lastly, **Health Management** involves strategies such as: monitoring medications to minimize drowsiness; adopting good sleep habits; regular vision care and appropriate use of corrective lenses; and monitoring and maintaining good bone health.

2. **Stay on Your Feet** is an evidence-informed approach for community level fall prevention, which recommends creating a hub or ‘umbrella’ of all fall prevention programs and resources (Barnett et al., 2004). This would be accomplished by hiring a ‘stay on your feet’ community coordinator. The coordinator would oversee the following initiatives:
 1. Public information and awareness (e.g., distribute prevention materials to community)
 2. Community education and skill development (e.g., develop media campaigns about fall issues and workshops)
 3. Partnerships with health care professionals (e.g., provide resources and educational materials to physicians, nurse practitioners and community health nurses)
 4. Community policy development (e.g., develop guidelines to assist local governments in taking fall prevention measures)
 5. Home safety/hazard reduction (e.g., engage other local partners to conduct home safety assessments using a checklist)

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Evidence-Informed Practice Recommendations: Preventing Injuries Related to Off-Road Vehicles

Overview

Injuries related to off-road vehicle use are common in Ontario. According to the Ontario Injury Data Report, off-road vehicles were related to more than 19,000 emergency room visits and more than 1,800 hospital admissions (Ontario Injury Prevention Resource Centre, 2012). The 'off-road vehicle' injury category in the Ontario Injury Data Report included all-terrain vehicles (ATVs), watercrafts, air transport and trains/railway-related injuries. While each vehicle was involved in the overall burden of injury to a certain extent, it is particularly noteworthy that ATVs were responsible for more than 80% of emergency room visits in this category. Furthermore, the Canadian Institute for Health Information (CIHI) reported that in 2004-2005, there were 4,104 hospitalizations in Canada related to ATV use, and this rate increased during the years of the study, despite a decrease in overall ATV sales (CIHI, 2007). These data outline the magnitude of the problem, and further demonstrate that injuries related to ATVs have increased dramatically. Injury prevention practitioners can play an important role in improving safety related to off-road vehicle use, especially ATVs.

The following report will focus on risk factors and prevention related to each of the aforementioned off-road vehicles; however, it is beyond the scope of these recommendations to cover the safety procedures related to air travel, thus, it will not be included. In addition, an emphasis will be placed on ATVs, given that these vehicles are related to the overwhelming majority of off-road injuries.

ATV Injuries

Risk Factors

A number of factors have been linked to ATV injuries. In terms of gender differences, data shows that males experience more injuries than females (Yanchar, 2012). Children younger than age 16 are also at risk, as more than one third of all ER visits and over half of ATV deaths are in this age group (Yanchar, 2012). A number of factors are likely responsible for these trends; youth have less experience operating powerful vehicles, may lack the physical strength to properly control the vehicle, and are still developing cognitive and motor skills that are important for safe operation. Lastly, the majority of ATV injuries occur on paved roads and involve a collision with another vehicle (Yanchar, 2012).

Prevention Strategies

Strategies to prevent ATV injuries can be classified into three categories: legislation, education and engineering.

Legislation

The Canadian Paediatric Society has suggested policy related recommendations for improved ATV safety. Specifically, it was recommended that youth under the age of 16 not be permitted to drive ATVs, as younger people lack the physical strength, driving experience, cognitive development and motor skills required to safely operate these vehicles (American Academy of Pediatrics, 2000; Yanchar, 2012). Other policy-related recommendations included: mandatory helmet use on both public and private property, mandatory training for drivers, and prohibiting children from riding as passengers (Yanchar, 2012). Lastly, it was recommended that three-wheeled vehicles be banned, given their inherent instability and increased injury risk.

Education

Education highlighting the high risk of injury with ATV use is important. Education efforts should target parents, drivers and the community. Paediatricians can educate parents about situations and conditions known to create a high risk of injury such as: a driver younger than 16, being a passenger, not wearing a helmet and driving on paved roadways (Yanchar, 2012). ATV owners need to be aware of the risks involved with driving at high speeds, as many reported crashes are due to speeds in excess of what the road or trail conditions allow for. It is also very important to educate all ATV users about the dangers of driving their vehicle under the influence of alcohol or other drugs. Parents should not only emphasize these safety behaviours, but demonstrate them too, because children are likely to learn safety standards through their parents' actions (Morrongiello, Corbett, & Bellissimo, 2008). Lastly, ATV clubs and manufacturers could contribute to safety education and promotion.

Engineering

A number of strategies have been recommended to make ATVs safer. These include: seatbelts, headlights that automatically turn on when the vehicle is in use, speed governors, a design that discourages passengers, and the inclusion of a roll bar to prevent a driver from being crushed in the case of a roll-over (American Academy of Pediatrics, 2000).

Boating Injuries

Risk Factors

According to the Canadian Red Cross (2009), 1,952 deaths between the years 1991 and 2000 were linked to boating. Further, boating incidents were found to be associated with 39% of drowning fatalities. Males aged 15 or over account for the majority of injuries and fatalities. In addition, alcohol use while operating a watercraft or having passengers that are drinking alcohol is a known risk factor. The Canadian Red Cross reported that between 1991 and 2000, 41% of boating incidents involved alcohol. Data also suggest a disproportionate number of boating fatalities among Canadian Aboriginal people (Canadian Red Cross, 2009). Other risk factors include cold water, high speeds, operating a small powerboat and not wearing a floatation device (O'Connor & O'Connor, 2005).

Prevention Strategies

In terms of prevention, education is an important strategy. There would be value in promoting basic boating safety principles such as the importance of wearing a flotation device, proper planning for weather and water conditions, and safe handling of the watercraft. Oftentimes, injuries occur when basic safety is neglected (Canadian Red Cross, 2009). Education efforts should be directed at boaters through safety courses, and at the community in general. Other goals of safety education could be to raise awareness regarding the high number of injuries that occur when alcohol is involved. To that point, enforcement and environmental strategies related to reducing alcohol use while boating are important. Enforcement also applies to licensing; boaters must have a valid operating card obtained through completion of a safety course. These safety courses should be evaluated and updated regularly.

Rail Safety

Risk Factors

According to Canadian data, approximately 100 people are killed annually as a result of railway-related injuries (Safe Kids Canada, 2004). In 2011, there were 169 collisions at railway crossings that resulted in 25 deaths and 21 serious injuries (Operation Lifesaver, 2011). When considering incidents involving trespassing on railway tracks, there were 45 fatalities and 21 serious injuries (Operation Lifesaver, 2011). Risk factors include participating in high-risk behaviours such as playing near tracks, trying to climb aboard a moving train, or ignoring signs at railway crossings. In addition, males experience a greater

risk than females. Environmental risk factors relate to weather conditions such as poor visibility or poor road conditions.

Prevention Strategies

Around the issue of rail safety, it is important to generate awareness regarding the dangers involved in ignoring crossing signals and trespassing on train tracks. Fatalities and injuries that occur as a result of being hit by a train are preventable if rules are followed, and communities need to be educated about the danger presented by rail operations and reminded about safety rules. Operation Lifesaver is a leader in rail safety education, providing sessions for students and professionals of all ages. More information is available through their website: <http://www.operationlifesaver.ca/>.

Safe Kids Canada (now part of Parachute) (2004) prepared a community resource outlining prevention strategies. In this report, the following recommendations were included:

- Targeting risk-taking behaviour among teens and young adults.
- Raising awareness around the risks of trespassing.
- Teaching children about rail safety.
- Environmental modifications to limit access to railways and railway crossings (e.g., controlled pedestrian crossings, fencing, automatic gates at all crossings).
- Ensure crossing guards are present before and after school.
- Work with law enforcement to raise awareness and improve enforcement of laws prohibiting illegal crossings and trespassing.

It is also important to note that some of the trespassing-related injuries and fatalities may have been related to suicide. For more information on suicide prevention, please see the practice recommendations included on this topic.

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Evidence-Informed Practice Recommendations for the Prevention of

On-Road Injuries

Overview

On-road incidents are a leading contributor to unintentional injuries and in turn this important public health issue has gained a great deal of attention both nationally and internationally (Government of Canada, 2011). In fact, 2011 was the Canadian Year of Road Safety (Government of Canada, 2011) and in May 2011 the World Health Organization (WHO) launched the Decade of Action, which is a global initiative aimed at preventing five million road traffic deaths by 2020 (World Health Organization, n.d.). It has been estimated that more than one million people die on roads globally every year and that 20 to 50 million people are injured (Government of Canada, 2011; WHO, 2011).

In 2009, Canadians suffered 2,209 fatalities on our nation's roads and 11,451 injuries required hospitalizations, which, although are declines from previous years, are still shocking numbers that deserve relevant and timely programming initiatives (Government of Canada, 2011). According to the Ontario Injury Data Report, on-road incidents led to more than 130,000 emergency room visits and 8,000 hospitalizations between fiscal years 2007/2008 and 2008/2009 and more than 3,000 deaths between 2001 and 2005 (Ontario Injury Prevention Resource Centre, 2012). The most recent Canadian Economic Burden of Injury report revealed that road related incidents (i.e., transport incidents) cost the Canadian economy roughly \$3.7 billion in 2004 (SMARTRISK, 2009).

Please note that depending on the document, on-road incidents are defined differently and include various injuries and ICD-10 codes. For example, some reports include pedestrian-related injuries and some do not. The ICD-10 codes used to define on-road for the Ontario Regional Injury Data Report (ORIDR) and Ontario Injury Data Report (OIDR) can be found in the associated summary documents.

Risk Factors

As almost everyone is a road user of some form, be it a driver, passenger, cyclist or pedestrian, numerous risk factors require consideration. Key risk factors, as related to Canadians and the injuries included in the OIDR and ORIDR on-road injury sections, are described below.

Factors influencing exposure to on-road incident risk

Various factors influence one's exposure to risk from road-related injuries. One important contributing factor is motorization (i.e., the amount of vehicles), as there is a positive correlation between number of vehicles on the road and number of injuries. Additionally, age plays a role in exposure to risk, with young Canadians being most at risk for exposure to road-related injuries. Planning is another risk factor that influences exposure. Specifically, when urban planning of roads is not thoroughly thought out ahead of time, the result can be a mixture of heavy traffic in highly populated areas, leading to increased risk of on-road injuries. Additional risk factors that increase one's exposure to on-road risk include an increasing need for travel and use of less safe forms of travel. For more information, please see WHO, 2004.

Factors influencing involvement in an on-road incident

Various factors influence one's likelihood of being involved in a road-related incident. These include excessive speed, driver impairment, driver inexperience, driver fatigue, driver inattention, poor visibility (caused by environmental factors, vehicle factors and human factors), specific aspects of vehicles (e.g., maintenance and handling) and road design (e.g., maintenance and layout). Additionally, being younger in age and male is also a risk factor that increases one's likelihood of being involved in a incident, as the incidence rate among male drivers aged 16-20 years of age has been found to be roughly three times that of male drivers over the age of 25. Weather and time of day are also risk factors that influence incident involvement, with poor weather conditions and/or travelling at night/in darkness contributing to an increased likelihood. For more information, please see WHO, 2004.

