WHITE PAPER ON THE PREVENTION OF POISONING OF CHILDREN IN CANADA

OCTOBER 2011

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EXECUTIVE SUMMARY

PURPOSE OF THE WHITE PAPER

Poisoning is a much larger public health issue than is generally recognized and currently there is no comprehensive poison prevention and control system in Canada. Poisoning is often thought to be an issue that has been solved since it is provided little press or policy attention. The purpose of this white paper is to provide background about the poisoning problem in Canada, identify the key concepts, theories sources of evidence and gaps in knowledge relating to poisoning in Canada. Focus is placed on children as they are a population vulnerable to poisoning and have historically been the target for poisoning prevention interventions.

MAGNITUDE OF THE POISONING PROBLEM

For Canadians of all ages, poisoning is the fourth leading cause of injury deaths and permanent total disability and the fifth leading cause of injury hospitalization, non- hospitalization, and permanent partial disability in Canada in 2004 (Smartrisk, 2009).)

Cost estimates show that in 2004 the economic burden of unintentional poisonings in Canada was approximately $771 million (Smartrisk, 2009).

Poisoning was initially viewed as a problem of young children but it now is a concern across the entire lifespan. It is estimated that half of all poison exposures occur among children less than 5 years of age; however, only about 10 percent of the more severe poisonings occur among young children. More than two thirds of severe poisonings happen to adults over 19 years.

KEY ISSUES

Canada has seen success in childhood poisoning prevention due to the introduction of child-resistant packaging and the development of provincial poison control centres. In addition to these initiatives, other best practices for poisoning prevention include safer medications, safer storage procedures of medications and cleaning products, increased knowledge of poison control centres and education of families about preventing poisoning.

HISTORY OF POISON CONTROL IN CANADA

(Adapted from the Canadian Association of Poison Control Centres website: http://www.capcc.ca/about/description/description.html)

In 1958, Health and Welfare Canada (now Health Canada), established the Poison Control Program, within the Product-Related Diseases Division. Product formulation cards (and later microfiche) served as the database for information requests regarding exposures. These cards were distributed to all active treatment hospitals throughout Canada. Manufacturers would voluntarily submit this information to Health and Welfare Canada. Missing information would be solicited by Health and Welfare Canada staff when an exposure occurred to a product about which no information was available. In exchange for these information cards, Centres kept statistics and reported these back to the Program. Annual reports were produced from the data until 1988 when the federal program folded.

Although the database and statistical reports came from the federal Poison Control Program, funding for the Centres was provincial and varied from province to province. In the '60s and '70s, most Centres were in the emergency departments of active treatment hospitals. The Poison Telephone was usually answered by the ER nurse. In the '80s, most of these local centres were replaced by regional or provincial centres with dedicated, trained staff. Physicians with specific training in toxicology were hired to give medical direction and continuing education. As many of the exposures were pediatric, four of the dedicated centres were located within pediatric hospitals. Although, initially, calls to the Poison Information Centres were from the public, over the years, increasingly, health care providers have come to rely on the toxicological expertise of the staff at Poison Centres to assist with the management of poisoned patients who present to Health Care facilities. Pediatric and adult calls are approximately equal in number.

Provincial Centres

In 1968, the Ottawa Civic Hospital Poison Information Centre was opened. During the day, a dedicated registered nurse answered calls from the public; at night, the intern staffing the emergency department answered these calls. Similarly, a dedicated registered nurse answered calls in the emergency department at the Hospital for Sick Children starting in 1977. Both centres were staffed 24/7 with full time medical directors from 1981 forward. In 2005, the Regional Centre at the Children's Hospital of Eastern Ontario was closed. The Centre at the Hospital for Sick Children became the Ontario Poison Centre. Front line staff include both registered nurses and pharmacists.

The BC Drug and Poison Information Centre (DPIC) began as a research project in the mid-1960s at the Faculty of Pharmaceutical Sciences at the University of British Columbia (UBC). The project involved development and distribution of poison information cards designed to assist practitioners in the diagnosis and treatment of poisoning incidents. DPIC was formally established at Vancouver's St. Paul's Hospital in 1975 through the cooperative efforts of the Hospital Programs Branch of the BC Ministry of Health and UBC. The original mandate of the Centre called for the development of centralized services to assist health professionals throughout BC in providing optimal levels of drug therapy and poison management. Public access to poison control began in 1981 for residents of the Vancouver area, further expanding to include the Victoria region in 1985. The following year, nurses joined the existing staff of pharmacists and consulting physicians, and the entire province was opened to toll-free poison information services. The Centre's history of providing supplemental toxicology information in written form has continued with publication of the Poison Management Manual, which replaced the original poison information cards in 1981. In addition to its UBC association, since 2002 DPIC has been affiliated with the BC Centre for Disease Control which is an agency of the Provincial Health Services Authority.

In 1986, three regional poison centres in Quebec were amalgamated as one provincial centre at le Centre Hospitalier de l'Université Laval in Québec City. Specialist nurses are located in the Centre in Quebec. Toxicologists throughout the province remained on staff. In 2003, the Centre was moved and came under the jurisdiction of the CLSC-CHSLD Haute-Ville-Des-Rivières.

Alberta established the toll-free provincial Poison and Drug and Information Service (PADIS) in 1986 at the Calgary Foothills Hospital. The Centre was established to replace five regional centres and to link the provision of poison information services with that of drug information services already established and operating out of the pharmacy department at the Foothills. Both registered nurses and pharmacists now answer these information lines.

In 1993, a toll-free poison information number for southern Saskatchewan was established in Regina and another in Saskatoon for northern Saskatchewan, but with no dedicated staffing. In 2001, Saskatchewan contracted with the Poison and Drug Information Service (PADIS) to provide comprehensive poison service to Saskatchewan through a dedicated toll-free number.

