

Unintentional Injury among Thai Children and Adolescents in 2010

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Background: Unintentional injury has been identified as a public health problem in Thailand as it is the leading cause of death among both children and adolescents.

Objective: To explore the number of admissions by unintentional injury and cause(s) among Thai children and adolescents in 2010.

Material and Method: Data on the number of admissions by unintentional injury in the fiscal year, 2010, were derived from hospitals nationwide as well as the three health insurance schemes. Data on Thai children and adolescents (0-18 years) was collected between October 1, 2009 and September 30, 2010. The coding for underlying cause(s) of unintentional injuries and death were done using the International Classification of Diseases, 10th edition.

Results: A total of 118,323 unintentional injuries were reported. The majority of patients were male and falls were the major cause of unintentional injuries (27,139 admissions; 22.94%) followed by motorcycle injuries (20,499 admissions; 17.32%). Accidental drowning and submersion was the major cause of death in the present study, followed by lightning strikes and accidental threats to breathing (i.e., choking and suffocation).

Conclusion: The current study revealed that falls were the major cause of unintentional injury and accidental drowning and submersion the major cause of death.

Keywords: Unintentional injury, Children and adolescents

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Injuries are a major public health concern, accounting for five million deaths per year. The World Health Organization's (WHO) Global Burden of Disease estimates that nearly 80% (3.9 million) of these deaths are due to accidents⁽¹⁾. The WHO defines accidents as unintentional injuries that occur in the absence of predetermined intent, for which the leading causes are traffic accidents, falls, drowning, burns and poisonings. Unintentional injuries account for 3 of the 15 leading causes of death among children and adolescents under 20 years of age⁽²⁾. Children who survive their injuries may require continuing care, due to a disability that impacts not only their health, but also their education and their family's livelihood.

In Thailand, injuries accounted for 34.4% of

all deaths among 1-14 years-olds in 1999⁽³⁾. The injury mortality rate (external causes of morbidity and mortality V01-Y89, ICD 10) compiled from Thailand death certificates in 2006 was 25.2/100,000 children (under 15 years of age) per year-the first year this was the leading cause of child death. The three leading causes of severe injury were transport injuries, falls and inanimate forces. The two leading causes of death among these children were drowning and transport injury⁽⁴⁾.

The 4th Thai National Health Examination Survey (NHES) 2008-9 showed that the cause of severe unintentional injury in 1-5 year-olds and 6-9 year-olds was falls, road accidents and sharp injuries. The cause of severe injury in 10-14 year-olds was road traffic accidents, falls and sharp injuries⁽⁵⁾.

It is important to approach childhood unintentional injury as a preventable disease. Proper identification of the cause of injuries can lead to the development of prevention(s) and education programs that would help to reduce the incidence of injuries.

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The quality of treatment and care given to the injured child and adolescents should be optimal from first contact⁽⁶⁾. The objective of the present study was to explore the number of admissions by unintentional injury and the cause(s) among Thai children and adolescents admitted to hospitals nationwide between October 1, 2009 and September 30, 2010.

Material and Method

As per Sutra et al in 'Health situation analysis of Thai population 2010: Implications for health education and health service reform' presented in this journal, the present study focused on the number of admissions by unintentional injury and cause(s) among Thai children and adolescents aged (0-18 years of age) between October 1, 2009 and September 30, 2010.

The coding for the underlying cause(s) of unintentional injuries and death were done using the International Classification of Diseases, 10th edition (ICD-10) based on the Bureau of Policy and Strategy, Ministry of Public Health. Data collection included V01-V09 pedestrian injured in transport accident, V10-19, V30-V89 land transport accident, W00-W19 falls, W20-W49 exposure to inanimate mechanical forces, W50-W64 exposure to animate mechanical forces, W65-W74 accidental drowning and submersion, W75-W84 other

accidental threats to breathing, W85-W99 exposure to electric current, X00-X19 exposure to fire and heat, X20-X29 contact with venomous animals and plants, X40-X49 accidental poisoning by and exposure to noxious substance, X40-X49 accidental poisoning by and exposure to noxious substance, X33 victim of lightning, Y85-Y89 sequelae of external causes of morbidity and mortality, Y40-Y84 adverse effects in medical care.