Factors influencing on-road incident severity

Various factors influence the severity of on-road incidents and the resulting injuries. One major risk factor is the availability and use of in-car protection measures (i.e., whether for not a road user has and is appropriately using seatbelts and air bags). Other risk factors include excessive speed, vehicle type and roadside objects. Child specific risk factors in this category include the improper use of child car seats and booster seats. For more information, please see WHO, 2004.

Factors influencing post on-road incident severity and recovery

Finally, there are factors that influence the severity of injuries after incidents and recovery rates for injured individuals. One initial risk factor is the response time and quality of response to the on-road incident, with slower response times and lower quality response

leading to increases in injury severity and mortality. Additionally, type of vehicle, size of vehicle, and materials involved (e.g., debris from road such as signage and loose materials in vehicle) in the on-road incident are important risk factors. Finally, there are care-related factors, including quality of care received at the incident and in hospitals/care centres, access to trained medical experts, access to equipment and general access to after care or rehabilitation. For more information, please see WHO, 2004.

Evidence-Informed Practice Recommendations

The need for prevention measures directed at on-road related injuries has been recognized on a global level, as indicated by the previously mentioned Decade of Action and Canadian Year of Road Safety. In turn, numerous prevention strategies have been developed and implemented, focusing on a variety of target issues. Given the multifaceted nature of on-road injuries and the related risk factors, there are strategies that apply differently to various segments of the population and examples of these will be outlined below. Many of these practice recommendations do not include specific campaign examples, but rather outline tools and strategies that have been found to be successful within road safety campaigns.

Population Level

According to the World Road Association, there are various types of road safety campaigns that can work to inform, persuade and motivate individuals to change their behaviours and beliefs around road safety (World Road Association, 2012). These various approaches can be implemented on a population level and also tailored to focus on specific groups of interest. These approaches include **communication campaigns, integrated campaigns, social marketing pieces and supporting activities** (World Road Association, 2012). Each campaign type presents unique ways to target and work with the population around road safety. The supporting activities are extremely important and should be included in all road safety strategies, as they have been proven to increase success. Supporting activities tend to focus on the 'three Es' of injury prevention; **enforcement, education and environment**, which when combined contribute to behaviour change. Overall, a well-planned campaign around road safety should be multifaceted in nature, in order to target the various risk factors associated with on-road injuries. For example, a campaign should include work involving legislation and the associated enforcement agencies, coupled with education around the issue and a promotion of environmental changes, which combined, may help to reduce on-road injuries among the population of interest. It is up to each community/practitioner to decide which aspects of each campaign type and supporting activities best target the road-related issues they are facing. For more information on any of the aforementioned campaign approaches, please see World Road Association, 2012.

Individual Level

As outlined above, there are various factors that contribute to on-road related injuries and many of these exist on an individual level. In turn, there are numerous individual-level practice recommendations, which will be outlined below. Please note that this is not an exhaustive list of individual-based practice recommendations. Practitioners should work to evaluate and understand the specific needs of their community when working to design road-safety campaigns.

Distraction / Inattention

Distracted driving and driver inattention have received considerable focus in recent years, mainly due to the role they have on road-related injuries and fatalities. The Canadian Council of Motor Transport Administrators (CCMTA) has developed a strategy focused on distracted driving, which highlights five key elements for managing distracted driving; **1) data collection, research and monitoring** (to effectively track and report on the issue), **2) public education and awareness, 3) legislation and regulations, 4) self-regulation and voluntary agreement, and 5) enforcement** (CCMTA, 2006). It is important to note that in order to fully target driver distraction, a campaign should work to include all of these elements and ensure that key partners have been included and assigned relevant roles. For more information on this strategy and for further examples, please see CCMTA, 2006.

Fatigue

Fatigue is often not thought of as a major road safety issue, but research demonstrates that roughly 20% of fatal collisions involve some form of driver fatigue (Government of Canada, 2011). As this issue has yet to receive a great deal of attention, the main goal of a campaign should be to increase driver awareness of this issue and provide practical steps and environmental supports for drivers (e.g., signage reminding drivers to not drive fatigued and of rest stops) who may face fatigue. Educational materials should recommend that drivers always sleep well, share driving responsibilities where possible, stop or nap at rest areas, avoid heavy meals and stay hydrated while driving (Government of Canada, 2011). Some communities have implemented roadside signs that remind drivers of the dangers of driving while fatigued and draw attention to exits where tired drivers can stop (Government of Canada, 2011).

Aggressive driving

Aggressive driving encompasses various driver behaviours such as impatience, speeding, tailgating, quick and continuous lane changing, and failure to obey the common rules of the road. Speeding alone has been found to contribute to roughly 27% of fatalities and 19% of serious injuries (Government of Canada, 2011). Various practices have been found to be effective in reducing specific aggressive driving behaviours, including: speed enforcement

on roads, speed cameras, legislation (e.g., driver sanctions and vehicle impoundment), and red light cameras (Government of Canada, 2011). Additionally, practitioners should continue to focus on raising the profile and awareness of the dangers of aggressive driving. Efforts should include various communications directed at the aggressive behaviours that are problems within their communities and practical tools (e.g., calming techniques and road side signage reminding drivers to stay calm or where rest stops are for them to take a break) to help drivers control their emotions when they are behind the wheel.

Seatbelts

One of the most well known evidence-based practices for preventing on-road injuries is the use of seatbelts. In fact, when correctly worn they can reduce the risk of fatalities in an on-road incident by 47% and the risk of serious injury by 52% (Government of Canada, 2011). Ontario has legislation that requires all vehicle occupants to wear seatbelts, which provides a strong footing for evidence-based programming. Specifically, programming focused on seatbelt use should use legislation and enforcement to their advantage and design tools that remind the public of the legal requirements and the consequences of not buckling up. There are specific measures that practitioners can apply to increase the effectiveness of these campaigns, including: combining incentive programs with enforcement programs (e.g., rewarding good behaviour – this approach was taken in Quebec in the 1980s), feedback signs on the road (e.g., signs showing the actual use rate which are changed daily), employer support for seatbelt use, and education tools that incorporate important influencers, such as parents and siblings (Government of Canada, 2011). Additionally, *Selective Traffic Enforcement Programs (STEPs)*, (e.g., “seatbelt blitzes”) can use heightened enforcement measures during key times (e.g., holidays) to bring attention to the issue; practitioners should work with their local agencies to organize these within their area.

Alcohol and other drugs

Impairment while driving is all too common in today’s society. In fact, 2008 data demonstrated that roughly 40% of drivers who were fatally injured on the road had consumed alcohol before the incident (Government of Canada, 2011). Similarly, drugs are found in roughly one-third of fatally injured drivers (Government of Canada, 2011). The Criminal Code of Canada includes provisions that are designed to help law enforcement detect and charge for impaired driving. When attempting to implement evidence-based practices around this issue, practitioners should utilize these legalities within the enforcement, education and awareness-raising portions of their campaigns. Education and awareness-raising is particularly important around drug use, as much of the public is unaware of the effect that drugs have on their driving abilities or the fact that police can detect someone who is under the influence of drugs and do not always apply the idea of drug-related impairment to prescription drugs that can also affect driving ability (Government of Canada, 2011). A practice that is becoming more common involves implementing a community system where concerned drivers can call 911 or a hotline when

they suspect that another driver may be under the influence. Mothers Against Drunk Driving Canada and the DRIVE SOBER (previously known as Ontario Community Council on Impaired Driving) are working in Canada to implement these hotlines (Government of Canada, 2011).

New Drivers

One of the most common population-level practices to prevent on-road injuries is Graduated Driver Licensing (GDL). As this document is meant to supplement an Ontario report, only Ontario licensing systems will be discussed. According to the Ministry of Transportation of Ontario (MTO), driving should be considered a privilege, not a right (MTO, 2012) and all Ontarians are required to go through a licensing process that takes a minimum of 20 months to complete (MTO, 2012). During this process, applicants must progress through various levels of licensing and pass specific knowledge, application and physical tests in order to obtain a full licence. In each level, various restrictions are placed on new drivers, such as not being allowed to drive without a fully licensed passenger present and being required to have a zero blood alcohol concentration (BAC) at all times (MTO, 2012). Additionally, there are specific requirements for younger new drivers, such as limitations on the number of youth passengers they can have in the vehicle with them while driving (MTO, 2012). Evaluations have found that GDL programs can reduce collisions between 15-30% (Government of Canada, 2011). Practitioners focusing on injury prevention among new drivers should utilize the rules and regulations of the GDL system as support for their awareness and educational programming pieces.

Children

Children are part of a group of vulnerable road users, due in part to their physical make-up, but also due to the fact that they are passive road users who often do not have a choice of when, where and how they travel on roads. In order to help prevent injuries to children in vehicles, child car seats and booster seats have been designed and applied. It has been found that properly used child car seats and booster seats can reduce the chance of death by 71% and injuries by 67% (Government of Canada, 2011). However, research demonstrates that roughly only 90% of children under 12 months of age, 86% of toddlers (aged 1-3) and 40% of children (aged 4-8) are placed in the correct child car seats or booster seat while in vehicles (Government of Canada, 2011). Evidence-informed practices for increasing the proper use of child car seats and booster seats include educational campaigns for parents/guardians, child restraint clinics, booster seat fitting clinics, grants to subsidize child car seats and booster seats to parents/guardians and working with local physicians and retail stores to provide information to parents/guardians around proper usage (Government of Canada, 2011). More information on specific child car seat and booster seat tips can be found on www.parachutecanada.org.

Youth

Young Canadian drivers between 16 and 24 are overrepresented in on-road injury statistics, as they comprise only 13% of licensed drivers, yet they tend to account for 24% of fatalities and 26% of serious injuries (Government of Canada, 2011). One specific evidence-informed practice that injury prevention professionals can employ includes utilization of the GDL system to support their work and the inclusion of it within their educational and awareness-raising tools. Additionally, parents/guardians should be involved in any and all programming pieces targeted at youth drivers, as they often serve as key teachers for their children and control the time that youth spend in the driver's seat.

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Evidence-Informed Prevention Strategies for Pedestrian Injuries

Overview

As vulnerable road users, pedestrians are at a high risk of injury. Pedestrians are considered to be roadway users who are: not in a motorized or otherwise propelled vehicle, in a wheelchair, or pushing a bicycle or a wheelchair (Office of the Chief Coroner for Ontario, 2012). Pedestrian safety is an important public health concern. In Ontario, more than 2,000 pedestrians were killed between the years of 1988 – 2002 (Office of the Chief Coroner for Ontario, 2012). Pedestrian incidents caused 12,747 emergency room visits in Ontario between 2007 and 2009 (Ontario Injury Prevention Resource Centre, 2012). Children and older adults² experience unique risk factors for being injured as pedestrians. Children lack sufficient knowledge and judgment around roadways to be safe without supervision. Safe Kids Canada (2008), which is now part of Parachute, reports that more than 30 children younger than age 14 are killed each year as pedestrians. Furthermore, older adults are at a high risk of being fatally injured; adults over the age of 75 accounted for more than 20% of pedestrian deaths between 1988 and 2002 (Office of the Chief Coroner for Ontario, 2012). Public health and injury prevention practitioners can play an important role in reducing injuries and improving road safety for pedestrians.

