

A Review Of Best Practices

Preventing Suffocation and Choking Injuries In Manitoba

Prepared for Manitoba Health by



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INTRODUCTION

Suffocation and choking injury is the fifth leading cause of injury death for Manitobans and the seventh leading cause of unintentional injury death for Canadians.^{1,2}

In the literature, there is no universal definition of ‘suffocation’ or ‘suffocation and choking’. Authors have used categories of ‘inhalation/suffocation’ or even ‘drowning and suffocation’ and the decision to view choking as a subcategory versus a separate category (i.e., ‘choking’ and ‘mechanical suffocation’) is inconsistent.^{5,6,7} As well, hanging/strangulation and fire-related causes are sometimes included and other times excluded. It is important to be aware of the inclusions and exclusions relevant to the definition of suffocation and choking injury by different sources when reviewing materials or data reports.

This report focuses on the higher risk age groups of children less than 15 years of age and the elderly (greater than 65 years of age). It describes injury data, and examines risk and protective factors, inter-

ventions, and best practice recommendations to address the problem of suffocation and choking injury. Injuries among children and older adults are addressed separately, given these age groups have different risk and protective factors and different interventions. Intentional causes of suffocation and choking and incidents involving asphyxia from fires (e.g., smoke inhalation) are not included in this report. In the middle adult years, unintentional suffocation deaths are primarily work-related. These occupational hazards can include suffocation from lack of oxygen due to trench collapses, work in confined spaces, traumatic asphyxia, and inhalation injuries or incidents.⁸⁻¹¹ The fatality rate for confined spaces is 0.07 fatal work injuries per 100,000 workers.¹² Further information on work-related injuries, is available from the Manitoba Worker’s Compensation Board (www.wcb.mb.ca) of Manitoba Labour and Immigration’s Workplace Safety and Health Division (www.gov.mb.ca/labour/safety).

DEFINITION OF TERMS^{3,4}

Choking is an inability to breathe as a result of an internal obstruction in the airway.

Suffocation can be caused by the throat being constricted thereby restricting breathing, a lack of oxygen and a surplus of carbon dioxide in the body tissues (asphyxia), and being in a place or position resulting in a decreased capacity for breathing (entrapment). Mechanical suffocation includes numerous causes of mechanical airway obstruction such as suffocation that occurs in a bed or cradle, due to plastic bags, or related to accidental hanging.

Strangulation is a type of mechanical suffocation involving external constriction of the neck which interferes with respiration.

Suffocation and Choking: The Problem in Manitoba

Manitoba Health Data¹

Suffocation and choking is the fifth leading cause of injury death in Manitoba, equal to ‘assault’ in numbers of deaths.

The following figures depict unintentional suffocation and choking deaths by age group and gender.

The association between age and injury due to suffocation and choking is a U-shaped curve (Figures 1 and 2), where children and older adults are at greater risk than other age groups. Table 1 shows the ages for which suffocation and choking was a leading (top 5) cause of death. For individuals 35 to 64 years of age, suffocation and choking was not a leading cause of death.

Figure 1. Deaths Due to Suffocation and Choking in Manitoba, 1992-1999

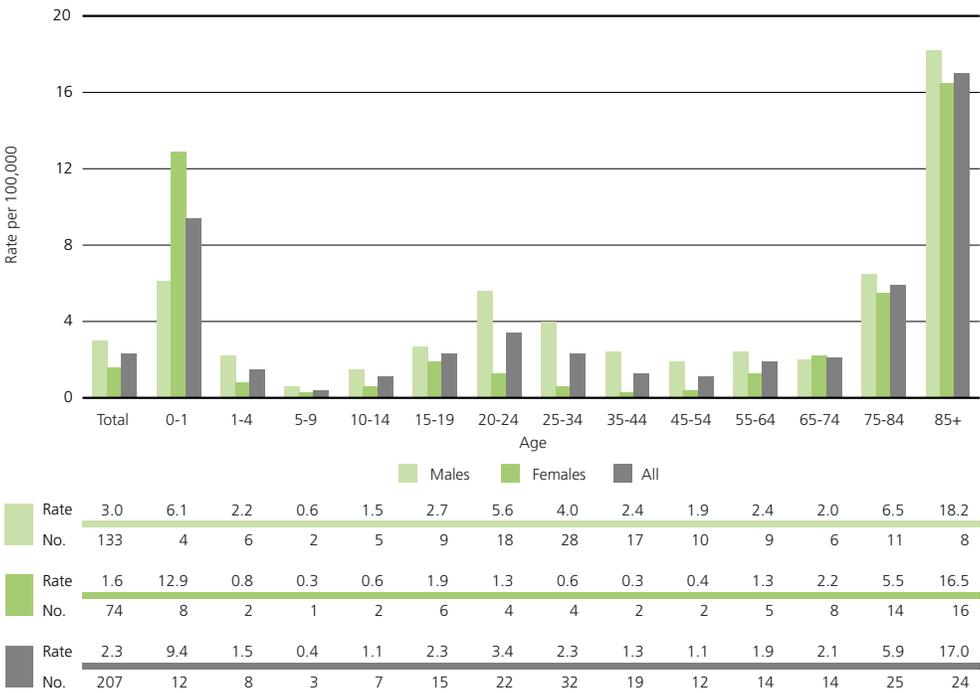


Table 1. Rankings for Suffocation/Choking as a Cause of Death in Manitoba, 1992-19991

Children		Adults	
Age Category	Ranking	Age Category	Ranking
Under 1 year	1	20-34 years	5
1-4 years	5	65-84 years	5
5-14 years	4	85+ years	4
15-19 years	5		

In Manitoba First Nations people, death due to suffocation and choking is the fourth leading cause of death, whereas for all Manitobans it ties as the fifth leading cause. Rates per 100,000 are 8.2 for First Nations Manitobans and 2.1 for Non-First Nations Manitobans.¹

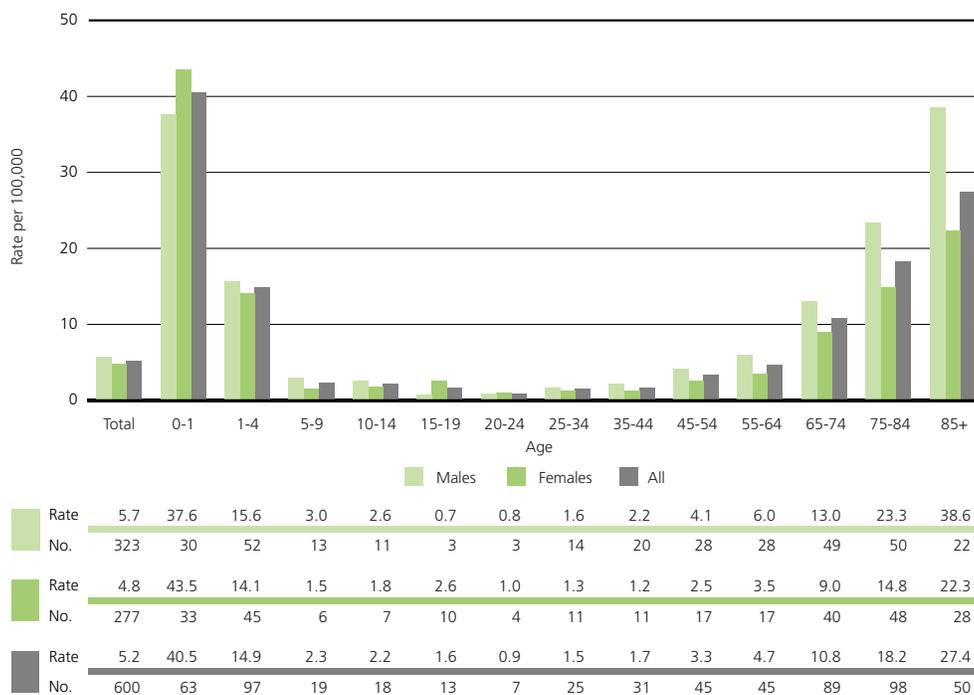
Manitoba data show that there were 207 fatalities (1992-1999) and 600 hospitalizations (1992-2001) due to suffocation or choking-related injuries which equates to an average of 26 deaths and 60 hospitalizations per year.¹ Annual Chief Medical Examiner reports (1992-2001) show an average of eight deaths from asphyxia each year.¹³ This does not include undetermined asphyxial deaths (approximately four per year) where intent is unknown. Suffocation and choking deaths resulted in 6,907 potential years of life lost (PYLL), with an average of 33.4 potential years of life lost per fatality.¹ Relative to other injury types the total PYLL is in the mid-range, however, the average PYLL per suffocation and choking death is higher than the average rate for all injury types combined. Deaths to young children have more impact when computing PYLL since the age of each victim is subtracted from 75 years of age.

