

**BC Coroners Service Child Death Review Panel
A Review of Drowning
2007-2013**

**REPORT TO THE CHIEF CORONER OF BRITISH
COLUMBIA**

June 2014

PREFACE


On February 11, 2014, the British Columbia Coroners Service (BCCS) held a child death review panel focused on 35 drowning deaths of children and youth. These children and youth were tragically lost and are greatly missed by their families and communities. This review of their deaths served to identify actions to prevent future drowning deaths.

Support for this panel was provided by the staff of the BCCS Child Death Review Unit (CDRU). Adele Lambert and Holli Ward compiled the aggregate case reviews and a review of the research and statistics which formed the basis of the panel discussions.

My sincerest appreciation is extended to the panel members who shared their expertise and showed support on behalf of their respective organizations. Their dedication to the health and well-being of all children and youth in B.C. is apparent in the contributions each panel member has made towards investigating the issue of drowning through discussions and the generating of action oriented recommendations.

- Dr. Evan Adams *Office of the Provincial Health Officer*
- Dr. Kelly Barnard *BC Coroners Service*
- Chief Constable Bob Downie *Saanich Police Department*
- Supt. Brendan Fitzpatrick *Royal Canadian Mounted Police (R.C.M.P.)*
- Shelley Dalke *Canadian Red Cross*
- Dan Froom *BC Ambulance Service*
- Dr. Jean Hlady *BC Children's Hospital*
- Dr. Shannon McDonald *Ministry of Health*
- Dale Miller *Lifesaving Society-B.C. and Yukon*
- Sherri Mohoruk *Ministry of Education*
- Bill Naughton *BC Representative for Children and Youth*
- Marilyn Ota *First Nations Health Authority*
- Dr. Ian Pike *BC Injury Research and Prevention Unit*
- Armarjit Sahota *Ministry of Children and Family Development*
(On behalf of Alex Scheiber)
- Dr. Jim Thorsteinson *Family Physician*

On behalf of the panel, I submit this report and recommendations regarding the prevention of drowning deaths to the Chief Coroner of B.C. for consideration.



Michael Egilson
Chair, Child Death Review Panel

EXECUTIVE SUMMARY

Much of British Columbia is located among spectacular natural settings with an abundance of lakes, rivers and ocean access. The possibilities to engage with nature and enjoy the great outdoors are almost endless. With all the opportunities to enjoy the water we also need to be aware of the inherent risks, take appropriate safety measures and be especially vigilant as the warm weather approaches.

Although child and youth drownings are relatively rare, the loss is profound and in many cases, compounded by the fact that it could have been prevented. There are many more near-drowning incidents that result in injury, sometimes life altering and many more cases that are characterized as a 'close call'. While this panel looked at children and youth who drowned, the issues of water safety have broad application to the experiences of many.

To better understand the issue of drowning and consider opportunities towards prevention, a death review panel was appointed under the *Coroners Act* to review 35 drowning deaths of children and youth under the age of 19 that occurred between 2007 and 2013. The circumstances of these children and youth were reviewed in aggregate in addition to the research literature relating to drowning, water safety and drowning prevention.

The death review panel included professionals with expertise in Aboriginal health, injury prevention, public health, medicine, law enforcement, education, emergency response, child welfare, drowning prevention and water safety. The review identified male youth and young children as being the most vulnerable to drowning.

In order to address the risk of drowning in B.C., it is essential that water safety and drowning prevention messaging target parents and male youth specifically. Additionally municipalities should consider establishing a bylaw in relation to improving the safety of backyard pools to prevent young children from gaining access to backyard pools, the place where they are most at risk. These specific actions form the basis for the following recommendations forwarded to the Chief Coroner for consideration:

Recommendation 1: Messaging to male youth between ages 15 to 18 years old

The B.C./Yukon Branch of the Lifesaving Society bring together its community partners to develop water safety and drowning prevention messaging specifically targeting male youth. Male youth need to be consulted about the relevancy and effectiveness of this messaging.

Recommendation 2: Messaging to parents

The Canadian Red Cross and The Community Against Preventable Injuries bring together community partners to develop water safety and drowning prevention messaging specific to first time parents, supervising children when they are in, on or near water, and reinforcing water safety with youth.

Recommendation 3: Support for a bylaw establishing 4-sided fencing around backyard pools

That the Union of B.C. Municipalities (UBCM) reviews this report for information and education purposes in consideration of establishing a 4-sided pool fencing bylaw to prevent young children from gaining access.

These recommendations are intended to protect children and youth who are in, on or near water from drowning in addition to any type of injury that may be caused by a near drowning incident.

CHILD AND YOUTH DROWNING

No one ever expects to lose their child, family member or a friend to drowning. The following accounts emphasize the potential unexpected and tragic consequences that can occur if the risk of drowning is not recognized or is misjudged. Even if our lives have not been personally touched by a drowning, many British Columbians have experienced a frightening encounter with water such as struggling while swimming in a lake or ocean or momentarily losing sight of a small child around water. Although these 'close calls' may have had happy endings, they could have resulted in tragic outcomes.

The details within both of these accounts are based on more than one specific drowning reviewed in this report.

DROWNING IN A RESIDENTIAL POOL

On an early Saturday evening in June, a family attended a celebration at a neighbour's house. They had visited there often enough that when they arrived, their 3 year old son ran straight for the playroom. Before heading to the living room to visit with the other adults, his mother checked on him to make sure he was settled in. She left him playing with two other children who were a little older than he was.

Ten minutes passed and the mother went to check on her son. She assumed he was still in the playroom and was surprised when he was not there. She came back to the living room and asked if anyone had seen him. A few people commented that he could not have gone very far and others got up to help in the search. No one remembered seeing him leave the playroom and everyone expected he would be found close by. As the mother checked the master bedroom for her son, she glanced out the window, into the backyard. Out of the corner of her eye, she noticed something bright floating in the pool. She quickly realized it was her son's clothing and that he was floating face down. She screamed "He's in the pool!"

Hearing the mother's screams, one of the adults ran outside and pulled the child from the pool. Immediately, the homeowner called 9-1-1 and received direction to start CPR. One of the adults performed CPR on the young boy until emergency services arrived and transported him to the hospital. Two days after admission to the hospital, the young boy showed no signs of brain activity and his parents made the heart-wrenching decision to remove him from life support.

Following the young boy's death, the coroner attended the neighbour's home to investigate what happened. It was found that the child likely accessed the pool from a sliding glass door off the kitchen. The pool was fenced around three sides and the back of the house was used as a fourth perimeter. The homeowner explained the pool was not in use the evening of the gathering and he thought the sliding glass door had been locked. The homeowner could not believe the child managed to get past all the adults in the living room and unlock the sliding glass door by himself without being noticed by anyone.

The coroner interviewed the child's parents who explained their son had attended swimming lessons at the local community pool and loved the water. They said that he

had known about the pool in the backyard because they had come over to use it in the past but they never thought he would go out to the backyard by himself. As the pool was not in use the night of the gathering, it had not occurred to them that there was any type of risk that their son would access it.

DROWNING IN A LAKE

In the spring, a group of 17 year old young men went camping for the weekend. The campsite was located on the shoreline of a lake about 30 minutes outside of the town they lived in. They were all very familiar with the area and had camped there on numerous occasions.

Everyone was drinking beer as they set up camp. One of the teens brought an old canoe along with some paddles and with the help of his friends, it was placed at the shoreline. The drinking continued throughout the evening, to the point where everyone was intoxicated.

Around midnight two of the friends took the canoe out onto the lake. The water was smooth and there was no wind. The outside temperature was about 5 degrees Celsius. They had paddled about 12 metres from the shoreline when one of them stood up, causing the canoe to capsize. Once in the water, they tried to flip the canoe upright but realized they could not and agreed to swim to shore. One made it to the shoreline and yelled to his friend to keep swimming. When he no longer heard his friend swimming, he ran back to the campsite for help.

The group from the campsite came to the shoreline but it was too dark to see and they could not hear their friend. After 20 minutes passed without seeing him, one of the teens contacted emergency response from his cell phone.

Emergency response was dispatched immediately and took 20 minutes to respond. Once they arrived, a boat and shoreline search was initiated. The 17 year old was located the next day. He was lying face down, fully clothed, at about 10 metres of water depth and 10 metres from the shoreline.

During the coroner's investigation, the friend who brought the canoe explained that he was already on his way to the campsite when he realized he had forgotten the lifejackets. He decided it was not a big deal because all of his friends were very experienced in operating a canoe and they were all really good swimmers. He said that although he brought the canoe, he did not think it likely anyone would use it or that if anyone did, that they would never end up in the water.

The coroner also interviewed the friend who had been in the canoe with the victim. He explained that taking the canoe out on the water did not seem like a big deal because it was so calm out. He was surprised that they ended up capsized and said he had not been prepared for how cold the water was or how hard it was to swim with clothes on. When interviewed by the coroner, all the friends commented that they had been to the campsite numerous times and never thought that anything like this could ever happen.

