The British Columbia Injury Research and Prevention Unit (BCIRPU) was established by the Ministry of Health and the Minister’s Injury Prevention Advisory Committee in August 1997. BCIRPU is housed within the Centre for Community Child Health Research (CCCHR) and supported by the Child and Family Research Institute. BCIRPU’s vision is “to be a leader in the production and transfer of injury prevention knowledge and the integration of evidence-based injury prevention practices into the daily lives of those at risk, those who care for them, and those with a mandate for public health and safety in British Columbia”.

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Partnerships

Many organizations exist in BC with the mandate to prevent poisoning-related injuries. The BC Centre for Disease Control’s Drug and Poison Information Centre is among several organizations actively working towards poisoning prevention. The mandate of the Drug and Poison Information Centre is 1) to develop and implement centralized services to assist health professionals in providing optimal levels of drug therapy and poison management in the province, and 2) to provide poison information request services to the public. In partnership with the BC Drug and Poison Information Centre, the BC Injury Research and Prevention Unit has developed this report to assist with understanding the burden of poisoning-related injuries and associated factors in British Columbia.

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April 2009
EXECUTIVE SUMMARY

Purpose
The purpose of this report is to provide descriptive data on unintentional and intentional poisoning in British Columbia (BC) for the period 2000 to 2005. Data reflect the incidence of poisoning mortality, hospital separations, poisonings attended by medical and paramedical services (i.e. BC Ambulance Services (BCAS), and the BC Drug and Poison Information Centre (DPIC)). Poisonings are described by age, sex, intent and substance.

Key Findings
Poisoning is a leading cause of both unintentional and intentional injury in BC, accounting for more than 20 percent of injury-related deaths and hospitalizations. During the study period there was, on average, each day in BC:
- At least 1 poisoning-related death
- 13 poisoning-related hospitalizations
- 33 requests for BCAS to attend poisoning events
- 72 calls made to DPIC for information and advice

Any substance consumed in excess can result in poisoning. Substances resulting in poisonings and the populations at risk of poisoning vary greatly by intent and lethality.

Mortality
Poisoning-related mortality
Between 2000 and 2003 in BC:
- There were 1,617 poisoning-related deaths
- Poisoning-related death rates decreased from 12.2 per 100,000 in 2000 to 7.2 per 100,000 in 2003
- 68.5 percent of poisoning-related deaths were among males
- 91.2 percent of poisoning-related deaths were among adults between the ages of 20 and 64 years
- Poisoning-related death rates were highest for both males (20.1/100,000) and females (8.8/100,000) aged 20 to 64 years

Unintentional poisoning-related mortality
Between 2000 and 2003 in BC:
- 64.3 percent of all poisoning-related deaths were unintentional
- 94.1 percent of unintentional poisoning-related deaths were among adults 20 to 64 years of age
- 73.9 percent of unintentional poisoning-related deaths were among males
- All poisoning-related deaths among children ages 12 years and younger were unintentional
- 78.6 percent of poisoning-related deaths among children aged 13 to 19 years were unintentional
- Unintentional poisoning-related deaths decreased 45.2 percent from the year 2000 to 2003
Self-poisoning mortality
Between 2000 and 2003 in BC:
- 32.3 percent of all poisoning-related deaths were self-poisonings
- 80.9 percent of self-poisoning deaths were among adults 20 to 64 years of age
- 60.3 percent of self-poisoning deaths were among males
- Self-poisoning accounted for 65.2 percent of poisoning-related deaths among seniors
- Deaths related to self-poisoning decreased 22.7 percent from the year 2000 to 2003

Regional rates for poisoning-related mortality
Between 2000 and 2003 in BC:
- Standardized rates for poisoning-related deaths were highest among males living in:
  - Vancouver Island Health Authority (15.3/100,000 population)
  - Vancouver Coastal Health Authority (15.0/100,000 population)
  - Interior Health Authority (13.7/100,000 population)
- Standardized rates for poisoning-related deaths were highest among females living in:
  - Interior Health Authority (7.5/100,000 population)
  - Vancouver Island Health Authority (6.8/100,000 population)
  - Vancouver Coastal Health Authority (5.9/100,000 population)

Hospitalization
Poisoning-related hospitalization
Between 2001/02 and 2005/06 in BC:
- There were 23,958 poisoning-related hospital separations
- Poisoning-related hospitalization rates in BC decreased 17.8 percent from 129.0 per 100,000 in 2001/02 to 106.0 per 100,000 in 2005/06
- 60.5 percent of poisoning-related hospitalizations were among females
- 73.1 percent of poisoning-related hospitalizations were among adults between the ages of 20 and 64 years
- Poisoning-related hospitalization rate among females was highest between the ages of 13 and 19 years (261.5/100,000)
- Poisoning-related hospitalization rate among males was highest between the ages of 20 and 64 years (110.2/100,000)

Unintentional poisoning-related hospitalization
Between 2001/02 and 2005/06 in BC:
- 25.8 percent of all poisoning-related hospitalizations resulted from unintentional poisoning
- Males accounted for 50.4 percent of all unintentional poisoning-related hospitalizations
- All poisoning-related hospital separations among young children under six years of age resulted from unintentional poisoning
• Unintentional poisoning-related hospitalization rates for males were highest among young children under 2 years of age at 69.4 per 100,000 population
• Unintentional poisoning-related hospitalization rates for females were highest among seniors aged 65 years and older at 52.8 per 100,000 population
• Unintentional poisoning-related hospitalization increased by 11.2 percent among adults 20 to 64 years of age

Self-poisoning hospitalization
Between 2001/02 and 2005/06 in BC:
• 63.5 percent of all poisoning-related hospitalizations resulted from self-poisoning
• Females accounted for twice the number of self-poisoning hospitalizations than did males
• Females 13 to 19 years of age experienced the highest self-poisoning hospitalization rates at 214.2 per 100,000 population
• Self-poisoning hospitalization rates among males were highest for those aged 20 to 64 years at 65.7 per 100,000 population
• Self-poisoning hospitalization increased by 19.0 percent among seniors aged 65 years and older

Regional rates for poisoning-related hospitalization
Between 2001/02 and 2005/06 in BC:
• Standardized rates for poisoning-related hospitalizations were highest in:
  o Northern Health Authority (184.6/100,000 population)
  o Interior Health Authority (138.7/100,000 population)
  o Vancouver Island Health Authority (133.2/100,000 population)

Poisoning Substance
• In BC, drugs or medicinal agents were the predominant substances resulting in poisoning deaths and hospitalizations
• Between 2000 and 2003, drugs or medicinal agents accounted for 84.1 percent of substances resulting in poisoning-related deaths
• Between 2001/02 to 2005/06, drugs or medicinal agents accounted for 87.6 percent of substances resulting in poisoning-related hospitalizations
• Between 2000 and 2005, drugs or medicinal agents accounted for 46.0 percent of the requests to DPIC for poisoning advice and service

Poisoning-related mortality
Between 2000 and 2003 in BC:
• 51.6 percent of poisoning-related deaths were by narcotics and psychodysleptics (hallucinogens)
  o 88.2 percent of poisoning-related deaths by narcotics and psychodysleptics were unintentional
  o 77.7 percent of poisoning-related deaths by narcotics and psychodysleptics were among males
  o 96.0 percent of poisoning-related deaths by narcotics and psychodysleptics were among adults 20 to 64 years old
Poisoning-related deaths by narcotics and psychodysleptics decreased by 45.7 percent, from 267 in 2000 to 145 in 2003

- 32.5 percent of poisoning-related deaths were by other and unspecified drugs
  - 52.0 percent of poisoning-related deaths by other and unspecified drugs were self-poisonings
  - 51.3 percent of poisoning-related deaths by other and unspecified drugs were among females
  - 86.3 percent of poisoning-related deaths by other and unspecified drugs were among adults 20 to 64 years of
  - Antidepressants were the most frequent drug type involved in poisoning-related deaths, averaging 38 deaths per year

- 11.4 percent of poisoning-related deaths were by organic solvents, hydrocarbons and gases
  - 85.2 percent of poisoning-related deaths by organic solvents, hydrocarbons and gases were self-poisonings
  - 86.4 percent of poisoning-related deaths by organic solvents, hydrocarbons and gases were male
  - 86.6 percent of poisoning-related deaths by organic solvents, hydrocarbons and gases were by carbon monoxide

- 3.5 percent of poisoning-related deaths were by alcohol
  - Poisoning-related deaths by alcohol were predominately unintentional
  - 70.0 percent of poisoning-related deaths by alcohol were among males
  - 87.7 percent of poisoning-related deaths by alcohol were among adults 20 to 64 years of age

Poisoning-related hospitalization
Between 2001/02 and 2005/06 in BC:

- 65.4 percent of poisoning-related hospitalizations caused by drugs as a whole were among females
- The majority of poisoning-related hospitalizations caused by drugs resulted from self-poisonings
  - 50.1 percent of self-poisoning hospitalizations were by antiepileptic, sedative-hypnotic, anti-Parkinsonism and psychotropic drugs

- 76.2 percent of poisoning-related hospitalizations were caused by drugs other than narcotics and psychodysleptics
  - 41.8 percent of poisoning-related hospitalizations by drugs other than narcotics and psychodysleptics were by antiepileptic, sedative- hypnotic, anti-Parkinsonism and psychotropic drugs
  - 20.3 percent of poisoning-related hospitalizations by drugs other than narcotics and psychodysleptics were by non-opioid analgesics, antipyretics and antirheumatics
  - Drugs other than narcotics and psychodysleptics were the leading substance category among young children less than 6 years of age

- 11.4 percent of poisoning-related hospitalizations were caused by narcotics and psychodysleptics
53.2 percent of poisoning-related hospitalizations by narcotics and psychodysleptics were among males
46.1 percent of poisoning-related hospitalizations by narcotics and psychodysleptics were unintentional
unintentional poisoning-related hospitalizations by narcotics and psychodysleptics increased by 31.2 percent
- Hospitalizations by organic solvents, hydrocarbons and gases, and by other chemicals and noxious substances were more likely to be unintentional (59% and 60.7%, respectively)
4.3 percent of poisoning-related hospitalizations were caused by alcohol
54.2 percent of poisoning-related hospitalizations by alcohol were among males
Poisoning-related hospitalizations by alcohol were nearly equally distributed among intentional (35%), unintentional (33%), and of undetermined (31%) intent
Compared with other health authorities, alcohol accounted for a higher proportion of poisoning-related hospitalizations in the Northern Health Authority

**DPIC advice and service requests**
Between 2000 and 2005 in BC:
- Calls to DPIC concerned non-prescription medications (22.8%), prescription medications (22.2%), cleaners (10.2%), plants and mushrooms (6.9%) and chemicals (6.4%)
- 31 percent of calls to DPIC were for adults aged 20 to 64 years; 30 percent for children 2 to 5 years; and, 24 percent for infants less than 2 years of age
- Males and females were almost equally distributed for all calls to DPIC related to unintentional poisoning
- Females accounted for 61 percent of calls to DPIC for intentional poisonings
- The rate of calls for unintentional poisonings was highest regarding infants less than 2 years of age (males 6,421/100,000; females 6,053.5/100,000)
- The rate of calls for intentional poisoning for both males and females was highest regarding those aged 13 to 19 years (51.8%)
- Non-prescription medications were the most common poisoning substance resulting in calls to DPIC among children 12 years of age and under
- Prescription medications were the most common poisoning substances resulting in calls to DPIC among children and youth aged 13 years and older
### Best Practices

<table>
<thead>
<tr>
<th>TOPIC</th>
<th>INTERVENTION</th>
<th>EFFECTIVENESS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Child-specific Strategies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child-resistant Packaging Legislation</td>
<td>Enforcement &amp; Engineering</td>
<td>Good Practice</td>
</tr>
<tr>
<td>Community-based Interventions</td>
<td>Education</td>
<td>Limited Evidence</td>
</tr>
<tr>
<td>Physician/Pharmacy-based Education</td>
<td>Education</td>
<td>Limited Evidence</td>
</tr>
<tr>
<td>Bittering Agents</td>
<td>Engineering</td>
<td>Limited Evidence</td>
</tr>
<tr>
<td>Drug Form</td>
<td>Engineering</td>
<td>Limited Evidence</td>
</tr>
<tr>
<td>Warning Labels (Mr. Yuk stickers)</td>
<td>Education</td>
<td>Negative Effects</td>
</tr>
<tr>
<td><strong>Other Prevention Strategies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poison Control Centres</td>
<td>Education</td>
<td>Promising Practice</td>
</tr>
<tr>
<td>Appropriate Medication Use</td>
<td>Education &amp; Engineering</td>
<td>Promising Practice</td>
</tr>
<tr>
<td>Restricting Sales of Acetaminophen (Paracetamol)</td>
<td>Enforcement</td>
<td>Promising Practice</td>
</tr>
<tr>
<td>Pesticide Exposure Prevention</td>
<td>Engineering</td>
<td>Limited Evidence</td>
</tr>
<tr>
<td><strong>Other Strategies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safe and Proper Storage</td>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>Substance Abuse Prevention Program Development</td>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>Supervision</td>
<td>Education</td>
<td></td>
</tr>
</tbody>
</table>

Current evidence suggests child-resistant packaging as a good practice against childhood poisoning.\(^1\) Child-resistant packaging and child resistant closures for medications reduce the incidence of poisonings. In BC, the College of Pharmacists has a by-law whereby all drugs are dispensed in a container that is certified as a child-resistant package, unless stated otherwise.

Limited evidence of effectiveness has been found regarding:

- Community-based interventions aiming to heighten awareness of poisonings, preventive measures, and promote appropriate course of action in an emergency situation to a broad population in a community.\(^1\)
- Educational interventions, such as physician- or pharmacy-based education, providing the opportunity to access parents and children and increase their awareness of poisoning, preventive measures, and what to do in an emergency situation.\(^1\)
- Bittering agents – harmless additions to poisonous liquids to make the taste so foul and bitter that children would not continue to ingest the hazardous substance.\(^1\)
- Drug form – the shape and character of a pill, making it non-chewable and too large for young children to swallow.\(^1\)
- Increased pesticide safety – techniques designed to isolate the chemical from a worker through training in personal protective equipment, decreasing spillage, or removing workers before exposure reaches dangerous levels.\(^2\) The ultimate

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intervention would be to terminate the use of many toxic pesticides commonly used or to substitute toxic pesticides with harmless products.¹

Negative effects have been found regarding the use of warning labels – colourful stickers (e.g. Mr. Yuk) placed on the containers of hazardous substances to warn and deter children from handling or ingesting the contents.¹ Evidence suggests either no effect of the intervention or an increase in children’s handling of labelled medicine. Warning stickers are not a good deterrent for children and may in fact serve as an attraction. Warning stickers can not be recommended for use as a poisoning deterrent for children.

Promising practices identified in the literature include:

- Poison control centres - providing expertise and advice enabling poisonings to be appropriately managed at home or triaged to a health care facility, as well as avoiding unnecessary visits to health care facilities, or inappropriate or harmful home treatments.¹,³
- Appropriate medication use – overall appropriateness of the complete medical regimen and patient compliance, particularly relevant to older adults. Interventions to increase medication compliance include cues and organizers, self-medication programs, decreasing dosing frequency, and counselling and education.⁴
- Restricting sales of acetaminophen (paracetamol) – acetaminophen poisoning has been linked to availability.¹

Other poisoning prevention strategies:

- Safe and proper storage - proper storage of chemicals and medicines, keeping products in the original containers and other behavioural modifications. Identification of behaviours that promote safety is crucial in the prevention of unintentional poisonings.¹,⁵
- Substance abuse prevention program development - programs that focus on developing life skills, that have intensive participation and that are interactive are more effective in reducing substance use and have produced stronger and longer lasting positive effects on substance use.¹
- Supervision within the home environment is considered an essential aspect to injury prevention among young children. Parental supervision is influenced by both parental and child attributes, such as child temperament and parent personality characteristics.⁶

Resources
Poisoning resources are readily available in BC, both for emergency situations and for poisoning and prevention information.