Unintentional suffocation and choking was a leading cause of hospitalization (4th) solely for infants under one year of age. The ratio of deaths to hospitalizations (1:3) for suffocation and choking is lower than for most injury categories. One study which compared mortality and morbidity data showed that the ratio of deaths rates to admission rates was 1:3 while the ratio for all injuries types was 1:39.¹⁴ Comparing the rates in Manitoba, there is a similar ratio of 1:2. The ratio of fatal suffocation injuries to non-fatal Emergency Department visits has been documented as 1:14 (US data).¹⁵

Economic Impact

The Economic Burden of Unintentional Injury in Manitoba combines ‘drowning and suffocation’ as a cause of injury.⁶ Supplementary data in the report’s appendix show that each year in Manitoba, this category accounts for \$1,291,612 in direct costs and \$19,868,693 in indirect costs. The total cost of ‘drowning and suffocation’ is \$21,160,305, which represents 2.6% of the total unintentional injury costs (\$819.43M) for the province. It is not possible to isolate the costs attributable solely to suffocation.

Figure 2. Hospitalizations Due to Suffocation and Choking in Manitoba, 1992-2001



METHODOLOGY

Literature Search

Databases

Eight electronic databases were searched for research articles on the topic of suffocation and choking. The databases included CINAHL (1982-2005/01), EMBASE (1980-2005/02), MEDLINE (1966-2005/02), PsycInfo (1972-2005/02 wk 3), PubMed (1951-2004), Allied and Complementary Medicine (1985-2005/02), ERIC (1966-2004/06) and Social Sciences Full Text (1983/02 to 2004/09). Search terms included 'choking', 'suffocation', 'aspiration', 'foreign bod*' (* - all endings searched), 'injury prevention', and 'review'. On-line archives of the Injury Prevention journal were searched (ip.bmjournals.com) using the headings 'choking' and 'suffocation' to identify any additional articles or relevant editorial content. Cochrane databases were also searched for systematic reviews and studies of suffocation and choking prevention initiatives. These searches focused on identifying systematic reviews of evaluated interventions, other interventions, as well as capturing the risk factors associated with suffocation and choking injury.

Internet Searches

The Google search engine (www.google.ca) was used to search for best practices and systematic reviews on the topic of suffocation and choking

injuries. Search terms were the same as described above. In addition, many injury-specific websites were targeted including:

- The Center for Disease Control's National Center for Injury Prevention and Control (www.cdc.gov/ncipc),
- Safe Kids Canada (www.safekidscanada.ca),
- Health Canada's Injury Section (www.hc-sc.gc.ca/pphb-dgspsp/injury-bles),
- The Harborview Injury Prevention & Research Centre (www.depts.washington.edu/hiprc),
- The World Health Organization's Department of Injuries and Violence Prevention (www.who.int/violence_injury_prevention),
- and international injury prevention centres.

Other Sources

An additional source was the IMPACT library, which includes resource material, relevant texts, and injury data reports.

SUFFOCATION AND CHOKING AMONG CHILDREN

Injury Profile

Deaths and Hospitalizations

Approximately 63 deaths and nearly 800 hospitalizations among children and youth less than 20 years of age are due to suffocation and choking injuries each year in Canada (Table 2).³ Each year in Manitoba, there are an average of 5.6 pediatric deaths and 21 hospitalizations due to suffocation and choking.¹ Paediatric Death Review Committee (1990-1999) data document that an average of three children less than 15 years of age are fatally injured due to unintentional suffocation or choking injuries each year in Manitoba.¹⁶ Manitoba has a higher pediatric hospitalization rate than the national average for suffocation and choking (14.5 vs. 11.0 per 100,000).³ These injuries may be classified by mechanism (type or circumstance) of incident. Specific mechanisms can be coded using the International Classification of Diseases (ICD), such as choking on food and non-food items, or mechanical suffocation, which is separated into further categories.¹⁷ For children, the most frequent type of suffocation or choking incident causing death is unintentional hanging, followed by choking on a non-food object, with food-related incidents occurring nearly as often. Crib-related injuries include becoming entrapped, such as in an opening or gap between widely spaced slats, or being hung by a cord (e.g., from a pacifier cord). Cribs accounted for 75% of the bed/cradle injuries.³

Emergency Department Data (CHIRPP)

The Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP), is an injury surveillance system that collects information on emergency department visits in 10 pediatric hospitals in Canada, including the Winnipeg Children's Hospital. CHIRPP is a voluntary system where parents and physicians are asked to complete a standardized form and provide information on injuries treated in the emergency department. Suffocation and choking injuries were searched in the Winnipeg CHIRPP database for the same period as the most recent Manitoba Injury Data Report (1992-2001).

No choking and suffocation incidents were found in the CHIRPP database for the years 1998-2000, and significant discrepancies were apparent among annual counts for the remaining years. The 167 records obtained were screened, and all intentional and fire-related suffocation cases were removed. All years with less than five cases reported were excluded. This resulted in an analysis of 1993-1996 data, which included 143 records.

There was an average of 36 injuries per year which represents 0.61% of all Children's Emergency Department CHIRPP visits for injuries during the study period. As seen in Figure 3, choking and suffocation injuries in Manitoba were stable between 1993 and 1995, and decreased in 1996. These trends were not tested statistically and need to be confirmed by additional years of data or supplemental chart review. Table 3 illustrates suffocation and choking injury visits by age group.

Table 2. Annual Deaths and Hospitalizations for Choking and Suffocation by Age and Mechanism Among Canadian Children and Youth, 1990-1992 (0-19 years)³

External cause of injury, ICD-9	Deaths		Hospitalizations	
	N	%	N	%
Inhalation and ingestion of food (E911)	13	20.1	409	51.5
Inhalation and ingestion of other object (E912)	15	24.3	348	43.8
Mechanical suffocation (E913)	35	55.6	37	4.6
In bed or cradle (E913.0)	12	19.0	7	0.8
By plastic bag (E913.1)	1	1.1	2	0.3
Accidental hanging (E913.8)	17	27.0	20	2.5
Other (E913.2, .3, .9)	5	8.5	8	1.0
Total	63	100.0	792	100.0

Figure 3. Emergency Department Visits for Choking and Suffocation Injuries (CHIRPP, 1993-1996)