Results

A total of 118,323 unintentional injuries were reported and the majority of patients were male (79,483; 67.5%). There was a greater tendency of injury among male patients, with the male-to-female ratio being 2.1:1. The present study revealed that falls (27,139; 22.94%) were the major cause of unintentional injuries followed by motorcycle accidents (20,499; 17.32%) and exposure to inanimate mechanical forces (20,150; 17.03%) (Table 1).

The majority of injuries (36.8%) occurred in the Northeast region while 28.6%, 18.1% and 16.5% of the patients were injured in the Central, Northern and Southern regions, respectively. The patients were between 0 and 18 years and age was categorized as: under 1 year, 1-5 years, 6-12 years and 13-18 years. Most of the injuries occurred among adolescents (13-

Table 1. Number of admissions by secondary diagnosis of unintentional injury (ICD 10) in Thai children and adolescents (0-18 years) 2010 by sex

Cause of unintentional injury	Total		Male		Female	
	Number	Number	Row %	Number	Row %	
V01-V09 Pedestrian injured in transport accident	1,658	1,095	66.0	563	34.0	
V20-V29 Motorcycle rider injured in transport accident	20,499	14,269	69.6	6,230	30.4	
V10-19, V30-V89 Land transport accident	6,767	4,608	68.1	2,159	31.9	
W00-W19 Falls	27,139	18,735	69.0	8,404	31.0	
W20-W49 Exposure to inanimate mechanical forces	20,150	15,270	75.8	4,880	24.2	
W50-W64 Exposure to animate mechanical forces	7,022	4,496	64.0	2,526	36.0	
W65-W74 Accidental drowning and submersion	1,267	831	65.6	436	34.4	
W75-W84 Other accidental threats to breathing	323	193	59.8	130	40.2	
W85-W99 Exposure to electric current	1,908	1,208	63.3	700	36.7	
X00-X19 Exposure to fire and heat	3,309	2,063	62.3	1,246	37.7	
X20-X29 Contact with venomous animals and plants	10,273	6,719	65.4	3,554	34.6	
X40-X49 Accidental poisoning by and exposure to noxious substance	6,564	3,858	58.8	2,706	41.2	
X33 Victim of lightning	37	21	56.8	16	43.2	
Y85-Y89 Sequelae of external causes of morbidity and mortality	391	255	65.2	136	34.8	
Y40-Y84 Adverse effects in medical care	11,016	6,222	56.5	4,794	43.5	
Total	118,323	79,483	67.5	38,480	32.5	

18 years; 39.9%) (Fig. 1) (Table 2).

The leading causes of unintentional injury also differed by age group. Among children under 1 year, the two major causes of injury were adverse effects in medical care (2,006) followed by falls (862). Among those 1-5 years of age, the two major causes of injury were falls (6,961) followed by exposure to inanimate mechanical forces (4,971). Among those 6-12 years of age, the two major causes of injury were falls (11,956) followed by exposure to inanimate mechanical forces (7,321). Among those 13-18 years of age, the three majority causes of injury were motorcycle accidents (17,340) followed by exposure to inanimate mechanical forces (7,521) and falls (7,360) (Table 2).

Overall, accidental drowning and submersion was the major cause of death followed by victim of lightning, accidental threats to breathing (Table 3).

When the data were analyzed, the percentage of death by unintentional injury by age group, it was found that pedestrians injured in traffic accidents and other accidental threats to breathing were the two major causes of death among children under 1 year. Accidental drowning and submersion was the major cause of death among 1-12 year-olds (Fig. 2). Lightning strikes were the major cause of death among the 13-18 year-olds (Table 4).