Risk Factors

There are a number of risk factors that apply to the population in general. For example: alcohol use (as a driver or a pedestrian), high speeds (due to a high speed limit, or due drivers exceeding the limit), urban areas with increased traffic, evening hours (e.g., between 2 and 10 pm), and disobeying crosswalk rules (pedestrians or drivers) are all factors that increase the risk of a pedestrian injury. Around the issue of speed, it has been shown in previous research that when a car travelling 30 km/hr hits a pedestrian the risk of death is 10%, but when the speed of the vehicle increases to 60 km/hr, the risk of death for a pedestrian increases to 100% (Corben & Oxley, 2006). This research is a powerful illustration of the danger created by speed. Other research around pedestrian risks shows that when more pedestrians are visible and present on the roadway, all pedestrians tend to be safer (Leden, 2002). Thus, there is value in promoting active forms of transportation.

² As a number of sources were synthesized in preparing this document, the age range used to define children and older adults varied, thus, it has not been defined in our summary. Please refer to the original sources for information regarding the specific ages in each study or resource.

There are also risk factors that apply to specific segments of the population. *Children* experience unique risk factors because of their developmental stage. Compared to teenagers and adults, children's peripheral vision is not fully developed, they lack a sense of vulnerability, are not as able to assess risky situations, understand the speed of oncoming vehicles in relation to their own speed, hear warning signals or move quickly out of a dangerous situation. As children get older, some of these developmental characteristics become less of a risk, but risk-taking behaviour increases, which is a risk factor in itself. Risk factors that emerge in the *teenage* years include: a further increase in risk taking behaviour, an invincible attitude and increased use of alcohol and other drugs. The Coroner's Review of Pedestrian Deaths in Ontario (2012) indicated that *older adults* accounted for 36% of all pedestrian-related fatalities. This is quite a disproportion, considering that older adults only represent 13% of the population, and suggests that older adults are at high risk of being seriously injured or killed as pedestrians. A number of reasons could contribute to this risk, such as mobility issues, a possible decrease in cognitive function, and an increasingly fragile physical condition.

The Ontario Coroner's Review (2012) also highlighted the five most common *situations* that lead to fatal injuries. These included: a pedestrian being hit at a mid-block location while crossing, pedestrian being hit on the sidewalk and/or shoulder of the road, a pedestrian crossing without the right of way, a vehicle turning left while the pedestrian was crossing with the right of way, and a vehicle turning right while the pedestrian was crossing with the right of way. These situations represent what appear to be the most dangerous for pedestrians, and the areas where the biggest difference in safety could be made. In sum, there are various risk factors that apply to all pedestrians. However, children and older adults experience unique risk factors, and specific pedestrian circumstances, such as those mentioned in the Coroner's report, seem to present a greater risk as well.

Evidence-informed Practice Recommendations

Coroner's Review of Pedestrian Deaths in Ontario

The Chief Coroner's Report (2012) outlined a number of recommendations to improve pedestrian safety in Ontario. The majority of these recommendations relate to adopting a '*complete streets approach*,' which is described in the report as follows:

“Viewing the road network holistically enables communities to reduce infrastructure costs by designing a transportation network that suits all users at the outset, rather than retrofitting to include pedestrian, cycling or transit amenities later. There are also safety and social benefits to be had by lowering traffic speeds, expanding mobility options, improving air quality, increasing

opportunities for physical fitness, and designing more attractive communities.” (Office of the Chief Coroner of Ontario, pp. 34, 2012)

In general terms, the complete streets approach involves building roadways that are safe for all road users; pedestrians, cyclists, transit users and motor vehicle drivers. Implementation of this approach will require time, resources and leadership at all levels of government, and cooperation of many sectors. However, the result would be significantly improved safety and long term sustainability.

The Chief Coroner’s Report (2012) included the following recommendations for preventing pedestrian fatalities:

Leadership: Leadership at all levels of government will be needed to make the complete streets solution viable. The report outlines specific recommendations for the various ministries involved including: the Ministry of Transportation, Ministry of Municipal Affairs and Housing, Infrastructure Canada and Ontario.

Legislation: The data in the report clearly indicates that high speed leads to fatal pedestrian injuries. Thus, the report recommends legislation that reduces posted speed limits, requires environment modification to support these reduced limits, and enforcement of new limits.

Engineering: In addition to environmental modifications to reduce speed, engineering efforts that would improve pedestrian safety include leading pedestrian signal intervals, non-signalized pedestrian crossings for mid-block crossings, side guards on heavy trucks, and sufficient lighting on both sides of the street.

Education: It is recommended that a coalition between various injury prevention stakeholders work together to deliver pedestrian safety education in the province. A program targeted to older adults is recommended. Further, the Ministry of Transportation and the Ministry of Education are asked to include pedestrian safety education in the school curriculum and in driver training programs. Other research in this area supports this recommendation; a systematic review showed that safety education can improve safety knowledge and safe crossing behaviour in children (Duperrex , Roberts & Bunn, 2009).

Enforcement: The recommendations related to enforcement involve having strict enforcement of laws pertaining to drivers and to pedestrians. Specifically, enforcement of speed limits, yielding to pedestrians, running red lights, distracted driving, crossing while distracted, crossing at an undesignated location, or crossing against the traffic signal in pedestrians would be helpful.

The Coroner's Review (2012) is a comprehensive summary of evidence-informed strategies for preventing pedestrian injuries using the *complete streets* approach. As mentioned, this approach is a long-term solution and will require time and resources.

Strategies for Improving Pedestrian Safety

In addition to long-term solutions such as the complete streets approach, some short term strategies have also been shown to improve pedestrian safety. These strategies include:

Traffic Calming Measures

Research shows that traffic calming strategies can reduce traffic-related injuries and create a safer environment. Traffic calming is described as physical measures introduced into the environment to reduce the negative effects of traffic, alter driver behaviour and create a safer environment for pedestrians. Specific examples include speed bumps, roundabouts or reduced speed limits to *slow traffic*, improved lighting conditions or road surface treatments to *improve visibility*, and one-way streets or road blocking to *redistribute traffic* away from certain targeted areas (Bunn et al., 2003).

Signals at Intersections

At uncontrolled intersections with no signals or stop signs, having an unmarked crosswalk does not improve safety of pedestrians. In fact, research suggests that the risk of being injured actually increases if the road is multi-lane. At controlled intersections, a signal that allows pedestrians to cross with no cars moving in any direction improves safety (Campbell et al., 2004). There is also evidence that having a leading pedestrian interval (LPI) is effective in reducing injuries, which involves starting the pedestrian signal before the traffic signal so pedestrians have started crossing by the time traffic is signaled to move (Fayish & Gross, 2010).

Medians and Curbs

Research suggests that raised medians on multilane roads and curb medians can reduce pedestrian injuries (Campbell et al., 2004).

Bus Stops

Placing bus stops at the far side of an intersection in areas where visibility is high can reduce pedestrian injuries (Campbell et al., 2004; Retting et al., 2003).

Pedestrian Clothing

To improve visibility of pedestrians to drivers, pedestrians should wear clothing that makes them more noticeable. Research indicates that fluorescent colours during the day are best and reflective clothing, flashing lights and head-lamps can improve visibility at night (Campbell et al., 2004; Retting et al., 2003; Kwan & Mapstone, 2009).

Parking

The availability and type of street parking can impact pedestrian safety. Research shows that diagonal parking, rather than parallel parking, can reduce injury rates because pedestrians must look in the direction of oncoming traffic before entering the street. Another strategy is to eliminate street parking, which helps ensure that pedestrians are visible to drivers (Retting et al., 2003).

Urban Sprawl

Urban sprawl is associated with the development of roadways that are inherently dangerous for pedestrians. Roads leading to suburban areas tend to have higher speeds, infrequent intersections and lack sidewalks. Research indicates that sprawling areas have increased pedestrian injuries and fatalities (Frumpkin, 2002). Efforts to improve road conditions and prevent urban sprawl are important for preventing pedestrian injuries.

Mobile Phones

Mobile phones and other handheld distractions can be dangerous for pedestrians in the same way as they are dangerous for drivers. Recent research shows that pedestrians using a handheld device are more likely to make decisions that lead to unsafe crossings at intersections, compared to those not using such a device (Nasar, Hecht & Wever, 2009). It is important to raise awareness around this issue.

Preventing Pedestrian Injuries in Children

Given the developmental characteristics that increase the risk of children being injured as pedestrians, there are a number of prevention strategies that apply specifically to children. In their report on child pedestrian injuries, Safe Kids Canada (now part of Parachute) (2008) recommends three overall strategies to reduce these types of injuries. The first strategy is to *reduce driver speed*. This could be accomplished through legislation that lowers speed limits in residential areas, and through enforcement of this legislation (MacKay et al., 2011). The second strategy is to *encourage guided practice to teach child pedestrian safety*. This is best accomplished when parents are involved in education, when parents model good behavior as well as teach it, and when education includes practical roadside experience (McKay et al., 2011). The American Academy of Pediatrics (2009) also recommends teaching pedestrian safety to children, and highlights the role of paediatricians. Specifically, they should remind parents about the dangers of playing near the street or parked cars, to model the safe behaviour they are teaching, and the importance of active supervision (American Academy of Pediatrics, 2009). Lastly, the third recommendation outlined by Safe Kids Canada (2008) is to *make communities more walkable*. This encompasses many different strategies such as traffic calming measures, modifications to the front of a vehicle that take children into account, and modifications to the environment to make pedestrian areas safer. Many children live close enough to walk

to and from school, and active transportation is something that has recently been encouraged. Because of this, many communities have adopted programs that highlight safe and active routes to school. A recent evaluation of this program in New York City shows that since the adoption of this program, pedestrian injuries in school-aged children during school hours have decreased by more than 40% (DiMaggio & Li, 2013).

Preventing Pedestrian Injuries in Older Adults

As mentioned, older adults experience unique risk factors for injury because of increasing fragility of the physical condition with age, decreasing cognitive ability and increasing mobility impairments. Preventing injuries in this population is related to education, vehicle design and the physical environment (Oxley et al., 2006).

Education should relate to:

- Teaching older adults about updated road regulations
- Age-related physical conditions that increase risk (e.g., balance, mobility, sensory) and high-risk behaviours (e.g., avoid stepping off curbs, slippery conditions, crossing at points that are not designated crosswalks)
- Maintaining good physical shape through exercise to maximize mobility

Vehicle design could relate to:

- Speed-alerting devices
- Hazard detecting devices
- The use of daytime running lights at all times
- Bull bars that are made of more forgiving material such as plastic, rather than metal

Environmental changes could relate to:

- Mechanisms to lower driving speeds
- Sidewalks that are well maintained (e.g., free of cracks and potholes) and that are separated from the roadway
- Crosswalk signals that incorporate the walking speed of older adults

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Evidence-Informed Practice Recommendations for Prevention of Poisoning

Overview

Poisoning is one of the leading causes of death from unintentional injury in Canada, and is an important public health issue. According to the Ontario Injury Data Report, poisoning caused more than 38,000 emergency room visits between 2007 and 2009 and a further 1,589 deaths between 2001 and 2005 (Ontario Injury Prevention Resource Centre, 2012). Poison centres across Canada receive 160,000 calls each year. The estimated economic burden of poisoning in 2004 was \$771 million (Safe Kids Canada, 2012). While poisoning can have serious consequences for a person at any age, children and older adults³ are at particularly high risk. There has been some controversy around the definition of poisoning because unintentional versus intentional poisoning incidents are difficult to differentiate without substantial evidence. Some research has suggested that injuries recorded as unintentional poisonings may actually be suicides, given the decrease in suicide rate and the corresponding increase of unintentional poisoning fatalities (Rockett et al., 2010). With this debate in mind, our summary of evidence will focus on the prevention of unintentional poisoning injuries and fatalities. More information on intentional injuries can be found in the violence or suicide sections of this report.