In Case of Emergency

- 911 Emergency Contact
- BC Poison Control Centre
  Greater Vancouver: 604 682-5050
  Phone toll-free: 1-800-567-8911
  Website: www.dpic.org
For Poisoning and Prevention Information

- BC Poison Control Centre
  Greater Vancouver: 604 682-5050
  Phone toll-free: 1-800-567-8911
  Website: www.dpic.org

- BC NurseLine
  Phone toll-free in BC: 1-866-215-4700
  Greater Vancouver: 604-215-4700
  Deaf and hearing impaired toll-free province-wide: 1-866-TTY-4700
  Website: www.bchealthguide.org/nurseline.stm

- Public Health Units/Community Health Centres
  Offer a wide range of services to promote the optimal physical development, communication and cognitive abilities, healthy emotional attachment, and positive social development for all infants and children. Services include: breastfeeding clinics, nutrition information and consultation, parent and infant drop-in, child health clinics, and family and infant follow-up. Contact your local health authority for information.

- Baby’s Best Chance & Toddler’s First Steps
  Baby’s Best Chance Parents’ Handbook of Pregnancy and Baby Care, the Sixth Edition (2005), and Toddler’s First Steps, the Second Edition (2008) are published by the Government of British Columbia. Baby’s Best Chance covers ages 0 to 6 months and offers general safety tips. Toddler’s First Steps covers ages 6 to 36 months and include poison prevention and treatment information. Both of these resources are available from public health offices or via the BC Ministry of Health website: http://www.health.gov.bc.ca (select Reports and Publications)

- Canadian Poisonous Plants Information System
  Poisonous plants by botanical and common names; includes interactive search tool.
  Website: www.cbif.gc.ca/pls/pp/poison

For Poison Prevention Materials & Factsheets

- BC Drug and Poisoning Information Centre (DPIC):
  o Phone Stickers: Lower Mainland, Toll Free (outside lower mainland)
  o Fridge Magnets: Lower Mainland and Toll Free
  o Posters: “Kids and Pills”, “Medicine Cabinet”, “Thirsty?”
  o Pamphlets: “Poison Awareness” (includes First Aid for Poisoning):
    English, Chinese, French, Korean, Persian, Punjabi, Spanish, Vietnamese; “Plant Awareness”: English only
  o Factsheets: “Poisonings”, “Springtime Hazards”, “Holiday Hazards”

- Health Canada
  o Consumer Product Safety
    ▪ Reports & Publications; Reports & Publications for Industry & Health Professionals: Stay Safe - An Education Guide to Hazard Symbols
Aboriginal Resources
Poisoning resources specific to aboriginal communities include:

- Health Canada; First Nations, Inuit and Aboriginal; Health Promotion; Keeping Safe-Injury Prevention: Preventing Unintentional Poisoning
  Includes poisoning prevention information as well as links to other resources.
  Website: www.hc-sc.gc.ca

Resources in Need of Updating
BC HealthGuide

- In the “Poisoning Prevention” section it currently states:
  “… discard old medicines by flushing them down the toilet.”
  This should be replaced by:
  “… unused and expired prescription and over-the-counter medications, herbal supplements, mineral supplements, vitamin supplements and throat lozenges should be returned to participating pharmacies for environmentally safe disposal.”

  The BC Pharmacy Association offers a province-wide waste disposal program that encourages consumers to take unused medications back to pharmacies across the province for environmentally safe disposal. The program is sponsored through a partnership among the BC Pharmacy Association, the Pharmaceutical Manufacturers Association of Canada, the Canadian Drug Manufacturers Association and the Nonprescription Drug Manufacturers Association of Canada. Canadian pharmacies participation in this return program can be found at www.medicationsreturn.ca.

- In the “Preventing Poisoning in Young Children” section is currently states:
  “Use “Mr. Yuk” stickers and teach your children to recognize them.”
  This should be replaced by:
  “You can start to teach your toddler that warning symbols mean “Danger! Do not touch.” However do not expect your toddler to understand or remember. Keep all poisons locked up and out of reach” (Toddlers First Steps, 2008)

  As noted in the Best Practices section, negative effects have been found regarding the use of warning labels – colourful stickers (e.g. Mr. Yuk) placed on the containers of hazardous substances to warn and deter children from handling or ingesting the contents. ¹ Warning stickers are not a good deterrent for children and may in fact serve as an attraction. Warning stickers can not be recommended for use as a poisoning deterrent for children.
In the “Preventing Poisoning in Young Children” section is currently states:

“ASA (Aspirin) is a common source of childhood poisoning, especially flavoured “baby” ASA.”

This should be replaced by:

“ASA (Aspirin) is a common source of childhood poisoning.”

Flavoured “baby” aspirin is no longer available.

In the “Preventing Poisoning in Young Children” section is currently states:

“… discard old medicines by flushing them down the toilet.”

This should be replaced by:

“… unused and expired prescription and over-the-counter medications, herbal supplements, mineral supplements, vitamin supplements and throat lozenges should be returned to participating pharmacies for environmentally safe disposal.”

The BC Pharmacy Association offers a province-wide waste disposal program that encourages consumers to take unused medications back to pharmacies across the province for environmentally safe disposal. The program is sponsored through a partnership among the BC Pharmacy Association, the Pharmaceutical Manufacturers Association of Canada, the Canadian Drug Manufacturers Association and the Nonprescription Drug Manufacturers Association of Canada. Canadian pharmacies participation in this return program can be found at www.medicationsreturn.ca.

Conclusion

The annual rate of deaths and hospitalizations resulting from poisoning decreased and the numbers of calls for poisoning advice were relative stable in BC during the study period. Drugs and medicinal agents are the predominant substance involved in poisoning in BC, however the class of the substance and the populations at risk vary greatly by the intent and lethality of the poisoning event.

Comprehensive approaches targeted to specific causes of poisonings should be developed to reduce both fatal and non-fatal poisonings.

Regarding prevention from the perspective of the three ‘E’s – poisoning prevention strategies need to focus on all three of Engineering, Enforcement and Education. Evidence demonstrates that Education alone is not sufficient to safeguard the public from poisoning, however used in conjunction with other strategies, best and promising practices are emerging.

Poisoning prevention education initiatives need to consider the multicultural mosaic in BC in order to meet the diverse needs within these unique groups.

There is a lack of poison prevention initiatives targeting youth and adults when compared to those targeting children.
Awareness of poison prevention resources among youth and adults need to be raised in order to lower morbidity and mortality rates due to unintentional poisoning.

Data used in this report are from four different sources, and notably lack poisoning cases treated in emergency departments. Information related to the circumstances of poisoning events, victims’ socio-demographics, and the pattern of substance use is not available from the currently available data. The ability to make more specific prevention recommendations is therefore limited.

There is no surveillance system within BC to systematically and continually collect and analyze poisoning data. Building such a surveillance system would provide detailed profiles, patterns and trends of poisonings, which would inform targeted prevention initiatives. A well-developed surveillance system includes key indicators which serve to monitor and evaluate the issue and the success of intervention initiatives, allowing for constant improvement in prevention efforts.

A systematic surveillance system needs to be developed to inform targeted prevention strategies and initiatives, benefiting public health practitioners, decision makers and persons at risk.

A new BC Health Act will make poisoning a mandatory reportable event; however regulations around this process have not been finalized. It is suggested that these reports be directed to DPIC, with an agreement with the BC Injury Research and Prevention Unit (BCIRPU) to provide analytical support. BCIRPU is the Provincial Health Services Authority (PHSA) agency responsible for monitoring the trends and patterns of injury in BC, and should have regular access to these data.

Mandatory poisoning reports should be directed to the BC Drug and Poison Information Centre, with analytical support provided by the BC Injury Research and Prevention Unit.

**Methods & Limitations**

The characteristics and burden of poisoning in BC for the period 2000 to 2005 are described using four datasets, and encompasses intentional, unintentional, and undetermined intent. Mortality data pertaining to BC residents from 2000 to 2003 were obtained from the BC Vital Statistics Agency. Hospital separations data pertaining to BC residents discharged from hospital between 2001/02 and 2005/06 were extracted by the Knowledge Management and Technology Division, BC Ministry of Healthy Living and Sport. Poisoning cases were identified by International Classification of Diseases (ICD-10) codes. Adverse effects resulting from legal drugs taken as directed and in the proper doses were not included.

The BC Drug and Poison Information Centre (DPIC) poisoning advice and service requests occurring between 2000 and 2005 were obtained. Poisoning events included suspected poisonings, toxic effects, and adverse reactions from prescription medications, non-prescription medications, street drugs, foods, beverages, personal
care products, cleaners, chemicals, plants, animals and other materials. Demand on the BC Ambulance Service (BCAS) for poisoning ingestion and overdose cases from 2003/04 to 2005/06 was assessed using the Advanced Medical Priority Dispatch System (AMPDS) codes. The analysis describes substance and intent of poisoning by sex, age and regional Health Authority using numbers, percentages and rates. Crude rates were calculated by dividing the total number of poisoning cases by the annual population in the same area during the same period. Standardized rates were calculated to compare poisonings across Health Authorities.

The periods of data included in this report are not consistent across all datasets. Definitions for poisoning, coding systems, and inclusion and exclusion criteria varied with each dataset, as well as varying detail regarding the substance of poisoning (e.g. drug category vs. specific drug). Detailed information regarding poisoning substance and patient demographics was not available. Misclassification regarding intent may be an issue. Cases where poisoning was a contributing factor, but not the primary diagnosis were not included, therefore the true burden of poisoning may be underestimated.

References
5. Kent D. BC Drug and Poison Information Centre. Personal communication 2005

__ Analysis of the BCAS data is presented in Appendix B of the report only __
### TABLE OF CONTENTS

#### EXECUTIVE SUMMARY

- **PURPOSE** ................................................................. I
- **KEY FINDINGS** ........................................................... III
- **BEST PRACTICES** ................................................................ VIII
- **RESOURCES** ................................................................. IX
- **ABORIGINAL RESOURCES** ........................................ XI
- **RESOURCES IN NEED OF UPDATING** .................. XI
- **CONCLUSION** .............................................................. XII
- **METHODS & LIMITATIONS** ..................................... XIII
- **REFERENCES** ............................................................. XIV

#### INTRODUCTION

- **DEFINING POISONING** .................................................. 1
- **BURDEN OF POISONING** ............................................. 1
- **FACTORS ASSOCIATED WITH POISONING** ............ 2
- **POISONING IN BRITISH COLUMBIA** ....................... 2

#### METHODOLOGY

- **DATA SOURCES** ............................................................. 3
  - Mortality and Hospital Separations ........................................ 3
  - Poisoning Advice and Service Requests ........................................ 3
  - Ambulance Services ............................................................... 4
- **DATA ANALYSIS** .............................................................. 4
- **CAUTIONS AND LIMITATIONS** ..................................... 4

#### POISONING IN BC

- **MORTALITY** ................................................................. 6
  - Overview of Poisoning-related Mortality ........................................ 6
  - Poisoning-related Mortality and Intent ........................................ 7
  - Substances Resulting in Poisoning-related Mortality .................... 8
  - Regional Variation in Poisoning-related Mortality ..................... 10
- **HOSPITAL SEPARATIONS** .............................................. 13
  - Overview of Poisoning-Related Hospital Separations ................ 13
  - Poisoning-Related Hospital Separations and Intent .................... 14
  - Substances Resulting in Poisoning-Related Hospital Separations .... 15
  - Regional Variation in Poisoning-Related Hospital Separations ...... 20
- **DPIC POISONING ADVICE AND SERVICE REQUESTS** .... 22
  - Overview of DPIC Poisoning Advice and Service Requests .......... 22
  - DPIC Poisoning Advice and Service Requests, and Intent ........ 23
  - Substances Resulting in DPIC Poisoning Advice and Service Requests 25
  - Poisoning Route ................................................................... 28
  - Telephone Case Management of DPIC Poisoning Advice and Service Requests . 29
  - Regional Variation of DPIC Poisoning Advice and Service Requests .. 30

#### DISCUSSION

- **POISONING OVERVIEW** .................................................. 32
- **IMPLICATIONS FOR POISONING PREVENTION IN BC** ...... 35
- **INTERPRETATION OF THE EVIDENCE AND CONSIDERATIONS** .... 40
- **RESOURCES** ................................................................. 40
- **ABORIGINAL RESOURCES** ........................................... 42
- **RESOURCES IN NEED OF UPDATING** ...................... 42
- **CONCLUSION** .............................................................. 43
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>REFERENCES</td>
<td>45</td>
</tr>
<tr>
<td>APPENDIX A</td>
<td>49</td>
</tr>
<tr>
<td>WHO ICD-10</td>
<td>49</td>
</tr>
<tr>
<td>APPENDIX B</td>
<td>58</td>
</tr>
<tr>
<td>BC AMBULANCE SERVICE FOR POISONING</td>
<td>58</td>
</tr>
<tr>
<td>APPENDIX C</td>
<td>61</td>
</tr>
<tr>
<td>BC DRUG AND POISON INFORMATION CENTRE (DPIC)</td>
<td>61</td>
</tr>
</tbody>
</table>
LIST OF FIGURES

Figure 1.1: Number and rate of poisoning-related deaths per 100,000 population in BC, 2000 to 2003 ......................... 6
Figure 1.2: Rate of poisoning-related mortality per 100,000 population by age group and sex in BC, 2000 to 2003 .......... 7
Figure 1.3: Poisoning-related mortality by intent and age group in BC, 2000 to 2003 ................................................ 8
Figure 1.4: Poisoning-related mortality by substance in BC, 2000 to 2003 .......................................................... 8
Figure 1.5: Poisoning-related mortality by intent and substance in BC, 2000 to 2003 ................................................. 9
Figure 1.6: Age standardized mortality rate per 100,000 population for poisoning by Health Authority and sex in BC, 2000 to 2003 ........................................................................................................ 10
Figure 1.7: Poisoning-related mortality by intent and Health Authority in BC, 2000 to 2003 ......................................... 11
Figure 1.8: Poisoning-related mortality by substance and Health Authority in BC, 2000 to 2003 ......................... 12
Figure 2.1: Number and rate of poisoning-related hospital separations per 100,000 population in BC, 2001/02 to 2005/06 13
Figure 2.2: Rate of poisoning-related hospital separations per 100,000 population by age group and sex in BC, 2001/02 to 2005/06 ........................................................................................................................................ 14
Figure 2.3: Rate of poisoning-related hospital separations per 100,000 population by age group and intent in BC, 2001/02 to 2005/06 ........................................................................................................ 15
Figure 2.4: Poisoning-related hospital separations by substance in BC, 2001/02 to 2005/06 ........................................... 16
Figure 2.5: Poisoning-related hospital separations by substance and sex in BC, 2001/02 to 2005/06 ............................. 17
Figure 2.6: Poisoning-related hospital separations by substance and intent in BC, 2001/02 to 2005/06* .................... 19
Figure 2.7: Age standardized morbidity rate per 100,000 population for poisoning by Health Authority and sex in BC, 2001/02 to 2005/06 ........................................................................................................ 20
Figure 2.8: Poisoning-related hospital separations by Health Authority and intent in BC, 2001/02 to 2005/06 .............. 21
Figure 2.9: Poisoning-related hospital separations by Health Authority and substance in BC, 2001/02 to 2005/06 ....... 21
Figure 3.1: DPIC poisoning advice and service requests by caller category in BC, 2000 to 2005 .................................... 22
Figure 3.2: DPIC poisoning advice and service requests by patient sex and age group in BC, 2000 to 2005 .............. 23
Figure 3.3: Rate of DPIC poisoning advice and service requests per 100,000 population by sex, age group and intent in BC, 2000 to 2005 ........................................................................................................ 24
Figure 3.4: DPIC Poisoning Advice and Service Requests by substance in BC, 2000 to 2005 ..................................... 25
Figure 3.5: DPIC advice and service requests by substance and intent in BC, 2000 to 2005 ....................................... 28
Figure 3.6: DPIC advice and service requests by poisoning route in BC, 2000 to 2005 .................................................. 29
Figure 3.7: DPIC Poisoning Advice and Service Requests by substance, intent and case management in BC, 2000 to 2005 ........................................................................................................ 30
Figure 3.8: DPIC Poisoning Advice and Service Requests by intent and Health Authority in BC, 2000 to 2005 ....... 31
LIST OF TABLES