The present study revealed that mortality rate of accidental drowning and submersion (100.7 per 1,000,000), transport accident among 0-12 year-olds (46.1 per 1,000,000), transport accident among 13-18 year-olds (302.8 per 1,000,000), exposure to electric current and radiation (6.2 per 1,000,000), exposure to smoke, fire and flames (2.9 per 1,000,000), other accidental threats to breathing (7.6 per 1,000,000) and falls (1.8 per 1,000,000) were higher than the Index of

Thai 'A World Fit for Children', 2010 (Table 5).

Discussion

The analysis revealed that boys comprised the majority of hospitalizations due to unintentional injuries. Gofin et al⁽⁸⁾ reported that the incidence of hospitalizations due to injuries is nearly four times higher among boys than girls. In the USA between 2000 and 2006, males had the highest number of nonfatal injuries among 0-19 year-olds found (*e.g.*, cuts or piercings, falls, traffic accidents, cycling accidents, struck by or against an object)⁽⁹⁾. Other reports on children showed similar trends^(8,10). Various theories have been proposed for the difference in injury rates between boys and girls. These include (a) that boys are engaged in more risk taking than girls (b) that boys had higher levels of activity and (c) that boys behave more impulsively. Boys, it is argued, are socialized differently than girls and are less likely to have their exploration restrained by parents⁽¹¹⁾.

Most injuries occurred in the northeastern region of Thailand, where the majority have a low socioeconomic status. In poor households, parents might have to work and not be able to supervise their children and/or afford safety equipment⁽³⁾. The WHO Region and Country Income Level, World 2004 reported that greatest burden of childhood injury occurs in low- and middle-income countries⁽²⁾.

The current research revealed that falls constitute the major cause of unintentional injuries, which is consistent with Monese et al⁽¹⁰⁾. Gofin et al⁽⁸⁾ also noted that falls were the most frequent cause of injured children's being hospitalized. Van As et al⁽¹²⁾ reported that falls represented 43% of non-fatal injuries in children.

To prevent falls, the following measures have been suggested by Britton⁽¹³⁾: when children are (1) walking or running: a) keep toys and other objects off the floor; b) fix rugs so that they remain in place; c) wipe up any spills. (2) On or near stairs: a) never leave objects on stairs; b) always have a safety gate at the top and bottom of the stairs; c) avoid use of baby walkers. (3) In bed: a) avoid playing risky games on the bed; b) never allow under-sixes to sleep on the top bunk. (4) Near windows or porches: a) install barriers; b) never place a cradle or any other piece of furniture next to a window, roof or porch; c) never allow play on fire escape ladders.

The current research showed that most injuries occur in adolescents (13-18 year-olds). According to Monese et al, injuries were more

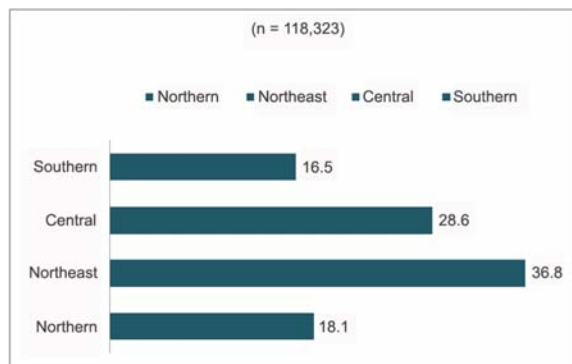


Fig. 1 Percent of unintentional injury in Thai children and adolescents (0-18 years) in 2010 by region

Table 2. Number of admissions by secondary diagnosis of unintentional injury (ICD 10) in Thai children and adolescents (0-18 years) in 2010 by age group