Risk Factors

Risk factors for poisoning can be described in terms of high risks groups. Children are at a high risk compared to other age groups because of their natural sense of curiosity and inexperience with harmful substances (Safe Kids Canada, 2012). Older adults also have a relatively high risk for unintentional poisoning for a variety of reasons, including decreased immune function, symptoms of dementia and/or taking multiple medications.

Evidence-Informed Practice Recommendations

There are a number of strategies that can help reduce the risk of poisoning. Many of these strategies are specific to children and older adults, given their unique risk factors, and others apply to the population as a whole. General strategies that apply at the population level will be described next, followed by strategies tailored to children and older adults.

³ As a number of sources were synthesized in preparing this document, the age range used to define children and older adults varied, thus, it has not been defined in our summary. Please refer to the original sources for information regarding the specific ages in each study or resource.

Population level

1. Safe Kids Canada (now part of Parachute), a leader in poison prevention, has recommended a **comprehensive approach** to poison prevention that combines the three E's of injury prevention – education, enforcement and engineering. For example, providing education to parents and community members about the safe storage of medications, enforcing the use of child-resistant closures on medications and locking medication away and out of reach would be a comprehensive strategy.
2. The use of **carbon monoxide detectors** is an important poison prevention strategy. Carbon monoxide is known as the 'silent killer' because it has no smell or colour, but can be deadly. Exposure at low concentrations can have negative cardiovascular and neurobehavioral effects, and at high concentrations it can be fatal (Raub et al., 2000). Common appliances found in the home (e.g., furnaces or clothes dryers) can produce carbon monoxide and should be inspected annually. Carbon monoxide detectors should be found on every level of each home and near all sleeping areas (MacKay et al., 2011; Safe Kids Canada, 2012).
3. **Poison control centres** are effective in reducing harm caused by poisoning and can also result in considerable cost savings in emergency room visits (MacKay et al., 2011,). It is important that parents and community members are made aware of their local poison control centre; the phone number should be widely distributed.
4. Since almost all poisonings occur in the home (Mack & Liller, 2010), an effective strategy for prevention is to provide **home safety education** (Kendrick et al., 2008). Research has shown that it can improve safe storage of medication and other harmful household products, and can increase awareness of the poison control centre.

Children

Because of their natural sense of curiosity and tendency to explore their environment, children are at high risk of poisoning from harmful substances found in the home.

1. One of the most important prevention strategies is the **safe storage of medication** (Safe Kids Canada, 2012; Safe Kids Worldwide, 2012). This involves a number of different tactics including:
 - Ensuring that medication has a child-resistant cap (CRC) when possible. One issue around this is that bulk medications are not required to have a CRC. Extra care should be taken when storing such medication.
 - Putting all medications in a locked compartment or cupboard and out of reach.

- Keeping all medication in original containers, so that in the event of an accidental ingestion the dosage and proper name will be available when calling the poison centre.
 - Do not take medication in front of children (they will naturally want to imitate behaviour) or refer to it as candy.
 - Regularly collect and dispose of old medications following Health Canada's guidelines (<http://www.hc-sc.gc.ca/hl-vs/iyh-vsv/med/disposal-defaire-eng.php>)
2. **Household products** can be dangerous in the same way as medications; children are unaware of the potential harm associated with these substances and will be naturally curious. Therefore, many of the same strategies used for storage of medication can be used for household products such as cleaning products (e.g., products containing bleach), car-care products (e.g., windshield washer fluid), or personal hygiene related products (e.g., nail polish remover). These items should be kept in a locked cupboard and always in their original containers (Safe Kids Canada, 2012). This will ensure children do not mistake it for something they are allowed to have (e.g., water bottle) and ensure that the important information on the substance's label is available in case of an emergency.
 3. **Active parental supervision** is extremely important for poison prevention (MacKay et al., 2011). This applies at all times, but especially when visitors come by who may carry medications with them, or when bringing a child to a new environment that may not have potentially harmful products locked up.

Older Adults

It is particularly important to target older adults with poison prevention strategies because of the likelihood of being prescribed one or more medications. Also, older age can result in a natural decrease in immune system functioning, making this group more susceptible to injury.

1. **Safety related to medication** applies differently to older adults compared to children. It is important that older adults are attentive when taking medication; it should never be taken in the dark or in the absence of any corrective lenses that might be required to verify the medication and proper dose. It is also very important to keep medication in its original packaging, because some medications should not be taken with others and the proper dose can vary greatly between medications that may look similar (Centre for Research and Prevention of Injuries, 2013). For a detailed summary of good practices specific to older adults and medication, visit the following link: http://www.capic.org.uk/documents/FS_Poisoning.pdf.

2. **Safe food preparation** is always important to prevent food poisoning. However, because of the natural decrease in immune system functioning that happens with age, this is particularly important for older adults (Centre for Research and Prevention of Injuries, 2013).

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Evidence-Informed Practice Recommendations to Prevent

Suffocation and Breathing-Related Injuries

Overview

Suffocation and other breathing-related emergencies such as choking and accidental strangulation are a leading cause of injury and death in Canada (Safe Kids Canada, 2012). Between 2005 and 2007, there were 1,626 emergency room visits related to suffocation and between 2001 and 2005, these incidents were to blame for more than 600 deaths (Ontario Injury Prevention Resource Centre, 2012). This issue is particularly significant in infants; it has been estimated that in the United States, 66% of injury-related deaths in infants are due to suffocation and/or choking. The trends in Canada demonstrate a similar sense of urgency around prevention. One study looking at choking incidents in Canada found that more than half occurred in infants (Vilke et al., 2004). Public health and injury prevention practitioners can play an important role in preventing these types of injuries.

Risk Factors

The risk factors for suffocation and other breathing-related emergencies have been defined in previous research. As mentioned, age is a known risk factor, with infants and young children being at a high risk for these injuries. Risk factors related to age include food items or products that are choking hazards. High-risk food items for young children are those that can easily become lodged in an airway, such as hot dogs, peanuts, grapes or popcorn. Other than food, children tend to put objects such as toys into their mouths, so small parts on toys, button batteries and magnets are also a hazard. Further, products such as balloons or plastic bags should never be given to children, because of their ability to cause suffocation. Another risk factor for children is their sleep environment; loose blanketing, pillows, stuffed toys or unsafe sleep positions can create a high risk for suffocation. Similar to children, older adults also experience unique risk factors. Older adults are at an increased risk of suffocation or choking because of insufficiently chewing food, possible drowsiness due to medication, alcohol use and reduced motor coordination (IMPACT, 2005).

Evidence-Informed Practice Recommendations

A number of strategies can be applied to prevent suffocation or choking. Many of them apply to children and older adults, because of the increased risk of injury in these

populations. The following strategies apply to the population in general, followed by strategies that specifically apply to children and older adults⁴.

Population Level

Population level strategies to prevention poisoning include common safety behaviours such as properly chewing food, not attempting to talk/laugh while eating, limiting alcohol use and by exercising caution around potential hazards (e.g., rope, cords, plastic).

Aside from these common sense strategies, it is important to promote first aid procedures, including the Heimlich manoeuvre (Cyr, 2012; IMPACT, 2005). While this strategy does not prevent incidents from happening, it does ensure that when incidents occur the chances of such events being fatal are dramatically reduced. It is especially important for parents and caregivers to become certified in first aid.

Children

1. Many suffocation-related deaths occur in unsafe sleeping environments (IMPACT, 2005; Safe Kids Canada, 2012). Cribs are a main contributor to the sleep environment and need to meet safety standards. Safe Kids Canada (now part of Parachute) states that cribs produced before 1986 are unsafe. Further, cribs that are homemade should be avoided. More information on crib safety is available through Parachute's website <http://www.parachutecanada.org/injury-topics/item/home-safety-bed-time> or through Health Canada's website <http://www.hc-sc.gc.ca/cps-spc/index-eng.php>.

There are other important safe sleep practices that parents and caregivers need to be aware of. Young children should sleep only on firm surfaces with no loose bedding. They should always be placed on their backs for sleeping. Bed sharing is not recommended and is deemed unsafe, due to the risk of suffocation. The American Academy of Pediatrics (2011) has highlighted the importance of safe sleeping practices in reducing the risk of Sudden Infant Death Syndrome (SIDS). Similarly, the Public Health Agency of Canada provides information on safe sleep, available at the following link: http://www.phac-aspc.gc.ca/hp-ps/dca-dea/stages-etapes/childhood-enfance_0-2/sids/pdf/sleep-sommeil-eng.pdf

2. Many recommendations to prevent choking or suffocation in children are related to safe handling and preparation of food (McKay et al., 2011). As mentioned above, food that has a small round shape can become easily lodged in an airway and should not be given to young children. Examples include hot dogs (unless they are sliced lengthwise), hard

⁴ As a number of sources were synthesized in preparing this document, the age range used to define children and older adults varied, thus, it has not been defined in our summary. Please refer to the original sources for information regarding the specific ages in each study or resource.

candies, peanuts, grapes, etc. (Cyr, 2012; Safe Kids Canada, 2012; IMPACT, 2005). Children should always sit down when eating and should be supervised (IMPACT, 2005).

3. Non-food items such as buttons, latex balloons, plastic bags, stuffed animals with buttons or glass eyes/noses, button batteries, magnets or toys containing small parts are also dangerous to children and should be kept out of reach (IMPACT, 2005). It is important that parents are aware of these risks and take steps to prevent their children from coming into contact with these items. Some ideas include: tying plastic bags in knots and storing out of reach; keeping balloons out of the house if possible or using mylar balloons (foil); always follow age recommendations on toy packages and regularly inspect for broken pieces; monitor play areas for small objects that may have fallen under chairs or couches, especially if the play space is shared with older children. To test if an item is a choking hazard, check if the item fits into a toilet paper roll. If it does, it is a choking hazard. There are also choking tubes that can be purchased. Button batteries are used more frequently in toys and household items (e.g. key fobs, non-flame candles, games) and can cause both a choking hazard as well as cause severe burn injuries to the esophagus. Magnets, and especially very strong earth magnets, are also increasingly found in children's toys (e.g. bucky balls) and can cause severe injuries to the internal organs if more than one is swallowed. They can tear the lining of the GI tract as they connect together. Keep button batteries and magnets away from children.
4. Cords, window coverings and drawstrings are major risks for strangulation. Pull cords on window blinds can be very dangerous. If cords are present, they should be cut short and tied out of reach (Safe Kids Canada, 2012). It is important to note that the Canadian Standards Association (CSA) has a standard outlining safe blind cords. Drawstrings should be removed from clothing, and mittens should be clipped to coats rather than attached with a string as they can get caught around a child's neck and cause strangulation.
5. As with many preventable childhood injuries, active supervision is important for preventing suffocation, choking or strangulation (IMPACT, 2005; Safe Kids Canada, 2012).