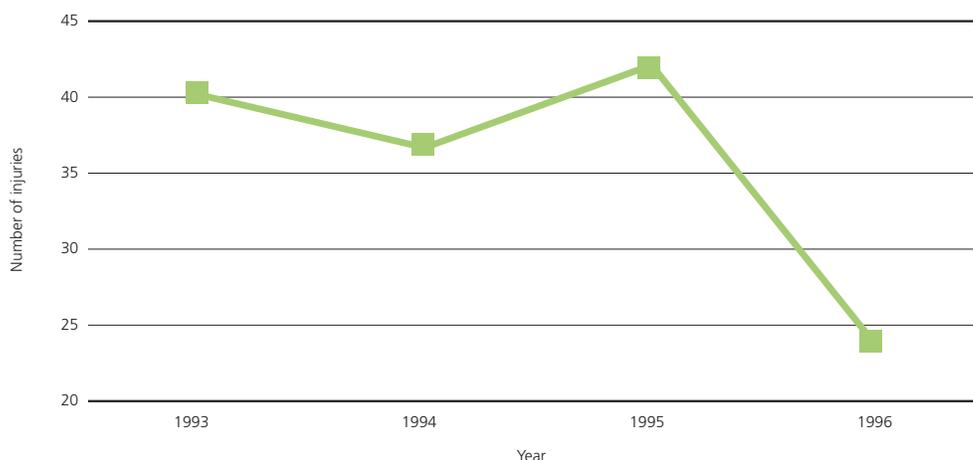


Table 3. Choking and Suffocation Emergency Room Visits by Age Group

Age Group	Number of Injuries	Percentage
Less than 1 year	16	11%
1-4 years	89	62%
5-9 years	26	18%
10-14 years	8	6%
15-19 years	4	3%
Total (0-19 years)	143	100%

Months with a higher number of injuries included July (11%), December (11%) and September (11%), followed by October (10%) and April (10%), however variability by month had a range of only 6%. Injuries occurred more often on Saturdays (20%) and Wednesdays (17%) followed by Sundays (16%). When time was specified, 39% of injuries occurred between 4:00 p.m. and 8:00 p.m., 25% occurred between noon and 4 p.m., and 23% occurred between 8:00 p.m. and midnight.

Where location was specified, 86% of choking and suffocation injuries occurred in the child's own home. Activities most often engaged in at the time of injury were playing (59%) and eating or drinking (24%). Common injury circumstances included 'an object or person inappropriately located' (50%), using an item not in accordance with instructions (31%), and something being caught in the airway (16%).

For all cases, the mechanism was coded as 'suffocation'. Over half of the ingested items were coins, 8% were bones/meat/poultry/fish and another 8% were nuts.

Other noted categories are listed below:

- Candy
- Cereals/grains
- Foods and beverages
- Fruits/vegetables
- House plants
- Jewellery
- Kitchen gadgets/items
- Metal pieces – unknown origin
- Musical instruments/accessories

- Nails/screws/bolts/tacks
- Pens/pencils
- Pins/needles
- Plastic pieces and products
- Safety pins
- Seasonal decorations
- Seeds/berries
- Sticks, not attached to tree/bush
- Tie/belt racks/clothes hangers
- Toys
- Wood items

When the nature of the injury was identified, it was most often a foreign body in the alimentary (69%)

or respiratory (25%) tracts. The thorax was the body part involved (87%) in most cases.

Table 4 illustrates the outcome of the Emergency Department visit for choking and suffocation injuries for 1993-1996 as well as the results for all injuries. The average rate of hospital admission was 12.9% for all injuries. Following assessment at the Emergency Department for choking/suffocation, 9% of patients were given advice, 4% were treated with follow-up as needed, 1% required follow-up, and 86% were admitted to hospital. This represents an extremely high rate of hospital admission. The average rate of hospital admission for all injuries in Manitoba (1992-2001) was 10.9% (unpublished CHIRPP data). The above result is eight times this rate and also is much higher than that found in the Canadian CHIRPP report (34%) for choking and near-choking injuries.²

Table 4. Comparison of Disposition for Choking and Suffocation Injuries vs. All Injury Types Combined

Year	Choking and Suffocation Injuries				All Injury Types					
	1993	1994	1995	1996	1993	1994	1995	1996		
# Injuries			42	39	46	27	5,861	5,673	5,550	6,430
# Admitted to hospital			36	36	36	18	819	731	806	685
Percent hospitalized			86	92	78	67	14	13	14.5	11

Risk Factors

Knowledge of the risk factors associated with pediatric suffocation and choking injuries can aid in the development of effective prevention strategies.

Age

Very young children are most at risk for suffocation and choking injuries. These injuries are the leading cause of injury death for infants less than one year of age and the fourth leading cause of injury hospitalization for this age group.¹ A study assessing choking in children less than five years of age demonstrated that infants accounted for 55% of cases.¹⁸ Canadian, United States, and Manitoba data demonstrate that hospitalization rates decline as

children progress from infancy to adolescence.^{1,3,19} Table 5 illustrates the mechanisms of suffocation and choking deaths and hospitalizations for different pediatric age groups. The mechanisms and circumstances for pediatric suffocation and choking deaths are age-specific.¹⁸ While food items are more commonly aspirated by infants and toddlers, non-food objects (e.g., coins, pen caps, pins, and paper clips) are more often aspirated by older children.^{20,21}

Injuries to infants tend to occur in areas where they sleep and are due to wedging (40%), facial occlusion (24%), overlying (8%), entrapment with suspension (7%), and hanging (5%).²²

Table 5. Unintentional Suffocation and Choking Deaths in Manitoba Children (0-14 years)³

Cause	<1 years		1-4 years		5-9 years		10-14 years	
	#	Rate*	#	Rate	#	Rate	#	Rate
Deaths								
Choking on Food	1	0.8	2	0.4				
Choking on non-food object	4	3.1	2	0.4				
Suffocation by plastic bag								
Suffocation in bed or cradle	3	2.4	1	0.2				
Hanging ex in bed or cradle	2	1.6	2	0.4	3	0.4	6	0.9
Not specified	2	1.6	1	0.2			1	N/A
Total	12	9.4	8	1.5	3	0.4	7	1.1
Hospitalizations								
Choking on Food	43	27.6	53	8.1	2	0.2	1	0.1
Choking on non-food object	16	10.3	38	5.8	14	1.7	8	1.0
Suffocation by plastic bag								
Suffocation in bed or cradle	2	1.3						
Hanging ex in bed or cradle			5	0.8	3	0.4	7	0.9
Not specified	2	1.3	1	N/A			2	N/A
Total	63	40.5	97	14.9	19	2.3	18	2.2

*Note: Rates are expressed per 100,000

First Nations Populations

In Manitoba children, the highest injury death rate was for female First Nations infants (21.2 per 100,000); this rate was nearly twice the rate for Non-First Nations female infants (12.2 per 100,000). There were eight other deaths to First Nations children. Six of the nine First Nations child deaths (67%) involved males including a 5-9 year old, a 10-14 year old, and two 15-19 year olds. The remaining two deaths were to 15-19 year old females. Across genders, the highest pediatric suffocation injury death rate was for 15-19 year olds (12.5 per 100,000).

Gender

For Manitoba children 0-14 years of age, suffocation and choking mortality and hospitalization rates are slightly higher for males. The male to female ratios are 1.3:1 for deaths (17 vs. 13) and 1.2:1 for

hospitalizations (106 vs. 91).¹ Similarly, Canadian data for 1991 document child death rates of 1.0 for males and 0.6 for females per 100,000.³ For hospitalizations, the rate for male children is 12.6 and for females 9.3 per 100,000. Gender differences were not found in a study of mechanical suffocation in infants less than 13 months of age.²²

Specific Injury Mechanisms

Suffocation and choking can result from a variety of mechanisms. Health Canada (www.hc-sc.gc.ca) and the United States Consumer Product Safety Commission (CPSC) (www.cpsc.gov) have issued many warnings regarding choking and suffocation hazards including crib toys, small balls, balloons, infants sleeping in adult beds, and soft bedding. The diagram below summarizes leading choking and asphyxiation causes for children less than five years of age.