Cause of unintentional injury	Age group							
	Under 1 year		1-5 years		6-12 years		13-18 years	
	Number	%	Number	%	Number	%	Number	%
V01-V09 Pedestrian injured in transport accident	12	0.7	609	36.7	715	43.1	322	19.5
V20-V29 Motorcycle rider injured in transport accident	135	0.7	1,064	5.3	1,960	9.5	17,340	84.5
V10-19, V30-V89 Land transport accident	57	0.8	1,474	21.8	3,218	47.6	2,018	29.8
W00-W19 Falls	862	3.2	6,961	25.6	11,956	44.1	7,360	27.1
W20-W49 Exposure to inanimate mechanical forces	337	1.7	4,971	24.7	7,321	36.3	7,521	37.3
W50-W64 Exposure to animate mechanical forces	135	1.9	1,679	23.9	2,734	38.9	2,474	35.3
W65-W74 Accidental drowning and submersion	42	3.3	667	52.6	403	31.9	155	12.2
W75-W84 Other accidental threats to breathing	43	13.3	151	46.7	90	27.9	39	12.1
W85-W99 Exposure to electric current	95	5.0	470	24.7	596	31.2	747	39.1
X00-X19 Exposure to fire and heat	515	15.6	1,865	56.4	564	17.0	365	11.0
X20-X29 Contact with venomous animals and plants	286	2.8	1,995	19.4	4,328	42.1	3,664	35.7
X40-X49 Accidental poisoning by and exposure to noxious substance	451	6.9	3,151	48.0	1,498	22.8	1,464	22.3
X33 Victim of lightning	1	2.7	4	10.8	9	24.3	23	62.2
Y85-Y89 Sequelae of external causes of morbidity and mortality	12	3.1	61	15.6	110	28.1	208	53.2
Y40-Y84.A adverse effects in medical care	2,006	18.2	2,633	23.9	2,820	25.6	3,557	32.3
Total (118,323)	4,989	4.2	27,755	23.5	38,322	32.4	47,257	39.9

Table 3. Percent of death in unintentional injury (ICD 10) in Thai children and adolescents (0-18 years) in 2010 by cause

Cause of unintentional injury	Total	Death	
	Number	Number	Row %
V01-V09 Pedestrian injured in transport accident	1,658	41	2.5
V20-V29 Motorcycle rider injured in transport accident	20,499	396	1.9
V10-19,V30-V89 Land transport accident	6,767	68	1.0
W00-W19 Falls	27,139	39	0.1
W20-W49 Exposure to inanimate mechanical forces	20,150	39	0.2
W50-W64 Exposure to animate mechanical forces	7,022	.00	0.0
W65-W74 Accidental drowning and submersion	1,267	158	12.4
W75-W84 Other accidental threats to breathing	323	12	3.7
W85-W99 Exposure to electric current	1,908	39	2.0
X00-X19 Exposure to fire and heat	3,309	14	0.42
X20-X29 Contact with venomous animals and plants	10,273	5	0.05
X40-X49 Accidental poisoning by and exposure to noxious substance	6,564	13	0.2
X33 Victim of lightning	37	4	10.8
Y85-Y89 Sequelae of external causes of morbidity and mortality	391	2	0.5
Y40-Y84 Adverse effects in medical care	11,016	147	1.3

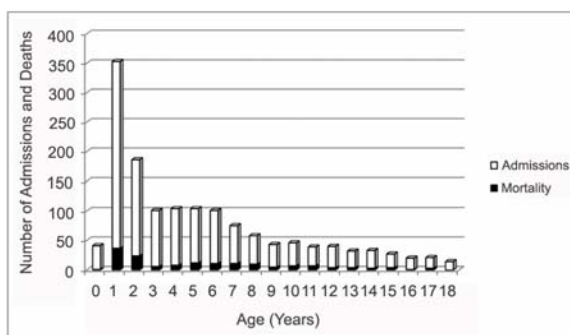


Fig. 2 Number of hospital admissions and deaths of accidental drowning and submersion (W65-W74) in children and adolescents in 2010

frequently observed in the older teens (15-19 year-olds)⁽¹⁰⁾. The leading causes of unintentional injury also differed by age group. Among children under 1 year in the present study, the primary causes of injury were adverse effects in medical care followed by falls. By comparison, in England and Wales between 1968 and 2000, medications accounted for 12.8% of unintentional poisoning deaths in under-tens⁽¹⁴⁾. In the United States, however, among children under 1 year, the majority of nonfatal injuries were due to falls (52%) followed by being struck by or against an object (14%)⁽⁹⁾.