Older Adults

1. Risk factors such as older age, poor dentition, alcohol use and decreased motor control may contribute to choking in older adults. Strategies for prevention include educating caregivers about these risk factors, ensuring good denture fit, monitoring medication to prevent drowsiness, and diet modifications if necessary (removing high risk foods, no semi-solid food).

2. There have been incidents of strangulation or suffocation in hospitals or care facilities caused by unsafe beds. A report released in Manitoba outlines the need to develop regulations for hospital beds, to improve their safety and reduce entrapment gaps (IMPACT, 2005).

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Evidence-Informed Practice Recommendations for the Prevention of Suicide

Overview

Suicide, defined by the World Health Organization as the act of deliberately killing oneself, is an important public health issue. In Canada, it occurs at a rate of 11.5 per 100,000 people and is ranked as one of the ten most common causes of death (Statistics Canada, 2012). The total economic burden of suicide and self-harm has been estimated at approximately \$707 million (SMARTRISK, 2009). However, this economic data highlights the need to clarify the differences between suicide and self-harm.

Definitions

Unlike suicide, self-harm does not have one unanimously accepted definition. One way it has been conceptualized is “intentional self-poisoning or self-injury, irrespective of type of motive or the extent of suicidal intent (Hawton, Saunders & O’Connor, 2012).” It is important to understand the distinction between these concepts; suicidal intent does not have to exist for self-harm to occur. Research tells us that some acts of self-harm are accompanied with an intention to end one’s life, while in other situations, this intention is absent. These behaviours are commonly referred to as non-suicidal self-injury (NSSI) (Soomro, 2008). NSSI has been correlated with subsequent suicide attempts (Hamza, Stewart, Willoughby, 2012; Wilkinson & Goodyer, 2011), but still represents a unique behaviour and can require distinctive interpretation and interventions. One issue around this is that injury-related data does not always reflect the differences between these two self-harming behaviours and it can be difficult to differentiate the two when simply using data at face-value.

There are two main reasons for this difficulty in interpreting data around self-injury. First, hospitals report injury data in terms of emergency room visits, hospitalizations and deaths. Second, the ICD 10 codes often used to track data are related to self-harm (see ICD codes X60 – X84). Thus, if a death does *not* occur due to self-harm, it would be tracked as either an emergency room visit or a hospitalization, but there will be no distinction regarding intent of the self-harming behaviour. Therefore, the tracking of data does not allow for a proper distinction between the two concepts. Readers should recognize the limitations around data collection and avoid interpreting the data as a continuum of one issue.

For the purposes of this report, it is important for readers to understand the distinction between the concepts of self-harm and suicide. We will summarize evidence-informed practices that relate to suicide prevention. The prevention of self-harm, while also an

important issue, will not be discussed here as it is beyond the scope of this summary to discuss both concepts.

A Complex Issue

The definition of suicide does not accurately convey the complexity of this issue. As stated in the book *Suicide Risk Management: A Manual for Health Professionals*, “understanding suicide is unachievable (Chehil & Kutcher, 2007, pp. vi).” Suicide is the end point of a complex process that involves many possible determinants including cultural, geographic, religious, social, family and individual factors (Chehil & Kutcher, 2012). Thus, finding a solution to this issue will not be easy. The most effective efforts will take a community approach and involve collaboration of multiple stakeholders. There are many challenges associated with this type of work, and community-based efforts help ensure everyone involved feels supported.

Risk and Protective Factors

Research devoted to understanding the risk factors for suicide has allowed us to gain a better understanding of this issue. However, before identifying these factors, it is critical to recognize that this research is correlational. That is, even if strong links are found between risk factors and suicide, no single factor can be said to cause this event. There may be times where a person exhibits many known risk factors and does not die by suicide, and also times where a person shows no warning signs at all, and does die by suicide. Moreover, research shows that the extent to which various risk factors correlate with suicide varies between factors. With this in mind, there is value in identifying risk factors because it can help professionals determine which segments of the population have the highest overall risk (Chehil & Kutcher, 2012).

In the general population, the most prominent risk factors for suicide include the *presence of a mental illness* (particularly mood disorders, such as major depression), and *having made a previous suicide attempt* (Schwartz et al., 2009). Other strongly correlated risk factors include: drug and alcohol abuse, hopelessness, family history of suicide, poor physical health, experiencing a sudden change or loss of loved one, and access to lethal means (Chehil & Kutcher, 2012; Miller & Eckert, 2009). Protective factors include positive family relationships, perceived social support, reduced access to lethal means, ease of access to mental health care services, and having strong religious beliefs (Schwartz et al., 2009). There is also evidence supporting the existence of gender and age-specific risk factors. Males are more likely to die by suicide, whereas attempted suicide occurs more often in females. Possible explanations offered for this trend include: men may be less likely to seek help for mental illness, men often act more impulsively than women, and men experiencing depression may have higher rates of alcohol and drug use compared to women (which can compound suicide risk). With regards to age, trends indicate that

suicide rates increase as age increases. However, data shows that rates peak for adolescents/young adults and the elderly. The highest suicide rates are found among men over the age of 80 (Wilson & Gauvin, 2012).

Evidence-Informed Practices for Prevention

The need for suicide prevention has been recognized and prevention strategies have been developed and evaluated. It is important to note that evaluation of prevention strategies is difficult due to the relatively low base rate of suicide (e.g., a controlled study would require an unrealistically large sample) (Nordentoft, 2011). Much of the evidence pertaining to suicide prevention comes from ecologically based research, which does not allow for potentially confounding environmental factors to be eliminated. There is also a reliance on proxy outcome measures such as suicidal thoughts, suicidal intent, or suicidal behaviour, and the rates of such indicators are much greater than the rate of death by suicide. The following suicide prevention strategies are based on the best available research findings. They have been categorized according to individual level, community level and school-based strategies.

Individual

1. **Improve treatment of mental illness.** One of the most important individual level strategies for suicide prevention is improving the identification and treatment of mental disorders through educating medical professionals. Research shows that the majority of people who die by suicide are likely to be experiencing mental health difficulties at the time of their death (Mann et al., 2005). In fact, many people have contact with a medical professional in the month before their death. Typically, primary care physicians do not receive specific training in recognizing mental illness and risk factors for suicide. Educating physicians to recognize these risk factors and intervene with patients in crisis has been shown to reduce suicide attempts and improve treatment of depression (Bruce et al., 2004). The American Association of Suicidology offers a one-hour, online training course that provides medical professionals with the knowledge required to integrate suicide assessment into routine visits. More information on this course is available here: <http://www.suicidology.org/education-and-training/recognizing-responding-suicide-risk-primary-care>
2. **Identify and support previous suicide attempters.** Another individual level strategy is the management of persons who have made a previous suicide attempt, since these individuals are known to be at high risk for attempting suicide again. This involves identifying individuals at risk, ensuring any necessary treatment for a mental illness is provided, removing lethal means, appropriate monitoring of the individual (e.g., take necessary steps to ensure safety through supervision, admission to inpatient unit, etc.) and maintenance of regular contact. A number of strategies for maintaining contact

with a person after a suicide attempt have been evaluated and appear to be promising (Beautrais et al., 2007):

- Provision of 'green cards' (encouraging help seeking and providing crisis centre contact information)
- Regular receipt of a postcard containing a caring message
- Regular telephone calls to individuals to monitor treatment

Community

1. **Reduce access to lethal means.** Some evidence indicates that reducing access to lethal means is effective in preventing suicide. Such strategies include restricting firearm sales and use, the availability of pesticides, barrier construction at jumping sites (e.g., bridges), changes to prescription drug policies (e.g., restriction of amounts available for pick up), and vehicle emissions of carbon monoxide (Beautrais et al., 2007). These efforts help reduce suicides in which each particular method is used and can help reduce impulsive acts (Mann et al., 2005). The most effective strategies will sometimes depend on common methods in individual communities. For example, firearms are more accessible in the United States compared to Canada, so efforts to restrict firearms may be more effective in various States than in Canada, where more common methods include asphyxiation (Wilson & Guavin, 2012). It is important to note that some research suggests limiting access to lethal means may result in method substitution. That is to say, suicide may not actually be *prevented*; a person may end up choosing another method. However, reducing access to lethal means appears to be a promising strategy for preventing suicide.
2. **Gatekeeper training.** Another strategy that can be implemented within a community is gatekeeper training. A gatekeeper is someone who regularly interacts with members of the community. Typical gatekeepers include teachers, mental health professionals, police officers, paramedics, social workers and clergy. In gatekeeper training, these individuals learn to recognize signs of mental illness and risk factors for suicide, and they practise proper communication with individuals at risk, to ultimately increase help seeking and treatment. Evaluations of these programs show they are successful in increasing gatekeeper knowledge and awareness, and in some cases, lowering suicide rates (Knox et al., 2003). Programs offered locally include the Canadian-developed programs, safeTALK and ASIST. SafeTALK is a three hour training session for anyone aged 15 and over that teaches skills to recognize and respond to people who express suicidal thoughts or behaviours. ASIST is a two-day training session that helps prepare caregivers to identify risk factors and prevent suicide. More information on both of these programs can be found here: <http://www.livingworks.net/training/find>.

Another promising program is the *Community Helpers* program that has been implemented in Alberta. This program uses an anonymous community survey to identify adults in the community who youth seem to already turn to for support; these adults are called natural helpers. The *Community Helpers* program works to identify these community leaders and provide them with the knowledge and support required to link at-risk youth to community support services.

3. **Education and Awareness Campaigns.** Another community-based strategy is providing education and awareness programs. These programs are designed to improve mental health literacy, encourage help-seeking behaviour and reduce stigma associated with suicide and mental health. While these interventions are popular and intuitively seem important, the effects are difficult to evaluate and rigorous evidence to support their use is somewhat lacking. Research shows that public knowledge and awareness is typically improved, but changes in actual behaviour, such as help seeking, are not as common. Further, there is a lack of evidence that directly links these programs with reductions in suicide rates. Nevertheless, improving knowledge and awareness of mental illness and suicide at the community level is important for reducing stigma and encouraging treatment. Examples of these programs include: Mental Health Week (Canadian Mental Health Association), National Suicide Prevention Week (American Association of Suicidology), Mental Health First Aid training (Mental Health Commission - <http://www.mentalhealthfirstaid.ca>).
4. **Media Reporting Guidelines.** Research has shown that the way suicide is reported in the media can affect behaviour and either contribute to or reduce future suicide attempts (Beautrais et al., 2007). This idea originated more than 200 years ago, when a German novelist's book was banned due to the large number of people who chose to end their lives in the same manner as the book's main character. This has been labeled the Werther Effect. In Austria, media guidelines were introduced and evaluated after a number of similar suicides involving the subway occurred within weeks of each other. When the media changed the way in which these stories were written, subway related suicides significantly declined. This effect is known as 'suicide contagion.' Evidence supporting the existence of this effect has led to the development of media guidelines to be used when reporting on suicide. In Canada, guidelines developed by the Canadian Psychiatric Association include the following recommendations:
 - Reporters should **avoid**: using 'suicide' in the headline, using photos, describing the method, front page stories, romanticizing or glorifying the suicide in any way, giving the idea that suicide is unexplainable or a solution to problems
 - Reporters should **include**: available treatment and community resources, warning signs for suicide, how to approach a suicidal person

- For more information on media guidelines in Canada -<http://publications.cpa-apc.org/media.php?mid=733&xwm=true>

However, there is some controversy around this topic due to the lack of direct evidence on suicide rates, and the emergence of social media adds another layer of complexity. We also have to differentiate between contagion and a clustering phenomenon. Sometimes there are groups of death by suicide that occur in a community without any direct link between them. This is a statistical anomaly and not contagion due to media.

