Age-Based Risk Factors for Cheerleading Injuries

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Abstract

Introduction: Cheerleading has gradually become more important in Canada and represents an accessible way for youth to be physically active.

Objective: To determine the differences in the injuries encountered by cheerleaders according to their age, in order to propose safety guidelines taking into account the developmental stages of children.

Method: Retrospective database review of cheerleading injuries extracted from the Canadian Hospitals Injury.
Reporting and Prevention Program (CHIRPP) database between 1990 and 2010. The injuries were compared by age group (5-9; 10-14; 15-19; 20 and over) according to their gender, mechanism, body part injured, nature and gravity.

Results: Overall, in 20 years, there were 1496 cases of injuries documented secondary to cheerleading (Median age 15, 4 (IQR=2, 2) years; The number of injuries reported increased by roughly 200% between 1990 and 2010. 1410 females (94%)). 2% of cases were 5-9 years old (Age Group-AG- 1) , 40% were 10-14 (AG 2) , 52% were 15-19 (AG 3) and 6% were 20 and over (AG 4). In AG 1, 2, and 3, girls were predominant while the gender ratio was close to 1:1 in AG 4. In AG1, injuries mainly occurred through tumbling while in the other groups stunts and projection skills were the ones involved. In all age groups, the upper limbs were the most injured, followed by the head and neck, and the lower limbs.
Fractures were predominant in AG 1 (37%) and 2 (22%). However, sprains/strains were the most common injuries in AG 2, 3 and 4 with 29, 28, and 25% respectively. In all age groups, the injuries were in majority minor (requiring no follow-up). However, individuals in AG1 had a higher proportion of moderate (43%-requiring follow-up and treatment) and severe (3%-requiring admission and specific treatment) injuries. No fatalities were reported.

Conclusion: Children's developmental stages affect their ability to participate in sports and the responses of their bodies to impact forces. Our findings concerning cheerleading injuries seem to indicate that younger children (5-9 years old) are more likely to suffer moderate to severe injuries. Thus, on a local basis the use of appropriate safety measures including safety mats, and spotters to catch falling athletes should be mandatory. On a national basis, Canadian Legislation should be emitted to standardize the approach to security in the practice of cheerleading.

Introduction

Cheerleading has gradually been transformed into a legitimate sport involving the integration of chants, dance moves, stunts, pyramids, tosses, and tumbling over a piece of music to form what is called a "routine". The cheerleading team is composed of several stunt groups in which a "flyer" is lifted in the air by her "bases" while other members of the team known as "spotters" may stand close to prevent falls.

While this sport was originally almost uniquely practiced in the United States [1], it is now being exported worldwide with an estimated 3,5 million athletes, and **Canada is no exception to this growing trend**.

This new found popularity could be explained by the inclusiveness and accessibility of this sport which does not require a lot of equipment or a high level of prior athletic abilities, with the exception of tumbling skills.

However, this team sport which involves high level tumbling skills, aerial stunts, pyramids over 3 meters high, and tosses presents an **obvious potential for traumatic injuries.** Therefore, it is essential to determine which injuries are related with cheerleading and whether it is a safe activity for children of all ages in order to establish specific safety guidelines.

Material and Methods:

Injury data were obtained from the database of the Canadian Hospitals Injury Reporting and Prevention Program **(CHIRPP)**, an initiative of the Public Health Agency of Canada. CHIRPP is an injury and poisoning surveillance system presently operating in 11 paediatric and 4 general hospitals across Canada since 1990. The CHIRPP system currently contains over 2,2 million records. Information collected includes activity at the time of injury, activity leading to the injury, the direct cause of injury, contributing factors, time and place of injury, the patient's age and sex, and the treatment received in the emergency department.

The data obtained was then compared by age group (5-9; 10-14; 15-19; 20 and over) according to gender, mechanism, body part injured, nature, and gravity.

Results

Over 20 years, 1496 cases (Median age 15,4 years; 1410 females (94%)) were available after exclusion criteria (accidental injuries that weren't related to the practice of cheerleading, injuries occurring in a private property, children «playing» cheerleading, and majorettes) were applied. The **injury rateincreased by approximately 200%** between 1990 and 2010 (figure 1). Schools were the most common site of injury occurrence (74%).

2% of cases were 5-9 years old (Age Group-AG- 1), 40% were 10-14 (AG 2) , 52% were 15-19 (AG 3) and 6% were 20 and over (AG 4) **(Table I)**.