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PART 1: INTRODUCTION

Much of British Columbia is located among spectacular natural settings with an abundance of lakes, rivers and ocean access. The possibilities to engage with nature and enjoy the great outdoors are almost endless. With all the opportunities to enjoy the water we also need to be aware of the inherent risks, take appropriate safety measures and be especially vigilant as the warm weather approaches.

Although child and youth drownings are relatively rare, when it happens, the loss is profound and in many cases compounded by the fact that it could have been prevented. There are many more near-drowning incidents that result in injury, sometimes life altering and many more cases that are characterized as a 'close call'. While this panel looked at children and youth who drowned, the issues of water safety have broad application to the experiences of many.

To better understand the issue of drowning and consider opportunities towards prevention, a death review panel was held in February 2014. The panel completed an **aggregate**¹ review of 35 drowning deaths² of children and youth that occurred between 2007 and 2013.

DEATH REVIEW PANEL

A death review panel is mandated³ to review and analyse the facts and circumstances of deaths to provide the Chief Coroner with advice on medical, legal, social welfare and other matters concerning public health and safety, and the prevention of deaths. A death review panel can review one or more cases before, during or after a coroner's investigation, an inquest or a review by the BCCS Child Death Review Unit (CDRU), and regardless of any decision made by a coroner or member of the CDRU.

The Chief Coroner established a child death review panel to meet on specific occasions throughout the year to provide recommendations on the prevention of child and youth deaths. This process is consistent with the child death review principles laid out by the Honourable Ted Hughes in his 2006 report⁴. The Chair of the CDRU was appointed chair of the child death review panel whose membership includes: a child death coroner, a CDRU coroner and professionals with expertise relating to children including: Aboriginal health and child welfare, injury prevention, public health, medicine, law enforcement, emergency response, education, advocacy and child welfare. In the course of reviewing the drowning deaths that occurred between 2007 and 2013, the panel reviewed:

- BCCS investigative findings;
- Academic and research literature;
- Information provided by panel members;
- Environmental, social and medical factors associated with the deaths;

¹ Key terms appearing in **bold face** are defined in the glossary located at the end of this report.

² Drowning deaths classified as either homicides or suicides were not included in this review.

³ Under the *Coroners Act*

⁴ *BC Children and Youth Review, 2006*

- Possible patterns, trends or themes;
- The current state of related public policy, programs and available services; and
- Existing challenges.

Each of the panel members shared their professional perspective and collectively identified actions focused on what can be done to prevent the drowning deaths of children and youth.

LIMITATIONS AND CONFIDENTIALITY

The number of drowning deaths that occurred between 2007 and 2013 is small and this presents challenges in accurately analyzing and reporting information while protecting privacy and data accuracy. Provisions under the *Coroners Act* and *Freedom of Information and Protection of Privacy Act* allow for the BCCS to disclose information to meet its legislative mandate and support the findings and recommendations generated by the review process. For the purposes of this report, information about these children and youth is presented in aggregate form. The BCCS is sensitive to the privacy of the children and youth and the families that we serve and proceeds with caution when reporting case review findings. In general, the statistical results are based on a small number of cases and should be interpreted with caution given the potential for random variation.

PART 2: REVIEW OF THE 2007 BC CORONERS SERVICE CHILD DEATH REVIEW UNIT REPORT ON DROWNING

In 2007, the CDRU completed an aggregate review of 35 drowning deaths⁵ of children and youth that occurred between 2003 and 2006. Risks related to intentional and unintentional drowning were identified and best practices related to water safety, boat safety, motor vehicle incidents and suicide prevention were presented.

Since the release of this 2007 report, ongoing efforts by a number of agencies have contributed to water safety and drowning prevention. These include: reports, programs, courses, public messaging strategies and collaborative efforts among agencies. Examples⁶ include:

- 2007: Canadian Red Cross initiated an annual National Lifejacket Day campaign preceding the May long weekend that engages communities in the promotion of encouraging lifejacket/personal flotation device (PFD) wear.
- 2009: The Community Against Preventable Injuries (aka 'Preventable') launched a media campaign that focused on reminding people of the risk, consequences and choices that exist in a number of potentially hazardous situations, including drowning.
- 2009: The Swim to Survive School Grant Program was initiated by the B.C./Yukon Branch Lifesaving Society. This program provides aquatic experience to grade 3 students by exposing them to 3 essential self rescue skills (forward roll, tread water for 1 minute and swim 50 metres) required to survive an unexpected fall into deep water.
- 2010: Canadian Red Cross identified a focus for annual National Water Safety week as effective supervision for children in, on or near water. Parents and caregivers receive instructions on how to supervise children.
- 2012: The Lifesaving for Backyard Pool Owners course was introduced to provide swimmers and non-swimmers who own or frequently visit a backyard pool, information focused on the principles of lifesaving around water, victim recognition and methods of low risk rescue and basic first aid.
- 2012: Open Water Wisdom-The Lifesaving Society and Canadian Red Cross collaborated to provide education and a supply of PFDs to over 250 rural, remote and Aboriginal communities across Canada. The goal was to have these communities promote their own locally based drowning prevention efforts.

⁵ Intentional and unintentional drowning deaths of children and youth under age 19.

⁶ Links to the referenced organizations, reports, initiatives, plans and strategies are provided at the end of the report.

- 2014: Canadian Red Cross swim programs have begun to encourage youth to try swimming activities while wearing clothes. This experience exposes the challenges of unexpected falls into the water in a safe supervised environment. Youth gain a greater understanding of the risks and develop skills and attitudes to keep them safe in, on and near the water.

PART 3: REVIEW OF THE BC CORONERS SERVICE RECOMMENDATIONS RELATED TO DROWNING BETWEEN 2007 AND 2013

Recommendations forwarded to the Chief Coroner for review and approval can originate from either a single investigation into the death of a child or youth by a coroner or a review by the CDRU. Recommendations are made in an effort to prevent future similar deaths from happening and are directed to a specific recipient. The following is a summary of the recommendations that were made between 2007 and 2013.

In 2008, as a result of a number of child deaths in backyard pools, recommendations were put forward to facilitate public service awareness about the risks associated with young children accessing backyard pools and to examine proactive strategies to minimize the risks of backyard pool drownings.

As a result of these recommendations:

- A toolkit to assist municipalities to take action to improve backyard pool safety in their communities was developed by a committee initially led by the Ministry of Housing and Social Development. Resource limitations have impacted the completion of this toolkit and it remains in draft format.
- The Building and Safety Policy Branch of the Office of Housing and Construction Standards completed a review of private pool fencing and other interventions to prevent drowning in young children.

Following these actions, the B.C./Yukon Lifesaving Society has taken the leadership role in approaching the UBCM in an effort to have all municipalities across B.C. consider establishing a bylaw in relation to improving the safety of backyard pools.

In 2010, as a result of a child death involving a summer day camp outing to a lake, recommendations were directed to the Ministry of Health in relation to the monitoring and compliance, the child staffing ratios and the activities of summer day camp programs.

As a result of these recommendations the Ministry of Health developed and posted a Water Safety Bulletin on their website. The bulletin was also shared with health authority Community Care Licensing Programs and with Medical Health Officers who are responsible for licensing programs, with a request that they share the bulletin with their colleagues.

PART 4: DEFINITION OF DROWNING AND REVIEW OF DROWNING DEATH RATES

DEFINITION OF DROWNING

In 2002, the following definition of drowning was proposed at the World Congress on Drowning and widely adopted by the World Health Organization (WHO), International Life Saving Federation and other agencies:

“Drowning is the process of experiencing respiratory impairment from submersion/immersion in liquid.”

Information about drowning deaths is not always divided between unintentional and intentional death. Unintentional drowning death involves circumstances where the death is not intended (e.g. accidental). Intentional drowning death involves circumstances where the death is a homicide or suicide. **In this report, the term *drowning* will refer only to unintentional drowning deaths and does not include homicides or suicides unless otherwise stated.**

DROWNING DEATH RATES INTERNATIONAL

Differences in the way drowning deaths are recorded make international comparisons difficult. Many developing countries use hospital based reporting to record injury related deaths which does not reflect deaths at a community level (UNICEF, 2004). There are also countries that do not have a death registration system or that may use one that does not identify the cause of death (UNICEF, 2004). Considering these limitations, the WHO reports that:

- Worldwide, drowning is the 3rd leading cause of unintentional injury death (following road traffic injuries and falls);
- There are around 388,000 drowning deaths worldwide each year, accounting for 0.7% of global mortality; and
- The majority of drowning deaths (96%) occur in low to middle income countries.