School-Based Programming

In addition to the aforementioned individual and community-based strategies, there have been many school-based programs developed around the issue of suicide prevention. These programs can be found through the National Registry of Evidence-Based Programs and Practices (NREPP), a U.S. based resource that lists various programs according to the level of research evidence available to support their use. While the following programs have strong evidence according to their inclusion in the NREPP database, there is mixed evidence supporting school-based programming. Some research has indicated that certain aspects of suicide prevention programs in schools can be harmful. Moreover, many of these programs are based on U.S. data. Therefore, any school-based initiative should be implemented according to the best available research evidence and must be evaluated on an ongoing basis to monitor the effects of the program. Examples of programs listed in NREPP are:

CARE (Care, Assess, Respond, Empower). This program targets high-risk youth and involves a suicide assessment and one brief counselling session. More information, as well as training for the program is available via the program developer, Reconnecting Youth, on their website www.reconnectingyouth.com.

CAST (Coping and Support Training). This program was designed to be delivered in a high school setting by trained teachers or school nurses. It has 12 sessions, each one hour in length, and focuses on mood management, improved school performance and decreased use of drugs and alcohol. Training is available through the developer, Reconnecting Youth (www.reconnectingyouth.com).

LEADS (Linking Education and Awareness of Depression and Suicide). LEADS is a high school based curriculum involving three sessions, each one hour in length. It is delivered by teachers and designed to increase students' knowledge of depression, suicide and how to get help. Training is available. More information about this program can be found here: <http://www.save.org/leads>.

Lifelines. This program takes a school-wide approach in that it offers training for administration, teachers, parents and students. Activities include: developing administrative guidelines for dealing with students at risk, training for teachers, information for parents and a curriculum for students. It encourages the idea that suicide should be talked about and never kept a secret. Training is available for this program and more information can be found by contacting the developers: <http://www.hazelden.org/web/public/lifelines.page>

Reconnecting Youth. This program was developed for high-risk students that have a history of or are likely to drop out of school. It is one semester long and students receive a credit for taking it. Evaluations show significant reductions in drug use, drop out rates, depression symptoms and suicidal behaviour. Training is available for this program and more information can be found on the website, www.reconnectingyouth.com.

Postvention

Postvention refers to the activities and procedures that follow a death by suicide. Postvention efforts can play a critical role in suicide prevention, as the occurrence of a suicide can be a risk factor in itself for subsequent suicides, by increasing the likelihood of other people viewing suicide as an option (Headspace, 2012). This is especially true for young people. Therefore, a number of resources have been developed outlining evidence-informed postvention procedures for school communities. One resource developed for secondary schools in Australia is organized according to the events that should take place as an immediate response to a suicide, and in the following month and school year. The immediate response should be focused on ensuring the safety of students and staff at the school, finding out the facts to stop the spread of rumors, and providing immediate support to the students and staff affected. The first 24 hours involves setting up support networks for students and staff in the school, and verifying the facts of the crisis. Staff must be informed about the crisis and need to be directed to provide consistent messaging to students regarding what happened. This should be done in small groups, not via a school assembly, which has been shown to be harmful. The week following a suicide should be focused on maintaining a regular routine at school, providing support for students, liaising with the affected family members and documenting all of the school's activities related to the postvention program. During the months following a suicide, it is important to be proactive by planning for potentially traumatic events such as the release of the yearbook, anniversaries, and other significant events. Lastly, an incident report must be completed. More detailed information can be found in the following resources:

- Headspace: Suicide Postvention Toolkit 2012. www.headspace.org.au/schoolsupport.com

- Youth Suicide Prevention School-Based Guide. (2012). University of South Florida.
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Evidence-Informed Practice Recommendations for Preventing Sports and Recreation Injuries

Overview

The benefits of leading an active lifestyle have been well documented. Being active is important to maintaining good health and participation should be encouraged, however, it is also necessary to recognize and understand the risk of injury associated with these activities. Between the years 2007 and 2009, there were 5,475 hospital admissions and more than 300,000 emergency room visits due to sport- or recreation-related injuries (Ontario Injury Prevention Resource Centre, 2012). By recognizing the risks, we are better able to reduce the rate of injury and maximize health benefits.

Risk Factors

Risk factors for sports- and recreation-related injuries are described as either intrinsic or extrinsic. Intrinsic risk factors are related to the biological or psychological characteristics of an individual, whereas extrinsic factors are related to an individual's surrounding environment (Caine, Maffulli & Caine, 2008). It is important to keep in mind that most previous research has focused on risk factors for specific sports or age groups; thus, not all of the factors discussed will apply to the whole population. This summary will provide an overview of common risk factors and explain the context in which they apply.

Examples of intrinsic risk factors include: previous occurrence of an injury, physical growth characteristics, changes in maturity, fitness level, muscle strength, balance and coordination (Frisch et al., 2009). Individuals who have been previously injured are more likely to re-experience an injury. Young people going through growth spurts are at an increased risk because of factors such as muscle-tendon tightness, vulnerable bones and decreased physical strength (Caine et al., 2008). Changes in maturity level can alter risk-taking behaviour and level of self-control, which may contribute to injury risk (Frisch et al., 2009). Fitness level is an important factor, and research has shown that improving cardiovascular fitness, muscle strength, range of motion and balance before a competitive season begins can decrease injury risk. (Frisch et al., 2009).

Extrinsic risk factors include protective equipment, amount of time spent participating in activities, rules, level of coaching and the culture of an activity/sport (Frisch et al., 2009). Protective equipment should be chosen in accordance with safety standards where they exist. Other considerations are proper fit and regular maintenance of equipment. Research indicates that in high school-aged students, more time spent playing sports increases injury risk (Emery & Tyreman, 2009). Rules and regulations around body contact and the

mandatory use of safety equipment can also impact safety. Level of coaching has been associated with injury risk; more experienced coaches tend to have players and teams with fewer injuries compared to coaches with less experience (Caine et al., 2008). Lastly, culture can impact safety in sports or recreational activities as it influences behavioural norms and affects the expectations of players or participants (e.g., competitive level, sitting off while injured, interaction with opponents) (Schiff et al., 2010).

Evidence-Informed Practice Recommendations

The following recommendations are made according to the age⁵ of the participant or player. A section focused on concussion has also been included given the widespread occurrence and serious nature of this type of injury in sport and recreational pursuits. Research has also been dedicated to injury prevention in specific sports and recreational activities. As it is not realistic for public health efforts to focus on one sport only, this research is not examined in great detail. Instead, a table has been prepared that describes the key prevention strategies for each sport and references are provided for further reading.

Sports and Recreation Injuries among Children and Adolescents

In Canada, an estimated 43% of youth aged 12 – 15 participate in sport (Emery & Tyreman, 2009). As such, many injury prevention strategies for children and youth involve efforts to reduce injury in an organized sport setting. The following strategies are supported in the research literature.

1. **Physical training and conditioning** in the preseason has been shown to reduce injuries in youth sport. Balance and proprioceptive training (awareness of one's joint position), preseason conditioning including flexibility, cardiovascular training and strength training, and a structured warm up including strengthening, stretching, plyometrics and sport-specific balance training have shown promising results (Abernethy & Bleakley, 2007; Heidt et al., 2000; Schiff et al., 2010). These intrinsic interventions have been evaluated in isolation and together, in studies examining multiple strategies at once (Schiff et al., 2010). Both types of studies have shown positive results, however, interventions that combine multiple types of training appear to be superior (Abernethy & Blakely, 2007). More research is needed in this area to evaluate the generalizability of these strategies.
2. The use of **protective equipment** is an important injury prevention strategy. Various types of equipment have been evaluated and have shown generally positive results.

⁵ Please note that various sources were used in the preparation of this document and age ranges varied. More information can be found by referring to the original studies.

These include ankle braces in basketball, knee pads in various high school sports, wrist protectors in snowboarding, face shields and protective eyewear in a variety of sports, helmet use in cycling, skiing and snowboarding, and mouthguards (Emery & Tyreman, 2009; Schiff et al., 2010). With regard to knee braces, studies have shown mixed results. Some indicate that knee braces were not effective for preventing knee injuries, and may actually increase the risk of ankle injuries (Abernathy & Bleakley, 2007). More research is required to understand the protective effects of equipment in a general sense, but results suggest that most protective equipment can be beneficial in preventing injury.

3. There is some evidence suggesting **rule changes** can prevent injury. Conclusive evidence exists for rule changes such as wearing a face shield in hockey, or eliminating “spearing” in football (Schiff et al., 2010). A recent study looking at various interventions to reduce injury in hockey showed that rule changes were the most effective, compared to education or cognitive-behavioural interventions (Cusimano, Nastis & Zuccaro, 2013). Mixed evidence exists for other strategies such as fair play initiatives in hockey (Macpherson et al., 2006). Lastly, it is important to consider that rule changes can only be effective if they are enforced by referees/officials and consistently modeled and reinforced by coaches.

Sports and Recreation Injuries among Adults

There is a lack of research examining injury prevention specifically in an adult sport context. However, the strategies discussed above for youth sport should be considered valid for adults as well. Compared to children and youth, adults have fewer opportunities to participate in organized sport, so people tend to begin or remain active by individual type exercise, such as jogging, cycling, swimming and aerobics. Injury prevention during exercise involves the following strategies:

1. According to Canada’s physical activity guidelines for adults, health benefits through exercise can be achieved by accumulating 150 minutes of moderate to vigorous physical activity in one week, with muscle and bone strengthening activities performed two days per week (see <http://www.csep.ca>). For those new to exercise, the key to preventing injury is to **start slowly and build gradually**. If a health condition exists that may interfere with a person’s ability to exercise, a physician should be consulted before beginning any physical activity. The PAR-Q is a standardized test that assesses a person’s health in accordance with starting an exercise program, and highlights any major risks that should be taken into account (Canadian Society for Exercise Physiology, 2002).
2. Another important consideration when beginning to exercise is using **proper equipment**. Appropriate footwear is especially important for preventing injury. Those beginning an exercise program for the first time should ensure they are oriented to new

equipment and its correct use. For example, cardiovascular training equipment such as treadmills or stationary bikes are relatively easy to operate by the experienced exerciser, but can be intimidating to a new user. Without proper orientation, these types of machines can be hazardous. Weight machines and free weights also present a risk for injury to the new user if an orientation to its correct use is not provided.