Figure 4. Suffocation, Asphyxia and Choking Injury

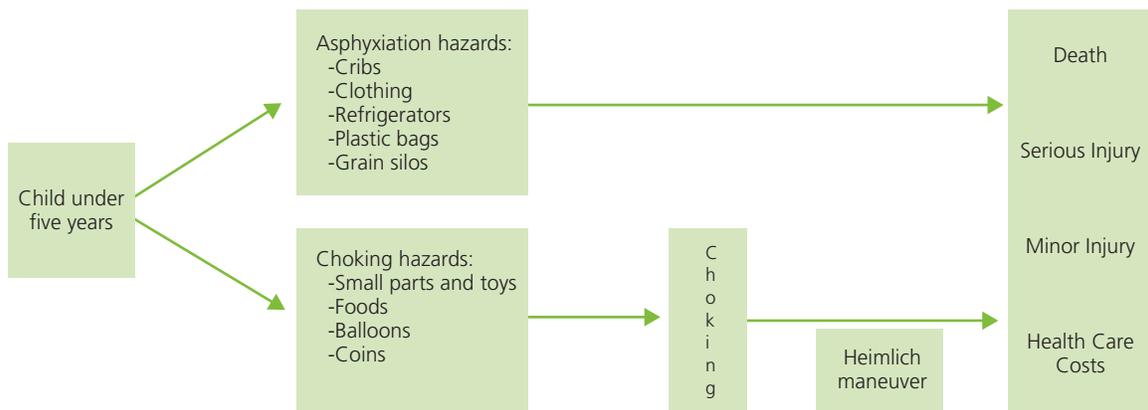


Figure adapted from the Harborview Review²³

Choking on Food

As illustrated in Table 5, food is a significant cause of choking. Young children cannot chew food effectively; solid foods are not broken down into manageable pieces before being swallowed. Also, young children cannot readily prevent and abort a potential choking episode.²⁴ In children less than five years of age, round food (e.g., hot dogs, nuts, grapes, candy) is the predominant cause of fatal asphyxiation.²⁵ One study found that hot dogs were responsible for 50% (six of 12) of fatal food-related choking incidents in children less than 10 years of age.²⁶ A recent fatality involved a nine-year old child in Kenora. Other common foods that cause choking in children include nuts, seeds, raw carrots, and popcorn kernels.^{27,28}

Two recent articles have highlighted the dangers associated with Asian gel candies that contain the binding agent konjac and can cause upper airway obstruction.^{29,30} Six fatal cases were described with ages spanning from eight months to five years of age. Two cases were female, and in two cases the mother provided the candy. It was recommended that physicians provide parents with anticipatory guidance about the dangers of this candy.^{29,30} While the Food and Drug Administration has since issued warnings about the choking hazard associated with these gel candies for children less than three years of age, fatalities may not be limited to these ages.

Choking on Non-Food Objects

A recent study of children 14 years of age or less in the United States showed that 41% of choking deaths were due to food and 59% were due to non-food items.¹⁹ Several studies, including the Manitoba CHIRPP report, confirm that coins are the most common non-food item causing choking among children.^{18,19,31} One study demonstrated that non-food choking fatalities often resulted from ingesting small, round, and sometimes pliable objects (e.g., balls, balloons).²⁰ Less common non-food items that have led to choking incidents include a barrette, a hair clip, a bottle cap, crib material, plastic wrap, a crayon, plastic cup fragments, and plastic decals from child products (e.g., car seats).^{18,32-34} Hollow hemispherical or egg-shaped objects such as toys, lids, and containers also pose a hazard risk as they can cover both the nose and mouth, thereby creating a seal and causing suffocation.^{4,35} These are dangerous for use during play and as items in the child's crib or playpen.

A study of non-nutritive mouthing behaviour found that children six to nine months of age are most likely to put items in their mouths.³⁶ This decreases after nine months. A variety of toys and other items were mouthed; 49% were plastics and 24% were fabrics.³⁶ Young children mouth practically any object irrespective of its shape, size, or consistency.³⁷

Balloons

Uninflated balloons and balloon fragments can be fatal for children.³⁸ Between 1972 and 1992, balloons were the cause of 29% of non-food-related choking fatalities reported to the CPSC.³¹ These are described as 'conformity objects' as they take the shape of the spaces where they are lodged, blocking the airway completely.^{37,39} Balloons and pieces of balloons pose a high choking risk to children of all ages. Toy balloons are the leading cause of pediatric choking deaths due to children's products.^{31,40}

Toys

An annual survey of toy stores showed that while hazardous toys continue to be available on store shelves, more of them include warnings for small parts, balls, marbles, and balloons as required by law.⁴¹ The CPSC mandates that toys with small parts must contain a warning regarding use by children less than three years of age (www.cpsc.gov). Toy packaging, therefore, often contains age-related warning labels. In Canada, this is governed by the Hazardous Products Act. A survey of toy buyers showed that some parents do not view the age recommendations as a warning. The phrasing of the message was also relevant. When the warning read 'Recommended for children three and over' 44% said they might buy the item for a two or three year old child. Only 4% would buy a product that was labelled 'Not recommended for a child less than three years old – small parts'.⁴² The latter statement identifies the age-specific hazard and may better inform parents of the choking risk.

Furniture-Related Injuries

Adult Beds

Bed sharing and the use of adult beds for infants is discouraged by the Canadian Paediatric Society since they can lead to death by suffocation.⁴³ There are additional risks when parents smoke or are under the influence of alcohol or drugs.⁴⁴ One study found the risk of suffocation is 20X greater for

children who are placed for sleeping in adult beds as opposed to cribs.⁴⁵ Fatal injuries can result from adult beds when the child becomes wedged between the mattress and wall, adjacent furniture, bed frame, or bed railings. There is also a risk of strangulation on bed railings and youth guard rails and suffocation on water beds.⁴⁶ Infants should not be put to sleep on sofas and chairs since they present an even greater risk than adult beds.

Cribs/Playpens

United States data show that 60% of mechanical suffocation incidents among infants involve a bed or cradle.⁷ Many authors have highlighted the need for infants and young children to have a safe sleep environment, including a crib that is in good condition, conforms to current safety standards, has a firm, tight fitting mattress, and no soft bedding or pillows.^{22,43,45,47,48} A recent warning (September 2003) from the CPSC discusses the risks associated with Graco's Pack 'n Play portable play yards with raised change tables.⁴⁹ When the change table is in place a child can lift it up and become trapped between the change table and the play yard rail, causing a strangulation hazard. This has led to fatalities including a one-year old Manitoba boy in 2004.

Car Seats

Suffocation may also occur due to a car seat or infant seat overturning onto a soft surface (e.g., waterbed, or bed). A study of national CPSC data (NEISS) from 1997 found 15 incidents of seat overturn involving children between six and eight months of age.⁵⁰ Many parents are not aware of these risks.

Entrapment

Children may suffocate due to inadequate oxygen supply when trapped in furniture or appliances. Fatal incidents have involved freezers, toy chests, and cedar chests.⁴⁴

Strangulation

Unintentional strangulation injuries include incidents where children are injured by blind cords, necklaces, clothing, or cords attached to clothing (e.g., drawstrings, ribbons, mitten cords, pacifier strings).⁴⁴ Looped blind cords present a hazard to children as a child can easily be strangled by placing their head through the loop of the cord.⁵¹ While the

blind cord itself poses a risk, so does the inner cord that can be pulled out between the blinds and form a loop, presenting a similar strangulation hazard.

Children's Products

Children's products and the restraints used to secure children in these devices can pose a risk to children in terms of entrapment and strangulation. Children's furniture such as beds, high chairs, infant swings, infant carriers, playpens, and strollers present strangulation hazards, particularly when items and restraints are misused. Graco, a prominent child product manufacturer, has recently received a \$4 million fine due to failure to report hundreds of incidents, injuries and fatalities that occurred from use of their products. The monetary penalty was imposed by the CPSC. In addition, Graco is currently recalling 1.2 million toddler beds due to a risk of limb entrapment between slats in the guardrail or footboard.