Also in 1993, the IWK Regional Poison Centre was established at the IWK Hospital in Halifax, Nova Scotia replacing the red phones in the pediatric emergency department. Specialist trained nurses and pharmacists answer the poison information lines. A physician toxicologist joined the Centre in 2005 and a complement of emergency physicians offer medical back-up.

Each of these Centres strives to follow the criteria as set by the American Association of Poison Control Centers (AAPCC) for certification. The registered nurses and pharmacists answering the information lines in each of these Canadian centres are eligible for certification as a Specialist in Poison Information. Eligibility for certification includes at least two years of full time employment at a poison centre, handling of two thousand human exposure calls and challenging a written examination as set by the AAPCC.

The Children's Hospital in Manitoba has a dedicated telephone information line in the emergency department answered by physicians. The phone number is local only. No toll- free line is available for the Province.

In Newfoundland, a registered nurse answers a dedicated province wide information line from 0800-2400.

In New Brunswick, poison calls from the public are answered by a health information line registered nurse. These nurses have no specific training in toxicology. No information line is available for health care providers.

None of the Territories have dedicated poison centres although poison calls are handled either by 911 operators or by personnel in the Emergency Departments in Whitehorse, Yellowknife and Iqaluit. Specific expertise and consultation may be sought as necessary from other provincial poison centres.

Canadian Association of Poison Control Centres
Association Canadienne des Centres Anti-Poison

In order to provide some cohesiveness and sense of "system" to a fragmented group of poison centres dispersed across the country, a voluntary association, the Canadian Association of Poison Control Centres (CAPCC) was formed at a meeting of Medical Directors in Toronto in 1982.

The CAPCC provides a centralized forum for communication, information and idea exchange among Canadian poison centres. While its members are primarily professionals working in poison control centres, other members have included pharmacists, pharmaceutical companies, forensic toxicologists, public health staff and emergency physicians.

Product Formulations Database

The federal government product database was maintained and distributed until 1988. At that time, the CAPCC and the Canadian Paediatric Society negotiated with Health & Welfare to take over responsibility for the database. The CPS agreed to use its permanent secretariat address for the receipt of Canadian product formulations. The CAPCC decided that the needs of its members would be best served by incorporating the Canadian data into the existing POISINDEX database that was presently being used by all members. POISINDEX is the largest and most complete resource for quickly identifying, managing, and treating toxicological exposures. It is used by poison and drug information specialists, emergency department personnel, and clinical toxicologists in hospitals, healthcare facilities, and poison control centers all over the U.S. Because of cross border trade, having access to American data was important. Subsequently, the Canadian federal data files were downloaded into the POISINDEX system. These records are updated and new records are solicited through mail outs to lists of manufacturers. The submissions are funneled through the Ottawa Poison Centre under the auspices of the Canadian Paediatric Society, to POISINDEX. Some Canadian companies, primarily industrial, only submit their information to the Canadian Centre for Occupational Health and Safety (CCOHS). The CCOHS CCINFOWEB database, which contains unedited Material Safety Data Sheets, is also essential. Both databases are CD-ROM and Web based.

IMPACT OF POISONING IN CANADA

Context

Poisoning is a much larger public health issue than is generally recognized and currently there is no comprehensive poison prevention and control system in Canada. According to Waller, a founder of the science of injury control, all unintentional injury involves damage by misapplication of physical energy. In the case of poisoning, the energy comes from chemicals the human body can not tolerate. Poisoning events interfere with the balance that the body maintains with the environment. Poisoning may occur because there is direct tissue damage from acids or bases or because a chemical may block or overwhelm specific enzyme systems within the body that also regulate metabolism. (Waller, 1985)

Waller states that children are most at risk of poisoning between the ages of 18 and 35 months which is the period in the development of a child when they are able to climb and reach new things but are without the experience to know what is to be avoided. While adults may be deterred from consuming a substance by its bad taste, this is not the case with young children. Children displaying hyperactivity and other behaviour problems such as destructiveness, uncooperativeness, stubbornness, fighting and temper tantrums are over represented among poisoning cases and are often found to experience repeat poisonings. Stress within a family has also been linked with a higher likelihood of poisoning.

Waller also finds that the major environmental factor influencing poisoning by liquids and solids appears to be the extent to which access is possible because of location and ease of opening of the container. Products no longer in their original container pose a higher risk of ingestion. Accessibility to the product container and the ability to open it are also factors related to the rate of ingestion of a product.

The most important determinant of severity of injury with poisons is the toxicity of the substance involved followed by dose. These factors, says Waller, along with the body weight of the individual determine the severity of the poisoning. To mitigate the negative effects of a poisoning, early identification that a poisoning has occurred along with accurate information about product ingredients, their toxicity, and correct treatment are key. Waller names countermeasures to poisoning such as the substitution of less toxic substances for more toxic ones in the products with which we come into contact, reducing access to hazardous products through the use of child-resistant packaging, limiting the amount of a toxic substance in a container to a sub-lethal dose, and community and family education about the identification of toxic materials and their safe storage.

Definition of Poisoning

The National Academy of Sciences, Committee on Poison Prevention and Control's operational definition of poisoning subsumes "damaging physiological effects of ingestion, inhalation, or other exposure to a range of pharmaceuticals, illicit drugs, and chemicals, including pesticides, heavy metals, gases/vapors, and common household substances, such as bleach and ammonia" (Institute of Medicine (U.S.). Committee on Poison Prevention and Control, 2004) pg 3

There is no standard definition of poisoning that is universally accepted and applied in clinical practice, in data collection, and in public health policy setting. Within data collection systems, different definitions of eligibility for the purposes of case reporting may apply in various surveillance schemes making comparisons across systems difficult in some circumstances. For example, there are several types of events which are not universally accepted as poisonings so that the inclusion or exclusion of these events can lead to variations in estimating the magnitude of poisoning. In developing a surveillance system clarifying the manner in which to handle each of these ambiguous events must be considered. Some of the events which are not universally included as poisoning events include:

- Envenomation from snakes and spiders (usually are included)
- Insect stings and bites that might not be considered toxic but may be complicated by allergic responses, including fatal anaphylaxis (usually not included)
- Medication responses that may not be dose related
- Unusual toxic responses that may involve susceptible subpopulations
- Adverse therapeutic events such as drug toxicity resulting from drug interactions, increased susceptibility or true allergic sensitivity, or dosing error
- Ethanol poisoning, either acute, chronic or effects of withdrawal
- Seafood-related toxins (usually included)
- Bacterially derived toxins (usually not included)
- Lay definitions of poisoning such as food poisoning, poison oak or sun poisoning o Toxin exposure without attributable and defined or discrete clinical effect (exposure to lead).