Among children between 1 and 12 years of age in the present study, the primary cause of injury

were falls, as was found in other studies^(5,9,13). In Thailand, Phuenpathom et al found that head injuries in traffic accidents involving motorcycles were a major cause of death and disability (70-75%)⁽¹⁵⁾. In some Asian countries, where motorbikes are the most common form of transportation, crashes were the leading cause of mortality and morbidity among teenagers⁽¹⁶⁾.

For all unintentional injuries in Thai children and adolescents between 0-18 years, accidental drowning and submersion were the major cause of death. As a percent of death in unintentional injury by age group, it persisted as the major cause of death among 1-12 year-olds. It was the second most common cause of death among 13-18 year-olds while it was the third most common cause of death in children under 1 year. Data from the studies conducted in South and East Asia show that drowning accounts for 90% of all injury deaths for 1-4 year-olds and over 50% of injury deaths for 5-9 year-olds⁽¹⁶⁾. Risk and circumstances of child drowning generally relate to the developmental stage of the child. Infants under 1 year are usually unable to access water by themselves, so unintentional drowning at this age is mostly the result of a child's being left unattended or with an untrained caregiver⁽¹⁷⁾. The increased risk during adolescence was possibly as a result of (a) less supervision and increased independence (b) increased risk-taking and (c) greater exposure to open water during work or leisure⁽¹⁶⁾. Parents and caregivers need to understand that young

Table 4. Percent of death in unintentional injury (ICD 10) in Thai children and adolescents (0-18 years) in 2010 by age group

Cause of unintentional injury	Age group					
	Under 1 year			1-5 years		
	Total	Death		Total	Death	
	count	count	%	count	count	%
V01-V09 Pedestrian injured in transport accident	12	2	16.7	609	13	2.1
V20-V29 Motorcycle rider injured in transport accident	135	4	3.0	1,064	13	1.2
V10-19,V30-V89 Land transport accident	57	0	0	1,474	14	0.9
W00-W19 Falls	862	4	0.5	6,961	14	0.2
W20-W49 Exposure to inanimate mechanical forces	337	1	0.3	4,971	11	0.2
W50-W64 Exposure to animate mechanical forces	135	0	0	1,679	0	0
W65-W74 Accidental drowning and submersion	42	2	4.8	667	74	11.1
W75-W84 Other accidental threats to breathing	43	6	14.0	151	2	1.3
W85-W99 Exposure to electric current	610	3	0.5	2,335	14	0.6
X00-X19 Exposure to fire and heat	515	2	0.4	1,865	6	0.3
X20-X29 Contact with venomous animals and plants	286	0	0	1,995	2	0.1
X40-X49 Accidental poisoning by and exposure to noxious substance	451	2	0.4	3,151	7	0.2
X33 Victim of lightning	1	0	0	4	0	0
Y85-Y89 Sequelae of external causes of morbidity and mortality	12	0	0	61	0	0
Y40-Y84 Adverse effects in medical care	2,006	70	3.5	2,633	24	0.9