Other Sleeping Hazards

Co-Sleeping

Co-sleeping is not recommended by the American Academy of Pediatrics, Canadian Paediatric Society, or the CPSC. A policy statement regarding safe sleep environments for infants and children was recently published by the Canadian Paediatric Society.⁴³ This statement recommends the crib as the safest sleep location, and also urges hospitals to develop policies regarding bedsharing of parents and infants in hospital beds.

Sleep Positioning /SIDS

Sudden Infant Death Syndrome (SIDS) is the sudden death of an apparently healthy infant less than one year of age whose death remains unexplained following an autopsy, an examination of the circumstances of death, and a case history review (www.sidscanada.org). Sudden Unexpected Infant Death (SUID) is a newer classification now used for SIDS-like cases which have a suggested but unconfirmed risk factor or cause. There are a number of ways to reduce the risk of SIDS and SUID.

The American Academy of Pediatric's Back to Sleep recommendation is a new initiative that encourages parents to place healthy babies on their backs for sleeping at all times. Research shows that compliance with this recommendation is not complete. A

study of childcare centres in the United States showed that while many caregivers were aware of the recommendation, they still failed to comply. Reasons for non-compliance included the child's comfort and fears of the child choking.^{55,56} Similar results were found with nurses on pediatric and maternity units; 97% were aware of the recommendation yet only 29% of infants were placed on their backs to sleep.⁵⁴ In another study, 64% of mothers who were aware of the Back To Sleep recommendation complied with this practice.⁵⁷

Suffocation by Plastic Bags

Plastic bags present a suffocation risk for infants and children. Parents and caregivers continue to be relatively unaware of this injury mechanism.^{7,22} Due to its conformity, plastic film, such as dry cleaning bags, is one of the more lethal materials.

Other Factors

Unsafe sleeping arrangements have resulted in unintentional suffocation fatalities (e.g., wedging between the mattress and headboard or crib rail, overlying). Risk factors include soft bedding or pillows, and bed-sharing.⁵²⁻⁵⁴

Older siblings may provide hazardous food or non-food items, thereby increasing a young child's risk of choking or suffocation.^{7,24} Parents may also rely on them to provide supervision or assistance that is beyond their capability. Other factors which put infants at risk include being of low birth weight and having a young mother.²⁴

INTERVENTIONS

Choking Prevention

The effectiveness of several injury reduction regulatory strategies has been investigated. Fatalities associated with suffocation from refrigerator/freezer entrapment and plastic bag related suffocation declined following the introduction of preventive countermeasures.⁵⁸ It is unknown whether this outcome was entirely due to legislation. In Canada, death rates for choking and suffocation have decreased from 1960-1992 from a rate of 5.6 to 0.6 per 100,000 for females and 8.6 to 1.0 per 100,000 for males.³ This may be due to a combination of regulation, product redesign and public education.

As suffocation and choking prevention interventions have not been rigorously evaluated, it is necessary to rely on expert opinion and injury data for recommendations. Strategies to prevent suffocation and choking injuries should be tailored to children's developmental stages and the specific mechanisms known to be implicated.

Product Design and Regulation

Children's products and other hazards (e.g., plastic bags) can be modified in terms of design and labelling. The Hazardous Product Act includes bans on dangerous products and design and labelling requirements to protect children from these hazards.^{59,60} For instance, a toy that a child is capable of entering that can be closed by a lid or door must have openings on at least two sides. Toys likely to be used by a child less than three years of age must pass a small parts test. Some items are regulated through consumer warnings (e.g., balloons) while others are not regulated (e.g., clothes with drawstrings and blind cords). Aesthetics, label placement and wording can affect whether the warnings will be adhered to.⁴²

The United States Consumer Product Safety Commission (www.cpsc.gov) and Health Canada's Consumer Product Safety Program (www.hc-sc.gc.ca) have issued warnings to alert the public of choking and suffocation hazards (e.g., toys with small parts, balloons). Parents should ensure that

they purchase age-appropriate toys and follow toy warning labels (e.g., small parts, not suitable for a child under three years of age).

Education

Education alone is not recommended as a strategy as it does not consistently lead to injury reduction and behaviour change. Education may, however, complement other strategies.⁶¹ Educating parents during well-child visits improves certain safety practices (e.g., car restraint use) but not others.⁶⁵ Instructing parents about prevention strategies for suffocation and choking may lead to positive behavioural changes.⁶³⁻⁶⁷ Targeted, simple, action-oriented messages are recommended, along with periodic reinforcement. Education regarding the prevention of suffocation and choking injuries should be tailored to the child's developmental stage. Dissemination of this information is important to ensure that prevention messages are reaching relevant caregivers (e.g., babysitters, day care workers).

Parents should regularly scan their home environment for new hazards.

Children less than four years of age should not be given or have access to, any of the following foods or objects:^{28,68-70}

- Balloons (latex)
- Button batteries
- Buttons
- Candy (hard/round)
- Chewing gum
- Coins
- Fruit with seeds
- Hot dogs
- Key rings
- Nuts or seeds
- Pins
- Plastic bags

- Popcorn
- Raisins
- Raw fruits or vegetables
- Sausages
- Spoonfuls of peanut butter
- Toys with small parts
- Whole grapes

Parents can assess whether home items constitute a choking hazard by verifying if they completely fit inside the inner cardboard tube of a standard toilet paper roll. A small parts tester can also be purchased (www.safekids.org). Items that can completely fit in this tester are potential choking hazards.

The following recommendations can aid in the prevention of food-related choking incidents and apply to children younger than four years of age:⁷¹

- Do not give children less than four years of age nuts, popcorn, gum or hard candy
- Grate hard fruits and vegetables
- Cut softer fruits and vegetables
- Remove all bones
- Cut hot dogs in thin strips and then into small pieces
- Slice grapes lengthwise

Toy Safety

Parents should purchase age-appropriate toys and regularly assess their children's toys for broken or loose parts. This includes ensuring that eyes and noses of stuffed animals are securely fastened. It is important that older children's toys are not accessible to younger children. Parents should be aware of the risk of fatal suffocation injury from toddlers and older children becoming trapped in an enclosed space (e.g., toy box with a lid).

Suffocation Prevention

Parents should be informed about a safe sleep environment. This includes ensuring the child's crib meets federal safety standards; using a firm tightly fitting crib mattress to reduce entrapment risk;

placing child on his/her back for sleeping; not putting pillows, stuffed animals or blankets in the crib; not allowing children to sleep in adult beds; and not engaging in co-sleeping.^{43,46,70,72}

SIDS Prevention

It is recommended that to help prevent SIDS parents and caregivers should always place babies to sleep on their back, keep the environment free from smoke and ensure that the child does not overheat.^{43,48,73}

Strangulation Prevention

Toddlers and older children are at increased risk of strangulation due to their increased mobility and physical development. Blind cords should be kept out of reach of children by cutting them short (tassels can be added to each end), tying the cord up, wrapping the cord around a high hook, and avoiding placing any children's furniture (e.g., high chair, crib, playpen) near such window coverings.⁶⁹ The window covering industry has responded to these risks. Window blinds sold since 1995 no longer have looped outer cords (or have a safety device which breaks the loop) and those sold since 2000 have been redesigned so that the inner cord cannot be pulled into a loop.⁷⁴⁻⁷⁶

Drawstrings on children's clothing and mitten cords have resulted in strangulation deaths. Removing strings and cords from children's upper outerwear and hoods and ensuring that strings and cords are not attached to or adjacent to the crib area can eliminate the risk of strangulation. Fatal incidents involving older children have resulted from the use of ropes and cords, such as tying a skipping rope to a play structure or tree.⁷⁷

Supervision

Since supervision is one of the strongest protective factors for many injuries within the home parents should be encouraged to supervise their children at all times, particularly during meals and play time.⁷⁹ Emphasis should be placed on sitting while eating, playing with age-appropriate toys, and not allowing an older sibling to supervise a younger sibling.