Table 1: Rate of poisoning-related hospital separations per 100,000 population by age group and substance in BC, 2001/02 to 2005/06 .......................................................................................................................... 18
Table 2: DPIC poisoning advice and service requests by age group and intent in BC, 2005 as compared to 2000 ....... 25
Table 3: Rate of DPIC advice and service requests per 100,000 population by substance and age group in BC, 2000-2005 ........................................................................................................................................ 26
Table 4: DPIC advice and service requests by age group and substance in BC, 2005 as compared to 2000 ............. 27
Table 5 DPIC Poisoning Advice and Service Requests by Health Authority in BC, 2000 to 2005 ......................... 31
### Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAPCC</td>
<td>American Association of Poison Control Centers</td>
</tr>
<tr>
<td>AMPDS</td>
<td>Advanced Medical Priority Dispatch System</td>
</tr>
<tr>
<td>BC</td>
<td>British Columbia</td>
</tr>
<tr>
<td>BCAS</td>
<td>BC Ambulance Services</td>
</tr>
<tr>
<td>CIHI</td>
<td>Canadian Institute for Health Information</td>
</tr>
<tr>
<td>CO</td>
<td>Carbon Monoxide</td>
</tr>
<tr>
<td>DPIC</td>
<td>Drug and Poison Information Centre</td>
</tr>
<tr>
<td>ICD-9</td>
<td>International Classification of Disease, Version 9</td>
</tr>
<tr>
<td>ICD-10</td>
<td>International Classification of Disease, Version 10</td>
</tr>
<tr>
<td>OTC</td>
<td>Over the Counter</td>
</tr>
<tr>
<td>UK</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>US</td>
<td>United States</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
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</tbody>
</table>
INTRODUCTION

*Poison is in everything, and no thing is without poison. The dosage makes it either a poison or a remedy.*

*Paracelsus*

**Defining Poisoning**

A poison is defined as a substance that is harmful to the body when ingested, inhaled, injected, or absorbed through the skin.\(^1\) The American Association of Poison Control Centers (AAPCC) also defines a poisoning by therapeutic error in regards to medication use as “an unintentional deviation from a proper therapeutic regimen that results in the wrong dose, incorrect route of administration, administration to the wrong person, or administration of the wrong substance”.\(^2\) Poisoning results from the damaging physiological effects of exposure to pharmaceuticals, illicit drugs, chemicals, heavy metals, gases and vapours, and household substances.\(^3\)

Poisonings can be divided into those that are intentionally caused and those that are unintentional. Intentional poisoning (e.g. self-harm, suicide & assault) results from a person consuming or giving someone else a substance with the intention of causing harm. Unintentional poisoning may be the result of an inaccurate prescription or administration of a drug or other substance, or the inappropriate consumption of a drug or other substance. Examples of unintentional poisoning include a confused person taking too much medication, exposure of a toddler to a noxious household product, and the use of drugs for recreational purposes in excessive amounts.\(^1\)

**Burden of Poisoning**

Poisoning is a significant global public health problem. According to data from the World Health Organization (WHO), an estimated 350,000 people died worldwide from unintentional poisoning in 2002.\(^4\) In 2000, unintentional poisoning was the 9th most common cause of death globally among young adults aged 15 to 29 years.\(^5\)

In Canada, the age standardized mortality rate for poisoning was 2.8 per 100,000 in 2004.\(^6\) Next to falls and motor vehicle collisions, poisoning ranked as the third most frequent cause of injury leading to hospitalization.\(^7\) According to the Canadian Institute for Health Information (CIHI) there was a total 197,002 hospital admissions for all injuries in 1999/2000, of which 28,581 were poisoning cases (14.5%).\(^7,8\)

In British Columbia (BC), unintentional and intentional poisoning is among the leading causes of death and hospitalization.\(^9\) A total of 1,403 deaths from unintentional poisoning occurred between 1999 and 2003 (approximately 281 deaths/year), with the majority of victims being youth and adults aged 15 to 64 years. Unintentional poisoning among youth and adults accounted for 1,097 hospital separations between April 2001 and March 2003 (approximately 549 separations / year).
Factors Associated with Poisoning

Factors contributing to poisoning vary by intent. Factors associated with unintentional poisoning include: not reading and following product label instructions, storage of medicine near chemicals, cluttered medicine cabinets, transfer of chemicals from original packaging to food or beverage containers, and alcohol or substance abuse. Factors associated with intentional poisoning include mental health and substance abuse issues.

Age is an important factor in poisoning. Younger children in particular are at higher risk of being poisoned and much of poison prevention education has focused on this issue. High incidence of self-inflicted poisoning has been found among women aged 20 to 40 years who used tranquilizers, analgesics, anti-depressants and other psychotropic medication. While some poison data are available, a comprehensive report on contributing factors among youth, adults or seniors, for both unintentional and intentional poisoning has not previously been available.

Poisoning in British Columbia

This report assists in filling the knowledge gap regarding the factors associated with poisoning. The purpose of this report is to provide descriptive data on unintentional and intentional poisoning in BC for the period 2000 to 2005. A variety of data sources are incorporated, including mortality data, hospital separations data, and poisonings attended by medical and paramedical services (i.e. BC Ambulance Services and BC Drug and Poison Information Centre). The measures used in this report include age, sex, intent and substance.
METHODOLOGY

This report includes both intentional and unintentional poisoning, as well as cases listed as 'undetermined intent'. Data were drawn from four datasets in order to describe the characteristics and burden of poisoning in BC for the period 2001 to 2005.

Data Sources

Mortality and Hospital Separations

Poisoning mortality data were obtained from the BC Vital Statistics Agency, which maintains mortality information for all BC residents. This report includes all poisoning-related deaths among BC residents during the period 2000 to 2003.

Poisoning-related hospital separations data were extracted by the Knowledge Management and Technology Division, BC Ministry of Healthy Living and Sport. Patients who were known residents of BC, admitted to hospital for acute care or day care as a result of poisoning, and discharged during fiscal years 2001/02 to 2005/06 are included in this analysis.

Both datasets were provided at the individual case level with all personal identifiers encrypted or stripped. Cause of death or hospitalization was classified and coded according to the 10th version of the International Classification of Disease (ICD-10). For this report, poisoning cases were defined as those with ICD-10 codes X40-X49 (unintentional poisoning), X60-X69 (self-poisoning), X85-X90 (assault), and Y10-Y19 and Y90-91 (poisoning event of undetermined intent). This definition of poisoning includes overdose of both legal and illegal drugs, as well as poisoning from alcohol, pesticides, chemicals, and household products. Adverse effects resulting from legal drugs taken as directed and in the proper doses, and any other ICD-10 codes, were not included in this analysis. Substances resulting in poisoning were further identified and categorized via ICD-10 codes T35-T65 (Appendix B).

Poisoning Advice and Service Requests

The BC Drug and Poison Information Centre (DPIC) provides first aid and poisoning treatment advice by telephone to both the public and health professionals. All calls regarding poisoning events are managed by poisoning specialists, and information such as the name of the product or medicine, quantity ingested, time of ingestion, weight and sex of the patient, and current condition is recorded. Poisoning advice and service requests regarding human poisoning within BC for the period 2000 to 2005 are included in this report. Poisoning events included suspected poisonings, toxic effects, and adverse reactions from prescription medications, non-prescription medications, street drugs, foods, beverages, personal care products, cleaners, chemicals, plants, animals and other materials.


**Ambulance Services**

The BC Ambulance Service (BCAS) is the sole ambulance service provider of pre-hospital emergency care in BC. Medical information is recorded onto a proprietary dispatch card including information on the victim’s location, current condition and state of consciousness, along with substances ingested. Demand on the ambulance service for poisoning ingestion and overdose cases was assessed using the Advanced Medical Priority Dispatch System (AMPDS) codes. Aggregated data by year and AMPDS code for the fiscal years 2003-04 to 2005-06 are included in this report.

**Data Analysis**

Descriptive analyses were conducted with an emphasis on the substance and intent of poisoning by sex, age and regional Health Authority. The number, percentage and rate of poisoning cases were used to depict the patterns and characteristics of poisoning in BC. Crude rates were calculated by dividing the total number of poisoning cases by the annual population in the same area during the same period. To compare poisonings across Health Authorities, rates were standardized to the total BC population over the study period.

**Cautions and Limitations**

This report is based on a variety of data sources. Definitions for poisoning along with inclusion and exclusion criteria varied with each dataset. Poisoning-related mortalities and hospital separations were identified by ICD-10 codes and excluded adverse effects and misadventure during medical care. Coding assigned to the underlying (primary) cause of death or hospitalization provided a broad drug category rather than specific drugs.

DPIC does not currently use the ICD-10 coding system, thus the classification of both intent and poisoning substance were not consistent with those used for mortality and hospitalizations. Furthermore, the DPIC dataset included all calls for poisoning advice and service regarding human poisonings or suspected poisonings, toxic effects or adverse reactions resulting from all kinds of drugs, chemicals, and other products, which were subsequently grouped into 17 categories.

BCAS data included callouts related to poisoning ingestion and overdose only, and were aggregated by year and AMPDS codes. Detailed information about the poisoning substance and patients' demographics was not available. Terminology related to the poisoning substance as provided in the source database was used in this report.

Determining the intent of a person who suffered a poisoning event is often difficult. As a consequence, the conclusion of a coroner’s inquest, hospital separation file, DPIC or BCAS record may result in misclassification. Some poisoning events may have been intentional, although not classified as such. Conversely, some of the poisonings categorized as self-poisoning, suicide or undetermined intent may have been

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C Analysis of the BCAS data is presented in Appendix B
unintentional. The extent of such misclassification in unknown and therefore cannot be analyzed or assessed.

This report comprises poisoning-related deaths, hospitalizations, ambulance service callouts, and calls to the poison control centre, with a focus on acute poisonings. Chronic substance abuse or drug dependence cases, and poisoning-related deaths and hospitalizations coded outside of the poisoning ranges described above, were not included in this analysis. Only mortality and hospitalization cases where poisoning was the underlying cause of death or the most responsible diagnosis (first occurrence) were included. In addition, ambulance services data did not include poisoning cases other than those resulting from ingestion and overdose. All poisoning rate calculations were based on the general population of the province of BC or regional Health Authority, not the people at risk. Therefore, the data presented in this report may underestimate the true burden of poisoning in BC.

Finally, this report is based on data from available sources. Although every effort was made to access the most recent information available, some data, specifically mortality, was only available up to 2003. The periods of data included in the analyses were not consistent across all datasets, ranging between four to six years. Fatalities before the year 2000, and hospital separations before 2001/02, were excluded from analysis as both were coded using ICD-9. It is unclear how this change in coding systems affects the enumeration and analysis of poisoning, however CIHI (personal communication, 2008) has stated that comparisons of data between the two coding systems is not reliable. Data included in this report summarize poisoning events during the study period and provide a picture of the nature and extent of poisoning in BC. Results of the analyses provide valuable information toward the prevention of poisoning-related deaths and disability among British Columbians.
POISONING IN BC

Mortality

Overview of Poisoning-related Mortality

There were 1,617 poisoning-related deaths in BC between 2000 and 2003. The number of deaths decreased by 38.8 percent, from 492 in 2000 to 301 in 2003, with a corresponding reduction in rates from 12.2 per 100,000 in 2000 to 7.2 per 100,000 in 2003 (Figure 1.1). Poisoning-related deaths decreased over the study period for both sexes and all ages.

Males accounted for 68.5 percent of all cases, and 91.2 percent of all cases were between the ages of 20 and 64 years. Rates of poisoning-related mortality were highest among those aged 20 to 64 years for both males (20.1/100,000) and females (8.8/100,000) (Figure 1.2).

Figure 1.1: Number and rate of poisoning-related deaths per 100,000 population in BC, 2000 to 2003

![Graph showing number and rate of poisoning-related deaths per 100,000 population in BC, 2000 to 2003.](image-url)
Poisoning-related Mortality and Intent

Approximately 64.3 percent of all poisoning-related mortalities were unintentional, 32.3 percent were attributed to self-poisoning, 0.1 percent resulted from assaults, and the remaining 3.3 percent were of undetermined intent. This proportionate distribution varied greatly with age: 78.6 percent of poisoning-related deaths among children aged 13 to 19 years were unintentional, while 65.2 percent of poisoning-related deaths among those aged 65 years or older resulted from self-poisoning (Figure 1.3).

Males accounted for 73.9 percent of unintentional poisoning-related deaths and 60.3 percent of self-poisoning deaths. Approximately 94.1 percent of unintentional poisoning-related deaths were between 20 and 64 years of age, as compared to 80.9 percent of self-poisoning deaths. Both unintentional poisoning and self-poisoning deaths decreased between 2000 and 2003, by 45.2 percent and 22.7 percent, respectively.
**Figure 1.3:** Poisoning-related mortality by intent and age group in BC, 2000 to 2003

*Fewer than 5 cases per age group
**Undetermined numbers indicated above the bar

**Substances Resulting in Poisoning-related Mortality**

Over one-half of poisoning-related deaths resulted from overdosing of narcotics and psychodysleptics (hallucinogens) (834 deaths; 51.6%); followed by other and unspecified drugs (526 deaths; 32.5%); and organic solvents, hydrocarbons and gases (184 deaths; 11.4%) (Figure 1.4).

**Figure 1.4:** Poisoning-related mortality by substance in BC, 2000 to 2003
Among the 834 deaths by narcotics and psychodysleptics (hallucinogens), 88.2 percent were unintentional (Figure 1.5), males accounted for 77.7 percent, and 96.0 percent of cases were between the ages of 20 and 64 years. Drugs within this category included cocaine (average 64 deaths/year), other opioids (58 deaths/year), heroin (55 deaths/year) and methadone (26 deaths/year). Deaths by narcotics and psychodysleptics decreased by 45.7 percent, from 267 in 2000 to 145 in 2003, resulting in the largest contributor to the decrease in total poisoning-related deaths. Deaths by methadone remained relatively steady during the same period.

Figure 1.5: Poisoning-related mortality by intent and substance in BC, 2000 to 2003

Over one-half of the 526 deaths resulting from other and unspecified drugs were self-poisoning and 42.2 percent were unintentional (Figure 1.5). Females accounted for 51.3 percent of these deaths, while 86.3 percent were among victims between 20 and 64 years of age. From 2000 to 2003, other and unspecified drug poisoning deaths decreased by 31.8 percent. The most frequent substances involved in other and unspecified drug deaths were antidepressants (average 38 deaths/year), and of these 60.0 percent were classified as self-poisoning.

Nearly 85 percent of the 184 deaths by organic solvents, hydrocarbons and gases were self-poisoning (Figure 1.5). Males between the ages of 20 and 64 years accounted for 86.4 percent of these deaths. Carbon monoxide (CO) was the primary substance of
poisoning within this category (average 41 deaths/year, 88.6%), and the leading cause of suicidal poisoning-related deaths in this category.

More than 94 percent of alcohol poisoning-related deaths were unintentional (Figure 1.5), 70.0 percent were male, and 87.7 percent were between 20 and 64 years of age. The number of alcohol poisoning-related deaths varied from 11 to 22 deaths per year from 2000 to 2003.

**Regional Variation in Poisoning-related Mortality**

The Fraser and Vancouver Coastal Health Authorities accounted for 30.6 percent (495) and 27.9 percent (451) of all poisoning-related deaths, respectively, followed by Vancouver Island (18.7%, 303), Interior (17.2%, 279) and Northern (5.3%, 87). Standardized by the total BC population over the 4-year study period, the rate per 100,000 standard population was highest among males in the Vancouver Island Health Authority (15.3), followed by the Vancouver Coastal (15.0) and Interior Health Authorities (13.7). Among females, the rate was highest for the Interior Health Authority (7.5), followed by the Vancouver Island (6.8) and Vancouver Coastal Health Authorities (5.9) (Figure 1.6).

**Figure 1.6: Age standardized poisoning mortality rate per 100,000 population by Health Authority and sex in BC, 2000 to 2003**

The highest proportion of unintentional poisoning-related deaths occurred in the Vancouver Coastal Health Authority (71.0%) while Vancouver Island Health Authority accounted for the highest proportion of self-poisoning deaths (36.3%) (Figure 1.7).
Assaults accounted for few poisoning-related deaths, with fewer than five cases each in the Fraser and Interior Health Authorities.