Cause of unintentional injury	Age group					
	6-12 years			13-18 years		
	Total	Death		Total	Death	
	count	count	%	count	count	%
V01-V09 Pedestrian injured in transport accident	715	19	2.7	327	7	2.1
V20-V29 Motorcycle rider injured in transport accident	1,960	21	1.1	17,803	358	2.0
V10-19,V30-V89 Land transport accident	3,218	27	0.8	2,034	27	1.3
W00-W19 Falls	11,956	9	0.1	7,408	12	0.2
W20-W49 Exposure to inanimate mechanical forces	7,321	11	0.2	7,589	16	0.2
W50-W64 Exposure to animate mechanical forces	2,734	0	0	2,493	0	0
W65-W74 Accidental drowning and submersion	403	63	15.6	155	19	12.3
W75-W84 Other accidental threats to breathing	90	2	2.2	39	2	5.1
W85-W99 Exposure to electric current	160	8	0.7	1,121	14	1.2
X00-X19 Exposure to fire and heat	564	2	0.4	366	4	1.1
X20-X29 Contact with venomous animals and plants	4,328	1	0	3,683	2	0.1
X40-X49 Accidental poisoning by and exposure to noxious substance	1,498	2	0.1	1,474	2	0.1
X33 Victim of lightning	9	0	0	23	4	17.4
Y85-Y89 Sequelae of external causes of morbidity and mortality	110	0	0	210	2	1
Y40-Y84 Adverse effects in medical care	2,820	14	0.5	3,597	39	1.1

Table 5. Rate of morbidity and mortality of External causes of morbidity and mortality (V01-Y98) of children and adolescents as compared to Index of Thai 'A World Fit for Children', 2010 ⁽⁷⁾

Type of External causes of morbidity and mortality (V01-Y98)	Age (Year)	Rate	Index per year
Mortality rate of All accidents (V01-Y98)	0-12	211.8	< 100/1,000,000
Mortality rate of All accidents (V01-Y98)	13-18	627.2	< 150/1,000,000
Admission rate of All accidents (V01-Y98)	0-12	73.0	< 30/10,000
Mortality rate of Accidental drowning and submersion (W65-W74)	0-12	100.7	< 50/1,000,000
Mortality rate of Transport accident (V01-V99)	0-12	46.1	< 20/1,000,000
Mortality rate of Transport accident (V01-V99)	13-18	302.8	< 100/1,000,000
Admission rate of Transport accident (V01-V99)	0-12	8.9	< 5/10,000
Mortality rate of Other accidental threats to breathing (W75-W84)	0-12	7.6	< 3/1,000,000
Mortality rate of Exposure to electric current, radiation (W85-W99)	0-12	6.2	< 3/1,000,000
Mortality rate of Falls (W00-W19)	0-12	1.8	< 1/1,000,000
Admission rate of Falls (W00-W19)	0-12	19.1	< 2/10,000
Mortality rate of Exposure to smoke, fire and flames (X00-X19)	0-12	2.9	< 1/1,000,000
Admission rate of Exposure to smoke, fire and flames (X00-X19)	0-12	2.8	< 0.5/10,000
Mortality rate of Accidental poisoning by and exposure to noxious substance(X40-X49)	0-12	0.7	< 10/1,000,000
Mortality rate of Contact with venomous animals and plants (X20-X29)	0-12	0.8	< 10/1,000,000
Admission rate of Contact with venomous animals and plants (X20-X29)	0-12	6.4	< 5/10,000
Mortality rate of Intentional self-harm and Assault (X60-Y09)	0-12	3.2	< 5/1,000,000
Mortality rate of Intentional self-harm and Assault (X60-Y09)	13-18	74.1	< 0/1,000,000
Admission rate of Intentional self-harm and Assault (X60-Y09)	0-12	1.1	< 1/10,000

children should never be left alone or with another young child in or around any body of water. Parents and caregivers also need to learn basic life-saving and first-aid skills. Most studies showed that swimming instruction improved swimming ability, but no evidence existed that swimming ability protected against the risk of drowning. There were indications that swimming instruction and the consequent increased ability at swimming, as well as greater survival skills, provided some protection, even at relatively young ages⁽²⁾.

The second major cause of death in the present study was lightning strikes, particularly among 13-18 year-olds. In the United States, there are 300-600 deaths from lightning strikes. A lightning strike generates 100 to 110,000 amperes, with a temperature in excess of 20,000°C⁽¹⁸⁾. Nguyen et al found that death from lightning strikes in Canada predominated among 0-19 year-olds⁽¹⁹⁾.