Factors of intent may also impact whether or not an exposure is categorized as a poisoning event. For instance, health care providers may or may not consider a drug overdose as a poisoning depending whether the medical complaint was viewed as an intended end-point. (Institute of Medicine (U.S.), Committee on Poison Prevention and Control, 2004)

Poisoning Statistics (Canada and International Comparison)

As poison centres are funded provincially, each province has different reporting requirements and formats. Currently, no federal government department keeps or reports national poisoning statistics, except for those resulting in death. An initiative by Health Canada to establish a Canadian poison database and statistics was piloted in 2002 but funding was cancelled prior to its national implementation. However, the Canadian Association of Poison Control Centres (CAPCC) remains committed to working towards the development of national statistics.

Magnitude of the Problem

For Canadians of all ages, poisoning is the fourth leading cause of injury deaths and permanent total disability and the fifth leading cause of injury hospitalization, non- hospitalization, and permanent partial disability in Canada in 2004 (Smartrisk, 2009).)

Data from the Canadian Institutes for Health Information (CIHI) show that annually an estimated 7 children age 14 years and under die in Canada from poisoning, and another 1,700 are hospitalized for serious injuries. Canadian children have an approximate 1 in 820,000 risk of dying and a 1 in 3,400 risk of being seriously injured as a result of poisoning. Medication is involved in 67% of all unintentional poisonings of children age 14 and under. The remaining poisonings are caused by a wide range of products such as household cleaners, alcohol, plants, fertilizers, pesticides, paint thinner and antifreeze. Among medications iron pills are a leading cause of death for children. Iron supplements are commonly taken by women of childbearing age and therefore often found in households with young children. Over two-thirds (64%) of poisoning incidents occur in children age 1 to 4 years. This age group is at risk for poisoning in part because they are at a developmental stage of putting items in their mouths and exploring their environments.

Cost estimates show that in 2004 the economic burden of unintentional poisonings in Canada was approximately $771 million (Smartrisk, 2009).

Because of differences in data collection, data is not easily combined to give a clear view of the issue in Canada as a whole. Therefore, two examples of provincial-level data, Alberta's and Ontario's, are included here to provide a more detailed picture of the scope of poisoning. In Alberta, poisonings are a leading cause of injury. For the period 1999- 2008 poisonings were the third leading cause of death, accounting for an average of 293 deaths each year. In 2008 the death rate for poisonings was 8.34 deaths per 100,000 population. The economic burden or total costs of poisonings for Alberta in 2004 was approximately $78M (Smartrisk, 2009).

The Ontario Poison Control Centre responded to over 60 000 calls in 2008. The majority (88%) were due to a human poison exposure. The majority of the calls were made by the public (64%) but as many as 29% of calls were from health-care professionals at a health- care facility. Forty-two percent of poison exposures involved children younger than six years old. Unintentional exposures accounted for 77% of poison exposures reported; the majority involved children less than six years of age. Ingestion accounted for the majority (82%) of poison exposures.

ECONOMIC BURDEN OF POISONING

Costs of Injury by Cause
Total, direct, and indirect costs of injury by cause, Canada, 2004

Description	Total Cost	Direct Cost	Indirect Cost
Falls	6,155	4,457	1,698
Transport Incidents	3,699	1,603	2,096
Suicide/Self-harm	2,442	707	1,735
Violence	871	381	490
Poisoning, unintentional	**771**	**281**	**490**
Fire/Burns	290	118	172
Struck by/against Sports Equipment	188	97	91
Other Unintentional	4,801	2,918	1,882
Undetermined Intent/Other	456	145	311
Total	**19,781**	**10,716**	**9,065**

(Smartrisk, 2009)

Poisoning is the fifth leading cause of overall injury costs and the third leading cause of overall costs for unintentional injuries.

The BC Injury Research and Prevention Unit produced a report entitled The Economic Burden of Poisoning in British Columbia. The report estimates the economic burden of poisonings (fatal, hospitalized, attended by medical and paramedical professionals but not hospitalized) through an examination of the human and economic costs of poisoning in BC for the year 2003. The report is available at: http://www.injuryresearch.bc.ca/admin/DocUpload/3_20090616_101153The%20Econo mic%20Cost%20of%20Poisoning%20in%20BC%20061006.pdf

The Ontario Poison Centre publishes an annual report which provides information about the Centre's activities and statistics about poisoning in Ontario.

International Comparisons

In 2004 an estimated 346,000 people worldwide died of unintentional poisoning (World Health Organization, 2011). Poisoning is significantly less of a problem in the America's than it is in other parts of the world (World Health Organization, 2008).

In the United States, a conservative estimate of the annual incidence of poisoning episodes is 4 million cases per annum. One in four cases do not appear to lead to any direct ambulatory or inpatient treatments. Approximately 300,000 cases may be hospitalized, 7.5 percent of all events and approximately 13 percent of all those seen by a health care provider at any site. An estimate of fatal poisonings is at least 24,000, which represents 0.8 percent of all poisoning incidents; including ethanol-coded deaths increases this proportion to approximately 1 percent. (Institute of Medicine (U.S.), Committee on Poison Prevention and Control, 2004)

Populations at Risk

In Canada as in the United States, not only have the magnitude and cost of the poisoning problem been underappreciated, but the diverse nature of poisonings and the populations at risk have changed over time. Poisoning was initially viewed as a problem of young children but it now is a concern across the entire lifespan.