In a review of 16 countries (including Canada), the 2007 International Life Saving World Drowning Report found that:

- More men died by drowning than women. There are differences in the ratios among countries ranging as high as 4:1.
- Men between the ages of 18 to 49 years of age had the highest drowning rate. Breaking the age range down further was difficult due to the absence of standardized age groupings.
- In many countries, children under 5 years old had the second highest drowning risk despite many of the reporting countries indicating a decline.
- Drowning deaths occurred mostly in natural bodies of water. In some countries (including Canada), private pools were the most common location of drowning deaths for young children.
- Swimming and boating were the most common activities.

CANADA

Similar to the international findings, drowning is the 3rd most common cause of unintentional injury death across all age groups, following transportation incidents and falls (Smart Risk, 2009). Since the 1990's, the long term trend has shown a decrease in the rate of drowning deaths overall across Canada (Drowning Prevention Research Centre, 2013).

Young adults between the ages of 18 to 24 years old had the highest rate of drowning death at 2.2 per 100,000 between 2006 and 2010 (Drowning Prevention Research Centre, 2013). Under the age of 18 years old and between 2006 and 2010, children from birth to 4 years old accounted for the highest risk of drowning death followed by youth aged 13 to 17 years and children aged 5 to 12 years, respectively (Drowning Prevention Research Centre, 2013). Across all age groups, males account for the majority of drowning deaths (Drowning Prevention Research Centre, 2013).

Approximately two thirds of all drowning deaths happen in natural bodies of water (e.g. lakes, rivers). In children under 5 years old, backyard pools are the most common location of drowning death (Drowning Prevention Research Centre, 2013).

BRITISH COLUMBIA

Since 2003, drowning deaths in children and youth have declined. The drowning death rate dropped from 1.2 deaths per 100,000 between 2003 and 2006 to 0.5 deaths per 100,000 between 2007 and 2012 (see Table 1). This decline is consistent with national Canadian drowning rates.

Table 1:

Death Rate per 100,000 Population by Age Group		
Age Group	2003-2006	2007-2012
<1	0.6	0.4
1-4	2.4	0.4
5-9	0.3	0.2
10-14	0.4	0.1
15-18	2.1	1.2
Total	1.2	0.5

Source: BCCS Stats

PART 5: CASE FINDINGS: DROWNING IN B.C.

This section presents an aggregate overview of the demographics and circumstances of the deaths of 35 children and youth who drowned between 2007 and 2013. These findings are presented with what is known about drowning from national and international research literature over the last 10 years.

DEMOGRAPHICS

AGE

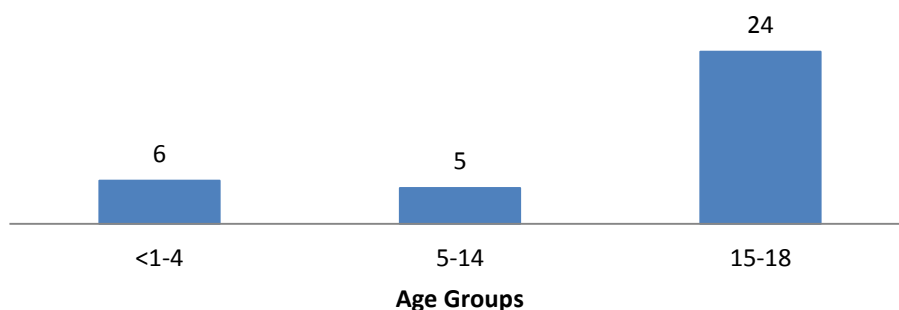
Young children are often curious about their environment and youth (between 15 and 18 years old) is an age range often associated with risk taking behaviour. These are the most vulnerable age groups for drowning in those under the age of 19 years (Canadian Red Cross, 2003 and Drowning Prevention Research Centre, 2013).

TEENAGE BOYS AND YOUNG CHILDREN ARE MOST AT RISK FOR DROWNING

The majority of drowning deaths happened in youth between the ages of 15 and 18 years old (69%) followed by children aged less than five years old (17%) (figure 1). Fourteen percent of the children who died by drowning during this period were between the ages of 5 to 14 years old (figure 1).

Figure 1:

CHILD and YOUTH DROWNING DEATHS BETWEEN 2007 AND 2013 BY AGE



Source: BCCS

SEX

Generally, male youth are known to engage in more risk taking behaviours compared to their female counterparts. Consistent with this finding, the research shows that male youth are at highest risk for drowning.

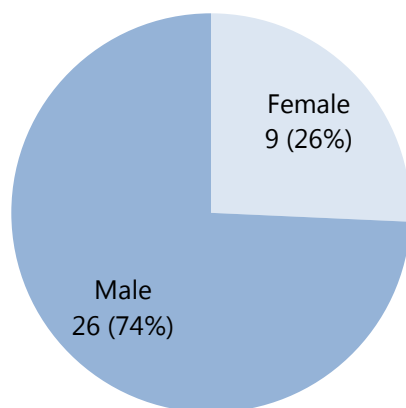
TEENAGE BOYS ARE MORE LIKELY THAN TEENAGE GIRLS TO UNDERESTIMATE THE DEGREE OF RISK THAT COULD RESULT IN A DROWNING INCIDENT

The ratio difference between the sexes increases with age from a ratio of about 2:1 (males to females) in children under the age of 12 to approximately 10 times higher for male youth (ages 15 to 19 years old) (Committee on Injury, Violence and Poison Prevention, Weiss, 2010).

In this review, males accounted for the majority of the drowning deaths (74%) (figure 2). Twenty six percent were female.

Figure 2:

CHILD and YOUTH DROWNING DEATHS BETWEEN 2007 AND 2013 by SEX



Source: BCCS

Research looking at the difference in injury rates between males and females suggests that the overrepresentation of males may be due in part to the role that gender differences between males and females plays. The term 'gender' refers to the social constructs of what it means to be masculine or feminine whereas the term 'sex' refers to the biological differences between males and females (Short, Yang, Jenkins, 2013). Theories focused on gender and socialization suggest that parents are likelier to encourage boys to take risks compared to girls (Yanchar, Warda, Fuselli, Canadian Paediatric Society Injury Prevention Committee, 2013). Research also suggests that boys typically view risk taking differently than girls making them more likely to take risks (Yanchar, et.al, 2013).

Specific to drowning, the research literature suggests that males tend to consume more alcohol, engage in risky behaviour, and overestimate their swimming ability (Burford, Ryan, Stone, Hirshon and Klein, 2005; Zuckerman and Conway, 2000).

UNDERLYING MEDICAL CONDITIONS

Underlying medical conditions such as epilepsy, autism and sudden cardiac events may be associated with increasing the risk of drowning death. In this review however, none of the children or youth were found to have any underlying medical conditions that could have contributed to their death.

Research related to studying epilepsy and autism indicates that the degree of risk these conditions pose depends on factors such as: age, severity of the condition, and the level of supervision provided to the person (Committee on Injury, Violence, and Poison Prevention, Weiss, 2010; Anderson, et.al, 2012; Kemp and Sibert, 1993).

Research on sudden cardiac death suggests that in some cases of drowning deaths there could be a link but it is not clear how often this happens (Martin, 2011; Tester, Kopplin, Creighton, Burke, Ackerman, 2005). It is thought that activities involved in swimming such as exertion, cold water exposure and facial immersion may trigger a cardiac event and that the drowning is secondary (Martin, 2011, Tester, et.al, 2005).

BEHAVIOURAL RISKS

ALCOHOL AND SUBSTANCE USE

Youth under the influence of a substance(s) are likelier to engage in behaviours they might otherwise choose not to do or that are beyond their level of comfort and skill, including activities near or in water. When this happens, the risk of injury or death is increased.

Of the 24 youth between 15 and 18 years old who drowned, 38% (n= 9) used substances before they died. In 13% (n=3) of these deaths, alcohol was noted as a contributing factor to their death.

Research on the physiological impact of substance use in relation to drowning is primarily focused on alcohol consumption. Alcohol impairs a person's orientation, lowers body temperature, affects balance, movement and vision, and blood vessel dilation which may lead a person to stay in cold water longer thereby increasing the risk of hypothermia (Driscoll, et.al, 2004; Mulligan, 2009).

The pattern and degree of alcohol use, in addition to the type of alcohol consumed, can also impact a person's level of risk for serious injury or death. In the 2013 B.C. Adolescent Health Survey, both male and female youth equally reported binge drinking⁷ (McCreary Centre Society, 2014).

Research suggests that male youth, particularly those who perceive themselves to be strong swimmers, are at heightened risk for unintentional drowning when they have consumed alcohol or used a substance because of their likelihood to take risks beyond their skill level (Hamilton and Schmidt, 2013). In many cases, peer influence impacts a person's drinking or substance use and their risk taking behaviours and in the case of male youth, their desire to fit within their peer group may influence their decision to drink or use substances and swim (Hamilton, et.al., 2013).