**Figure 1.7: Poisoning-related mortality by intent and Health Authority in BC, 2000 to 2003**

Narcotics and psychodysleptics were the leading cause by category of poisoning-related deaths in each of the five Health Authorities (Figure 1.8), having the highest proportions in the Vancouver Coastal (59.4%) and Fraser (54.5%) Health Authorities. Vancouver Coastal Health Authority also accounted for nearly one-third of all deaths by narcotics and psychodysleptics (268/832 deaths) in the province. The proportion of deaths by alcohol was highest for the Northern Health Authority (9.2%) accounting for 29.8 percent of all alcohol poisoning-related deaths in the province. Compared to the other regions, organic solvents, hydrocarbons and gases accounted for larger proportions of poisoning-related deaths for the Northern and the Interior Health Authorities (17.2% each), however the Northern Health Authority accounted for 26.1 percent of all poisoning deaths by organic solvents, hydrocarbons and gases in the province while the Interior accounted for only 8.2 percent.
Figure 1.8: Poisoning-related mortality by substance and Health Authority in BC, 2000 to 2003

*Alcohol numbers indicated below the bar
**Other chemicals and noxious substances numbers indicated above the bar
Hospital Separations

Overview of Poisoning-Related Hospital Separations

In total, 23,958 poisoning-related hospital separations occurred over the five-year period from 2001/02 to 2005/06. The number of hospital separations decreased by 14.2 percent from 5,261 in 2001/02 to 4,515 in 2005/06, with a corresponding reduction in rates from 129.0 per 100,000 in 2000/01 to 106.0 per 100,000 in 2005/06 (Figure 2.1). Of these cases, 60.5 percent were female, 73.1 percent were between the ages of 20 and 64 years, and 13.9 percent were between the ages of 13 and 19 years. The rate of poisoning-related hospital separations per 100,000 population was highest among females between the ages of 13 and 19 years (261.5), followed by those between 20 and 64 years (158.0) and those 65 years or older (87.4) (Figure 2.2). Among males, the highest rate was among those between 20 and 64 years of age (110.2), followed by those 13 to 19 years (87.4) and 65 years or older (81.2).

Figure 2.1: Number and rate of poisoning-related hospital separations per 100,000 population in BC, 2001/02 to 2005/06
Poisoning-Related Hospital Separations and Intent

Nearly two-thirds of poisoning-related hospital separations were due to self-poisonings (15,216 cases; 63.5%) and one-quarter were unintentional (6,176 cases; 25.8%), with the remainder of cases either resulting from assault (48 cases; 0.2%) or undetermined intent (2,515 cases; 10.5%). Males and females were almost equal in the number of unintentional poisonings, at 50.4 percent and 49.6 percent respectively, whereas female self-poisoning hospitalizations were twice those of male.

Young children under the age of six years experienced high rates of poisoning-related hospital separations and were all unintentional in nature (Figure 2.3). The rate of unintentional poisonings among males under 2 years of age was 69.4 per 100,000 (145 hospital separations), while females under 2 years of age experienced a slightly lower rate of 49.1 per 100,000 (97 hospital separations). Self-poisonings either did not occur or were infrequent under 13 years of age. Within the 13 to 19 years age group, females experienced higher rates of self-poisoning than males (214.2/100,000 vs. 52.8/100,000) as well as higher rates than any other age group for either sex. Males aged 20 to 64 years had the highest rate of self-poisonings (65.7/100,000; 4,241 hospital separations), followed by those aged 13 to 19 years (52.8/100,000; 526 hospital separations). Unintentional poisoning was more common than self-poisoning among seniors aged 65 years or older for both males and females.
Compared with 2001/02, the number of hospital separations for both unintentional poisoning and self-poisoning decreased by 2005/06 among all age groups, with the exception of unintentional poisoning among 20 to 64 year-olds which increased by 11.2 percent, and self-poisonings among those aged 65 years or older which increased by 19.0 percent.

**Substances Resulting in Poisoning-Related Hospital Separations**

Drugs or medicinal agents accounted for nearly 88 percent of the 23,958 poisoning-related hospitalizations. More than three-quarters of poisoning-related hospitalizations were caused by drugs other than narcotics and psychodynamics (18,251 cases, combined as other and unspecified drugs) (Figure 2.4). Of these, 41.8 percent were by antiepileptic, sedative- hypnotic, anti-Parkinsonism and psychotropic drugs; and 20.3 percent were non-opioid analgesics, antipyretics and antirheumatics. Approximately 11.4 percent of poisoning-related hospitalizations (2,727 cases) were caused by narcotics and psychodynamics (hallucinogens) drugs. The remaining cases resulted from alcohol (1,024 cases; 4.3%); organic solvents, hydrocarbon and gases (656 cases; 2.7%); and other chemicals and noxious substances (1,282 cases; 5.4%).
Poisoning-related hospitalizations caused by drugs were higher among females than males (65.4% vs. 34.6%), except for those caused by narcotics and psychodysleptics where males accounted for 53.2 percent of cases. Males also accounted for a higher proportion of poisoning-related hospitalizations caused by alcohol (54.2%); organic solvents, hydrocarbon and gases (68.9%); and by other chemicals and noxious substances (52.1%) (Figure 2.5).
The substances involved in poisoning-related hospitalizations varied greatly by age (Table 1). Other and unspecified drugs were the leading substance category among young children less than six years of age. Other chemicals and noxious substances also presented as a high risk for infants less than two years old. For youth between 13 and 19 years of age, non-opioid analgesics, antipyretics and antirheumatics accounted for the majority of poisoning-related hospitalizations; followed by antiepileptic, sedative-hypnotic, anti-Parkinsonism and psychotropic drugs. The leading category involved in poisoning-related hospitalizations among adults aged 20 years and older was antiepileptic, sedative-hypnotic, anti-Parkinsonism and psychotropic drugs.

The second leading causes of poisoning-related hospitalizations were attributed to other chemicals and noxious substances among children 12 years of age and younger; alcohol among youth 13 to 19 years old; and narcotics and psychodysleptics among adults aged 20 years and older (Table 1).
Table 1: Rate of poisoning-related hospital separations per 100,000 population by age group and substance in BC, 2001/02 to 2005/06

<table>
<thead>
<tr>
<th>Substance</th>
<th>&lt;2</th>
<th>2-5</th>
<th>6-12</th>
<th>13-19</th>
<th>20-64</th>
<th>65+</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Narcotics and psychodysleptics</td>
<td>6.6</td>
<td>1.9</td>
<td>0.4</td>
<td>8.6</td>
<td>16.8</td>
<td>11.3</td>
<td>13.1</td>
</tr>
<tr>
<td>Non-opioid analgesics, antipyretics and antirheumatics</td>
<td>3.2</td>
<td>2.3</td>
<td>2.0</td>
<td>78.6</td>
<td>23.0</td>
<td>9.2</td>
<td>23.3</td>
</tr>
<tr>
<td>Antiepileptic, sedative-hypnotic, anti-Parkinsonism and psychotropic drugs</td>
<td>9.3</td>
<td>8.0</td>
<td>2.6</td>
<td>48.0</td>
<td>62.6</td>
<td>26.9</td>
<td>48.1</td>
</tr>
<tr>
<td>Other drugs acting on the autonomic nervous system</td>
<td>1.7</td>
<td>0.7</td>
<td>0.0</td>
<td>1.5</td>
<td>1.7</td>
<td>2.1</td>
<td>1.5</td>
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<tr>
<td>Other and unspecified drugs, medicaments and biological substances</td>
<td>17.7</td>
<td>11.1</td>
<td>2.0</td>
<td>15.9</td>
<td>14.1</td>
<td>25.2</td>
<td>14.7</td>
</tr>
<tr>
<td>Alcohol</td>
<td>1.2</td>
<td>0.0</td>
<td>*</td>
<td>10.3</td>
<td>5.9</td>
<td>2.5</td>
<td>5.0</td>
</tr>
<tr>
<td>Organic solvents, hydrocarbons and gases</td>
<td>7.6</td>
<td>2.5</td>
<td>2.0</td>
<td>2.4</td>
<td>3.6</td>
<td>2.0</td>
<td>3.2</td>
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<td>Other chemicals and noxious substances</td>
<td>13.5</td>
<td>6.8</td>
<td>2.6</td>
<td>6.4</td>
<td>6.5</td>
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<tr>
<td><strong>Total</strong></td>
<td>61.0</td>
<td>33.3</td>
<td>11.7</td>
<td>171.9</td>
<td>134.2</td>
<td>84.6</td>
<td>115.1</td>
</tr>
</tbody>
</table>

* Indicates fewer than 5 cases

The majority of poisoning-related hospitalizations caused by drugs resulted from self-poisonings, with the exception of those by narcotics and psychodysleptics in which 46.1 percent were unintentional, 33.5 percent were self-poisoning and 20.4 percent were of undetermined intent (Figure 2.6). Hospitalizations by organic solvents, hydrocarbons and gases, and by other chemicals and noxious substances were more likely to be unintentional (58.8% and 60.7% respectively). Alcohol poisonings were nearly equally distributed among intentional (35.3%), unintentional (33.4%), and of undetermined intent (31.3%).
One-half of the 15,216 cases of self-poisoning hospitalizations were caused by antiepileptic, sedative-hypnotic, anti-Parkinsonism and psychotropic drugs (50.1%); 25.2 percent by non-opioid analgesics, antipyretics and antirheumatics; and 10.6 percent by other and unspecified drugs, medicaments and biological substances. The leading substances of poisoning for the 6,176 cases of unintentional poisoning included antiepileptic, sedative-hypnotic, anti-Parkinsonism and psychotropic drugs (24.5%); narcotics and psychodysleptics (20.3%); and other and unspecified drugs, medicaments and biological substances (17.9%).

Poisoning-related hospitalizations for all drugs reduced by 17.1 percent during the period 2001/02 to 2005/06, except for unintentional poisoning attributed to narcotics and psychodysleptics which increased by 31.2 percent after 2002/03. Poisoning-related hospitalizations by alcohol and by other chemicals and noxious substances also fell by 22.7 percent and 22.6 percent respectively. An increase of 13.1 percent was observed for poisoning by organic solvents, hydrocarbons and gases, with the largest increases attributed to carbon monoxide (CO) and other gases.
Regional Variation in Poisoning-Related Hospital Separations

The Fraser Health Authority accounted for 28.9 percent of poisoning-related hospital separations, followed by the Interior (19.8%) and Vancouver Island Health Authorities (19.6%). Standardized by the total BC population over 5-years, the Northern Health Authority demonstrated the highest hospitalization rate per 100,000 standard population at 184.6, followed by the Interior (138.7/100,000) and Vancouver Island (133.2/100,000) Health Authorities (Figure 2.7).

Figure 2.7: Age standardized morbidity rate per 100,000 population for poisoning by Health Authority and sex in BC, 2001/02 to 2005/06

The highest proportion of unintentional poisoning-related hospital separations occurred in the Interior Health Authority (29.5%), while the Fraser Health Authority had the highest proportion of self-poisonings (68.1%) (Figure 2.8). Other and unspecified drugs were the leading cause of poisoning-related hospitalizations for each health authority ranging from 74.1 to 79.0 percent, followed by poisonings by narcotics and psychodysleptics ranging from 9.9 to 12.4 percent (Figure 2.9). Alcohol accounted for more poisoning-related hospitalizations in the Northern Health Authority (6.7%) than in any other area.
Figure 2.8  Poisoning-related hospital separations by Health Authority and intent in BC, 2001/02 to 2005/06

*Assault numbers indicated below the assault bar

Figure 2.9:  Poisoning-related hospital separations by Health Authority and substance in BC, 2001/02 to 2005/06

*Some numbers indicated to the right of the bar
DPIC Poisoning Advice and Service Requests

Overview of DPIC Poisoning Advice and Service Requests

DPIC received a total of 157,947 calls from British Columbians requesting human poisoning consultation support and services during the period 2000 to 2005. Annual calls ranged from 25,760 to 27,360 per year, and included both unintentional and intentional poisonings and overdoses, as well as adverse reactions. Over 80 percent of calls were from the general public (lay person), followed by registered nurses (7.0%) and physicians (7.0%) (Figure 3.1).

Figure 3.1: DPIC poisoning advice and service requests by caller category in BC, 2000 to 2005

Calls for poisoning advice and service were higher regarding males than females 12 years of age and younger; however among females there were more calls regarding those aged 13 years or older (Figure 3.2).

Nearly 20 percent of all calls to DPIC were regarding children less than two years of age, 23.9 percent were for children aged two to five years, and 38.5 percent were for adults 20 to 64 years old. However, the rate of calls to DPIC for poisoning advice per 100,000 population was highest among males under two years of age (6,450.5), followed by females under two years (6,078.7) (Figure 3.2). Rates per 100,000 decreased with age among males (2-5 years: 3,851.2; 6-12 years: 420.6; 13-19 years: 403.2; 20-64 years: 337.9; 65+ years: 167.6), whereas among females decreased until 12 years of age, increases among youth 13-19 years and decreased thereafter (2-5 years: 3,288.2; 6-12 years: 315.6; 13-19 years: 641.9; 20-64 years: 439.6; 65+ years: 227.8).
The total number of calls to DPIC for poisoning advice and service remained relatively steady over the period 2000 to 2005. Calls decreased by 9.2 percent regarding infants less than two years of age; by 5.3 percent for young children aged two to five years; and by 7.8 percent for children aged six to 12 years. In contrast, the number of calls increased regarding individuals aged 13 years and older, driven mostly by calls for those older than 65 years (88.0%).

**DPIC Poisoning Advice and Service Requests, and Intent**

Almost all poisoning-related calls to DPIC regarding children less than six years of age were for unintentional poisoning, while intentional poisoning accounted for 51.8 percent of calls regarding those aged 13 to 19 years. Unintentional poisonings accounted for 64.5 percent of all calls received regarding individuals aged 20 to 64 years, and 86.3 percent for those 65 years and older.

Males and females were almost equally distributed for all calls related to unintentional poisoning. Adults aged 20 to 64 years accounted for 30.8 percent of all calls related to unintentional poisoning, those aged two to five years accounted for 29.5 percent, and infants less than two years of age accounted for 24.2 percent. The rate of calls for unintentional poisonings was highest regarding infants less than 2 years of age (males 6,421/100,000; females 6,053.5/100,000) and decreased with age for both males and females (Figure 3.3). Females accounted for a total of 60.8 percent of calls for intentional poisonings; over 70 percent were regarding females aged 20 to 64 years and
24.4 percent were for those aged 13 to 19 years. The rate of calls for intentional poisoning for both males and females was highest regarding those aged 13 to 19 years (males 163.5/100,000; females 381.1/100,000), followed by those aged 20 to 64 years (males 94.6/100,000; females 137.3/100,000).

Figure 3.3: Rate of DPIC poisoning advice and service requests per 100,000 population by sex, age group and intent in BC, 2000 to 2005

The number of calls related to unintentional poisonings decreased among all children between 2000 and 2005, with a 21.3 percent decrease among youth aged 13 to 19 years. Adults experienced a slight decrease, however calls to DPIC increased by 79.7 percent during the same time period for seniors aged 65 years and older. Number of calls related to intentional poisonings also increased, particularly among seniors 65 years and older with a 278.3 percent increase (Table 2).
Table 2: DPIC poisoning advice and service requests by age group and intent in BC, 2005 as compared to 2000

<table>
<thead>
<tr>
<th>Intent</th>
<th>Age Group (years)</th>
<th>&lt; 2</th>
<th>2-5</th>
<th>6-12</th>
<th>13-19</th>
<th>20-64</th>
<th>65+</th>
<th>Unknown</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unintentional Poisoning</td>
<td>-9.2%</td>
<td>-5.0%</td>
<td>-7.7%</td>
<td>-21.3%</td>
<td>-3.5%</td>
<td>79.7%</td>
<td>-21.4%</td>
<td>-4.0%</td>
<td></td>
</tr>
<tr>
<td>Intentional Poisoning</td>
<td>*</td>
<td>*</td>
<td>73.1%</td>
<td>30.0%</td>
<td>32.5%</td>
<td>278.3%</td>
<td>-20.7%</td>
<td>35.3%</td>
<td></td>
</tr>
<tr>
<td>Adverse Effect</td>
<td>-52.2%</td>
<td>-72.9%</td>
<td>-50.0%</td>
<td>-27.6%</td>
<td>-40.6%</td>
<td>33.3%</td>
<td>83.3%</td>
<td>-36.6%</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>-9.2%</td>
<td>-5.3%</td>
<td>-7.8%</td>
<td>1.7%</td>
<td>3.6%</td>
<td>88.0%</td>
<td>-17.6%</td>
<td>0.4%</td>
<td></td>
</tr>
</tbody>
</table>

* indicates no reported cases

Substances Resulting in DPIC Poisoning Advice and Service Requests

The leading substances involved in DPIC poisoning advice and service requests included non-prescription medications (22.8%), prescription medications (22.2%), cleaners (10.2%), plants and mushrooms (6.9%) and chemicals (6.4%) (Figure 3.4).