It is estimated that half of all poison exposures occur among children less than 5 years of age; however, only about 10 percent of the more severe poisonings occur among young children. More than two thirds of severe poisonings happen to adults over 19 years.

As reported in Forging a Poison Prevention and Control System, in the United States, unintentional death from exposure to hazardous household substances occurs primarily among children and youth, the group that also has the highest level of exposure to poisonous substances. However, suicide by poison and alcohol and illicit drug-related poison deaths occur in older adolescent and young adult populations (approximately 7.6 percent of the poison exposures reported are suspected suicides; another 3.5 percent are from intentional substance misuse or abuse). Adults are also at risk of death in the workplace from exposure to hazardous substances such as pesticide deaths among rural farm populations. The elderly are at risk of taking the wrong medications or the right medication at the wrong dose. In addition, elderly persons may be the source of medications that inadvertently poison young children (Institute of Medicine (U.S.), Committee on Poison Prevention and Control, 2004).

This changing pattern of poisoning has important implications for the provision of prevention and control services. While poison control centres were developed to respond primarily to parental concerns about the exposure of their young children to potential poisons these centres have become involved with the additional situations described above—suicide attempts, alcohol intoxications, medication errors, hazards evaluations—that arise from requests from emergency medical services and emergency department personnel, police and fire officials. In developing a system for poison prevention and control consideration should be given to design and organization that can respond to this variety of demands.

PREVENTION - BEST PRACTICES

The most important reasons we have seen success in childhood poisonings are safer medications, child resistant closures and legislation. A primary/passive protection strategy is most effective as it offers the greatest amount of protection for the least amount of effort. Developing safer medications that have non-toxic doses in the bottle has been the most effective primary/passive strategy. This is followed by the development of child resistant closures and finally locking the cabinet after use.

Child-resistant Packaging

Child-resistant packaging has been shown to significantly reduce death and injury (Rodgers, 2002). Child-resistant packaging is required by law for certain medications (Chien, Mariott, Ashby, & Ozanne-Smith, 2003). The standards required for child- resistant packages state that packages be difficult for children younger than five years of age to open and obtain a toxic amount within a reasonable time (Health Canada, 2007). It is considered impossible to manufacture a package or a closure that would prevent every single child from getting into the contents under all possible circumstances. Most child- test protocols require that at least 80% of those children being tested be prevented from opening the container during a 10-minute test. This requirement means that some children are likely to be able to open a container, if given enough time to do so and, therefore, even medications with child-resistant caps must be kept locked up (Health Canada, 2007).

Legislation

The following federal acts and their regulations each have sections which relate to the protection of people from poisoning:

Canada's Food and Drugs Act and Regulations
http://www.hc-sc.gc.ca/fn-an/legislation/acts-lois/act-loi_reg-eng.php

Consumer Product Safety Act
http://laws-lois.justice.gc.ca/eng/acts/C-1.68/index.html
The *Consumer Chemicals and Containers Regulations, 2001*
were published in the Canada Gazette, Part II on August 15, 2001.

Pest Control Products Act
http://laws-lois.justice.gc.ca/eng/acts/P-9.01/

These acts and their regulations in general control the types of foods, drugs and chemicals allowed for sale in Canada as well as their safe and sanitary manufacture and packaging.

Safer Medications

Stiffer regulations could be implemented to limit the quantity of potentially harmful over- the-counter drugs that can be purchased in a single package. Reducing the content of containers to non-lethal doses would protect children from unintentional over consumption.

Safe Storage

Storage of poisonous substances in a location that is inaccessible to children is essential because, as noted earlier, packaging for dangerous material is considered child-resistant not child-proof meaning up to 20% of young children may be able to open containers in short periods of time, and more if given longer periods of time.

Safe storage of poisonous substances requires proper behaviour of adults in all homes that children live or visit. The key message for the safe storage of toxic materials is to keep all toxic substances in their original child-resistance packaging and to store all materials in locking cabinets including medications, cleaning supplies, and other toxic substances.

A Cochrane systematic review and meta-analysis was published in 2007 evaluating the effect of home safety education and the provision of safety equipment on poison prevention practices and poisoning rates. Studies included were either randomized- control trials (RCTs), non-randomized control trials (quasi-randomized) and controlled before and after studies (CBA). Eight studies that reported on storage of medicines either in locked cupboards, drawers or cabinets, stored at or above adult waist level or as being inaccessible to a child were included in the meta-analysis. Families receiving home safety education (treatment group) were almost 60% more likely to store medicines safely than control group families [odds ratio (OR) 1.57, 95% confidence interval (CI) 1.22-2.02 statistically significant] (Kendrick et al., 2008).

Eleven studies that reported on safe storage of cleaning products were included in the meta-analysis. Families receiving home safety education (treatment group) were roughly 60% more likely to store cleaning products safely than control group families (OR 1.63, 95% CI 1.22-2.17), but effect sizes varied significantly between studies. The effect appeared to be greater among studies providing locks (OR 1.90, 95% CI 1.25-2.89) than those providing education only (OR 1.12, 95% CI 0.89-1.41). Interventions provided in clinical settings appeared to have a smaller effect (OR 1.29, 95% CI 1.09-1.53) than those delivered in the community (OR 2.31, 1.00-5.32). Less heterogeneity (more consistent results) seen in follow-up periods of 3 months or less (OR 2.22, 95% CI 1.39-3.54) compared to those with longer follow-up periods (OR 1.15, 95% CI 0.99-1.34) (Kendrick et al., 2008).