USING ALCOHOL AND/OR DRUGS INCREASES THE RISK OF DROWNING.

⁷ Binge drinking is defined in the survey report as 5 or more drinks within a couple of hours.

ACTIVITIES

With so many opportunities for people to engage in outdoor recreational activities that take them into natural environment settings (e.g. provincial park, trails, lakes, oceanfront) it is important to remember that there are also some inherent risks in these environments. Most drowning incidents happen in these areas (Canadian Red Cross Society, 2003; Drowning Prevention Research Centre, 2013).

The majority (60%) of the children and youth who died by drowning were involved in recreational activities at the time of their death, with the primary activity being swimming (38%). Eleven percent of these deaths involved youth who were boating. None of these youth (n=4, 11%) were wearing a lifejacket/PFD. Eleven percent were involved in a motor vehicle incident. Twenty-six percent were engaged in other recreational activities near or in the water. In 29% of the deaths, the circumstances of how the child or youth ended up in the water were unclear.

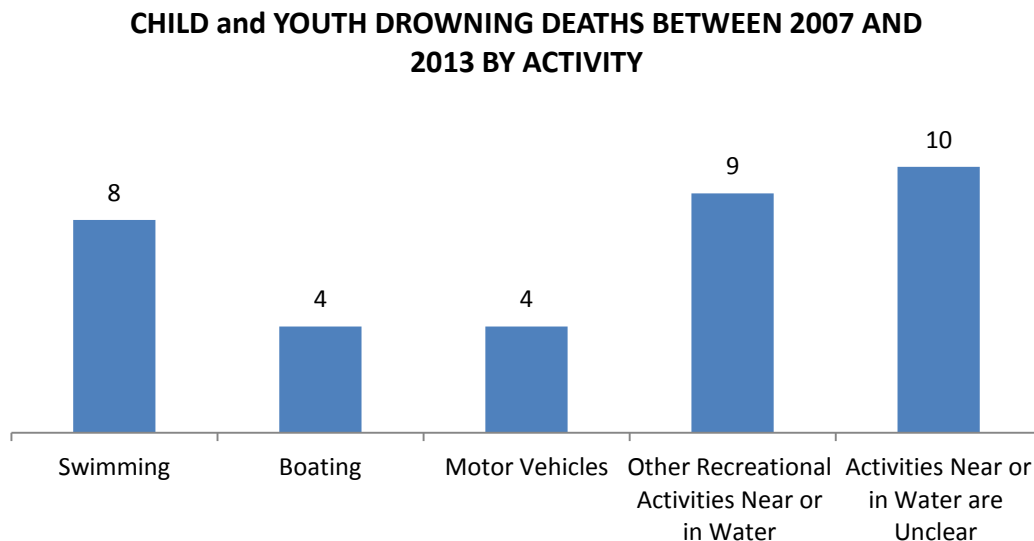
***SAFETY TIPS FOR
OUTDOOR ACTIVITIES IN,
ON OR NEAR WATER:***

***KNOW THE HAZARDS
BEFORE ENTERING THE
WATER AND TAKE
NECESSARY
PRECAUTIONS TO BE
SAFE.***

***SWIM WITH A FRIEND
AND LOOK OUT FOR
EACH OTHER***

***WEAR A LIFEJACKET
WHEN BOATING***

Figure 3:



Source: BCCS

A Canadian study focused on boating fatalities and injuries found that boating is primarily a recreational activity and that most deaths related to boating were the result of drowning (Transport Canada and Canadian Red Cross, 2011). During recreational

activities with either powered or unpowered boats, most of the deaths were the result of falling overboard (Transport Canada and Canadian Red Cross, 2011).

Research on motor vehicle incidents associated with drownings indicates that it is rare for a motor vehicle to end up submerged in water but the risk of drowning death is quite high (McDonald and Geisbrecht, 2013). The research suggests that these types of incidents generally involve a single vehicle being accidentally driven into a creek, river or stream (McDonald and Geisbrecht, 2013). Contributing factors may include the time of day, alcohol or substance use, road conditions, the distance between the road and water, minimal or no barriers between the road and water and no visible signage (McDonald and Geisbrecht, 2013).

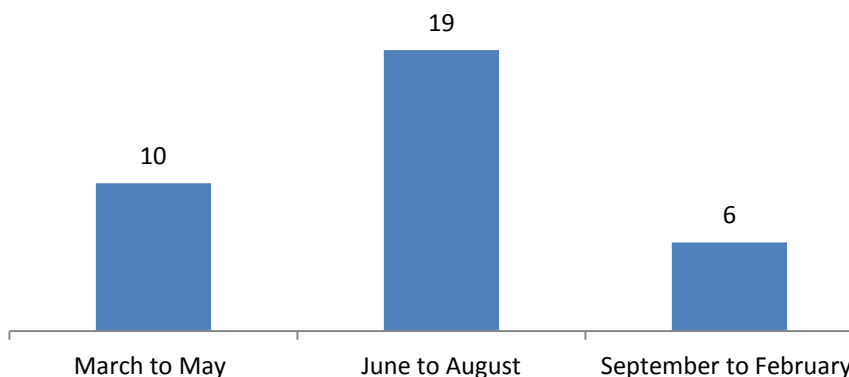
ENVIRONMENTAL RISKS SEASONS/WEATHER

Summer brings with it warmer weather which in turn, brings people outside to enjoy swimming, camping and other outdoor activities. Most drowning deaths happen during this time period.

The majority (54%) of drownings happened during the summer months between June and August, followed by the spring months between March and May (29%) (figure 3). Seventeen percent of the deaths happened in the fall and winter months between September and February (figure 4).

Figure 4:

**CHILD and YOUTH DROWNING DEATHS BETWEEN 2007
AND 2013 BY SEASON/MONTH**



Source: BCCS

These findings are similar to Canadian studies indicating that drowning deaths across all age groups peak between July and August (Chen, Mo, Yi, Jiang and Mao, 2013; Drowning Prevention Research Centre, 2013). A Canadian study focused on the influence of hot weather on drowning death suggests that when the weather is warm, people are more likely to spend more time near water, consume alcohol, engage in

***FAST MOVING WATER,
HIGH WATER LEVELS
AND COLD WATER
CREATE INCREASED
RISKS IN THE SPRING
AND EARLY SUMMER:***

***AVOID ACTIVITIES NEAR
OPEN WATER DURING
THESE TIMES AND WEAR
A LIFEJACKET/PFD WHEN
ON THE WATER!***

water related behaviour that may go beyond their skill or comfort level and are less likely to wear lifejackets/PFDs (Fralick, Denny and Redelmeier, 2013).

In the colder months of the year, cold water immersion increases the risk of **hypothermia** (Canadian Red Cross, 2006)⁸. Unlike in other parts of Canada where unintentional drowning deaths occur from snowmobiling and ice fishing activities, drowning deaths from these activities in B.C. are rare (Canadian Red Cross, 2006). None of the drowning deaths in this review were related to being on ice or snowmobiling.

DROWNINGS HAPPEN OUTDOORS WHEN PEOPLE ARE NOT EXPECTING TO BE IN THE WATER, FROM UNEXPECTED FALLS INTO POOLS AND OPEN WATER

WATER TEMPERATURE

Falling into cold water greatly increases a person's risk of drowning due to the risk of hypothermia or cold shock (Canadian Red Cross, 2006; Tipton, Eglin, Gennser, Golden, 1999).

In 6% (n=2) of the deaths reviewed, hypothermia was considered to be a contributing factor.

Hypothermia happens when the body's core temperature drops from a normal temperature of approximately 37 degrees Celsius (98.6 degrees Fahrenheit) to below 35 degrees Celsius (95 degrees Fahrenheit) (Mulligan, 2009). Hypothermia causes cooling of vital organs such as the brain and heart which can lead to death (Canadian Red Cross, 2006).

When a person falls unexpectedly into cold water, the ability to swim or stay afloat can be hampered by what is referred to as cold shock. Cold shock is when the person initially takes an automatic and involuntary gasp and then starts to hyperventilate (Canadian Red Cross, 2006).