Figure 3.4: DPIC Poisoning Advice and Service Requests by substance in BC, 2000 to 2005

*Number of calls to the right of bar
With regards to DPIC poisoning advice and service requests, non-prescription medications were the most common poisoning substance for children 12 years of age and under, while prescription medications were most common for those aged 13 years and older (Table 3). All substances posed a high risk for young children, especially for infants less than two years of age, particularly non-prescription medications, cleaners, plants and mushrooms, personal care substances and foreign bodies (Table 2). Street drugs resulted in the highest rate of poisonings (19.5/100,000 population) among those aged 13 to 19 years, followed by infants less than two years of age (8.0/100,000 population) and adults aged 20 to 64 years (6.5/100,000 population). With regard to alcohol-related poisonings, infants under two years demonstrated the highest rates (56.1/100,000 population), followed by those aged 13 to 19 years (47.0/100,000 population) and young children aged two to five years (29.6/100,000 population). Infants under two years also demonstrated the highest rates of poisoning by fumes and gases (17.7/100,000 population), as compared to other age groups (20 - 64 years: 12.7/100,000 population; 2 - 5 years: 7.6/100,000 population).

Table 3: Rate of DPIC advice and service requests per 100,000 population by substance and age group in BC, 2000-2005

<table>
<thead>
<tr>
<th>Substance</th>
<th>Age Group (years)</th>
<th>&lt; 2</th>
<th>2-5</th>
<th>6-12</th>
<th>13-19</th>
<th>20-64</th>
<th>65+</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non Prescription Meds</td>
<td></td>
<td>1479.9</td>
<td>1388.0</td>
<td>82.9</td>
<td>141.5</td>
<td>52.0</td>
<td>28.5</td>
<td>145.2</td>
</tr>
<tr>
<td>Prescription Meds</td>
<td></td>
<td>427.2</td>
<td>452.9</td>
<td>48.3</td>
<td>150.8</td>
<td>125.8</td>
<td>106.8</td>
<td>140.9</td>
</tr>
<tr>
<td>Cleaners</td>
<td></td>
<td>1035.0</td>
<td>378.5</td>
<td>24.5</td>
<td>22.7</td>
<td>34.8</td>
<td>15.3</td>
<td>64.9</td>
</tr>
<tr>
<td>Plants &amp; Mushrooms</td>
<td></td>
<td>992.0</td>
<td>284.8</td>
<td>33.1</td>
<td>17.7</td>
<td>10.4</td>
<td>8.5</td>
<td>44.0</td>
</tr>
<tr>
<td>Chemicals</td>
<td></td>
<td>261.3</td>
<td>135.6</td>
<td>26.6</td>
<td>23.5</td>
<td>37.8</td>
<td>6.5</td>
<td>40.5</td>
</tr>
<tr>
<td>Personal Care</td>
<td></td>
<td>644.3</td>
<td>317.8</td>
<td>16.1</td>
<td>13.5</td>
<td>9.6</td>
<td>8.0</td>
<td>36.0</td>
</tr>
<tr>
<td>Foreign Body</td>
<td></td>
<td>540.1</td>
<td>243.6</td>
<td>47.9</td>
<td>14.3</td>
<td>8.5</td>
<td>2.5</td>
<td>32.2</td>
</tr>
<tr>
<td>Alcohol</td>
<td></td>
<td>56.1</td>
<td>29.6</td>
<td>2.9</td>
<td>47.0</td>
<td>23.5</td>
<td>2.7</td>
<td>22.5</td>
</tr>
<tr>
<td>Food</td>
<td></td>
<td>103.1</td>
<td>53.4</td>
<td>15.5</td>
<td>14.2</td>
<td>19.5</td>
<td>6.4</td>
<td>20.3</td>
</tr>
<tr>
<td>Pesticides</td>
<td></td>
<td>146.3</td>
<td>85.4</td>
<td>14.6</td>
<td>16.9</td>
<td>16.1</td>
<td>4.7</td>
<td>20.3</td>
</tr>
<tr>
<td>Hydrocarbons</td>
<td></td>
<td>180.0</td>
<td>78.5</td>
<td>8.0</td>
<td>14.1</td>
<td>15.2</td>
<td>2.6</td>
<td>18.9</td>
</tr>
<tr>
<td>Bites &amp; Stings</td>
<td></td>
<td>32.4</td>
<td>31.6</td>
<td>22.5</td>
<td>8.7</td>
<td>10.8</td>
<td>4.3</td>
<td>12.2</td>
</tr>
<tr>
<td>Office &amp; Hobby</td>
<td></td>
<td>199.9</td>
<td>85.2</td>
<td>20.2</td>
<td>5.7</td>
<td>1.8</td>
<td>0.6</td>
<td>11.0</td>
</tr>
<tr>
<td>Fumes &amp; Gases</td>
<td></td>
<td>17.7</td>
<td>7.6</td>
<td>4.4</td>
<td>5.0</td>
<td>12.7</td>
<td>2.9</td>
<td>10.1</td>
</tr>
<tr>
<td>Street Drugs</td>
<td></td>
<td>7.9</td>
<td>1.9</td>
<td>0.8</td>
<td>19.5</td>
<td>6.5</td>
<td>0.2</td>
<td>6.4</td>
</tr>
<tr>
<td>Tobacco Products</td>
<td></td>
<td>141.0</td>
<td>7.5</td>
<td>0.1</td>
<td>0.3</td>
<td>0.3</td>
<td>0.2</td>
<td>3.4</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td>56.7</td>
<td>25.2</td>
<td>4.5</td>
<td>6.2</td>
<td>5.5</td>
<td>1.1</td>
<td>6.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>6321.1</td>
<td>3607.3</td>
<td>373.0</td>
<td>521.6</td>
<td>390.8</td>
<td>201.7</td>
<td>635.6</td>
</tr>
</tbody>
</table>

DPIC advice and service requests increased by 25.1 percent from 2000 to 2005 regarding street drugs; 20.2 percent for prescription medications; 9.0 percent for non-prescription medications; and 7.7 percent for chemicals. In contrast, calls regarding food
Poisoning in British Columbia

poisoning decreased by 58.3 percent; 36.6 percent for bites and stings; 36.1 percent for tobacco products; 30.8 percent for plants and mushrooms; and 24.4 percent for substances related to office and hobby. These trends varied by age (Table 4). In general, across all poisoning substances, the number of calls decreased for children aged 5 years and younger with the exception of drugs and cleaners, while calls increased for children aged 13 to 19 years for street drugs, alcohol, pesticide and chemicals. For seniors aged 65 years and older, the number of calls increased significantly for prescription and non-prescription medications, cleaners, alcohol, fumes and gases, and chemicals.

Table 4: DPIC advice and service requests by age group and substance in BC, 2005 as compared to 2000

<table>
<thead>
<tr>
<th>Substance</th>
<th>&lt; 2</th>
<th>2-5</th>
<th>6-12</th>
<th>13-19</th>
<th>20-64</th>
<th>65+</th>
<th>Unknown</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prescription Meds</td>
<td>15.7%</td>
<td>4.9%</td>
<td>50.4%</td>
<td>-4.9%</td>
<td>14.0%</td>
<td>159.4%</td>
<td>-27.6%</td>
<td>20.2%</td>
</tr>
<tr>
<td>Non Prescription Meds</td>
<td>16.1%</td>
<td>4.5%</td>
<td>-2.7%</td>
<td>-4.6%</td>
<td>15.3%</td>
<td>67.2%</td>
<td>-50.0%</td>
<td>9.0%</td>
</tr>
<tr>
<td>Street Drugs</td>
<td>125.0%</td>
<td>200.0%</td>
<td>0.0%</td>
<td>110.9%</td>
<td>-1.7%</td>
<td>*</td>
<td>0.0%</td>
<td>25.1%</td>
</tr>
<tr>
<td>Alcohol</td>
<td>-38.6%</td>
<td>-31.0%</td>
<td>-33.3%</td>
<td>31.6%</td>
<td>1.9%</td>
<td>72.7%</td>
<td>11.1%</td>
<td>2.2%</td>
</tr>
<tr>
<td>Hydrocarbons</td>
<td>-46.2%</td>
<td>-34.3%</td>
<td>-9.7%</td>
<td>0.0%</td>
<td>-1.0%</td>
<td>7.1%</td>
<td>0.0%</td>
<td>-18.1%</td>
</tr>
<tr>
<td>Fumes &amp; Gases</td>
<td>21.4%</td>
<td>-17.6%</td>
<td>-10.0%</td>
<td>-24.0%</td>
<td>4.7%</td>
<td>45.5%</td>
<td>0.0%</td>
<td>3.2%</td>
</tr>
<tr>
<td>Pesticides</td>
<td>-40.0%</td>
<td>-26.3%</td>
<td>-4.8%</td>
<td>139.0%</td>
<td>16.4%</td>
<td>-17.9%</td>
<td>25.0%</td>
<td>0.7%</td>
</tr>
<tr>
<td>Chemicals</td>
<td>-17.0%</td>
<td>-25.7%</td>
<td>8.0%</td>
<td>28.8%</td>
<td>21.4%</td>
<td>57.1%</td>
<td>-20.0%</td>
<td>7.7%</td>
</tr>
<tr>
<td>Tobacco Products</td>
<td>-37.4%</td>
<td>-42.9%</td>
<td>*</td>
<td>0.0%</td>
<td>-20.0%</td>
<td>-50.0%</td>
<td>*</td>
<td>-36.1%</td>
</tr>
<tr>
<td>Cleaners</td>
<td>13.3%</td>
<td>4.7%</td>
<td>-8.8%</td>
<td>2.2%</td>
<td>-5.3%</td>
<td>110.5%</td>
<td>133.3%</td>
<td>5.9%</td>
</tr>
<tr>
<td>Office &amp; Hobby</td>
<td>-12.3%</td>
<td>-20.3%</td>
<td>-47.8%</td>
<td>-45.2%</td>
<td>-33.3%</td>
<td>50.0%</td>
<td>-100.0%</td>
<td>-24.4%</td>
</tr>
<tr>
<td>Personal Care</td>
<td>-13.1%</td>
<td>-14.4%</td>
<td>-12.2%</td>
<td>-6.0%</td>
<td>32.4%</td>
<td>-5.4%</td>
<td>0.0%</td>
<td>-6.3%</td>
</tr>
<tr>
<td>Bites &amp; Stings</td>
<td>-45.9%</td>
<td>-44.1%</td>
<td>-31.8%</td>
<td>-40.9%</td>
<td>-36.5%</td>
<td>0.0%</td>
<td>-62.5%</td>
<td>-36.5%</td>
</tr>
<tr>
<td>Foreign Body</td>
<td>-2.1%</td>
<td>10.0%</td>
<td>15.3%</td>
<td>-16.7%</td>
<td>-17.8%</td>
<td>38.5%</td>
<td>-50.0%</td>
<td>6.5%</td>
</tr>
<tr>
<td>Plants &amp; Mushrooms</td>
<td>-44.1%</td>
<td>-23.2%</td>
<td>-30.7%</td>
<td>-3.2%</td>
<td>-12.8%</td>
<td>11.6%</td>
<td>0.0%</td>
<td>-30.8%</td>
</tr>
<tr>
<td>Food</td>
<td>-2.7%</td>
<td>-66.9%</td>
<td>-73.8%</td>
<td>-53.5%</td>
<td>-63.6%</td>
<td>-36.6%</td>
<td>-14.3%</td>
<td>-58.3%</td>
</tr>
<tr>
<td>Other</td>
<td>-19.2%</td>
<td>-18.0%</td>
<td>0.0%</td>
<td>-4.2%</td>
<td>35.4%</td>
<td>-50.0%</td>
<td>0.0%</td>
<td>6.9%</td>
</tr>
<tr>
<td>Total</td>
<td>-9.2%</td>
<td>-5.3%</td>
<td>-7.8%</td>
<td>1.7%</td>
<td>3.6%</td>
<td>88.0%</td>
<td>-17.6%</td>
<td>0.4%</td>
</tr>
</tbody>
</table>

* indicates fewer than 5 cases

DPIC advice and service requests resulted mainly from poisoning substances that were ingested unintentionally, with the exception of poisoning by drugs or alcohol.

Over 76 percent of requests concerned poisonings related to street drugs and 61.7 percent concerned alcohol-related poisonings. Approximately 40 percent of requests related to intentional prescription medication poisonings, while 15.3 percent related to non-prescription medications intentionally ingested. Approximately one-half of these intentional medication ingestions were suicides or suicide attempts, and over 30 percent were individuals seeking attention. More than half of food-related poisonings (53.3%) were classified as an adverse effect (allergic reaction) (Figure 3.5).
Poisoning Route

Ingestion was the most common poisoning route, particularly for children under the age of five years (90.7%), with intentional ingestions resulting in unintentional poisoning or adverse effect accounting for 95.9 percent. Other poisoning routes were far less common and included dermal (6.6%), inhalation (6.2%), ocular (5.4%) and bites and stings (1.5%) (Figure 3.6).
Figure 3.6: DPIC advice and service requests by poisoning route in BC, 2000 to 2005

- Ingestion: 79.6%
- Inhalation: 6.2%
- Dermal: 6.6%
- Ocular: 5.4%
- Bite-Sting: 1.5%
- Other: 0.7%

**Telephone Case Management of DPIC Poisoning Advice and Service Requests**

Telephone case management of DPIC poisoning advice and service requests depended on the substance and intent of poisoning (Figure 3.7). The majority of calls related to unintentional poisonings were managed on-site (87.6%), with the exception of street drugs, of which 51.1 percent were referred to a health care facility. Conversely, on average 72.5 percent of all calls for intentional poisonings were referred to a health care facility.
Regional Variation of DPIC Poisoning Advice and Service Requests

DPIC poisoning advice and service requests between 2000 and 2005 varied geographically in BC. The Fraser Health Authority accounted for 31.6 percent, followed by Vancouver Coastal (22.6%) and Vancouver Island Health Authorities (18.4%). Standardized by the annual total BC population for the years 2000 to 2005, the rate of requests was highest in the Vancouver Coastal Health Authority (883.1/100,000).
standard population), followed by the Northern Health Authority (770.2/100,000 standard population). The lowest rate was in the Vancouver Island Health Authority (490.5/100,000 standard population) (Table 5).

Table 5  DPIC Poisoning Advice and Service Requests by Health Authority in BC, 2000 to 2005

<table>
<thead>
<tr>
<th>Health Authority</th>
<th>Number</th>
<th>Rate</th>
<th>ASMR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interior</td>
<td>26,285</td>
<td>635.41</td>
<td>666.4</td>
</tr>
<tr>
<td>Fraser</td>
<td>49,884</td>
<td>585.89</td>
<td>547.8</td>
</tr>
<tr>
<td>Vancouver Island</td>
<td>29,097</td>
<td>469.78</td>
<td>490.5</td>
</tr>
<tr>
<td>Vancouver Coastal</td>
<td>35,633</td>
<td>841.10</td>
<td>883.1</td>
</tr>
<tr>
<td>Northern</td>
<td>15,275</td>
<td>863.73</td>
<td>770.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>157,947</td>
<td>635.61</td>
<td>629.0</td>
</tr>
</tbody>
</table>

Proportions of DPIC calls related to unintentional poisonings were highest in the Fraser (82.9%), Vancouver Island (82.8%) and Interior (82.1%) Health Authorities, while the Northern and Vancouver Coastal Health Authorities had relatively higher proportions for intentional poisonings (22.2% and 18.6% respectively) (Figure 3.8).