Phone-in Centres

Phone-in centres are effective in helping parents determine whether a child is at risk from a potential poisoning and what actions the parent or caregiver should take. Poison control centres can result in considerable cost savings by diverting appropriate cases from emergency rooms if the public is well informed about them (Miller & Lestina, 1997). The latest IWK Poison Centre report states that 86% of calls would have gone to emergency rooms were it not for the information provided by the phone-in centre. The phone number for the local poison information centre should be kept by the phone (IWK Health Centre, 2010).

In the same review discussed above, seven studies that reported on having the **poison control centre number** accessible were included in the meta-analysis. Families receiving home safety education were significantly more likely to have the poison control centre number accessible (OR 3.67, 95% CI 1.84-7.33). Providing or not providing poison control centre stickers achieved similar effect sizes. Education delivered in a clinical setting (OR 2.88, 95% CI 1.23-6.73) appeared to have a smaller effect than that delivered at home or in the community (OR 5.62, 95% CI 1.30-24.37). Larger treatment effects were observed in studies with follow up periods of three months or less (OR 5.01, 95% CI 2.08-12.09) than those in longer follow up periods (OR 1.85, 95% CI 0.95-3.61). Families with at least one parent not in paid employment are significantly more likely to have the poison control centre number accessible than those with employed parents (Kendrick et al., 2008).

Carbon Monoxide Detectors

Carbon monoxide detectors have shown to be effective in preventing deaths due to carbon monoxide poisonings (Yoon, Macdonald, & Parrish, 1998).

Controversy about syrup of ipecac

Ten studies that reported on **possession of syrup of ipecac** were included in the meta-analysis. Families receiving home education were significantly (234%) more likely to possess syrup of ipecac than control group families (OR 3.34, 95% CI 1.50-7.44) (Kendrick et al., 2008).

Having syrup of ipecac on hand is not a recommendation in Canada because vomiting induced by syrup of ipecac may not remove all or enough of the poison from the victims gut and it may prevent the patient from keeping down an appropriate antidote.

Education of Families

Home safety education that includes poison prevention, especially where cupboard locks, ipecac and PCC number stickers are provided free or at low cost, is effective in increasing safe storage of medicines and cleaning products.

Effect sizes tended to be larger when interventions were delivered at home rather than in a clinical setting.

Evidence in the review suggests that **community based education campaigns alone lead to no measurable reduction of poisoning in children.** Authors cite methodological flaws with studies included in the review and high quality evaluations of community based poisoning prevention programs are required to determine if these programs achieve population level improvements in injury outcomes (Nixon, Spinks, Turner, & McClure, 2004).

In the review there was a lack of evidence that home safety interventions were effective in reducing rates of poisoning (rate ratio 1.03, 95% CI 0.78-1.36). This analysis included only three studies with 5980 person-years in the combined intervention arms and 6137 person-years for controls but this amount of follow-up would likely not have been enough to detect a reduction reliably.

There was no evidence that the interventions discussed above varied in effect with child age, gender or family type. Families with at least one parent not in paid employment were significantly more likely to have the poison control centre number accessible than those with employed parents.

Effect sizes were greater when free or subsidized safety equipment was provided with education than when the intervention comprised education alone (eg, safe storage of cleaning products: OR 1.90, 95% CI 1.25-2.89 (equipment and education) vs OR 1.12, 95% CI 0.89-1.41 (education alone); possession of ipecac: OR 10.41, 95% CI 2.40-45.09 (equipment and education) vs. OR 1.77, 95% CI 1.08-2.91 (education alone)).

While they are key ingredients of an effective prevention initiative, education and awareness alone are not sufficient. Rather these activities must be combined with other best practices such as safe medication containers, child resistant packaging and access to quick care via phone-in centres.

CURRENT ACTIVITIES

Each province and territory provides education around poisoning prevention for children and youth. Some examples include attending health fairs with displays, distribution of school-based materials via the public health nurse, online virtual home safety with poison prevention messaging, media campaigns and a parent guide. A more detailed list is included in Appendix A.

Surveillance and Surveillance Systems

Surveillance consists of the systematic and ongoing collection, analysis, and interpretation of health data for use to prevent and control disease (Thacker and Berkelman, 1988). An effective surveillance system should have the attributes of simplicity, flexibility, data quality, acceptability, positive predictive value, representativeness, timeliness, and stability. Surveillance systems were originally developed to control communicable diseases but they now play a role in addressing other important problems, including chronic diseases and environmental issues. In public health, surveillance data can be useful for multiple purposes: (1) identifying and investigating outbreaks or clusters of diseases; (2) implementing and evaluating prevention and control measures; (3) planning and managing resources and establishing priorities; (4) identifying trends in occurrences of interest; and (5) identifying emerging problems or new populations at risk of disease. (Institute of Medicine (U.S.), Committee on Poison Prevention and Control, 2004) Information on the epidemiology, treatment, and outcomes of poisonings can help inform regulatory decisions and compliance, public policy initiatives, and the development and assessment of clinical management guidelines. Data from various sources are used by federal, state, and local health agencies and others for surveillance of poisonings and their sequelae.

Across the country poisoning data collection can vary. At present, only one province (Ontario) is completely electronic in their data collection. Two provinces have purchased computer-based systems (British Columbia and Nova Scotia); however, the remainder of the centres continues to record information manually on paper-based systems. All systems collect vital statistics, for example, name, age, city, substance. Most of the centres produce some type of report, either annual or by request but this is not standardized across the country. A more detailed list is included in Appendix B.

Currently, poisoning is not a reportable event, however, a number of agencies do collect information on poisonings. These include:

- Statistics Canada
- Provincial, territorial ministries of health
- Regional poison control centres.