The present study revealed that mortality rate of accidental drowning and submersion, transport accident, exposure to electric current and radiation, exposure to smoke, fire and flames, other accidental threats to breathing and falls were higher than the Index of Thai 'A World Fit for Children', 2010⁽⁷⁾. Therefore,

child mortality rate of these unintentional injuries should be improved. This report will lead to greater awareness of problem and preventability, as well as political commitment to act to prevent child injury.

Implications for unintentional injury prevention

The present study shows that unintentional injuries persist as an important under-addressed public health problem among Thai children and adolescents. It is important to approach childhood unintentional injury as a preventable disease in order to effectively reduce the burden of injuries. In this vein, effort should be made to (a) improve data collection of injuries (b) define the epidemiology of unintentional injuries (c) estimate the cost of injuries (d) understand public perceptions about injury causation and (e) engage with policy makers to improve injury prevention and control.

Study limitations

The present study had several limitations. First, the dataset for the present study represented only a small fraction of the total cases of injury in the community. It did not take into account those injuries treated as out-patients, treated at home and/or in other

facilities within the community. Second, the dataset for the present study did not provide sufficiently detailed information such as costs of injuries, time and place of injury.

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Potential conflicts of interest

None.

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การได้รับภยันตรายโดยไม่ตั้งใจในเด็กและวัยรุ่นไทย ปี พ.ศ. 2553

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ภูมิหลัง: การได้รับภยันตรายโดยไม่ตั้งใจเป็นปัญหาสาธารณสุขอย่างหนึ่งในประเทศไทย เป็นสาเหตุนำของการตายในกลุ่มเด็กและวัยรุ่นในประเทศไทย

วัตถุประสงค์: เพื่อสำรวจจำนวนผู้ป่วยในที่ได้รับภยันตรายโดยไม่ตั้งใจและสาเหตุของการเกิดภยันตรายในเด็กและวัยรุ่นไทย ปี พ.ศ. 2553

วัสดุและวิธีการ: ทำการเก็บรวบรวมข้อมูลจากจำนวนผู้ป่วยในที่ได้รับภยันตรายโดยไม่ตั้งใจและสาเหตุของการเกิดภยันตรายจากโรงพยาบาลทั่วประเทศและจากระบบประกันสุขภาพทั้ง 3 ระบบ ในปีงบประมาณ พ.ศ.2553 ในเด็กและวัยรุ่นไทยที่มีอายุ 0-18 ปีในช่วง วันที่ 1 ตุลาคม พ.ศ.2552 ถึงวันที่ 30 กันยายน พ.ศ.2553 โดยใช้ระบบการจำแนกโรคระดับนานาชาติครั้งที่ 10 เป็นรหัสของการเกิดภยันตรายโดยไม่ตั้งใจและการตาย

ผลการศึกษา: จำนวนการเกิดภยันตรายโดยไม่ตั้งใจในการศึกษานี้มีทั้งหมด 118,323 ครั้ง ส่วนใหญ่เป็นเพศชาย สาเหตุของการเกิดภยันตรายโดยไม่ตั้งใจส่วนใหญ่คือการพลัดตกหกล้ม จำนวน 27,139 ครั้ง (ร้อยละ 22.94) รองลงมาคือภยันตรายจากการขับขี้อุบัติเหตุจากรยานยนต์ในการขนส่งจำนวน 20,499 ครั้ง (ร้อยละ 17.32) สาเหตุการตายของการเกิดภยันตรายโดยไม่ตั้งใจส่วนใหญ่คือ อุบัติเหตุจากการจมน้ำ รองลงมาคือฟ้าผ่าและอุบัติเหตุที่คุกคามการหายใจ (เช่น การทำให้อึดอัด และการสำลัก)

สรุป: การศึกษานี้แสดงให้เห็นว่าสาเหตุของการเกิดภยันตรายโดยไม่ตั้งใจส่วนใหญ่คือการพลัดตกหกล้ม และสาเหตุการตายของการเกิดภยันตรายโดยไม่ตั้งใจส่วนใหญ่คือ อุบัติเหตุจากการจมน้ำ