THE 1-10-1 PRINCIPLE
WHEN A PERSON FALLS INTO COLD WATER:
THERE IS 1 MINUTE TO CALM DOWN AND CONTROL BREATHING
THERE ARE 10 MINUTES BEFORE MUSCLE FUNCTION BECOMES LIMITED
THERE IS 1 HOUR BEFORE BECOMING UNCONSCIOUS DUE TO HYPOTHERMIA

LOCATION

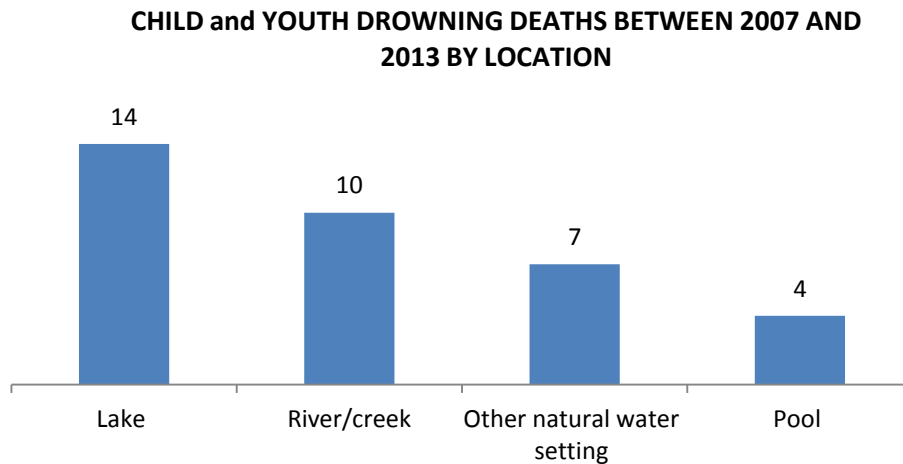
Many people enjoy taking advantage of the many opportunities a natural outdoor setting has to offer and so it is not surprising that across all age groups, natural water environments (e.g. rivers, lakes and ponds) are the most common locations for

⁸ Refer to the section *Water Temperature* for information about the effects of hypothermia.

drowning deaths to occur (Canadian Red Cross, 2003). The exception to this appears to be children under the age of 4 years old, who are at highest risk for drowning in a pool setting, usually when they are unsupervised (Brenner, Trumble, Smith, Kessler and Overpeck, 2001; Burford, Ryan, Stone, Hirshon and Klein, 2005; Quan and Cummings, 2003).

In this review, the majority (89%) of the drowning deaths occurred in a natural water environment such as a lake (40%) and river or creek (29%) (figure 5). Of the 6 drowning deaths of the children under the age of 4 years, two thirds (n=4) occurred in a pool (figure 5).

Figure 5:



Source: BCCS

PART 6: FIRST NATIONS AND ABORIGINAL CHILDREN AND YOUTH

First Nations and **Aboriginal** communities have diverse relationships with varying environments. Seasonality, weather, traditional water based activities, access to appropriate water safety programs and flotation devices, social context, water transportation, proximity to ocean, rivers or lakes are all factors to consider in relation to risk for injury or drowning for First Nations and Aboriginal populations.

Aboriginal and First Nations children and youth accounted for 23% (n=8) of the drowning deaths in this review. There was an equal ratio of female and male children and the majority of these deaths occurred in youth between the ages of 15 and 18 years (n=7, 88%). All of the Aboriginal and First Nations children and youth died in a natural body of water; the most common location being a river, often close to city limits. Six out of the 8 drownings were related to recreational activities with friends and involved alcohol or other substance use. In 4 separate cases, the drownings were not witnessed.

Research exploring the issue of drowning within the Aboriginal and First Nations populations is limited and generally included as part of studying injury related deaths more broadly. Among Aboriginal and First Nations children and youth in Canada, the overall rates of injury related deaths, including drowning, are approximately 3 to 4 times higher compared to the non-Aboriginal population (Banerji, Canadian Paediatric Society, First Nations, Inuit and Métis Health Committee, 2012; Saylor, 2004). While this is the case, there may be differences across regions where the rates may be higher in one area or province compared to another. Research indicates that the majority of drowning involving Aboriginal and First Nations children and youth occur in children and youth between the ages of 10 to 19 years, especially for males (Banerji, et.al, 2012). Canadian research indicates that these deaths are commonly associated with snowmobile use, falls, recreational activities (e.g. swimming) and boating (Banerji, et.al, 2012). Factors such as: access to safety devices (e.g. lifejackets/PFDs, seatbelts) and access to medical facilities, especially in remote areas, may impact the risks and outcomes (Saylor, 2004).

A 2010 Canadian Medical Association article suggests that Aboriginal and First Nations communities have not been well served by conventional water safety and drowning prevention messaging because these mainly target urban areas and do not account for the role of culture and traditional knowledge or the specific needs of a community (Vogel, 2010). Having communities take the lead or engaging Elders and youth to assist in the development, delivery and reinforcement of messaging or programming could contribute to better outcomes. For example, both the Canadian Red Cross in Ontario and the Lifesaving Society in Manitoba have worked with Aboriginal and First Nations communities to develop culturally relevant programs to support water safety and drowning prevention (Canadian Red Cross, 2010; Vogel, 2010).

In consideration for the drowning deaths reviewed, there is a need to target messaging for First Nations and Aboriginal youth, focusing on the importance of water safety in the context of alcohol or other substance use consumption. A key water safety message

should emphasize youth responsibility for themselves and their friends such as using safety equipment and avoiding alcohol when boating, fishing, etc.

PART 7: PREVENTION AND INTERVENTION

The prevention and intervention measures presented in this section focus on:

- Responsibility for one's self and/or others (i.e. awareness of your level of skill, supervising children);
- Awareness of the environment (i.e. water temperature, currents, location);
- Use of proper equipment (i.e. lifejacket/PFD); and
- Residential pool barriers for making residential pools safer.

In B.C., information, education and programming focused on either prevention or intervention measures are primarily offered by the B.C./Yukon Branch of the Lifesaving Society and Canadian Red Cross Society.

The B.C./Yukon Branch of the Lifesaving Society is a non-profit agency focused specifically on reducing water-related deaths and injuries. The Canadian Red Cross Society is a non-profit agency that promotes water safety through swimming lessons, and drowning prevention messaging as part of its larger mission as a humanitarian organization to improve the lives of vulnerable people. Both of these agencies offer services such as: swimming lessons, certification for water safety instructors, and public education on water safety.

PREVENTION

Prevention measures aim to reduce the risk of drowning or injury before it happens.

MESSAGING

Informing people about what they can do to keep themselves safe around water and prevent drowning is a primary goal of messaging. People generally receive messaging through pamphlets, advertisements, campaigns or signage at a particular location (e.g. pool or beach).

Currently, most messaging appears to target either parents responsible for the supervision of young children or the general public about topic areas such as: wearing lifejackets/PFDs or dangers of swimming in a particular area. Messaging to youth is more generally focused on reducing the risk of injury overall as opposed to being specifically about water safety and drowning prevention.

EDUCATION

The people who are primarily responsible for making sure that children and youth receive education on water safety and prevention measures are parents or guardians, who are also responsible for accessing their own education. This includes enrolling in educational programming and encouraging attendance and participation.

In B.C., the B.C./Yukon Branch of the Lifesaving Society and Canadian Red Cross both offer a number of programs devoted to teaching children, youth and parents skills related to water safety, survival techniques and drowning prevention.

Despite these educational program opportunities, limitations such as: financial barriers to pay for program costs or proximity to a facility that offers programming can be issues.

In B.C., both non-profit agencies and corporately sponsored programs offer funding for families that could not otherwise afford to pay for educational programming. Generally, these types of funding programs work in partnership with municipalities and cities to facilitate access to educational programming. Families that could benefit from this type of funding generally need to apply through a confidential application process that requires them to approach an employee of the program they or their child would like to attend or a designated employee of the local municipality. Nearby access to educational programming remains a challenge for some areas in B.C. as not all cities or municipalities are equipped with a pool facility or the closest pool may still be too far away, making attendance difficult. Across Canada, there have been some creative approaches to this challenge. For example, some communities have been known to offer educational programming at a nearby lake or a hotel that has a pool facility.

Safety and injury prevention is a topic area delivered to children and youth at all grade levels in B.C. schools; however, water safety education specifically is not a mandatory requirement. It is at the discretion of the school and school districts to choose whether to offer water safety education, swimming lessons or drowning prevention education at any grade.

SUPERVISION

Parental or caregiver supervision is an essential component in the prevention of drowning in young children.

An inadequate level of supervision was noted in the coroner's investigation for 5 of the drowning deaths. All of these cases involved children under the age of 7 years old.

Research suggests that in cases where a young child drowns, it is often due to a momentary lapse in supervision, where the parent or caregiver is distracted (Morrongiello, et.al, 2013). Another concern is the parent or caregiver underestimating the level of supervision required to adequately prevent drowning (Brenner, Taneja, Haynie, Trumble, Qian, Klinger and Klebanoff, 2009; Moran and Stanley, 2006). For example, a parent/caregiver may supervise a child by watching them from the shoreline as opposed to being within arm's reach or by periodic watching rather than constant supervision. A child's swimming skill or lifejackets/PFDs do not replace the need for adequate supervision (Morrongiello, Sandomierski, Schwebel and Hagel, 2013; Committee on Injury, Violence, and Poison Prevention, Weiss, 2010; Zuckerman and Conway Jr, 2000). Supervision can be compromised if the caregiver is under the influence of drugs or alcohol (Zuckerman and Conway Jr, 2000).