Figure 3.8: DPIC Poisoning Advice and Service Requests by intent and Health Authority in BC, 2000 to 2005

*Number of calls for Intentional Poisoning and Adverse Effect below the bar
DISCUSSION

Poisoning Overview

Young children under the age of 13 years experienced low rates of poisoning-related deaths and high rates of poisoning-related hospital separations. All were unintentional in nature. The majority of calls to poison control centres involved children less than five years of age but accounted for a minority of serious poisonings requiring emergency treatment. Children under the age of five explore the environment around them and frequently place objects in their mouths. The majority of child exposures involved cleaning substance, analgesics, cosmetics and personal care products, plants, and cough and cold substances. Factors related to childhood poisoning include a lack of childproof packaging of medications, inadequate manufacturer quality control leading to defective closures, misuse of childproof packaging in the home (leaving the cap off or unsecured, transferring the contents to regular packaging) and improper storage of household products. Rapid and effective treatment of poisoning by lay persons on the advice of poison control centers and healthcare personnel greatly reduces fatal outcomes.

Of all poisoning-related deaths among children and youth (13 - 19 years), 79 percent were unintentional; however a portion of these deaths would have involved the purposeful use of narcotics and psychodysleptics, as well as alcohol. Females experienced more self-poisonings than males, and more self-poisonings than any other age group. Calls to DPIC revealed that non-prescription medications were the most common poisoning substance for children 12 years of age and under, while prescription medications, non-prescription medications and alcohol were most common for those aged 13 years and older. Children and youth accounted for the highest rates of calls to DPIC for unintentional poisoning for both males and females.

There is growing concern regarding the abuse or non-medical use of prescription and non-prescription over-the-counter (OTC) drugs, particularly among adolescents and seniors who are the most vulnerable to drug abuse. Poisoning-related hospital separations among youth ages 13 to 19 years primarily involved non-opioid analgesics, antipyretics and antirheumatics; and antiepileptic, sedative-hypnotic, anti-Parkinsonism and psychotropic drugs. The most commonly abused prescription drugs are opioids, central nervous system depressants, and stimulants. Certain OTC medicines, including sleep aids, antihistamines and cough suppressants containing dextromethorphan can also be abused for their psychoactive effects.

Drugs may be administrated deliberately to cause harm, to ‘get high’, or for financial or sexual gains, and are often used to assist with suicide or attempted suicides, particularly among teenagers. Over one-half of poisoning-related deaths resulted from overdosing of narcotics and psychodysleptics (hallucinogens), while poisoning-related deaths decreased by 38.8 percent over a four year period (2000 to 2003). A supervised injection site located in the Vancouver Downtown Eastside may have contributed, at least in part, to this decline.
Drugs other than narcotics and psychodysleptics were the leading substances for suicide (52%). Nearly two-thirds of poisoning-related hospitalizations were due to self poisoning, the bulk of which were by drugs other than narcotics and psychodysleptics. Antiepileptic, sedative-hypnotic, anti-Parkinsonism and psychotropic drugs were the primary subclass of other drugs involved in self-poisoning hospitalization. Females accounted for 61 percent of all calls to DPIC for intentional poisoning, and prescription medications were the leading substance for all intentional poisoning calls. National surveys and published reports from the United States (US) indicate that abuse or non-medical use of drugs is particularly common among teenagers.14, 19 More young people aged 12 to 17 years abuse prescription drugs than any of the illicit drugs with the exception of marijuana – to a greater extent than cocaine, heroin, and methamphetamine combined. The prescription drugs most commonly abused by teens are prescription painkillers, depressants such as sleeping pills or anti-anxiety drugs, and stimulants mainly prescribed to treat attention-deficit hyperactivity disorder. Teens are also more likely to abuse some OTC cough and cold remedies to ‘get high’, which is especially troubling given the easy access to these products. The majority of those drugs are obtained free or inexpensively, usually from friends and relatives, often without their knowledge.14, 19

Adults 20 to 64 years of age accounted for 91 percent of all poisoning-related deaths and 73 percent of all poisoning-related hospitalizations. Poisoning-related deaths among adults were predominately unintentional (94%), and adults accounted for 81 percent of all self-poisoning deaths. Adult males had the highest hospitalization rates for self-poisoning.

Despite decreases in fatal poisonings during the period 2000 to 2003, narcotics and psychodysleptics remain the leading ingested substances leading to poisoning-related deaths, averaging more than 200 deaths per year in BC. Cocaine, heroin and other opioids were the most common illicit drugs involved in poisoning-related deaths. Narcotics and psychodysleptics were involved in only 11 percent of hospital separations while street drugs only accounted for 1.0 percent of all calls to DPIC. Prescription medications accounted for 22 percent of DPIC calls, a portion of which would be prescription narcotics.

Injection drug use is an issue for all Canadians, with an estimated 125,000 Canadians injecting cocaine, heroin, steroids and other substances.21 The relative risk of harm from drug use is highest for Canadians with a history of victimization, poverty, family dysfunction including alcohol and other drug problems among family members, low educational attainment, unemployment, and a lack of accessibility to appropriate and effective services. Most illicit drug users have experienced at least one non-fatal overdose and many have died from fatal overdoses.22

Cocaine and heroin use has decreased in Canada since 2001,23 while prescription opioid analgesics have become the predominant form of illicit drug use. Parallel to these changes, deaths from cocaine, heroin and other opioids have decreased, while deaths by methadone were stable during the same period. Researchers in the US found that methadone and other prescription opioid analgesics poisoning-related deaths account
for most of the increases in illicit drug deaths over the past decade.\textsuperscript{20, 24, 25} By 2002, opioid analgesics were more frequently involved in poisoning-related deaths over heroin and cocaine, attributed to its dramatic increase in availability.\textsuperscript{20, 25} Prescription opioid use by street-drug users may originate from the medical system, obtained either directly or indirectly from prescribers via friends or partners.\textsuperscript{22, 23} BC data are limited with respect to this issue.

Intentional drug abuse of prescribed and OTC medicines has increased steadily.\textsuperscript{14, 15} The US 2006 National Survey on Drug Use and Health demonstrated that 7.0 million (2.8\%) people aged 12 years or older used prescription psychotherapeutic drugs for non-medical reasons during the previous month. Of these, 5.2 million used pain relievers, 1.8 million used tranquilizers, and 1.2 million used stimulants (including 0.7 million using methamphetamines). Non-medical use of prescription drugs in the previous month among young adults aged 18 to 25 years increased from 5.4 percent in 2002 to 6.4 percent in 2006.\textsuperscript{14}

Alcohol poisoning accounted for only a small proportion of poisonings in this report, however it is a significant poisoning agent. Cases of reported alcohol poisonings may have been higher than reported if secondary causes or alcohol mixed with other substances had been included. Alcohol is a psychoactive substance causing the greatest harm in terms of health, legal, social and economic costs.\textsuperscript{26} According to the 2004 Canadian Addiction Survey, 79.3 percent of the Canadian population aged 15 years and older consumed alcohol, with 6.2 percent of drinkers engaged in heavy drinking at least once a week and 25.5 percent involved in heavy drinking at least once a month.\textsuperscript{27} Statistics showed that 17 percent of current drinkers were considered high-risk drinkers. Most heavy and hazardous drinkers were young males under the age of 25. It is also important to note that many prescription drugs or OTC medications can produce dangerous health effects when consumed with alcohol.\textsuperscript{17, 18} Alcohol has been implicated in 22 to 47 percent of combination drug-poisoning deaths\textsuperscript{25, 28} and was most commonly implicated as the secondary agent.\textsuperscript{29}

Many patients often take more than one drug at the same time.\textsuperscript{29} Research suggests that multiple drug use is involved in more than 50 percent of non-fatal overdoses\textsuperscript{30, 31} and drug poisoning deaths.\textsuperscript{28, 32} Drug combinations such as opiates, cocaine, and/or alcohol may account for a sizeable proportion of unintentional drug overdoses.\textsuperscript{28, 32} Concomitant use of other central nervous system depressants other than alcohol (e.g. benzodiazepines) appears to be a common practice among heroin users, potentially making a "normal" dose of heroin fatal.\textsuperscript{33-35}

Carbon monoxide (CO) is a considerable safety issue in North America,\textsuperscript{36} and resulted in 41 deaths each year in BC during the period 2000 to 2003, excluding fire-related CO poisoning. The majority of these deaths resulted from intentional inhalation, and most CO poisoning suicides are due to purposeful inhalation of motor vehicle exhaust.\textsuperscript{37} Research suggests that unintentional CO poisoning is often due to faulty oil and gas heating units and poor ventilation in buildings.\textsuperscript{37} Males and adults aged 65 years and older are more likely to die from unintentional CO poisoning than other individuals.\textsuperscript{38}
Of all poisoning-related deaths among seniors, 65 percent resulted from self-poisoning, while unintentional poisoning resulting in hospitalization was more common than self-poisoning among seniors for both males and females. Depression among seniors leading to self-poisoning may result from challenges associated with aging, including physical changes and declining health, bereavement and loneliness, and retirement.

Medication use is common among seniors because of deteriorating health associated with increased age and the accumulation of co-morbid conditions. An appropriate medication regimen is dependent on the physicians, pharmacists, and the consumer patients. Inappropriate medication use can result from inappropriate prescriptions, or from non-adherence to the medication regimen, and can lead to adverse drug reactions or poisoning.

From the prescriber/provider perspective, these professionals are responsible for providing information regarding the disease, consequences of neglecting medical intervention, and the benefits of complying with the prescribed regimen. Prescribing behaviour is depending on such contributing factors as: guidelines, off-label use, patient or family expectation, personal characteristics and advertising.

Not all patients comply with the medication regimen prescribed for them. Non-compliance can be either intentional or unintentional. Intentional non-compliance may be an attempt to avoid an adverse drug reaction, may be related to the cost of the medication, or may be passive resistance of the patient refusing to comply with the doctor’s orders. Unintentional non-compliance can result from forgetting to take a medication, or forgetting that the medication has already been taken thereby resulting in a second dose being taken. Confusion over the dose or the frequency of the medication regimen, as well as not understanding the clinical relevance and importance of each medication can also lead to unintentional non-compliance.

Chronic drug use is associated with the development of tolerance and physical dependency. With increasing tolerance, more of the drug is needed to get the same effect, leading to rampant dose escalation and abuse. Seniors are particularly vulnerable to drug overdose due to long-term drug use, as well as multiple prescriptions (polypharmacy). Seniors may also intentionally take medications that are not medically necessary.

**Implications for Poisoning Prevention in BC**

Findings from this report can inform poisoning prevention policy and practice in BC. Currently, a number of policies are in place supporting poisoning prevention, however to date there are few systematic evaluations of their effectiveness. It appears prudent to direct sufficient resources toward assessing the best public health practices and developing proven interventions to reduce both fatal and non-fatal poisoning in BC.

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Due to the complexity of poisonous substances, prevention efforts should target specific causes of poisoning according to the patterns among at-risk populations. It is evident that reducing poisonings requires systematic and comprehensive approaches, including education, engineering, enforcement and evaluation. Systematic attention to the availability of poisoning substances is an important component. Although intentional and unintentional poisoning prevention efforts have traditionally been independent and benefited from in-depth specialization, an integrated approach addressing all poisoning prevention, unintentional and intentional poisoning prevention, may be a more efficient use of resources and reduce duplication of effort.\(^45\)

Support of current poisoning prevention efforts are as follows.\(^E\)

<table>
<thead>
<tr>
<th>TOPIC</th>
<th>INTERVENTION</th>
<th>EFFECTIVENESS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Child-specific Strategies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child-resistant Packaging Legislation</td>
<td>Enforcement &amp; Engineering</td>
<td>Good Practice</td>
</tr>
<tr>
<td>Community-based Interventions</td>
<td>Education</td>
<td>Limited Evidence</td>
</tr>
<tr>
<td>Physician/Pharmacy-based Education</td>
<td>Education</td>
<td>Limited Evidence</td>
</tr>
<tr>
<td>Bittering Agents</td>
<td>Engineering</td>
<td>Limited Evidence</td>
</tr>
<tr>
<td>Drug Form</td>
<td>Engineering</td>
<td>Limited Evidence</td>
</tr>
<tr>
<td>Warning Labels (Mr. Yuk stickers)</td>
<td>Education</td>
<td>Negative Effects</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Other Prevention Strategies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poison Control Centres</td>
<td>Education</td>
<td>Promising Practice</td>
</tr>
<tr>
<td>Appropriate Medication Use</td>
<td>Education &amp; Engineering</td>
<td>Promising Practice</td>
</tr>
<tr>
<td>Restricting Sales of Acetaminophen (Paracetamol)</td>
<td>Enforcement</td>
<td>Promising Practice</td>
</tr>
<tr>
<td>Pesticide Exposure Prevention</td>
<td>Engineering</td>
<td>Limited Evidence</td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
<td><strong>Other Strategies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safe and Proper Storage</td>
<td>Education</td>
<td>Promising Practice</td>
</tr>
<tr>
<td>Substance Abuse Prevention Program</td>
<td>Education</td>
<td>Promising Practice</td>
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<tr>
<td>Development</td>
<td>Education</td>
<td>Promising Practice</td>
</tr>
<tr>
<td>Supervision</td>
<td>Education</td>
<td>Promising Practice</td>
</tr>
</tbody>
</table>

**Child-Resistant Packaging Legislation\(^46\)**

Child-resistant packaging is required for chemical products classified as toxic, very corrosive, corrosive and quick skin-bonding adhesive. Containers requiring a tool to open, such as paint or soup cans, are considered to be child-resistant by design. A person must not be able to gain access to the contents of the container without using a tool, and the tool must not be supplied with the container.\(^47\)

Supporting evidence indicates that child-resistant packaging and child resistant closures for medications reduce the incidence of poisonings. In BC, the College of Pharmacists has a by-law whereby all drugs are dispensed in a container that is certified as a child-resistant package unless stated otherwise.

\(^E\) Evidence regarding the following topics with the exception of Appropriate Medication Use can be found in: Evidence Review: Unintentional Injury Prevention. Core Public Health Functions for BC. Prepared by the BC Injury Research and Prevention Unit for Population Health and Wellness BC Ministry of Health, November 2007
Community-based Interventions

Community-based interventions aim to heighten awareness of poisonings, preventive measures, and appropriate courses of action in an emergency situation to a broad population in a community. There is currently limited evidence of effectiveness supporting community-based interventions to reduce childhood poisoning.

Physician/Pharmacy-based Education

Educational interventions, such as physician- or pharmacy-based, provide the opportunity to access parents and children and increase their awareness of poisonings, preventive measures, and what to do in an emergency situation. There is currently limited evidence of effectiveness supporting educational interventions. Studies do not demonstrate a significant degree of efficacy of educational interventions in decreasing the incidence of childhood poisoning.

Bittering Agents

Bittering agents are harmless additions to poisonous liquids in order to make the taste so foul and bitter that children and others would not continue to ingest the hazardous substance, such as anti-freeze and windshield washer fluid. There is currently limited evidence of effectiveness supporting bittering agents.

Drug Form

Drug form, the shape and character, has been studied to investigate its role in reducing poisoning. Making pills non-chewable and too large for young children to swallow may play a role in reducing poisonings. There is currently limited evidence of effectiveness supporting drug form in the reduction of childhood poisoning.

Warning Labels

Warning labels are colourful stickers (e.g. Mr. Yuk) placed on the containers of hazardous substances to warn and deter children from handling or ingesting the contents. Evidence of negative effects against the use of warning labels includes an increase in children’s handling of labelled medicine. Warning stickers are not a good deterrent for children and may in fact serve as an attraction. Warning stickers can not be recommended for use as a poisoning deterrent for children.

Poison Control Centres

Poison control centres provide expertise and advice, often on a 24-hour basis, to allow poisonings to be appropriately managed at home or triaged to a health care facility, as well as avoiding unnecessary visits to health care facilities or inappropriate or harmful home treatments. A number of published studies provide cost-benefit and cost-effectiveness analyses of poison control centres in the US. A Committee on Poison Prevention and Control report suggests that when these studies are reviewed as a whole they provide convincing evidence that poison control centres save the health care
system economic resources in the form of public time, lost wages, and anxiety by providing treatment management and guidance for the public.⁴⁸

Evidence supporting poison control centres as a promising practice includes studies using cost-benefit analysis, demonstrating significant medical savings. Informing the public of the availability and use of poison control centres is a crucial component for effectiveness.