Responsible Parties

As part of a national surveillance system, many organizations could engage in the collection and sharing of poisoning data and information. These include:

- Federal government departments; Health Canada; PHAC injury surveillance unit; Canadian Hospitals Injury Reporting & Prevention Program (CHIRPP); Chief Public Health Officer (CPHO).
- local public health departments
- Canadian Association of Poison Control Centre (CAPCC).
- Hospitals
- Emergency rooms
- Department of Citizenship and Immigration re education and calls (to help with language/cultural barriers).

- First Nations & Inuit Health (FNIH), Indian and Northern Affairs Canada (INAC), National Aboriginal Organizations (NAOs) (data partnership around Aboriginal data).
- Canadian Institutes for Health Information (CIHI)
- Canadian Institutes for Health Research (CIHR)
- Hired staff- a medical toxicologist could be hired to design, oversee and support the system.

Advocacy

It is important to acknowledge the huge role research and advocacy played in bringing the issue of poisoning forward and the resulting changes that occurred in the prevention of unintentional poisonings. In Canada, most advocacy efforts have focused on legislation. Highlights from current legislation related to poisoning in Canada are below.

Federal Government – Public Health Agency of Canada/Health Canada
The Food and Drugs Act controls prescription and non-prescription drugs through the standardization of labels, packages, sales and advertising. The Act, through its regulations, describes the features required to define a container as child resistant. The regulations state that child resistant packages must comply with one or more of three accepted standards: CSA (Canadian Standard Association standard), British Standard Specifications (now the European Standard), and/or the Federal Regulations of the United States.

Provincial/Territorial
Each province and territory has an act and a professional association or society that deals with the safe distribution of drugs. The provincial/territorial acts, through their regulations, state that child-resistant packaging must be used for all prescription drugs with four exceptions: 1. where the person presenting the prescription or the prescribing physician directs otherwise (these must be documented); 2. where in the professional judgment of the pharmacist it is advisable not to use child-resistant packaging; 3. where the physical form of the drug makes it unsuitable for child-resistant packaging (such as in the case of inhalers); and 4. where the pharmacist has not been able to obtain a supply of child-resistant packages.

Inspectors are employed by the pharmaceutical associations to visit pharmacies and randomly test prescriptions that have been filled to ensure that they are in compliance with the Act and regulations. Disciplinary action and fines are possible where practices have violated their regulations. Pharmacists may use any child-resistant containers (CRCs) that have obtained Canadian Standards Association (CSA) approval.

Ministers responsible for this area (usually ministers of health) may make changes to regulations through the use of a process called an order in council. The pharmaceutical association or society must complete a regulatory impact analysis statement similar to that required in recommending change to federal regulations. The regulatory impact analysis statement should contain information regarding the issues surrounding the recommended changes to allow the minister to make change with full knowledge of the reasoning and opposing arguments.

Education/Awareness

In the United States and similarly in Canada, the focus of most education programs is prevention of unintentional poisoning of children less than 6 years of age. Little effort has been directed toward serious poisoning or toward other age groups (the elderly), drug and alcohol abusers, and workers in certain high-risk occupations (Institute of Medicine (U.S.),Committee on Poison Prevention and Control, 2004).

RECOMMENDATIONS

In Canada the prevention of childhood poisonings is a success story. The reasons for success include: safer medications; child resistant closures; legislation (Hazardous Products Act; improved labeling; limiting the amount of drug per container); constituent reformations; anticipatory guidance; public education; product formulation/ product treatment databases; poison control centres; new antidotes; and, improved treatment resources. In order to build on this success and reduce the economic and social burden of poisoning in Canada the following recommendations are made:

Recommendation 1: A Comprehensive Approach

Prevention of poisoning is best accomplished through a multifaceted approach combining education, engineering and environmental modifications, enactment and enforcement of regulations and legislation, economic incentives, involvement of local health care providers, community empowerment, and program evaluation. While public education is necessary in poisoning prevention, it is not sufficient to prevent poisoning on its own. Integrating public education with other aspects of the public health system will improve the success of the efforts. For example, many provincial health programs have an injury prevention program that might serve as a focal point for coordinating poison prevention and education programs. In addition, poison control centres are experienced at providing secondary poisoning prevention and data from the centres can direct primary poisoning prevention initiatives.

Recommendation 2: Focus the Messages

To improve the impact of poisoning prevention, public education efforts should separate primary and secondary prevention messages. Currently, many existing materials mix these messages. Since the aim of primary prevention education is a reduction in incidents and the aim of secondary prevention education is increased use of poisoning centres, the effects of the messages when provided together will not give a clear indication if either is effective. Keep the messages for each type of prevention separate and concise.

Recommendation 3: Promote Best Practices

The development of a best practice in poisoning prevention repository should be pursued. The description of each practice should include information on target audiences, literacy level, and as well as information about how the program was developed, implemented, and evaluated. There are a multitude of tools and distribution channels that exist currently such as the PHAC best practices portal, the Canadian Association of Poison Control Centre (CAPCC) and the Canadian Collaborative Centres for Injury Prevention that could be used to promote the use of best practice.

Recommendation 4: Expand the Mandate of an existing national organization (the Canadian Association of Poison Control Centres)

Expanding the mandate of the Canadian Association of Poison Control Centres (CAPCC) so that it can work both inside and outside of government with resources and a broad scope to champion the development, implementation and evaluation of national poison data collection and surveillance would significantly improve the ability for Canada to understand and report on poisonings. The CAPCC would require sufficient financial support (national, provincial/territorial, local) for items such as human resources, 1-800 number, IT support, data collection, and maintenance of systems. Such a system would allow for the aggregation and publication of timely and comprehensive injury statistics and trends.

Integrating existing data sources would require formalized provincial and territorial data sharing agreements. Existing structures that collect data should be linked to a national poison surveillance system, e.g. the National Ambulatory Care Reporting System (NACRS), the Alberta Ambulatory Care Classification System (AACCS),

trauma registries, and Canadian Hospital Injury Reporting and Prevention Program (CHIRPP) in the collection of information for poisoning.