A TODDLER'S ABILITY TO OPEN A DOOR CAN CHANGE IN A MATTER OF MINUTES:

IF THERE IS A POOL NEARBY, ALWAYS DIRECTLY SUPERVISE YOUNG CHILDREN IN THE HOME AND OUTSIDE IF THE POOL IS ACCESSIBLE FROM THE HOUSE .

DO NOT GET DISTRACTED WHEN SUPERVISING

SWIMMING ABILITY

A child or youth who has the skills to swim can still be at risk for drowning. Swimming skills are an essential prevention measure to reduce the risk of drowning but they should never be considered the only prevention measure. Young children still need to be supervised and youth need to consider other factors (e.g. substance use, water temperature) that could impact their swimming ability.

Swimming ability was noted by the coroner in 9 (26%) of the drowning deaths. This information was based on descriptions provided by family or friends of the child or youth. Four (44%) of these children and youth were described as weak swimmers, 3 (33%) were described as fair swimmers and 2 (22%) were described as strong swimmers.

***EVEN A 'GOOD' SWIMMER
CAN BE AT RISK OF
DROWNING***

There is ongoing debate in the research literature about whether swimming ability should be considered a protective factor to reduce the risk of drowning. Some studies show that swimming skills are a protective factor to reducing the risk of drowning but others suggest that learning swimming skills may increase the potential for a person or parent/caregiver to overestimate swimming ability (Morrongiello, et.al, 2013; Brenner, Saluja and Smith, 2003). Also, some studies suggest that if young children are more familiar with water they may be more attracted to it or if their parents feel confident in their child's swimming ability, they may be less vigilant in supervising (Brenner, Saluja and Smith, 2003).

In 2012, the International Life Saving Federation, a world authority on drowning prevention and lifesaving skills, acknowledged the ongoing debate around the impact of swimming skill on drowning prevention. In a position statement, it endorsed teaching basic aquatic survival skill as a way of reducing the risk of drowning in consideration with other factors such as: water conditions, PFDs, age appropriateness and water safety education (International Life Saving Federation, 2012).

Whatever level of swimming skills a child or youth has, individual and environmental factors can influence their swimming ability. Individual factors such as drinking alcohol or swimming alone can increase the risk of drowning (McCool, Ameratunga, Moran and Robinson, 2009; Mulligan, 2009). Environmental factors such as weather conditions, location and water temperature can also increase risk (Brenner, et.al, 2003). As well, how a person ends up in the water can impact on their swimming ability. For example, if a person falls in unexpectedly they may be injured, fully clothed, disoriented or in a state of panic (McDonald and Geisbrecht, 2013; Committee on Injury, Violence and Poison Prevention, Weiss, 2010).

***SWIM LESSONS DO NOT
REPLACE THE NEED TO
SUPERVISE YOUNG
CHILDREN***

LEGISLATION & REGULATION

For laws to effectively contribute to reducing the risk of drowning, it is essential they are supplemented with education and enforcement. People need to understand why it is important to have legislation, what it is intended to do and what the consequences will be if it is not followed.

Backyard Pool Barrier Fencing

Fencing around a backyard pool can keep young children from gaining access to a backyard swimming pool. Four sided fencing, where the fence is built around the entire perimeter of the pool, separating it from the house, is considered to be the best type of barrier to a backyard pool (Committee on Injury, Violence, and Poison Prevention, Weiss, 2010).

In B.C., the establishment of a bylaw about barrier fencing around a backyard pool and the level of enforcement used to ensure a homeowner complies is the responsibility of municipal governments. Many B.C. communities have already established a barrier fencing bylaw, and others have not. Existing bylaws, in the communities that have one, require a backyard pool to be surrounded by 3-sided fencing (where the house is used as a 4th side perimeter), with a self closing and self latching gate. The main concern with this type of fencing is that potential for a child to access the pool directly from the house (Zuckerman, et.al, 2000). In all of the backyard pool drowning deaths, the fencing surrounding the pool was 3 sided; with the house used as a 4th side perimeter. In some of these cases, access to the pool was gained through an entrance point such as a gate or a sliding glass door from the house. Where access was gained through a gate, the gate was: open, broken or not self latching, and within reach.

***THE BEST BACKYARD
POOL BARRIERS
INCLUDE:***

***4-SIDED FENCING THAT
GOES ALL THE WAY
AROUND THE POOL***

A SELF CLOSING GATE

A SELF LATCHING LOCK

The current number of pools in B.C. is unknown, however some municipalities track building permits related to the construction of pools (Zukowski, 2008). In B.C., there are 61 local governments with backyard pool bylaws (57 municipalities and 4 regional districts) (Zukowski, 2008). These bylaws are not uniform across all jurisdictions as some include hot tubs, ornamental ponds, seasonally constructed pools and wading pools, to name a few (Zukowski, 2008). There is also variability in fencing height and gate closure requirements (Zukowski, 2008).

Research suggests that in order for legislation requiring four sided pool fencing to be maximally effective, it should be accompanied with education to bring awareness of how fencing can reduce the risk of drowning death (Thompson and Rivara, 2010).

Alcohol and Substance Use

In B.C., the minimum drinking age established by the Provincial government is 19 years old. Illegal and prescription drugs are federally regulated under the *Controlled Drugs*

and Substances Act. The federal *Criminal Code* regulates enforcement of both alcohol and substance use related offences. Research suggests that educating youth who are most at risk for use about how their consumption can increase the risk of drowning is an important component in reducing that risk (Driscoll, Harrison and Steenkamp, 2004; Ahlm, Saveman and Bjornstig, 2013).

Boating and Lifejacket/Personal Flotation Devices (PFD)

Wearing a lifejacket/PFD while in a boat can decrease the risk of drowning.

When people fall from a boat unexpectedly, they have to adjust to personal and environment conditions such as panic, water temperature, wind, waves and lighting (Transport Canada and Canadian Red Cross, 2011). Without already wearing a lifejacket/PFD, trying to retrieve one in the water and properly put it on can be extremely difficult (Transport Canada and Canadian Red Cross, 2011).

Canadian research on boating safety finds that legislation does not independently appear to be a strong deterrent with respect to boating safety including: use of lifejackets/PFDs or ensuring proper safety equipment is on board (Canadian Red Cross, et.al, 2011). Transport Canada is the federal government agency that oversees boating safety, boating regulations and training across Canada. Boating safety is enforced by police and other authorized authorities at the local community level. The Criminal Code of Canada applies to offences such as boating while impaired or not having lifejackets/PFDs in the proper sizes and quantities for the people on board.

POOL COVERS AND ALARMS

Some pool covers and pool alarms are advertised as effective barriers for drowning prevention but there does not appear to be any research into the effectiveness of their use (Committee on Injury, Violence, and Poison Prevention, Weiss, 2010). For this reason, the research suggests that pool alarms and covers should not be viewed as adequate prevention barriers (Committee on Injury, Violence, and Poison Prevention, Weiss, 2010; Zuckerman, et.al, 2000). The research indicates that pool covers used for other types of functions (e.g. solar covers) may pose a risk to children due to the risk of becoming entangled or hidden from view (Committee on Injury, Violence, and Poison Prevention, Weiss, 2010).

INTERVENTION

Interventions are used when a drowning emergency is in progress. The type of intervention used depends on the circumstances of the emergency and the abilities of the people responding.

BYSTANDER RESCUE

Bystanders are often in a key position to respond when emergency personnel have not yet arrived.

In some cases, there may be potential dangers associated with trying to rescue a drowning victim (Venema, et.al 2010). Bystanders may be exposed to risks when they are intervening such as: water current, cold water temperatures or an overturned vehicle. If bystanders do not know CPR, there may be a delay that will impact the ability

for a victim to survive a drowning (Venema, et.al, 2010; Committee on Injury, Violence, and Poison, Kyriacou, et.al, 1994).

EMERGENCY RESPONSE

Emergency personnel may include police, ambulance, fire and lifeguard services. In all of the drowning deaths, emergency response personnel responded immediately after being notified that the child or youth was either discovered or missing.

Research on the effectiveness of emergency personnel in response to drowning incidents appears to focus primarily on the effectiveness of lifeguard presence. It is primarily based on anecdotal information and indicates that the presence of lifeguards has a positive effect on reducing the risk of drowning deaths (Committee on Injury, Violence and Poison Prevention, Weiss, 2010; Branche and Stewart, 2001). Generally, the role of a lifeguard is to prevent injury, provide emergency response, supervision, monitor the environment, enforce rules and regulations and educate the public; all of which contribute to safety (Committee on Injury, Violence and Poison Prevention, Weiss, 2010).