See Table 6 for further recommendations based on expert opinion.

Table 6. Recommendations to Prevent Suffocation and Choking Based on Expert Opinion

	American Academy of Pediatrics ⁶⁸	American Medical Association ⁶⁹	Canadian Paediatrics Society ^{43,73}	IMPACT ^{70,80}	Plan-It Safe ⁸¹	Safe Kids Canada ⁷¹	US Consumer Product Safety Commission ^{38,78,82}
Choking Prevention							
Food-Related Items							
Certain foods (hot dogs, popcorn, raisins, nuts, seeds, foods with seeds, whole grapes, peanut butter) should not be given to children less than four years of age.	•	•		•	•	•	•
Special preparation is needed for foods given to infants and children less than four years of age	•	•		•	•	•	
Ensure that children sit down when eating (i.e., never run, walk, lie down or play with food in their mouths)	•	•				•	
Encourage children to chew food thoroughly		•					
Supervise infants and children closely	•						
Ensure older children do not give younger siblings food or objects that present a choking risk	•	•					•
Non-Food Items							
Don't give latex balloons to children	•	•		•	•	•	•
Keep small household items out of reach of infants and young children	•						
Toys							
Do not provide toys with small parts to children less than 36 months of age	•	•			•		•
Check toys frequently for loose or broken parts		•		•	•		
Check that the eyes and nose of stuffed animals are secure							•
Clean up carefully after older children have finished playing with games or toys with small parts and discourage older children from sharing their toys with younger children	•	•		•	•	•	
Follow age recommendations on toy packages	•	•		•	•	•	•
Never buy vending machine toys for small children as they are not required to meet safety standards and often contain small parts		•		•			
Secondary Prevention							
Learn CPR and first aid in case of emergency	•					•	

	American Academy of Pediatrics ⁶⁸	American Medical Association ⁶⁹	Canadian Paediatrics Society ^{43,73}	IMPACT ^{70,80}	Plan-It Safe ⁸¹	Safe Kids Canada ⁷¹	US Consumer Product Safety Commission ^{38,78,82}
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Suffocation Prevention

Beds/Cribs							
The crib should meet current safety standards				•			•
Never place an infant face down on soft bedding or soft objects (e.g., pillow, fluffy bedding, stuffed toy) and do not put these in the crib		•	•	•			•
Ensure infants sleep on a firm mattress that fits snugly in the crib		•	•	•			
Do not allow children to sleep in adult beds			•	•			
Never put an infant down on a mattress covered with plastic or a plastic bag		•					
Place infants to sleep on their back			•				•
Promptly dispose of plastic wrap, plastic shopping bags and plastic dry-cleaning bags		•		•			

Preventing Unintentional Hanging/Strangulation

Keep blind and curtain cords out of reach				•	•		
Use mitten clips and neck warmers as opposed to mitten cords and scarves				•	•		
Do not attach pacifiers with long cords to cribs or clothing				•		•	
Remove drawstrings from children's clothing				•			•

RECOMMENDATIONS

CHILDHOOD SUFFOCATION AND CHOKING PREVENTION BEST PRACTICES

Recommended based on expert opinion

Supervise young children at all times

For children <4 years of age, special food preparations are recommended

Do not give young children nuts or raisins, gum, popcorn, hard candy, foods with seeds, hot dogs, raw vegetables or spoonfuls of peanut butter

Keep small objects out of reach (coins, batteries, buttons, pen caps)

Children should not play with latex balloons

Remove drawstrings and cords from clothing (hoods, waistline)

Never attach cords to cribs or place cribs or playpens near hazards (e.g., blind cords)

Infants should be placed to sleep on the back in a crib that meets current safety standards

Educate parents about suffocation and choking hazards

Adhere to age-related product warning labels on toys

Follow instructions for child equipment including restraint use

Parents should learn CPR and the Heimlich manoeuvre

Educate parents regarding the risks of co-sleeping and the risks of placing infants to sleep on adult beds and mattresses, sofas, and chairs

APPLICATION OF FINDINGS

Recommendations for the prevention of suffocation and choking injuries among children are applicable to parents, the health care sector, childcare, the manufacturing and retail sectors, restaurants and the food industry, and all levels of government. Outlined below are suggested strategies for reducing childhood deaths and injuries due to suffocation and choking.

Parents

- Parents should ensure that objects that are choking hazards for young children (e.g., toys with small parts) are not accessible in the home or other settings their children are exposed to, such as schools and daycares.
- Parents should actively supervise their children.
- Parents should continuously monitor the home for choking and suffocation hazards.
- Parents should ensure that used equipment is in good condition, has all parts intact, and complies with current safety standards.
- Parents should always place children to sleep on their backs.

Physicians

- Physicians should provide parents with age-appropriate education/information regarding suffocation and choking hazards and relevant prevention measures.
- Physicians should be encouraged to educate the public regarding ways to prevent suffocation and choking, through the media or other venues.

Child Care Centres

- Childcare providers should be familiar with the Back To Sleep initiative and develop safe sleep policies.
- Childcare facilities should ensure that they provide a safe environment and a safe sleep

environment, including monitoring for and eliminating choking and suffocation hazards.

- Childcare facilities ensure that their cribs and playpens meet current safety standards and are carefully maintained.

Public Health Nurses/Home Visitors

- Public health nurses should provide information regarding suffocation and choking hazards in the home during home visits and other encounters with families.
- Home visitors and health care providers should be alert for any suffocation or choking-related hazards in homes they visit, and inform parents of observed risks.
- Age-specific standard parent information materials could be developed to facilitate these efforts.
- Public health nurses could facilitate/encourage compliance with the back to sleep recommendation during home visits and at day care centres.

Hospitals

- Hospitals should ensure that their cribs meet current safety standards (e.g., in the emergency department, wards).
- Hospitals should ensure that children less than two years of age are assigned a crib, rather than a hospital bed with side rails.
- Hospitals should ensure that cribs, patient rooms and waiting areas are monitored for choking hazards such as toys with small parts, and strangulation hazards such as lengthy looped blind and curtain cords.
- Hospitals should ban latex balloons in pediatric care areas.
- Hospitals should develop policies regarding co-sleeping in hospital beds.

Retail Sector

- The retail sector should ensure used products comply with current safety standards (e.g., cribs).
- The retail sector should educate consumers regarding blind and window covering cord safety.
- The retail sector should sell Mylar rather than latex balloons.
- The retail sector should educate consumers regarding the importance of proper use of children's equipment.

Restaurants/Food Service Industry

- Restaurants should ensure children's menus are consistent with safe food and preparation (e.g., hot dogs).
- Restaurants should provide toys which are safe for children less than three years of age, and clearly label toys which are safe only for older children.
- Restaurants should train staff in CPR/choking First Aid.

Regional Health Authorities (RHAs)

- RHAs should ensure that sufficient data regarding suffocation and choking injuries are collected and monitored. This should include the consideration of sentinel or periodic surveillance of emergency department visits.
- RHAs should work with community partners such as municipalities, recreation centers, schools, childcare providers, and other organizations to build regional capacity for implementing injury prevention programs and strategies.

- RHAs should ensure that suffocation and choking prevention strategies for children are implemented and evaluated.
- RHAs should provide educational opportunities for their employees regarding the best practices for designing, implementing, and evaluating these prevention programs for children.

Manitoba Health

- Manitoba Health should consider the use of the National Ambulatory Care Reporting System (NACRS) in regional Emergency Departments to improve the data collection, analysis and monitoring of suffocation and choking injury.
- Manitoba Health should support the development of tools and strategies that can be implemented by the RHAs.

Federal Government

- The Federal government should ensure that products on the market comply with the Hazardous Products Act.
- The Federal government should provide recommendations and information for the public regarding choking and suffocation hazards related to consumer products (e.g., cribs, children's equipment, toys, blind cords).