While we have a summary of data collection activities in Canada it is not a complete list of data sources on poisoning. Development of a resource similar to the tabular description of data sources containing poison-specific data sources as well as sources derived from health records and health care datasets, other exposure-related data sources, and survey data sources as is found in Table 7-2 Surveillance Data Sources Relevant to Poisoning and Overdose in the United States on pgs 178-183 of *Forging a Poison Prevention and Control System* would be very useful for Canada.

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Recommendation 5: Create an Advocacy Platform

Advocacy needs to play a significant role in ensuring there is support and resources (human, financial, jurisdictional, etc.) dedicated to identified priorities in poisoning prevention. Development of an advocacy platform and identification of individuals and organizations to act as champions in order to achieve the awareness needed to garner the resources needed to address this oft-forgotten injury and public health issue.

Groups that could have a role in advocating about poisoning prevention issues include injury organizations, poison control centres, and public health departments. Individuals whose lives have been touched by poisoning could play a role in advocating for poisoning prevention. There are many of issues relating to poison prevention that could benefit from advocacy efforts. The recommendations within this white paper each require concerted advocacy efforts if they are to be achieved.

CHALLENGES & LINKAGES

The challenges facing implementation of the recommendations made in this white paper and furthering poisoning prevention in Canada are similar to those facing other areas of injury prevention and public health. Among these are lack of resources, both human and financial; lack of awareness that poisoning continues to be an issue; and most importantly lack of a comprehensive approach to poisoning.

While the challenges may seem daunting the pieces needed to address poison prevention are related and while we are building one area the results support the building of another key area. Surveillance data can be used to support advocacy and education efforts, advocacy efforts can support the need for a surveillance system and education, and education and awareness efforts rely on data to provide current information.

FUTURE STEPS

This document, *A Dialogue on Poison Prevention in Canada* takes an important first step toward addressing poisoning injuries in Canada. With an emphasis on education, surveillance and advocacy, this white paper recognizes poisoning as an important public health issue that needs to be addressed jointly and collaboratively by the poison control and injury prevention communities and their federal, provincial and territorial (F/P/T) partners in the wider public health sector. The following are identified short, medium and long term steps to that will further poisoning prevention Canada.

Short Term (12 months)

- Establish a National Poison Prevention Network that involves regional Poison Centres, health promotion and injury prevention experts, industry and government.
- Identify resources and execute public awareness activities.
- Conduct a scan of resources, messages, etc. and share the findings.
- Develop a Working Group to develop strategies that will engage the media during 2012 Poison Prevention Week and Safe Kids Week 2012.
- Identify a champion (organization) outside government with resources and a broad scope to coordinate national efforts.
- Advocate for national funding to disseminate poison prevention information.

Medium Term (12-24 months)

- Examine how other countries such as the U.S. collect data and determine how their collection and coding procedures could be adapted to create a national Canadian system.
- Examine other data sets (e.g. trauma) to see how they collect, code and report data to determine if there are any transferable procedures.
- Standards of practice for PCC calls (incorporating prevention messages in calls or immediately afterward, where appropriate).

Long Term (24 months on)

- Launch national surveillance system.
- Computerize data collection system for all poison centres.
- Provide on-going education and professional development (electronic and in- person) of PCC staff (e.g. 1-800 telephone services, coding, treatment, toxins, agents, etc.).
- Develop strategies to reach vulnerable population groups (Aboriginal, Cultural groups, low-income, rural and remote, etc.).

The recommendations and proposed actions contained here represent an important step in Canada's journey to a poisoning-free country.

APPENDIX A: CURRENT ACTIVITIES BY PROVINCE

Province	Activity
British Columbia	• Distribute materials to callers, public health units, ESL, well baby clinics. • Attend health & safety fairs with displays and materials, especially the multicultural & diversity fairs. • Annual poison prevention week campaign. Involving pharmacy students in health fairs.
Alberta	• PADIS (Poison and Drug Information Service) is involved in outreach in both Alberta and Saskatchewan. • Efforts to increase awareness about services and information about common poisons in the home and yard are provided in addition to prevention tips. • A variety of children/family/industry/safety trade shows are attended. Public health in Alberta and Saskatchewan provides minimal poison prevention information. Usually this is included during presentations or consultations with parents and caregivers when talking about home safety for children.
Saskatchewan	• PADIS has school-based materials that can be used by public health nurses (these are Saskatchewan specific resources). • We have only one fact sheet on poisoning. • There was a campaign rolled out when PADIS became Saskatchewan's poison centre that involved a mailing to every household which included some public education along with a magnet featuring the 1-800 #. Apparently a plan is in place to repeat this.
Ontario	• Individual presentations at school, church etc. groups, booths at trade etc. fairs, train the trainer sessions with day cares and public health agencies.
Quebec	• Most resources devoted to free 24/7 bilingual telephone service resulting in a lack of human resources to produce prevention material. • No one specifically dedicated to poison prevention and education. Prevention/ education steering committee provides CAPQ with objectives and tasks. • Challenges in poison prevention: funding for materials and for specialized resources to help the centre use new technologies to its advantage (social networks, web, etc.). • Difficulty reaching specific populations: Nunavik, elderly, workers, English-speaking population and allophones. • Prevention material includes website, www.antipoison.ca; leaflets, conferences for parents of toddlers and community health nurses (train-the-trainer program); public service announcements; partnerships with the child care services; and information on mushroom poisoning prevention and treatment, hand sanitizer toxicity and its prevention.