In B.C., there are currently 19 waterfronts⁹ that are lifeguard-supervised. Lifeguard season is generally between June 30 and September 1. Lifeguard duty hours vary across the province. All public pools require lifeguards. In areas where no lifeguards are present or in remote locations, the arrival of emergency personnel can be delayed which may impact the survival of a drowning victim (Kyriacou, Arcinue, Peek and Kraus, 1994).

CPR (RESUSCITATION)

Being able to provide CPR to a drowning victim depends on whether they can be removed from the life threatening situation and whether there is someone who knows how to provide it. The time lapse between the person being rescued and the initiation of CPR can impact the chances of survival. In 26% (n=9) of the drowning deaths, resuscitation was attempted.

Research indicates that if resuscitation can be started immediately after a drowning incident, there is a greater chance for oxygen supply and circulation to reoccur (Venema, Groothoff and Bierens, 2010). Research recommends that parents and homeowners with backyard pools learn basic resuscitation skills (Weiss, et.al, 2010).

HYPOTHERMIA¹⁰ TREATMENT

Depending on the degree of hypothermia experienced, various treatment methods may be used.

In this review, 1 child had been treated for hypothermia prior to their drowning death.

⁹ 11 are located in Vancouver and 8 are located elsewhere in BC. 1 is on a river, 4 are on lakes and 14 are on ocean-fronts.

¹⁰ Hypothermia is defined in Part 4 of this report under 'Water Temperature'.

When someone ends up in cold water, there is a risk of hypothermia. As the body's temperature drops, the person may experience signs of hypothermia such as: shivering, slurred speech, dilated pupils and problems with moving their body, and eventually, the vital organs (e.g. heart and brain) will cool and shut down (Canadian Red Cross Society, 2006).

Immediate intervention includes preventing a person from losing additional body heat, re-warming the person slowly and seeking medical attention immediately (Mulligan, 2010). In mild cases, re-warming techniques include: warm water immersion, heating blankets and radiant heat (Coskun, Popov, Schmitto, Hinz, Kriebel, Schoendube, Ruschewski and Tirilomis, 2010). In cases of severe hypothermia, internal re-warming techniques (i.e. intravenous fluids) may be used (Coskun, et.al, 2010).

PART 8: RECOMMENDATIONS

The panel reaffirmed the many prevention messages put forth by the Lifesaving Society and Canadian Red Cross around water safety, supervision, boater safety, alcohol use, lifejacket/PFD use and pool safety.

The child death review panel also identified that some of these important messages are not getting through to the young people most at risk. The panel acknowledged that messaging to parents of young children needs to be ongoing to ensure that first time parents are informed and others are reminded that supervision of young children is necessary not only in or on water but also when there is water nearby.

The recommendations forwarded to the Chief Coroner from the Child Death Review Panel on drowning focus on prevention messaging to teenage males, prevention messaging to parents, and supporting the B.C./Yukon Lifesaving Society's efforts to have municipalities establish a bylaw requiring 4-sided fencing around backyard pools as key areas to target.

The recommendations arising from the death review panel were developed in a manner that was:

- Collaborative;
- Attributable to the deaths being reviewed;
- Focused on identifying opportunities for improving public safety and prevention of future deaths;
- Targeted to specific parties;
- Realistically and reasonably implementable; and
- Measurable.

Messaging to youth

The majority of the drowning deaths happened to male youth between 15 and 18 years old. These deaths were primarily associated either one of more of the following factors:

- Overestimation of swimming ability;
- Underestimation of risk;
- Substance use, specifically alcohol; and
- Not wearing a lifejacket/PFD.

The higher number of drowning deaths in this group is also a reflection of the higher number of injury related deaths among this same group. Many of the same factors around engaging in risky, sometimes impulsive, behaviour without sufficient safety protection, and overestimating abilities are seen in both drowning and injury related deaths.

At the time of their deaths, many of these young men were spending time with their friends in, on or near the water. In some cases they went to an area they were familiar

with and engaged in activities they had done before such as swimming, jumping or canoeing.

Currently, prevention messaging to this particular group in B.C. is extremely limited. The panel discussed the importance of trying to reach teenage males through media they would normally access, with messaging that would resonate specifically with this group. Geographic safety message texting and the use of social media were discussed at length; however, there was a recognition that more research and the involvement of youth is required to identify a specific media strategy and effective messaging for this group.

Recommendation #1:

By the end of 2015:

The B.C./Yukon Branch of the Lifesaving Society will bring together key stakeholder partners to develop water safety and drowning prevention messaging targeting young men between the ages of 15 and 18 years old. Key stakeholder partners include but are not limited to:

- Canadian Red Cross;
- The First Nations Health Authority; and
- School Districts.

The B.C./Yukon Branch of the Lifesaving Society will engage young men between the ages of 15 and 18 years old in developing the prevention messaging and implementation strategy.

Messaging to parents

Child and youth safety is a primary responsibility of parents.

It is essential for parents to provide an appropriate level of supervision when their young children are in, on or near water. In 5 of the drowning deaths, inadequate supervision was noted in the coroner's investigation. All of the children were under the age of 7 years old. Research finds that in many cases of drowning among young children, there is a level of supervision; however, the parent or caregiver became momentarily distracted or unaware of their child's change in location. Although messaging about supervising young children is not a new concept, there are always first time parents that need to know this information and other parents or caregivers that can benefit from being reminded about the potential consequences of inadequate supervision. Awareness messaging should continue to emphasize the importance of providing constant supervision and the risks of distraction in supervision. Supervision messaging also needs to emphasize the risks that pools or natural bodies of water pose even when the intention is not to go in the water because children are inherently curious and can wander.

Youth between 15 and 18 are at a higher risk for drowning. In this review, the majority of deaths occurred in this age group. Developmentally, most youth are becoming independent from their parents. Despite this, parents remain in a key position to provide youth with access to safety devices (e.g. lifejackets/PFDs) and influence their behaviours by reinforcing water safety and drowning prevention messaging.

Research indicates that wearing lifejackets/PFDs can save lives. When youth have access to a boat, they should be instructed to wear lifejackets/PFDs and the importance of wearing these can be reinforced by parents. Additionally, parents need to know the risks associated with drowning, water safety and drowning prevention in relation to youth. If parents are informed, they are better equipped to reinforce actions that youth can take to reduce their risk of drowning.

Recommendation #2:

By the end of 2015:

The Canadian Red Cross and The Community Against Preventable Injuries will bring together key community stakeholders to develop and implement water safety and drowning prevention messaging for parents/caregivers on:

- supervising young children in, on and near water; and
- keeping teens safe in, on and near water.

Key community stakeholders include but are not limited to:

- B.C./Yukon Branch of the Lifesaving Society;
- The First Nations Health Authority; and
- School Districts.

Four sided pool fencing bylaw

Young children under the age of 4 years are at highest risk for drowning in a backyard pool. Backyard pool safety barriers are an essential component in the prevention of drowning in B.C.'s young children.

In B.C., bylaws relating to the construction and maintenance of backyard pool barriers are a municipal responsibility. Currently, there are 61 local governments in B.C. with bylaws specific to pool safety barriers. None of these bylaws require 4-sided fencing that would completely isolate a backyard pool.

Research indicates that a residential pool safety barrier should include: 4-sided fencing with a minimum height of 1.22 metres (4 ft), a self closing and self latching gate. Research also suggests that the risk of drowning deaths is further mitigated when homeowners or renters with a residential pool have at minimum, basic CPR and first aid training.

The B.C./Yukon Branch of the Lifesaving Society has already taken a leadership role in encouraging municipalities to either establish a bylaw or modify an existing bylaw that would require 4-sided fencing around backyard pools. Plans for the B.C./Yukon Branch of the Lifesaving Society to attend an upcoming Union of B.C. Municipalities convention to educate municipalities on this important issue are underway. The Panel members are in full support of this action.

Recommendation #3:

That the Union of B.C. Municipalities (UBCM) reviews this report for information and education purposes.

This review is intended to reinforce the efforts of the B.C./Yukon Branch of the Lifesaving Society to have municipalities consider establishing a bylaw that requires barrier fencing to limit child access to backyard pools. Specifically, it is suggested this bylaw include the following requirements:

- 4-sided fencing with minimum height of 1.22 m (4 ft);
- Self closing and self latching gate;
- Retrofitting of 4-sided fencing for existing pools; and
- Includes in-ground, above ground and inflatable pools.

This bylaw could be supplemented with water safety and drowning prevention education that would be provided to the homeowner or renter with a backyard pool.

RESOURCES

The following links refer to agencies mentioned in Part 2 of this report and are intended to provide further information about water safety and drowning prevention in children and youth.

Community Against Preventable Injuries

<http://preventable.ca/>

Lifesaving Society-B.C. and Yukon Branch

<http://www.lifesaving.bc.ca/>

Canadian Red Cross Society

<http://www.redcross.ca/>

International Life Saving Federation

<http://www.ilsf.org/>

GLOSSARY

Aggregate: Presentation of individual findings as a collective sum.