SUFFOCATION AND CHOKING AMONG THE ELDERLY

Risk Factors

Knowledge of the risk factors associated with suffocation and choking injuries in the elderly can aid in the development of effective prevention strategies.

Age

Approximately eight deaths and 24 hospitalizations resulting from suffocation and choking occur each year among Manitoba seniors (65+ years of age).¹ Choking and suffocation risk increases with age. Between 1992-1999, the choking and suffocation rate for Manitoba seniors 65-74 years of age was 2.1 per 100,000, 5.1 for individuals 75-84 years of age, and 17.0 for those greater than 85 years of age (Table 7).¹ Therefore, older seniors (85+ years of age) were 8.1X more likely to suffocate or choke than younger seniors. The same incremental trend was seen for hospitalizations (10.8, 18.2, and 27.4 respectively) yet the magnitude of the differences was smaller (2.5X increased risk for 85+ vs. 65-74 years of age). Foreign body asphyxia has been found to be highly prevalent among the elderly, related to food and non-food substances.²³ Health Canada data from 1997 show that 178 seniors died that year as a result of choking on food or non-food substances.⁸³

Gender

For Manitoba seniors older than 65 years of age, slightly more females die from suffocation or choking injury (M:F ratio = 1:1.5), however equal

numbers of males and females are hospitalized.¹ In Canada, there were 104 male deaths and 379 female deaths, however mortality rates were higher for males (6.7 vs. 1.3 per 100,000).² Table 7 shows rates of suffocation and choking related deaths and hospitalizations by gender and age category for Manitoba.

First Nations Populations

A single death was reported for First Nations seniors greater than 65 years of age (1992-1999). Hospitalization rates per 100,000 are higher for First Nations populations compared with non-First Nations individuals across the three senior age groups (21.9 vs. 10.6 for 65-74 years; 32.5 vs. 22.9 for 75-84 years; and 26 vs. 155.8 for 85+ years).¹ The highest choking-related hospitalization rate is First Nations males 85+ years of age (237.0). While this rate is 6.7X higher than that of for male non-First Nations Manitobans (35.6 per 100,000), it includes only two cases, both of whom choked on food.

Mechanism of Injury

The Manitoba Injury Data Report further breaks down number and rates of injuries by specific mechanism. Suffocation and choking injuries may be classified by mechanism using the ICD coding system (Table 2). This is depicted in Table 8, which outlines injury data for each suffocation and choking mechanism for Manitoba seniors.

Table 7. Choking Injury Rates for Deaths and Hospitalizations by Gender and Age¹

Injury Outcome	65-74 years		75-84 years		85+ years		Total (65+) #
	#	Rate	#	Rate	#	Rate	
Deaths (1992-1999)							
Males	6	2.0	11	6.5	8	18.2	25
Females	8	2.2	14	5.5	16	16.5	38
Hospitalizations (1992-2001)							
Males	49	13.0	50	23.3	22	38.6	121
Females	40	9.0	48	14.8	20	22.3	116

Note: '#' is the number of cases and rates are expressed per 100,000

Table 8. Unintentional Suffocation and Choking in Manitoba by Age Group (65+ years)¹

Cause	65-74 years		75-84 years		85+ years	
	#	Rate	#	Rate	#	Rate
Deaths (1992-1999)						
Choking on food	6	0.9	15	3.5	12	8.5
Choking on a non-food object	6	0.9	7	1.6	11	7.8
Suffocation, in bed or cradle					1	0.7
Hanging except in bed cradle	1	0.2				
Not specified	1	0.2	3	N/A		
Total	14	2.1	25	5.9	24	17
Hospitalizations (1992-2001)						
Choking on food	65	7.9	70	13.0	39	21.3
Choking on a non-food object	23	2.8	27	5.0	11	6.0
Not specified	1	N/A	1	N/A		
Total	89	10.8	98	18.2	50	27.4

Note: ‘#’ is the number of cases and rates are expressed per 100,000 persons

Foreign Body Aspiration

Fatal food asphyxia has a number of predisposing factors that include old age, poor dentition, insufficiently chewing food, semi-solid diet, alcohol use, sedative drug use, reduced motor coordination, dementia, long-term care facility residence, sedative drug use, and various neurological and other diseases (e.g., Parkinson’s disease).^{12,23,84-86} A study of Chinese adults found foreign body aspiration to be localized more in the lower airway, resulting from bone fragments in 49% of cases.⁸⁷ Here the mean age was 60.5 years, with a range from 24-80 years of age and 81% were male. Another study concluded that unchewed meat or sausage caused choking in 67% of cases, with breads, cookies, and pastries 12%, fruits or vegetables accounted for another 8%, cheese and egg products 2%, and the remaining (2%) known sources were non-food items including dentures, a hair ornament, and a cork.⁸⁵

Unintentional Positional Asphyxia

Unintentional positional asphyxia is a cause of suffocation-related death in adults. This results from airway obstruction or impaired respiration due to bodily position. A Florida study found 30 fatal cases of positional asphyxia. Of these incidents, 73 per cent were associated with heavy alcohol use.⁸⁸ The mean age was 51 years and the ratio of males to females was 2:1. These incidents occurred most often in the bedroom or motor vehicle, and the three eldest victims (79+ years of age) all had degenerative brain disease. Positions included being face down (nose and mouth obstructed), lying over an object, being in vest restraints, or sitting upright or

in a restrictive position with the neck hyperflexed. Another study demonstrated that 12% of positional asphyxia cases involved an individual with cerebral palsy. This sample included children and adults.⁸⁹

Beds

In the United States approximately 25 incidents of patients being caught, trapped, entangled or strangled in hospital or nursing home beds with rails are reported each year.⁹⁰ In adults, entrapment in bedrails and restraints has occurred in hospitals and residential care institutions. Deaths related to physical restraints are more common among those 80-89 years of age. These incidents occur more often in a chair (e.g., wheelchair or geriatric recliner) or bed and generally involved vest or bed rail restraints.⁹¹ Restraints were correctly applied in most cases (90%). Most incidents (61%) are reported in nursing homes. Restraint use in psychiatric care has also had fatal consequences.⁹²

Becoming trapped between bed rails and air pressure mattresses resulted in death in 35 cases, with 21 fatalities due to placing the air mattress on top of another mattress and 13 involving built-in air pressure mattresses.⁹³ Hospital bed side-rails have been implicated in injuries and deaths (65% of cases) where entrapment occurred.⁹⁴ Advanced age, being female, low body weight, and cognitive impairment may increase the risk of side-rail entrapment.

Institutionalization

In a Taiwanese study, impaired swallowing was found to be more prevalent with tube-fed (98%) as opposed to non-tube fed (32%) residents of long-

term care; therefore tube-fed residents are at higher risk for choking.⁹⁵ The mean age of long-term care facility residents was 77.1 with a range of 16-102 years, 48% were women. Food asphyxiation resulted in death for 1.3% of hospital patients with chronic diseases.⁸⁶ In another study involving 75 cases of near-fatal choking episodes the incidents tended to occur in private residence (33%), nursing homes (24%) and hospitals (19%).⁸⁴

Other Risk Factors

Prior treatment for schizophrenia [RR=23.0, 95% CI 11.9-44.6], having an organic psychiatric disorder [RR=30, 95% CI 14.8-64.1] and the use of antipsychotic drugs to treat psychiatric disorders, including thioridazine [OR 92.1, 95% CI 37.2-228.5] or lithium [OR 31.2, 95% CI 9.8-99.0] have been linked with fatal choking incidents.⁹⁶

INTERVENTIONS

Since there are no published studies that evaluate choking and suffocation prevention strategies for seniors, recommendations must be based on expert opinion and injury patterns.