Beyond access by the public, the BC Drug and Poison Information Centre (DPIC)⁴ also provides drug information services to health professionals and compiles reports regarding adverse drug reactions (see Appendix C for a full description of DPIC). DPIC has proven effective in managing poison exposures and avoiding medical costs which otherwise would have been incurred. Providing effective management of poisoning-related emergencies at home, the number of 911 calls has been reduced, and undue ambulance dispatches and hospital visits have been avoided. However, it is unclear whether this service could benefit more British Columbians as there is no clear understanding of who is aware of this service. DPIC provides a necessary and valuable service in BC, but cannot fulfill the need for all poisoning prevention alone. Collaboration with other injury prevention and health-related agencies to develop, disseminate and evaluate intervention activities is required.

Appropriate Medication Use

Appropriate medication use, particularly among older adults, is a crucial element in the reduction of poisonings or adverse drug reactions leading to hospitalization or death. The two levels for prevention of inappropriate medication use lie with the prescriber/provider and the consumer. Multiple prescribing physicians and multiply pharmacies involved in dispensing the medications increase the risk of potentially inappropriate drug use. Optimally, a gatekeeper would be available to monitor each patient, responsible for supervising the overall appropriateness of the complete medical regimen.

Several interventions to increase medication compliance have been studied, including:⁴⁹

- Cues and organizers
- Self-medication programs
- Decreasing dosing frequency
- Counselling and education

Cues and organizers consist of reminders to either take or refill medications, and can involve printed materials, telephone/videophone daily reminders, pre-poured pill boxes and voice-activated automated medication dispensers.

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⁴ http://www.bccdc.org/content.php?item=14#3 (November 28, 2008)
Self-medication programs are delivered prior to hospital discharge, placing the responsibility for medication compliance with the patient while still under medical supervision.

Studies of dosing frequencies reduced to once a day, rather than two to three times a day, have demonstrated increased compliance in relation to the simpler regimen.

Counselling and education interventions are the most common, detailing the importance of compliance to drug regimens and the specific patient’s regimen – what is being taken, how much, how often and why. These interventions are rarely stand-alone, but often include cues and organizers, increase communication and contact with medical professionals, and self-monitoring.

Restricting Sales of Acetaminophen (Paracetamol)\textsuperscript{46}

Acetaminophen poisoning, also known as paracetamol poisoning in the United Kingdom (UK), has been linked to the availability of this drug. Regulations introduced in 1998 in the UK restricted sales of acetaminophen to reduce poisoning. Evidence supports these restricted sales of acetaminophen as a promising practice.

Pesticide Exposure Prevention\textsuperscript{46}

Techniques to increase pesticide safety are designed to isolate the chemical from a worker through training in personal protective equipment, decreasing spillage, or removing workers before exposure reaches dangerous levels.\textsuperscript{50} There is currently limited evidence of effectiveness supporting pesticide safety. Several studies have tested various techniques for reducing exposure on small numbers of subjects under carefully controlled conditions. The ultimate intervention would be to terminate the use of many toxic pesticides commonly used or to substitute toxic pesticides with harmless products.

Primary Research on Other Poisoning Prevention Strategies\textsuperscript{46}

Safe and Proper Storage: A container study, collecting poison information in BC over a 12-month period in 2001, collected cases of unintentional ingestion of a chemical product from a household or commercial food or beverage containers. Adults were the most frequent victims of this cause of poisonings, which can result in serious morbidity or death. The most common chemicals ingested were bleach, detergents, petroleum dist illates and corrosive cleaners. Active techniques include proper storage of chemicals and medicines, keeping products in the original containers and other behavioural modifications. Identification of behaviours that promote safety is crucial in the prevention of unintentional poisonings.\textsuperscript{51}

Substance Abuse Prevention Program Development: Prevention is most effective when it focuses on reducing risk and/or strengthening protection in young lives. Programs that focus on developing life skills, that have intensive participation and that are interactive are more effective in reducing substance use and have produced stronger and longer lasting positive effects on substance use.
Supervision: Supervision within the home environment is considered an essential aspect to injury prevention among young children. Parental supervision is influenced by both parental and child attributes, such as child temperament and parent personality characteristics.

Interpretation of the Evidence and Considerations
Child restraint packages have shown to be an effective intervention in reducing unintentional childhood poisonings. Legislation that requires child restraint closures on poisons should be supported at all levels, as well as advocating for effective enforcement of enacted legislation. Legislation is known to be better accepted by the public when associated with education. Health authorities can play a key role in supporting and delivering associated education as part of their public health initiatives.

Studies of poison control centres show they have the potential to reduce medical costs associated with poisonings. It is important that the public is aware of the services provided by poison control centres and health authorities can play an important role in educating the public about the services offered by DPIC and how to access them.

Appropriate medication use, especially among the vulnerable senior population, is a growing concern. Health authorities can play a supportive role in the provision and training of gatekeepers responsible for overseeing and monitoring the appropriateness of each patient’s drug regimen, as well as supporting initiatives aimed at increasing patient compliance.

Health authorities can support initiatives that aim to reduce exposure to toxic pesticides and the encouraged use of harmless products. Furthermore, the importance of safe and proper storage of household chemicals can be translated to the public through public health nurses and physicians.

Finally, regarding the prevalence of drug abuse, health authorities can support the ongoing need for drug and alcohol abuse prevention programs that require intensive participation and interaction, and focus on the development of life skills.

Resources
Poisoning resources are readily available in BC, both for emergency situations and for poisoning and prevention information.

In Case of Emergency
- 911 Emergency Contact
- BC Poison Control Centre
  Greater Vancouver: 604 682-5050
  Phone toll-free: 1-800-567-8911
  Website: www.dpic.org
For Poisoning and Prevention Information

- BC Poison Control Centre
  Greater Vancouver: 604 682-5050
  Phone toll-free: 1-800-567-8911
  Website: www.dpic.org

- BC NurseLine
  Phone toll-free in BC: 1-866-215-4700
  Greater Vancouver: 604-215-4700
  Deaf and hearing impaired toll-free province-wide: 1-866-TTY-4700
  Website: www.bchealthguide.org/nurseline.stm

- Public Health Units/Community Health Centres
  Offer a wide range of services to promote the optimal physical development, communication and cognitive abilities, healthy emotional attachment, and positive social development for all infants and children. Services include: breastfeeding clinics, nutrition information and consultation, parent and infant drop-in, child health clinics, and family and infant follow-up. Contact your local health authority for more information.

- Baby’s Best Chance & Toddler’s First Steps
  Baby’s Best Chance Parents’ Handbook of Pregnancy and Baby Care, the Sixth Edition (2005), and Toddler’s First Steps, the Second Edition (2008) are published by the Government of British Columbia. Baby’s Best Chance covers ages 0 to 6 months and offers general safety tips. Toddler’s First Steps covers ages 6 to 36 months and include poison prevention and treatment information. Both of these resources are available from public health offices or via the BC Ministry of Health website: http://www.health.gov.bc.ca (select Reports and Publications)

- Canadian Poisonous Plants Information System
  Poisonous plants by botanical and common names; includes an interactive search tool.
  Website: www.cbif.gc.ca/pls/pp/poison

For Poison Prevention Materials & Factsheets

- BC Drug and Poisoning Information Centre (DPIC):
  - Phone Stickers: Lower Mainland, Toll Free (outside lower mainland)
  - Fridge Magnets: Lower Mainland and Toll Free
  - Posters: “Kids and Pills”, “Medicine Cabinet”, “Thirsty?”
  - Pamphlets: “Poison Awareness” (includes First Aid for Poisoning):
    English, Chinese, French, Korean, Persian, Punjabi, Spanish, Vietnamese; “Plant Awareness”: English only
  - Factsheets: “Poisonings”, “Springtime Hazards”, “Holiday Hazards”
• Health Canada
  ○ Consumer Product Safety
    ▪ Reports & Publications; Reports & Publications for Industry & Health Professionals: Stay Safe - An Education Guide to Hazard Symbols
    ▪ Reports & Publications; Publications for Consumer Education: Aim for Safety – Target the Label (Factsheet)
  Phone: 1-866-662-0666
  Website: [www.hc-sc.gc.ca/cps-spc](http://www.hc-sc.gc.ca/cps-spc)

Aboriginal Resources
Poisoning resources specific to aboriginal communities include:
• Health Canada; First Nations, Inuit and Aboriginal; Health Promotion; Keeping Safe-Injury Prevention: Preventing Unintentional Poisoning
  Includes poisoning prevention information as well as links to other resources.
  Website: [www.hc-sc.gc.ca](http://www.hc-sc.gc.ca)

Resources in Need of Updating
BC HealthGuide
• In the “Poisoning Prevention” section it currently states:
  “… discard old medicines by flushing them down the toilet.”
  This should be replaced by:
  “… unused and expired prescription and over-the-counter medications, herbal supplements, mineral supplements, vitamin supplements and throat lozenges should be returned to participating pharmacies for environmentally safe disposal.”

  The BC Pharmacy Association offers a province-wide waste disposal program that encourages consumers to take unused medications back to pharmacies across the province for environmentally safe disposal. The program is sponsored through a partnership among the BC Pharmacy Association, the Pharmaceutical Manufacturers Association of Canada, the Canadian Drug Manufacturers Association and the Nonprescription Drug Manufacturers Association of Canada. Canadian pharmacies participation in this return program can be found at [www.medicationsreturn.ca](http://www.medicationsreturn.ca).

• In the “Preventing Poisoning in Young Children” section is currently states:
  “Use “Mr. Yuk” stickers and teach your children to recognize them.”
  This should be replaced by:
  “You can start to teach your toddler that warning symbols mean “Danger! Do not touch.” However do not expect your toddler to understand or remember. Keep all poisons locked up and out of reach” (Toddlers First Steps, 2008)
As noted in the Best Practices section, negative effects have been found regarding the use of warning labels – colourful stickers (e.g. Mr. Yuk) placed on the containers of hazardous substances to warn and deter children from handling or ingesting the contents. Warning stickers are not a good deterrent for children and may in fact serve as an attraction. Warning stickers can not be recommended for use as a poisoning deterrent for children.

- In the “Preventing Poisoning in Young Children” section is currently states:
  “ASA (Aspirin) is a common source of childhood poisoning, especially flavoured “baby” ASA.”

  This should be replaced by:
  “ASA (Aspirin) is a common source of childhood poisoning.”

  Flavoured “baby” aspirin is no longer available.

- In the “Preventing Poisoning in Young Children” section is currently states:
  “… discard old medicines by flushing them down the toilet.”

  This should be replaced by:
  “… unused and expired prescription and over-the-counter medications, herbal supplements, mineral supplements, vitamin supplements and throat lozenges should be returned to participating pharmacies for environmentally safe disposal.”

  The BC Pharmacy Association offers a province-wide waste disposal program that encourages consumers to take unused medications back to pharmacies across the province for environmentally safe disposal. The program is sponsored through a partnership among the BC Pharmacy Association, the Pharmaceutical Manufacturers Association of Canada, the Canadian Drug Manufacturers Association and the Nonprescription Drug Manufacturers Association of Canada. Canadian pharmacies participation in this return program can be found at www.medicationsreturn.ca.

Conclusion
The annual rate of deaths and hospitalizations resulting from poisoning decreased and the numbers of calls for poisoning advice were relative stable in BC during the study period. Drugs and medicinal agents are the predominant substance involved in poisoning in BC, however the class of the substance and the populations at risk vary greatly by the intent and lethality of the poisoning event.

Comprehensive approaches targeted to specific causes of poisonings should be developed to reduce both fatal and non-fatal poisonings.

Regarding prevention from the perspective of the three ‘E’s – poisoning prevention strategies need to focus on all three of Engineering, Enforcement and Education. Evidence demonstrates that Education alone is not sufficient to safeguard the public.
from poisoning, however used in conjunction with other strategies, best and promising practices are emerging.

Poisoning prevention education initiatives need to consider the multicultural mosaic in BC in order to meet the diverse needs within these unique groups.

There is a lack of poison prevention initiatives targeting youth and adults when compared to those targeting children.

Awareness of poison prevention resources among youth and adults need to be raised in order to lower morbidity and mortality rates due to unintentional poisoning.

Data used in this report are from four different sources, and notably lack poisoning cases treated in emergency departments. Information related to the circumstances of poisoning events, victims’ socio-demographics, and the pattern of substance use is not available from the currently available data. The ability to make more specific prevention recommendations is therefore limited.

There is no surveillance system within BC to systematically and continually collect and analyze poisoning data. Building such a surveillance system would provide detailed profiles, patterns and trends of poisonings, which would inform targeted prevention initiatives. A well-developed surveillance system includes key indicators which serve to monitor and evaluate the issue and the success of intervention initiatives, allowing for constant improvement in prevention efforts.

A systematic surveillance system needs to be developed to inform targeted prevention strategies and initiatives, benefiting public health practitioners, decision makers and persons at risk.

A new BC Health Act will make poisoning a mandatory reportable event; however regulations around this process have not been finalized. It is suggested that these reports be directed to DPIC, with an agreement with the BC Injury Research and Prevention Unit (BCIRPU) to provide analytical support. BCIRPU is the Provincial Health Services Authority (PHSA) agency responsible for monitoring the trends and patterns of injury in BC, and should have regular access to these data.

Mandatory poisoning reports should be directed to the BC Drug and Poison Information Centre, with analytical support provided by the BC Injury Research and Prevention Unit.
References


51. Kent D. BC Drug and Poison Information Centre. Personal communication 2005

Appendix A

WHO ICD-10
WHO ICD-10 external codes related to poisonings

Accidental poisoning by and exposure to noxious substances (X40–X49)
X40 Accidental poisoning by and exposure to nonopioid analgesics, antipyretics and antirheumatics
X41 Accidental poisoning by and exposure to antiepileptic, sedative-hypnotic, antiparkinsonism and psychotropic drugs, not elsewhere classified
X42 Accidental poisoning by and exposure to narcotics and psychodysleptics [hallucinogens], not elsewhere classified
X43 Accidental poisoning by and exposure to other drugs acting on the autonomic nervous system
X44 Accidental poisoning by and exposure to other and unspecified drugs, medicaments and biological substances
X45 Accidental poisoning by and exposure to alcohol
X46 Accidental poisoning by and exposure to organic solvents and halogenated hydrocarbons and their vapours
X47 Accidental poisoning by and exposure to other gases and vapours
X48 Accidental poisoning by and exposure to pesticides
X49 Accidental poisoning by and exposure to other and unspecified chemicals and noxious substances

Intentional self-harm (X60–X84)
X60 Intentional self-poisoning by and exposure to nonopioid analgesics, antipyretics and antirheumatics
X61 Intentional self-poisoning by and exposure to antiepileptic, sedative-hypnotic, antiparkinsonism and psychotropic drugs, not elsewhere classified
X62 Intentional self-poisoning by and exposure to narcotics and psychodysleptics [hallucinogens], not elsewhere classified
X63 Intentional self-poisoning by and exposure to other drugs acting on the autonomic nervous system
X64 Intentional self-poisoning by and exposure to other and unspecified drugs, medicaments and biological substances
X65 Intentional self-poisoning by and exposure to alcohol
X66 Intentional self-poisoning by and exposure to organic solvents and halogenated hydrocarbons and their vapours
X67 Intentional self-poisoning by and exposure to other gases and vapours
X68 Intentional self-poisoning by and exposure to pesticides
X69 Intentional self-poisoning by and exposure to other and unspecified chemicals and noxious substances
X83 Intentional self-harm by other specified means
X84 Intentional self-harm by unspecified means

Assault (X85–Y09)
X85 Assault by drugs, medicaments and biological substances
X86 Assault by corrosive substance
X87 Assault by pesticides
X88 Assault by gases and vapours
X89 Assault by other specified chemicals and noxious substances
X90 Assault by unspecified chemical or noxious substance

Event of undetermined intent (Y10–Y34)