First Nations and Aboriginal: First Nations and Aboriginal is used throughout this document, indicating that the topic is inclusive to all First Nations, Métis and Inuit people (urban, rural and remote) in British Columbia regardless of their age or where they live.

Hypothermia: a condition that occurs when the body becomes cold and loses heat faster than the body can produce it. Normal body temperature ranges from 36.4 degrees Celsius to 37 degrees Celsius.

REFERENCES

- Ahlm, K., Saveman, B.I., Bjornstig, U. (2013). Drowning deaths in Sweden with emphasis on the presence of alcohol and drugs-a retrospective study, 1992-2009. *BioMed Central, Public Health*, 13:216, p. 1-10.
- Anderson, C., Law, J.K., Daniels, A., Rice, C., Mandell, D.S., Hagopian, L. and Law, P. A. (2012). Occurrence and family impact of elopement in children with autism spectrum disorders. *Pediatrics*, 130, p. 870-877.
- Banerji, A., Canadian Paediatric Society, First Nations, Inuit and Métis Health Committee (2012). Preventing unintentional injuries in indigenous children and youth in Canada. *Canadian Paediatric Society*, 17(7):393, p. 1-7.
- Branche, C.M. and Stewart S. (Editors)(2001). Lifeguard effectiveness: a report of the working group. Atlanta: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, p. 1-36.
- Brenner, R.A., Saluja, G. and Smith, G.S. (2003). Swimming lessons, swimming ability, and the risk of drowning. *Injury Control and Safety Promotion*, Vol 10, No. 4, p. 211-216.
- Brenner, R.A., Taneja, G.S., Haynie, D., Trumble, A.C., Qian, C., Klinger, R. and Klebanoff, M.A. (2009). Association between swimming lessons and drowning in childhood. *Archives of Pediatrics and Adolescent Medicine*, 2009; 169(3), p. 203-210.
- Brenner, R.A., Trumble, A.C., Smith, G.S., Kessler, E.P. and Overpeck, M.D. (2001). Where children drown, United States, 1995. *Pediatrics*, Vol 108, No. 1 July, p. 85-89.
- Burford, A.E., Ryan, L.M., Stone, B.J., Hirshon, J.M. and Klein, B.L. (2005). Drowning and near-drowning in children and adolescents. A succinct review for emergency physicians and nurses. *Pediatric Emergency Care*, Vol 21, No. 9, September, p. 610-616.
- Chen, Y, Mo, F., Yi, Q.L., Jiang, Y. and Mao, Y. (2013). Unintentional injury mortality and external causes in Canada from 2001 to 2007. *Chronic Diseases and Injuries in Canada*, Vol 33, No. 2, p. 95-102.
- Committee on Injury, Violence, and Poison Prevention and Weiss, J. (2010). Prevention of drowning. *American Academy of Pediatrics*, 126, p. e253-e262.
- Coskun, K.O., Popov, A.F., Schmitto, J.D., Hinz, J., Kriebel, T., Schoendube, F.A., Ruschewski and Tirilomis, T. (2010). Extracorporeal circulation for rewarming in drowning and near-drowning pediatric patients. *Artificial Organs*, Vol 34, No. 11, pp. 1026-1030.

- Driscoll, T.R., Harrison, J.E. and Steenkamp, M. (2004). Alcohol and drowning in Australia. *Injury Control and Safety Promotion*, Vol 11, No. 3, p. 175-181.
- Drowning Prevention Research Centre Canada (2013). Canadian drowning report. Prepared by the Drowning Prevention Research Centre Canada for the Lifesaving Society. Retrieved from: <http://www.lifesavingsociety.com/home.aspx>
- Fisher, K.J. and Balanda, K.P. (1997). Caregiver factors and pool fencing: an exploratory analysis. *Injury Prevention*, 3, p. 257-261.
- International Life Saving Federation (2012). Life Saving position statement-LPS 15. Basic aquatic survival skill.
- Kemp, A. and Sibert, J.R. (1993). Epilepsy in children and the risk of drowning. *Archives of Disease in Childhood*, 68, p. 684-685.
- Kyriacou, D.N., Arcinue, E.L., Peek, C. and Kraus, J.F. (1994). Effect of immediate resuscitation on children with submersion injury. *Pediatrics*, Vol 94, No. 2 August, p. 137-142.
- Martin, D.K. (2011). Drowning and sudden cardiac death. *Archives of Disease in Childhood*, 98, pg. 5-8.
- McDonald, G.K. and Giesbrecht, G.G. (2013). Vehicle submersion: a review of the problem associated risks, and survival information. *Aviation, Space, and Environmental Medicine*, Vol 84, No. 5, p. 498-510.
- Moran, K. and Stanley, T. (2006). Parental perceptions of toddler safety, swimming ability and swimming lessons. *International Journal of Injury Control and Safety Promotion*, Vol. 13, No. 3, p. 139-143.
- Morrongiello, B.A., Sandomierski, M., Schwebel, D.C. and Hagel, B. (2013). Are parents just treading water? the impact of participation in swim lessons on parents' judgements of children's drowning risk, swimming ability and supervision needs. *Accident Analysis and Prevention*, 50, p. 1169-1175.
- Mulligan, D. (2009). Management of water incidents: drowning and hypothermia. *Nursing Standard*, 24, 7, p. 35-39.
- Saylor, K. (2004). Injuries in aboriginal children. *Paediatric Child Health*, Vol 9, No. 5, p. 312-314.
- Shavelle, R.M., Strauss, D.J. and Pickett, J. (2001). Causes of death in autism. *Journal of Autism and Developmental Disorders*, Vol 21, No. 6, p. 569-576.
- Short, S.E., Yang, Y.C. and Jenkins, T.M. (2013). Sex, gender, genetics, and health.

- American Journal of Public Health*, Vol 103, No. 1, p. S93-S101.
- SMARTRISK. (2009). The economic burden of injury in Canada. SMARTRISK: Toronto, Ont. Retrieved from: <http://parachutecanada.org>
- Szpilman, D., Bierens, Handley, A.J., Orlowski, J.P. (2012). Drowning. *The New England Journal of Medicine*, 366; 22, p. 2102-2110.
- Tester, D.J., Kopplin, L.J., Creighton, W., Burkner, A.P., Ackerman, M.J. (2005). Pathogenesis of unexplained drowning: new insights from a molecular autopsy. *Mayo Clinic Proceedings*; 80(5), p. 596-600.
- Red Cross Society (2003). What we have learned: 10 years of pertinent facts about drownings and other water-related injuries in Canada 1991-2000. Retrieved from: <http://www.redcross.ca/>
- Canadian Red Cross Society (2010). Annual review 2009-2010. Ontario zone, p. 1-20. Retrieved from: <http://www.redcross.ca>
- Canadian Red Cross Society (2006). Drownings and other water-related injuries in Canada, 1991-2000. Module 2: ice and cold water. *Canadian Red Cross Society*, p.1-67.
- Thompson, D.C. and Rivara, F. (2010). Pool fencing for preventing drowning of children (review). *The Cochrane Collaboration*. Published by John Wiley and Sons, Ltd.
- Tipton, M., Eglin, C., Gennser, M. and Golden, F. (1999). Immersion deaths and deterioration in swimming performance in cold water. *The Lancet*, Vol 354, p. 626-629.
- Transport Canada and Canadian Red Cross Society (2011). Boating immersion and trauma deaths in Canada: 18 years of research. *Transport Canada and Red Cross Society*, p. 1-57.
- UNICEF (2004). Towards a world safe for children.
- Venema, A.M., Groothoff, J.W. and Bierens, J.J.L.M. (2010). The role of bystanders during rescue and resuscitation of drowning victims. *Resuscitation*, 81, p. 434-439.
- Vogel, L. (2010). Decades of water safety training culturally “irrelevant” to First Nation people. *Canadian Medical Association*, 182(12), p. E565-E566.
- Wintemute, G.J. and Wright, M. (1991). The attitude-practice gap revisited: risk reduction beliefs and behaviors among owners of residential swimming pools. *Pediatrics*, Vol 88, No. 6 December, P. 1168-1171.

Yanchar, N.L. Warda, L.J., Fuselli, P. and Canadian Paediatric Society Injury Prevention Committee (2013). Child and youth injury prevention: a public health approach. *Paediatric Child Health*, 17(9): 511, p. 1-8.

Zuckerman, G.B. and Conway Jr, E.E. (2000). Drowning and near drowning: a pediatric epidemic. *Pediatric Annals*, 29:6 June, p. 360-366.

Zukowski, S., Cross Government Research, Policy and Practice Branch, Office of the Chief Information Officer, Ministry of Labour and Citizens' Services (2008). Private pool fencing and other interventions to prevent the drowning of preschool aged children in British Columbia.