Sports and Recreation Injuries among Older Adults

Exercise by older adults is very important to maintaining good health and mobility. Many older adults are nervous about exercising because they are afraid of falling; however, exercise is extremely important in fall prevention and injury prevention in general. The following guidelines describe the amount and types of exercise that are necessary to help reduce the risk of falling (Sherrington et al., 2011):

1. Exercise should be moderately or very challenging to balance, and should involve reducing the base of support, moving one's centre of gravity, and aim to decrease reliance on upper body support to balance while standing. A good example of such exercise is Tai Chi, which challenges balance through slow controlled movement.
2. In order to have an effect on fall risk, older adults should engage in at least two hours of exercise per week.
3. Exercise needs to be ongoing, as benefits can be rapidly lost.
4. All adults, whether they are at a high risk for falling or living independently in the community, should engage in exercise to prevent falls.
5. Exercise in a group setting or at home has been shown to reduce falls, and many studies have shown positive results when group exercise is supplemented with home exercise.
6. Walking is beneficial and can be included in an exercise program, but not at the expense of balance training. Additionally, adults at high risk for falls should avoid brisk walking, as it has been shown to increase falls among these individuals.
7. Similarly, strength training has many benefits for health and physical fitness. However, it should not be included at the expense of balance training, only in addition to exercises improving balance.
8. Those involved in administering exercise for older adults should be aware of other fall-related risk factors, and suggest a full risk assessment. Multifactorial interventions have been strongly linked to decreased fall risk and it is preferred to implement other appropriate strategies in addition to exercise.

Another reason older adults may avoid exercise is frail health. If an adult has a health problem that could interfere with performing physical activity, it is important to consult a physician before beginning a new program. Conditions such as a recent surgery, unexplained chest pain or breathing difficulties, osteoporosis, arthritis or high blood pressure should be discussed with a physician before exercising (National Institute on Aging, 2011). However, exercise can be adapted to accommodate almost any health condition and is highly recommended because of its ability to improve common health problems associated with advancing age.

Beyond ensuring medical conditions are assessed prior to beginning an activity or program, the same injury prevention principles apply to older adults as in the general population: a slow start, a gradual increase in difficulty and the proper use of equipment. Exercise classes specifically designed for older adults are increasingly available. More information is available through the Centre for Active Aging at Western University, <http://www.uwo.ca/actage/>.

Concussion

Concussion has been recognized as a significant risk related to participation in sport and recreation activities for all age groups. Research by the Centers for Disease Control and Prevention examining the epidemiology of concussion in the United States estimates that between 1.6 and 3.8 million concussions occur in sports and recreational activities each year (Daneshvar et al., 2011). The Canadian Institute for Health Information reported that between 2003 and 2004, head injuries sustained during sport or recreational activity were the third leading cause of traumatic head injury hospital admission in Canada (CIHI, 2006). One of the guiding documents in the field of concussion research is the *Consensus Statement on Concussion in Sport*, prepared by the world's leading experts on concussion at the 4th International Conference on Concussion in Sport, held in Zurich (McCroory et al., 2013). The most recent version was released March 12, 2013. The link to the full article is available on Parachute's website: <http://www.parachutecanada.org/injury-topics/item/consensus-statement-on-concussion-in-sport-with-new-resources>.

Risk factors for Concussion

Specific risk factors for concussion include: having previously had a concussion, the number and severity of previous concussions, sex, age, and the sport or recreation activity played (Harmon et al., 2013). As with other sports injuries, when someone has experienced a previous concussion, they are at increased risk of re-injury. With concussion, this is particularly problematic because repeat concussions can lead to slower recovery and more severe symptoms, which have been linked to chronic traumatic encephalopathy (CTE). When symptoms of a concussion are more severe, recovery is likely to take longer. Data suggests that females experience concussion more often than males, but this trend could exist simply because females may be more likely to report the injury. Because the brain is

not fully developed, youth are more likely to experience severe symptoms and longer recovery times than adults. Lastly, contact between players is the most common cause of sport-related concussion; thus, contact sports present a greater risk (Harmon et al., 2013).

Prevention

It is not realistic to prevent all incidents of concussion due to the physical nature of many sports and recreational activities. However, efforts can certainly be made to reduce the number of concussions that occur, and to properly treat these injuries to minimize harmful effects.

1. According to a recent position statement released by the American Medical Society for Sports Medicine (Harmon et al., 2013), athletes should complete a **pre-participation exam** that asks about history of concussions or head injuries, and the presence of learning disabilities, mood disorders or migraines. Coaches and trainers can use this information to identify high-risk athletes.
2. When a concussion or head injury is suspected, the athlete should be assessed on the sidelines as soon as any required first aid is completed (McCrory et al., 2013). There are a number of tools that have been developed for assessment purposes. **The gold standard assessments** are: the Sport Concussion Assessment Tool 3 (SCAT3) and the SCAT3 for children, which were recently updated along with the concussion consensus statement in Zurich (McCrory et al., 2013). Another valuable tool is the concussion recognition tool (CRT). These assessments are accessible on Parachute's website: <http://www.parachutecanada.org/injury-topics/item/consensus-statement-on-concussion-in-sport-with-new-resources>
3. Following a concussion, athletes should be examined and **monitored carefully for symptoms** that may appear after the injury. Symptoms are not always apparent right away and may be delayed as long as two days following the injury. Drugs that alter one's mental state should be avoided if possible, to ensure possible symptoms are not overlooked (Harmon et al., 2013). Physical and cognitive rest is very important to recovery and should be strictly adhered to.
4. There have been guidelines developed for **returning to sport and physical activity** following a concussion (McCrory et al., 2013). These guidelines are from the updated Zurich consensus statement for concussion in sport, and are regarded as the gold standard (McCrory et al., 2013). The first stage is no activity, and the individual focus is on recovery. The next stage is light aerobic exercise, where a slight increase in heart rate is acceptable. Next, sport-specific exercise is recommended, where the movements associated with the activity are performed. Then, non-contact training drills are completed, and only if the participant remains symptom free, is full contact practice introduced. Once all of these stages are completed and the participant remains

symptom free, then a full return to their activity can occur. It is recommended that each stage take at least 24 hours, but it is important to emphasize that this is an *individual* process and if at any point symptoms are experienced, rest is needed before trying again to progress through the stages (McCroory et al., 2013).

5. **Education** can help improve the recognition, management and prevention of concussion (Tator, 2012). Education should target players/participants, coaches and trainers, parents, and other officials involved in organized sport and recreation activities such as referees, management and teachers. Further, health care professionals can benefit from education as to the risk factors, symptoms and guidelines for gradually returning participants to full activity. Educational strategies include concussion road shows, websites, cards (sport-specific cards containing symptoms and return to play guidelines), and mandatory concussion education. Mandatory education for players, parents and coaches of high school athletes has been implemented in many jurisdictions in the United States. Evaluation of these programs is needed, but they are designed to improve recognition and reporting of concussions, to prevent long-term damage and to ensure return-to-play protocols are followed. A similar strategy has been to hold pre-season or pre-activity meetings on concussion, or viewing of concussion videos (Tator, 2012).
6. **Legislative prevention strategies** addressing other injury-related issues have had previous success and show promise for preventing concussions (Tator, 2012). Previous examples include the introduction of new rules in football and hockey. In football, forms of tackling referred to as “spearing” and “clothes lining” are no longer allowed, and this has led to a reduction in the number of spinal and head injuries. In hockey, enforcing the rule of no body checking from behind has been important in preventing concussions (Harmon et al., 2013). It is important to note that rule changes are effective only if coaches consistently model these rules and officials consistently enforce them (Harmon et al., 2013).
7. Another prevention strategy is to **limit the number of contact practices** allowed in one week; this strategy has been adopted by some schools at the college level in the United States for football, lacrosse and soccer. In practice, it is also important to emphasize proper technique for high risk moves such as tackling, body checking or heading a ball in soccer (Harmon et al., 2013).

Injury Prevention for Specific Sports and Activities

The table provided in the appendix summarizes Scanlan et al.’s (2001) detailed review of injury prevention strategies related specifically to baseball, basketball, bicycling, football, hockey, rugby and soccer. More detailed information can be found in the full article.

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Appendix

Table 1: Prevention strategies in various organized sports.

Sport	Prevention Strategies to Reduce Injury			References
	<i>Education</i>	<i>Equipment / Engineering</i>	<i>Enforcement</i>	
Baseball		The use of breakaway bases has been shown to reduce injuries among college athletes caused by sliding into base	Due to the high number of shoulder injuries reported by pitchers due to repetitive throwing action, it has been suggested that the number of innings young pitchers play per game be standardized	Scanlan, McKay, et al. 2001
Basketball	Preseason conditioning can help athletes be physically prepared and less likely to experience an injury	The use of high top shoes and ankle braces can be effective in reducing ankle injuries		Scanlan, McKay, et al. 2001
Bicycling	Education and safety training programs, such as CAN-BIKE, can improve safe riding behaviour	Helmet use is effective in preventing head injuries	Helmet legislation can improve rates of wearing helmets	Scanlan, McKay, et al. 2001

Football	<p>Preseason training and being in good physical shape is important</p> <p>Coaches should be educated on new injury prevention developments</p>	<p>Helmets should meet safety standards</p> <p>All equipment should be maintained, replaced if needed, and fit properly</p> <p>The use of protective knee braces has mixed results; these should be available for players who need them.</p> <p>Playing surfaces should be well maintained</p>	<p>Rule changes that eliminated spear tackling were very effective; future rule changes that reduce roughness could be considered based on this success</p>	Scanlan, McKay, et al. 2001
Ice Hockey	Coaches should be skilled enough to teach players about high risk scenarios and how to avoid them	<p>Helmets and face protection should be mandatory for all players</p> <p>Equipment should be evaluated and replaced when necessary</p>	<p>Rules such as no checking from behind, no high sticking and no fighting (certain leagues) need to be consistently enforced</p> <p>Rules of fair play could be developed and enforced, in addition to regular rules</p>	Scanlan, McKay, et al. 2001
Rugby	Preseason conditioning is important	Players should wear mouthguards during practice and games	Coaches and officials should strictly enforce fair tackling rules	Scanlan, McKay, et al. 2001

Soccer	Some evidence exists to support proprioceptive training and strength training, but more research is needed		Guidelines to prevent heat exhaustion could be developed and enforced	Scanlan, McKay, et al. 2001
Skiing and Snowboarding	While rigorous research is not available to support the effect of ski lessons for beginners, they are still recommended as an injury prevention strategy	Proper fit and adjustment of ski bindings Helmet use decreases risk of head injury		Scanlan, McKay, et al. 2001
Snowmobiling	The majority of injuries occur among young adults who are male; educating this demographic about speed and following designated trails is important The Canadian Red Cross recommends that water should have 10 inches of ice before it is safe for snowmobiles	Clearly, wearing a helmet while snowmobiling is very important for injury prevention	ThinkFirst Canada (now part of Parachute) has recommended that graduated licensing be introduced for snowmobiling	Ontario Injury Compass, 2008 ThinkFirst Canada, 2008

Evidence-Informed Practice Recommendations for Preventing Violence

Overview

Violence has been defined by the World Health Organization (WHO) as ‘the intentional use of physical force or power, threatened or actual, against oneself, another person or against a group or community, that either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment or deprivation (World Health Organization, 2002).’ In 2000, it was estimated that deaths due to violence amounted to 1.6 million worldwide (World Health Organization, 2002). In Ontario, the economic burden of violence was estimated at \$266 million (SMARTRISK, 2009). Violence exists in many different forms. It is usually divided into three types: self-directed (suicidal behaviour and self-harm), interpersonal (family and intimate partner violence and community violence) and collective (social and political violence such as organized hate crimes or war). For the purposes of this summary, the focus will be interpersonal violence, which includes child maltreatment, youth violence, elder abuse or intimate partner violence. In Ontario, there were more than 75,000 emergency room visits between 2005 and 2007 as a result of interpersonal violence (Ontario Injury Data Report, 2012). Public health and injury prevention practitioners can play an important role in preventing violence by encouraging multi-sector collaboration, identifying risk and protective factors and through implementing and evaluating promising practices.