Choking Prevention

Potential strategies include ensuring good denture fit, medication adjustment to reduce sedation, and dietary modifications to eliminate high risk foods and ensure adequate preparation.¹² Food preparations for seniors include slicing and dicing foods to manageable pieces, cooking vegetables, chopping up hot dogs, and not providing candies or thick, sticky substances such as peanut butter. In institutions, it may be possible to regulate the diet of various groups who are at an increased risk of choking on foods.

One study suggests alerting individuals working in private and public health of the risk of injury due to foreign body aspiration in older populations.⁹⁷ This research shows that few health care workers are aware that semi-solid diets can contribute to choking risk for elderly patients. Therefore, dietary counselling should take into consideration chewing and swallowing capability.⁸⁴

In terms of secondary prevention, having access to an individual who is capable of administering cardiopulmonary resuscitation (CPR) may be beneficial once an incident has occurred. Preliminary research involving public education efforts showed that the Heimlich manoeuvre may help prevent choking deaths. However, there was insufficient evidence to implement the recommendation. The effectiveness of training elderly caregivers in CPR and how to perform the Heimlich manoeuvre requires further evaluation.^{12,98}

Suffocation Prevention

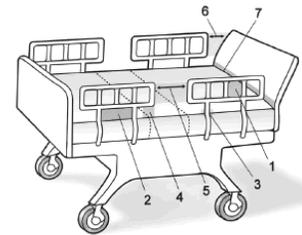
To prevent hospital bed entrapment, standards for side-rail design should be developed. Evaluations of patients' need for bed rails should be regularly conducted. Caregivers should assess beds regularly for maintenance and to identify gaps which could cause entrapment.⁹⁴ The FDA outlines the zones where

entrapment can occur with hospital beds (see Figure 5).⁹⁹

Figure 5

The seven areas in the bed system where there is a potential for entrapment are identified in the drawing below.

- Zone 1:** Within the Rail
- Zone 2:** Between the top of the compressed mattress and the bottom of the rail, between the rail supports
- Zone 3:** Between the rail and the mattress
- Zone 4:** Between the top of the compressed mattress and the bottom of the rail, at the end of the rail
- Zone 5:** Between the split bed rails
- Zone 6:** Between the end of the rail and the side edge of the head or foot board
- Zone 7:** Between the head or foot board and the mattress end



In 1995, Health Canada released an alert regarding the hazards associated with split side rails and the need for spacing in split rails to not exceed 60mm when closed.¹⁰⁰ The Food and Drug Administration (www.fda.gov) is currently investigating this issue and has published initial guidance documents that include space dimension recommendations for the prevention of body part entrapment.⁹⁹

The Health Insurance Reciprocal of Canada's risk management guidance document on the use of restraints highlights the need for policies to address issues concerning:

- assessment criteria for restraint application;
- prohibiting standing restraint orders and PRN restraint orders;
- discouraging restraint use for confused or agitated patients;
- regular re-assessment; determining intervals for removal/readjustment;
- and the need for proper administration, documentation, and monitoring of restraint use and practice.¹⁰¹

A number of institutions and organizations have been successful in reducing or eliminating restraint use in long-term care. Patient-focused initiatives to reform nursing home care were introduced in the United States in 1987. Recent progress in some nursing homes has included implementing a restraint-free or restraint-elimination program.

These programs have been found to benefit residents and staff members.¹⁰² Education was a useful strategy for changing restraint use policies and practices in long-term care facilities in Canada.¹⁰³

RECOMMENDATIONS

SUFFOCATION AND CHOKING PREVENTION BEST PRACTICES FOR THE ELDERLY

Recommended based on expert opinion

Development of restraint policies for hospitals and long-term care facilities

Development of hospital bed standards to reduce entrapment gaps

Special food preparation and avoidance of high-risk foods

Adults and caregivers of the elderly should learn CPR and the Heimlich manoeuvre

APPLICATION OF FINDINGS

Caregivers

Caregivers should be encouraged to learn CPR and the Heimlich manoeuvre.

Physicians

- Physicians should identify and counsel seniors at risk of choking (swallowing dysfunction, cognitive impairment, sedation, impaired gag reflex).
- Physicians are encouraged to make available public education information on choking and suffocation prevention among seniors' populations.
- Physicians should take a leadership role in bed and restraint safety for their institutionalized patients.

Hospitals and Long-Term Care Facilities

- Facilities should conduct regular surveillance of potentially hazardous equipment presenting a risk of entrapment (beds, chairs, restraints).
- Policies should be developed regarding the use of side-rails and bed safety.
- Policies should be developed regarding the use of restraints.
- Facilities should provide safe meals and snacks for individuals with swallowing dysfunction.

- Supervision should be provided during feeding for individuals at risk of choking.
- Facilities should offer ward staff training in CPR and the use of the Heimlich manoeuvre.

Regional Health Authorities (RHAs)

- RHAs should collect data on choking and suffocation injuries from acute care and long-term care facilities and home support services as well as community-dwelling seniors. These data should be summarized and applied to the design and evaluation of suffocation and choking prevention strategies and patient safety programs.

Manitoba Health

- Manitoba Health should consider the use of the National Ambulatory Care Reporting System (NACRS) in Emergency Departments to improve data collection.
- Manitoba Health should encourage Emergency Medical Services (ambulance) to collect and use ambulance service data.
- Manitoba Health should investigate ways to encourage thorough, multidisciplinary models of care for seniors, which include choking and suffocation risk assessment and prevention.

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APPENDIX A: EVALUATION CRITERIA

In developing grades of recommendation for each intervention, first the body of evidence was graded according to the level of evidence, which reflects study design (Table A). For levels of evidence, the Canadian Task Force on Preventive Health Care methods were used. These correspond to grades of recommendation (good, fair, conflicting, and insufficient). Then a summary grade of recommendation

was assigned, using the Community Guide methods (Table C), in order to provide a common framework for this series of Manitoba injury prevention best practices reports. This system provides a clear hierarchy of recommendations, and clearly indicates where expert opinion is considered to increase the strength of the recommendation.

Table A. Levels of Evidence and Grade of Recommendation

Grade	Level of Evidence	Criteria
Good	I	Evidence obtained from at least one properly randomized control trial
Fair	II-1	Evidence obtained from well-designed controlled trials without randomization
	II-2	Evidence obtained from one or more cohort or case-control analytic studies
	II-3	Evidence obtained from comparisons between times or places with or without an intervention. Dramatic results in uncontrolled experiments could be included
Poor	III	Opinions of respected authorities based on clinical experience, descriptive studies or reports of expert committees

Table B. Recommendations Grades for Specific Clinical Preventive Actions

A	There is good evidence to recommend the clinical preventive action.
B	There is fair evidence to recommend the clinical preventive action.
C	The existing evidence is conflicting and does not allow making a recommendation for or against use of the clinical preventive action, however other factors may influence decision-making.
D	There is fair evidence to recommend against the clinical preventive action.
E	There is good evidence to recommend against the clinical preventive action.
I	There is insufficient evidence (in quantity and/or quality) to make a recommendation, however other factors may influence decision-making.

Table C. Grades of Recommendation

Code	Evidence Level of Evidence	Canadian Task Force Recommendation	Strength of Evidence	Community Guide Recommendation
I	Good	Strongly recommended or Discouraged	Strong	Strongly recommended
II-1 II-2 II-3	Fair	Recommended or Recommended based on expert opinion	Sufficient	Recommended
III	Insufficient	Recommended based on expert opinion	Insufficient empirical information supplemented by expert opinion	Recommended based on expert opinion
			Available studies do not provide sufficient evidence to assess	Insufficient evidence to determine effectiveness
Any level		Insufficient evidence to determine effectiveness	Sufficient or strong evidence of ineffectiveness or harm	Discouraged

Adapted from 'Canadian Guide to Clinical Preventive Health Care' www.hc-sc.gc.ca/hppb/healthcare/pdf/clinical_preventive/meth.pdf and the Community Guide www.thecommunityguide.org/.