APPENDIX A: CURRENT ACTIVITIES BY PROVINCE (cont'd)

Province	Activity
Nova Scotia, PEI	• Partnership between Child Safety Link (CSL) and the IWK Regional Poison Centre (RPC). This provides access to specialists in poison information (SPI`s) and local data for direction on poison prevention. CSL had a dedicated 0.5 FTE poison educator (half time position) from approximately 2003 to 2006 when the position was discontinued due to funding restraints. • Initiatives undertaken: Evaluation of "Bee Poison Smart", a daycare- based education program; original plant guide, created with the help of the Museum of Natural History; dollhouse showing poisoning hazards for public displays; a poison prevention poster contest for elementary schools to celebrate Poison Prevention Week; and the CSL Virtual Home, launched in 2004, which incorporated poisoning prevention information. • 2008 review of programs, local data and North American programs jointly by CSL and IWK RPC determined that a poison educator would be a worthwhile position between CSL and IWK RPC and for child poisoning prevention the target would be parents of children aged 1-3, focusing on cleaning products and analgesics (based on frequency of calls to the IWK RPC) • Celebrating Poison Prevention Week yearly. Themes: Put Poison in its Place—High and Out of Reach (2005); Check it Out, Clean it Out—proper disposal of expired medicines (2006); Children Act Fast, So Do Poisons—poison purse, high and out of reach (2007); Preventing Medicine Poisonings in Children (2008); Aim for Safety, Target the Label—original containers and symbols (2009); and Locked, and Out of Reach (2010/2011). • Activities for Poison Prevention Week have focused in recent years on internal activities within the IWK Health Centre for staff and families; and, media awareness: print, PSA (Public Service Announcement), Internet (information on Child Safety Link website) and TV. • Print Resources created in collaboration with IWK RPC: A Parent's Guide to Poison Prevention; Plants: A Guide for Poison Prevention; Check it Out, Clean it Out poster; poison stickers (telephone stickers displaying the telephone number for the IWK RPC); Not All Poisons are Found in a Bottle, a parent planter card and professional downloadable resource; Family & Co. (Halifax Free family publication) full-page poison plant article on back cover; and the Parent Child Guide which is a Halifax Regional Municipality free family newspaper, articles on Poison and Food Poisoning and Keeping Poisons Out of Reach. • Recent TV appearances: CTV appearances on Breakfast Television (Morning News/ Arts/Culture Program), Live at 5 (Evening News/Arts Culture Program), and CTV Evening News. • Focus of recent PSA (CSL produces two PSA's per year) to prevent medicine poisoning. All PSAs available on Child Safety Link YouTube channel. • Although IWK RPC serves only NS and PEI, CSL materials and media coverage (especially TV) reaches a maritime audience of NS, NB and PEI.

APPENDIX B

Summary of Data Collection Activities

From A Dialogue on Poison Prevention in Canada

Across the country poisoning data is collected in several different ways. To provide a better understanding of how data is collected and reported, participants were asked to forward information prior to the meeting and during the meeting participants heard presentations from British Columbia (Roy Purssell, BC Poison Centre), Alberta/Saskatchewan (Patti Stark, Alberta Centre for Injury Control and Research), Ontario (Margaret Thompson, Ontario Poison Centre), Quebec (Anne Letarte, Quebec Poison Centre) and Nova Scotia (Sarah Blades, Child Safety Link). Below please find a summary of what came forward.

Province	Data/Surveillance Activities
British Columbia	• Information collected manually on paper charts and then a portion of the data is entered into a data base. The data not entered includes: initial symptom assessment, weight, history, recommendations, calculations, time since exposure, references. The charts are considered medical records and kept for as long as required in BC. • Will be switching to Visual Dot Lab, an electronic data entry system. This is the same system that Ontario and Nova Scotia are presently using. • Produce a full annual report and can produce ad hoc reports based on requests for specific data.
Alberta	• Collect poisonings resulting in death (vital statistics), hospital admissions, emergency department visits. • Poison and Drug Information Services (PADIS) collects information from callers regarding demographics, substances, symptoms, exposure, advice given by information specialist, and disposition. • PADIS provides reports by request and is planning to release an annual report this year (last report was in 2007). • No separate report is created just for poisonings. Poisonings are included in the general injury data report.
Saskatchewan	• Uses Poison and Drug Information Service (PADIS) based out of Calgary. Saskatoon Health Region has contract with PADIS for the entire province. • PADIS provides a virtual "team" providing expertise to physicians and other health professionals (e.g. toxicology). • PADIS reports monthly to Saskatchewan Ministry of Health via the Saskatoon Health Region. • There is a Poison Information services advisory committee in the province. • Call volume is recorded by the Health Region.

APPENDIX B (cont'd)

Province	Data/Surveillance Activities
Ontario	• Data sets too extensive to send but include patient & caller names, city, age, weight, sex, substance, circumstances, outcome, etc. Produce annual report depending on resources, not part of budget. Focus on children up to age 14. • Currently looking at suicide attempts by 11- and 12-year-olds.
Quebec	• Centre anti-poison du Québec (CAPQ) is celebrating 25 years of ongoing data collection and service to the population. • The data collected is quite extensive including demographic and the dynamics of poison incidents. • Patient files are considered as medical records and are archived as such with 40,000 to 45,000 files processed per year. • The Centre takes calls from French-speaking HCP (health care professionals) and residents of New Brunswick. • Most financial and human resources are devoted to the free 24/7 bilingual telephone service. This results in a lack of human resources to produce prevention material. • Operated by specialized nurses who are trained for 7-8 weeks in clinical toxicology and telephone management of health problems. A clinical leader supports the team of nurses and the nurses are supported by a team of 6 toxicologists. • Two labs perform toxicology analysis with CAPQ authorization. Provide support to regional and provincial public health services. Stopped producing an annual report as of 2006. • The CAPQ is currently renewing the 25-year-old toxins database. The Institut national de santé publique du Québec (INSPQ) uses the data to produce various reports on trauma, poisonings and public health.
Nova Scotia, PEI	• Partnership between Child Safety Link and the IWK Regional Poison Centre. This provides access to specialists in poison information (SPI`s) and local data for direction on poison prevention. • 2010 annual report will be available soon. • Although Physically located in NS, the IWK RPC formally serves PEI as well

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