Risk Factors

Violence is a complex behaviour. It cannot be predicted by one simple risk factor; it is the result of many interacting influences. The Centres for Disease Control and Prevention (CDC) use the social ecological model (SEM) to frame their understanding of violence. According to the SEM, this behaviour is the result of interacting factors related to the *individual*, their *relationships*, the *community*, and *society* as a whole. It is important to recognize that most risk factors are not unique to each type, but can be considered shared risk factors for many types of violence (WHO, 2002). Some of the common risk factors for interpersonal violence include: maltreatment as a child, experiencing or witnessing violence as a child, low income, low self-esteem, high parental stress level, social isolation, alcohol use, social norms and availability of community supports. Evidently, the risk factors for violence have been examined in detail and a thorough explanation of these factors and how they relate to each other and to violence is beyond the scope of this report. Readers are encouraged to refer to the *World Report on Violence and Health* (WHO, 2002, pp. 12-15), *Preventing intimate partner and sexual violence against women: taking action and*

generating evidence (WHO, 2010, pg. 21), and *Preventing child maltreatment: a guide to taking action and generating evidence* (WHO, 2006, pp. 13-16) for detailed descriptions of risk factors using the SEM.

Evidence-Informed Violence Prevention Strategies

Violence is a complex issue with many contributing influences. The most effective efforts to prevent violence will be multifaceted and require collaboration between stakeholders at local, national and even international levels. As stated in the *World Report on Violence and Health* (2002), “the links between violence and the interaction between individual factors and the broader social, cultural and economic contexts suggest that addressing risk factors across the various levels of the ecological model may contribute to decreases in more than one type of violence (pp. 15).” The World Health Organization has produced a number of influential reports on violence prevention strategies, combining the extensive research in this area into practice recommendations and implementation strategies. In addition to *The World Report on Violence and Health* (2002), these reports are *Violence: the Evidence* (2010), and *Preventing Violence: A guide to implementing the recommendations of the world report on violence and health* (2004). The recommendations discussed in these three influential reports will be summarized; more detailed information can be found in the full reports, which are listed in the references.

In the report *Violence: the Evidence*, seven evidence-based prevention strategies are discussed in detail (WHO, 2010).

1. The first strategy is to **develop safe, stable and nurturing relationships between children and their parents and caregivers**. This can prevent child maltreatment, reduce childhood aggression, and help develop positive parenting skills. Examples of evidence-informed programs include the Positive Parenting Programme (Triple P) and the Nurse Family Partnership. Starting these positive parenting programs in the prenatal period is very important to maximize positive results.
2. The second strategy discussed by WHO is to **develop life skills in children and adolescents**. These programs have been shown to prevent youth violence, and improve childrens’ abilities to handle academic, emotional and social challenges. In addition, pre-school enrichment and social skills programs can improve academic performance and eventually improve job prospects. Youth engagement initiatives have also demonstrated positive results in terms of improving school performance, improving social skills and facilitating a productive use of free time.
3. The third strategy is to **reduce the availability and harmful use of alcohol**. Alcohol is strongly linked to many types of violence. Promising strategies to reduce alcohol use

include reducing the hours and number of locations selling alcohol, increasing prices and having longer treatment available for problem drinkers.

4. Fourth, the report states that **reducing access to guns, knives and pesticides is effective in preventing violence**. Guns, knives and pesticides are three of the most common means used to inflict violence. Examples of programs that could limit access to firearms and sharp objects include licencing, enforcing a minimum buying age and requiring a background check. (Note: Pesticide availability is a risk factor for suicide, and not applicable to our summary of interpersonal violence. Refer to the section on suicide prevention for more information).
5. Fifth, there is evidence to suggest that **promoting gender equality** can help prevent violence against women. In Canada, the Youth Relationship project has shown promising results in reducing dating violence (Wolfe et al., 2003). This program targets adolescents, and is delivered in 18 group sessions that focus on building positive relationships, improving communication skills and improving real-life problem solving abilities.
6. There is also evidence that highlights the importance of **changing cultural and social norms** that support violence. Laws and policy changes help to send a message that violence in any form will not be tolerated, and many governments worldwide have started to initiate change in this area. Public education and awareness campaigns that challenge the cultural norms supporting violence are also valuable, but more rigorous research is needed to understand the specific effects of these programs.
7. Lastly, **victim identification, care and support programmes should be available**. Services such as trauma-focused cognitive behavioural therapy, protection orders, and advocacy support programs have been shown to reduce possible mental health issues related to violence, reduce repeat victimization and improve safety behaviours.

Another influential report prepared by WHO, the *World Report on Violence and Health* (2002), offers recommendations to prevent specific types of violence. Prevention strategies are presented according to their corresponding level of the SEM, and are summarized below.

Preventing Youth Violence

Strategies at the individual level are focused on increasing protective factors associated with youths' skills, attitudes and beliefs. Examples of these programs include preschool enrichment programs and social skills development programs. At the relationship level, prevention strategies focus on building positive relationships with the people youth interact with on a daily basis. Programs such as home visitation programs during infancy

(to foster parenting skills), parenting programs (e.g., Triple P), mentoring programs within the community and therapeutic family interventions (e.g., multi-systemic family therapy) are good examples. At the community level, violence prevention focuses on making changes in the environment that lead to improved interactions between people. For example, policing programs, alcohol regulations and availability, extracurricular activity availability, and actions to limit gang activity are all community strategies. Lastly, prevention at the societal level addresses economic and social conditions that may contribute to violence. For example, poverty, gun activity, and health inequalities are all known to lead to violence in youth, and prevention would work to address these underlying issues.

Preventing Violence toward Children

In their report, WHO points out that there are a number of programs for children who have experienced or witnessed violence, but programs focusing on primary prevention are lacking. Common strategies at the individual level include victim support programs and child protection services. Relationship level prevention strategies include parent training programs, home visitation programs and intensive family preservation programs. At the community level, violence prevention in children involves community support services and school based programs (e.g., teach children appropriate interactions and how to recognize violent situations). At the societal level, national policies preventing child abuse and international regulations (e.g., Convention on the Rights of the Child) help to raise awareness and prevent violence.

Preventing Intimate Partner Violence

Individual strategies to prevent intimate partner violence involve support services for victims (e.g., women's crisis centres, safe houses). These are important in preventing repeat victimization and addressing health needs. Community level strategies involve awareness and prevention campaigns, and coordinated community services between multiple sectors. Currently, the best evidence for preventing intimate partner violence is through school-based programs that prevent dating violence and focus on developing positive relationships during adolescence (in fact, these are the only programs considered to be effective) (WHO, 2010).

Preventing Violence in the Elderly

Preventing violence in older adults can be challenging because of social isolation, which limits the people available to confide in, and because of lack of companionship, where older adults may not want to acknowledge violence if the perpetrator is a companion. Examples of prevention strategies include: national networks to support development of policies, services such as safe-houses and emergency shelters (community level), caregiver training

programs, support through existing social services (community level), identification through those close to the elderly, such as family members or health care workers (relationship level) and education and awareness campaigns (community and society levels) (WHO, 2013).

The last report to be discussed in this summary is entitled *Preventing Violence: A guide to implementing the recommendations of the World Report on Violence and Health (WHO, 2004)*. As indicated by the title, this report outlines strategies and action steps for public health organizations to follow, which will ultimately reduce violence. The report is divided into six steps that are further broken down into detailed action items. For the purposes of this summary, the rationale behind each step will be described; the full report is a valuable and detailed resource that is highly recommended for practitioners interested in preventing violence using a public health approach.

1. **Increasing the capacity for collecting data on violence.** Data collection impacts the ability to quantifiably define a public health issue and thus create priorities. It also allows public health agencies to plan for the most effective geographic locations of various services, which improves prevention and also treatment. Finally, it provides a way to evaluate and improve prevention strategies.
2. **Researching violence – Causes, consequences and prevention.** High quality research leads to a better understanding of an issue. As stated in this report, if a problem is well understood, the response to the problem will be more effective. Similar to other population health issues, the best research methods are longitudinal or case control studies; these types of research tend to be expensive and work-intensive, but are very important to designing effective prevention efforts.
3. **Promoting the primary prevention of interpersonal violence.** As previously mentioned, support services for those who have been victims of violence are important, but primary prevention should continue to be a priority. Action at all levels of the social ecological model will be important, especially policy. Interventions that target early development, improve parenting skills in infancy, strengthening communities, changing cultural norms that lead to violence and reducing inequalities will be the most effective at preventing violence.
4. **Promoting social and gender equality and equity.** Social and gender inequalities and equity are risk factors at the societal and community levels. Further, these conditions worsen many other risk factors identified. It is important to focus on reducing these inequalities and inequities to ultimately prevent violence.
5. **Strengthening support and care services for victims.** Although primary prevention has been identified as an important focus, it is still important to provide appropriate

and accessible services for those who are victims of violence. Violence, whether experienced first hand or witnessed, can lead to physical, mental and emotional health issues. If services are available for victims that meet these needs, further harm can be limited.

6. **National plan of action.** Countries need to work on developing nation-wide plans for preventing violence. Ministries of health can spearhead these efforts, but preventing violence will involve collaboration of many sectors. This collaborative effort needs to be organized through common goals (care of victims and primary prevention) and realistic timelines.

Other Valuable Resources

- **Blueprints Database:** This resource centre began at the University of Colorado's Centre for the Study and Prevention of Violence. The aim is to collect, analyse and disseminate information about programs that have been shown to be effective in preventing youth violence and developing important life skills. This is an effective tool for finding suitable programs suited to community needs and resources. <http://www.blueprintsprograms.com/>
- **Canadian Best Practices Portal:** This service, provided through the Public Health Agency of Canada, features a searchable database of violence prevention programs that have been reviewed and deemed effective. <http://cbpp-pcpe.phac-aspc.gc.ca/>; <http://66.240.150.14/topic/br-rlac/6/page/1>
- **Centres for Disease Control and Prevention (CDC):** The CDC, based in the United States, has a branch dedicated to Injury, Violence and Safety. Extensive information on various high risk groups is available through the website: <http://www.cdc.gov/InjuryViolenceSafety/>.
- **Canadian Red Cross:** The Canadian Red Cross has a number of violence prevention education programs. More information is available on their website: <http://www.redcross.ca/article.asp?id=294&tid=030>
- **WHO – Violence prevention:** This website offers numerous resources and provides access to detailed information. http://www.who.int/violence_injury_prevention/violence/en/
- **WHO report on intersectoral action:** In their 2010 report, *Violence Prevention: An Invitation to Intersectoral Action*, WHO encourages collaboration between sectors in order to be successful in preventing violence. The full report is available here: http://www.who.int/violenceprevention/about/intersectoral_action.pdf.

- **PREVNet (Promoting Relationships and Eliminating Violence):** PREVNet is a Canadian network of professionals from many different sectors dedicated to the prevention of bullying and violence. Their website is an excellent resource: <http://prevnet.ca/>

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