Y10 Poisoning by and exposure to nonopioid analgesics, antipyretics and antirheumatics, undetermined intent
Y11 Poisoning by and exposure to antiepileptic, sedative-hypnotic, antiparkinsonism and psychotropic drugs, not elsewhere classified, undetermined intent
Y12 Poisoning by and exposure to narcotics and psychodysleptics [hallucinogens], not elsewhere classified, undetermined intent
Y13 Poisoning by and exposure to other drugs acting on the autonomic nervous system, undetermined intent
Y14 Poisoning by and exposure to other and unspecified drugs, medicaments and biological substances, undetermined intent
Y15 Poisoning by and exposure to alcohol, undetermined intent
Y16 Poisoning by and exposure to organic solvents and halogenated hydrocarbons and their vapours, undetermined intent
Y17 Poisoning by and exposure to other gases and vapours, undetermined intent
Y18 Poisoning by and exposure to pesticides, undetermined intent
Y19 Poisoning by and exposure to other and unspecified chemicals and noxious substances, undetermined intent

WHO ICD-10 codes related to substance of poisoning

(T36-T50) Poisoning by drugs, medicaments and biological substances

T36 Poisoning by systemic antibiotics
T36.0 Penicillins
T36.1 Cefalosporins and other ß-lactam antibiotics
T36.2 Chloramphenicol group
T36.3 Macrolides
T36.4 Tetracyclines
T36.5 Aminoglycosides
T36.6 Rifamycins
T36.7 Antifungal antibiotics, systemically used
T36.8 Other systemic antibiotics
T36.9 Systemic antibiotic, unspecified

T37 Poisoning by other systemic anti-infectives and antiparasitics
T37.0 Sulphonamides
T37.1 Antimycobacterial drugs
T37.2 Antimalarials and drugs acting on other blood protozoa
T37.3 Other antiprotozoal drugs
T37.4 Anthelminthics
T37.5 Antiviral drugs
T37.8 Other specified systemic anti-infectives and antiparasitics
T37.9 Systemic anti-infective and antiparastic, unspecified

T38 Poisoning by hormones and their synthetic substitutes and antagonists, not elsewhere classified
T38.0 Glucocorticoids and synthetic analogues
T38.1 Thyroid hormones and substitutes
T38.2 Antithyroid drugs
T38.3 Insulin and oral hypoglycaemic [antidiabetic] drugs
T38.4 Oral contraceptives

T38.5 Other oestrogens and progestogens
T38.6 Antigonadotrophins, antioestrogens, antiandrogens, not elsewhere classified
T38.7 Androgens and anabolic congeners
T38.8 Other and unspecified hormones and their synthetic substitutes
T38.9 Other and unspecified hormone antagonists

T39 Poisoning by nonopioid analgesics, antipyretics and antirheumatics
T39.0 Salicylates
T39.1 4-Aminophenol derivatives
T39.2 Pyrazolone derivatives
T39.3 Other nonsteroidal anti-inflammatory drugs [NSAID]
T39.4 Antirheumatics, not elsewhere classified
T39.8 Other nonopioid analgesics and antipyretics, not elsewhere classified
T39.9 Nonopioid analgesic, antipyretic and antirheumatic, unspecified

T40 Poisoning by narcotics and psychodysleptics [hallucinogens]
T40.0 Opium
T40.1 Heroin
T40.2 Other opioids
T40.3 Methadone
T40.4 Other synthetic narcotics
T40.5 Cocaine
T40.6 Other and unspecified narcotics
T40.7 Cannabis (derivatives)
T40.8 Lysergide [LSD]
T40.9 Other and unspecified psychodysleptics [hallucinogens]

T41 Poisoning by anaesthetics and therapeutic gases
T41.0 Inhaled anaesthetics
T41.1 Intravenous anaesthetics
T41.2 Other and unspecified general anaesthetics
T41.3 Local anaesthetics
T41.4 Anaesthetic, unspecified
T41.5 Therapeutic gases

T42 Poisoning by antiepileptic, sedative-hypnotic and anti-Parkinsonism drugs
T42.0 Hydantoin derivatives
T42.1 Iminostilbenes
T42.2 Succinimides and oxazolidinediones
T42.3 Barbiturates
T42.4 Benzodiazepines
T42.5 Mixed antiepileptics, not elsewhere classified
T42.6 Other antiepileptic and sedative-hypnotic drugs
T42.7 Antiepileptic and sedative-hypnotic drugs, unspecified
T42.8 Anti-Parkinsonism drugs and other central muscle-tone depressants

T43 Poisoning by psychotropic drugs, not elsewhere classified
T43.0 Tricyclic and tetracyclic antidepressants
T43.1 Monoamine-oxidase-inhibitor antidepressants
T43.2 Other and unspecified antidepressants
T43.3 Phenothiazine antipsychotics and neuroleptics
T43.4 Butyrophenone and thioxanthene neuroleptics
T43.5 Other and unspecified antipsychotics and neuroleptics
T43.6 Psychostimulants with abuse potential
T43.8 Other psychotropic drugs, not elsewhere classified
T43.9 Psychotropic drug, unspecified

T44 Poisoning by drugs primarily affecting the autonomic nervous system
T44.0 Anticholinesterase agents
T44.1 Other parasympathomimetics [cholinergics]
T44.2 Ganglionic blocking drugs, not elsewhere classified
T44.3 Other parasympatholytics [anticholinergics and antimuscarines] and spasmolytics, not elsewhere classified
T44.4 Predominantly @-adrenoreceptor agonists, not elsewhere classified
T44.5 Predominantly ß-adrenoreceptor agonists, not elsewhere classified
T44.6 @-Adrenoreceptor antagonists, not elsewhere classified
T44.7 ß-Adrenoreceptor antagonists, not elsewhere classified
T44.8 Centrally acting and afrenergic-neuron-blocking agents, not elsewhere classified
T44.9 Other and unspecified drugs primarily affecting the nervous system

T45 Poisoning by primarily systemic and haematological agents, not elsewhere classified
T45.0 Antiallergic and antiemetic drugs
T45.1 Antineoplastic and immunosuppressive drugs
T45.2 Vitamins, not elsewhere classified
T45.3 Enzymes, not elsewhere classified
T45.4 Iron and its compounds
T45.5 Anticoagulants
T45.6 Fibrinolysis-affecting drugs
T45.7 Anticoagulant antagonists, vitamin K and other coagulants
T45.8 Other primarily systemic and haematological agents
T45.9 Primarily systemic and haematological agent, unspecified

T46 Poisoning by agents primarily affecting the cardiovascular system
T46.0 Cardiac-stimulant glycosides and drugs of similar action
T46.1 Calcium-channel blockers
T46.2 Other antidysrhythmic drugs, not elsewhere classified
T46.3 Coronary vasodilators, not elsewhere classified
T46.4 Angiotensin-converting-enzyme inhibitors
T46.5 Other antihypertensive drugs, not elsewhere classified
T46.6 Antihyperlipidaemic and antiarteriosclerotic drugs
T46.7 Peripheral vasodilators
T46.8 Antivaricose drugs, including sclerosing agents
T46.9 Other and unspecified agents primarily affecting the cardiovascular system

T47 Poisoning by agents primarily affecting gastro-intestinal system
T47.0 Histamine H(2)-receptor antagonists
T47.1 Other antacids and anti-gastric-secretion drugs
T47.2 Stimulant laxatives
T47.3 Saline and osmotic laxatives
T47.4 Other laxatives
T47.5 Digestants
T47.6 Antidiarrhoeal drugs
T47.7 Emetics
T47.8 Other agents primarily affecting the gastro-intestinal system
T47.9 Agent primarily affecting the gastro-intestinal system, unspecified

T48 Poisoning by agents primarily acting on smooth and skeletal muscles and the respiratory system
T48.0 Oxytocic drugs
T48.1 Skeletal muscle relaxants [neuromuscular blocking agents]
T48.2 Other and unspecified agents primarily acting on muscles
T48.3 Antitussives
T48.4 Expectorants
T48.5 Anti-common-cold drugs
T48.6 Antiasthmatics, not elsewhere classified
T48.7 Other and unspecified agents primarily acting on the respiratory system

T49 Poisoning by topical agents primarily affecting skin and mucous membrane and by ophthalmological, otorhinolaryngological and dental drugs

T49.0 Local antifungal, anti-infective and anti-inflammatory drugs, not elsewhere classified
T49.1 Antipruritics
T49.2 Local astringents and local detergents
T49.3 Emollients, demulcents and protectants
T49.4 Keratolytics, keratoplastics and other hair treatment drugs and preparations
T49.5 Ophthalmological drugs and preparations
T49.6 Otorhinolaryngological drugs and preparations
T49.7 Dental drugs, topically applied
T49.8 Other topical agents
T49.9 Topical agent, unspecified

T50 Poisoning by diuretics and other and unspecified drugs, medicaments and biological substances

T50.0 Mineralocorticoids and their antagonists
T50.1 Loop [high-ceiling] diuretics
T50.2 Carbonic-anhydrase inhibitors, benzothiadiazides and other diuretics
T50.3 Electrolytic, caloric and water-balance agents
T50.4 Drugs affecting uric acid metabolism
T50.5 Appetite depressants
T50.6 Antidotes and chelating agents, not elsewhere classified
T50.7 Analeptics and opioid receptor antagonists
T50.8 Diagnostic agents
T50.9 Other and unspecified drugs, medicaments and biological substances

(T51-T65) Toxic effects of substances chiefly nonmedicinal as to source

T51 Toxic effect of alcohol

T51.0 Ethanol
T51.1 Methanol
T51.2 2-Propanol
T51.3 Fusel oil
T51.8 Other alcohols
T51.9 Alcohol, unspecified

T52 Toxic effect of organic solvents

T52.0 Petroleum products
T52.1 Benzene
T52.2 Homologues of benzene
T52.3 Glycols
T52.4 Ketones
T52.8 Other organic solvents
T52.9 Organic solvent, unspecified

T53 Toxic effect of halogen derivatives of aliphatic and aromatic hydrocarbons

T53.0 Carbon tetrachloride
T53.1 Chloroform
T53.2 Trichloroethylene
T53.3 Tetrachloroethylene
T53.4 Dichloromethane
T53.5 Chlorofluorocarbons
T53.6 Other halogen derivatives of aliphatic hydrocarbons
T53.7 Other halogen derivatives of aromatic hydrocarbons
T53.9 Halogen derivative of aliphatic and aromatic hydrocarbons, unspecified

T54 Toxic effect of corrosive substances

T54.0 Phenol and phenol homologues
T54.1 Other corrosive organic compounds
T54.2 Corrosive acids and acid-like substances
T54.3 Corrosive alkalis and alkali-like substances
T54.9 Corrosive substance, unspecified

T55 Toxic effect of soaps and detergents

T56 Toxic effect of metals
T56.0 Lead and its compounds
T56.1 Mercury and its compounds
T56.2 Chromium and its compounds
T56.3 Cadmium and its compounds
T56.4 Copper and its compounds
T56.5 Zinc and its compounds
T56.6 Tin and its compounds
T56.7 Beryllium and its compounds
T56.8 Other metals
T56.9 Metal, unspecified

T57 Toxic effect of other inorganic substances
T57.0 Arsenic and its compounds
T57.1 Phosphorus and its compounds
T57.2 Manganese and its compounds
T57.3 Hydrogen cyanide
T57.8 Other specified inorganic substances
T57.9 Inorganic substance, unspecified

T58 Toxic effect of carbon monoxide

T59 Toxic effect of other gases, fumes and vapours
T59.0 Nitrogen oxides
T59.1 Sulphur dioxide
T59.2 Formaldehyde
T59.3 Lachrymogenic gas
T59.4 Chlorine gas
T59.5 Fluorine gas and hydrogen fluoride
T59.6 Hydrogen sulphide
T59.7 Carbon dioxide
T59.8 Other specified gases, fumes and vapours
T59.9 Gases, fumes and vapours, unspecified

T60 Toxic effect of pesticides
T60.0 Organophosphate and carbamate insecticides
T60.1 Halogenated insecticides
T60.2 Other insecticides
T60.3 Herbicides and fungicides
T60.4 Rodenticides
T60.8 Other pesticides
T60.9 Pesticide, unspecified

T61 Toxic effect of noxious substances eaten as seafood
T61.0 Ciguatera fish poisoning
T61.1 Scombroid fish poisoning
T61.2 Other fish and shellfish poisoning
T61.8 Toxic effect of other seafoods
T61.9 Toxic effect of unspecified seafood

T62 Toxic effect of other noxious substances eaten as food
T62.0 Ingested mushrooms
T62.1 Ingested berries
T62.2 Other ingested (parts of) plant(s)
T62.8 Other specified noxious substances eaten as food
T62.9 Noxious substance eaten as food, unspecified

**T63 Toxic effect of contact with venomous animals**
- T63.0 Snake venom
- T63.1 Venom of other reptiles
- T63.2 Venom of scorpion
- T63.3 Venom of spider
- T63.4 Venom of other arthropods
- T63.5 Toxic effect of contact with fish
- T63.6 Toxic effect of contact with other marine animals
- T63.8 Toxic effect of contact with other venomous animals
- T63.9 Toxic effect of contact with unspecified venomous animal

**T64 Toxic effect of aflatoxin and other mycotoxin food contaminants**

**T65 Toxic effect of other and unspecified substances**
- T65.0 Cyanides
- T65.1 Strychnine and its salts
- T65.2 Tobacco and nicotine
- T65.3 Nitroderivatives and aminoderivatives of benzene and its homologues
- T65.4 Carbon disulphide
- T65.5 Nitroglycerin and other nitric acids and esters
- T65.6 Paints and dyes, not elsewhere classified
- T65.8 Toxic effect of other specified substances
- T65.9 Toxic effect of unspecified substance
Appendix B

BC Ambulance Service for Poisoning
BC Ambulance Service for Poisoning

The events reported by the BCAS for attending poisoning ingestion or overdose cases increased from 10,545 events in 2003-04 to 13,460 in 2005-06, representing an over-all increase of 21.6 percent over the three year period.

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<td>76</td>
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<td>OD Not Alert</td>
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<td>OD Unconscious</td>
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Appendix C

BC Drug and Poison Information Centre (DPIC)
The purpose and mandate of DPIC are:

- To develop and implement centralized services to assist health professionals in providing optimal levels of drug therapy and poison management in the province.
- To provide poison information request services to the public.

Poison information services provided by DPIC include:

- Information available to health care professionals throughout BC 24 hours/day, 365 days/year
- 24 hour toll-free poison information is available for the public by calling 682-5050 (Lower Mainland) or 1-800-567-8911 in remainder of BC
- Poison Management Manual (PMM) and treatment protocols for managing the poisoned patients are made available to all Emergency departments in the province. The PMM is used extensively across Canada
- Poison Perspectives Newsletter is produced quarterly and distributed to health care professionals in acute care hospitals and public health units

Poison statistics are provided by DPIC as the Drug Information Reference (DIR), including 500 monographs on frequently used drugs and featuring several advantages over similar publications. The DIR is widely used in both acute care and long term care facilities in BC and across Canada, with electronic versions installed in hospital and community pharmacies and medical office environments across Canada.

Drug information services provided by DPIC include:

- A telephone Drug Information consultation service available via toll-free access to health professionals from 0900-1600 hours weekdays. Pharmacists skilled in information retrieval and evaluation aid pharmacists, physicians and nurses throughout BC in identifying and solving patient-specific drug-related problems.
- Medication safety issues such as drug interactions, drug use in pregnancy and lactation, appropriate dosing, and side effects to both conventional and alternative therapies are frequent queries.
- Drug Information Perspectives, a quarterly newsletter is sent to all subscribers of the DIR and used to update and add to information presently in the DIR as well as focusing attention on new items in drug therapy such as interactions and adverse effects.
- From the Drug Desk, a newsletter distributed to pharmacists throughout BC pertaining to local issues in drug therapy.
- Master Drug List, a list of commonly used drugs in Canada identified by a unique classification system which is used to provide automatic alerts on drug allergies and interactions as well as serving as the basis for developing formulary, drug inventory control and drug use review programs.

http://www.bccdc.org/content.php?item=14#3 (November 28, 2008)
Poison prevention initiatives undertaken by DPIC include:

- Poison Prevention Week, an annual poison prevention campaign sponsored by DPIC and various professional agencies in conjunction with other North American Poison Control Centres.
- Educational materials for the public and health care professionals, including posters, pamphlets, telephone stickers, videos and lecture materials on poison prevention and first aid for poisoning.
- Speakers bureau for talks to health professionals, parents, child care supervisors and teachers.

Education is provided by DPIC to undergraduate pharmacy students, hospital pharmacy residents, Pharm. D. students and residents in emergency medicine. Continuing pharmacy education programs are routinely provided.