The most injured body parts were the upper limbs (36%) followed by the head and neck (29%), and the lower limbs (26%). The predominant types of injuries were sprains/strains (28%), soft tissue injuries (22%), fractures (16%), and superficial wounds (12%). Most interestingly, **concussions composed 4% of cases (figure 2)**. This repartition was similar in all age groups.

Falls were the most common injury mechanism (39%). Stunts were involved in 40% of injuries, while pyramids were involved in 8% of injuries, and tosses in 7,5% **(figure 3)**. This repartition of injury mechanism was portrayed in AG 2, 3 and 4 while in AG1, injuries mainly occurred through tumbling (43%).

The treatment needed for these injuries was a simple emergency treatment in 72,5% of cases, while 26% of patients required an emergency treatment with clinical follow up, and 1,5% of patients were admitted to the hospital for treatment. In all age groups, the injuries were in majority minor (requiring no follow-up). However, individuals in **AG1 (5 to 9 years old) had a higher proportion of moderate (43%-requiring follow-up and treatment) and severe (3%-requiring admission and specific treatment) injuries (Table I)**. No fatalities were reported.

Figure 1-Number of Cheerleading Related Injuries per Year

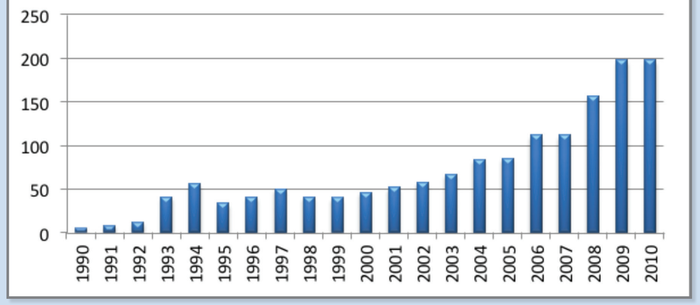


Table I– Cheerleading Injury Severity* in Relation to Age Group

	Age Group 1 (5-9 years old)	Age Group 2 (10-14 years old)	Age Group 3 (15-19 years old)	Age Group 4 (20 and older)
Number of cases (% from total)	35 (2)	600 (40)	777(52)	84 (6)
Number of females (%)	34 (97)	588 (98)	744 (96)	44 (52)
Number of minor injuries(%)	17 (49)	396 (66)	563 (72)	70 (83)
Number of moderate injuries (%)	15 (43)	180 (30)	191 (25)	11 (13)
Number of severe injuries (%)	1(3)	15 (3)	7 (1)	0 (0)

*Injury severity correlated with treatment extent.

Figure 3- Cheerleading Mechanism of Injury

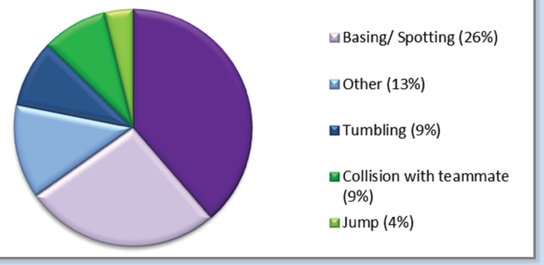
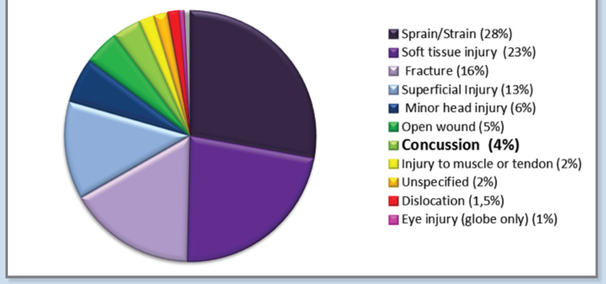


Figure 2- Nature of the Cheerleading Injuries*



Discussion and Conclusion

To our best knowledge, no study has been conducted so far to determine the impact of children's developmental stages in the practice of cheerleading and the associated injury risk factors.

This study sampled almost 1500 cases of cheerleading injuries over the span of 20 years. We were able to establish that cheerleading is a predominantly feminine sport (94% females) appealing most to a teenage demographic.

Our results demonstrated that cheerleading injuries, while usually minor, affect predominantly the head and neck (29%), which indicates a risk of serious injuries. The rise in the rate of cheerleading-related injuries secondarily to the increased popularity of the sport and the frequency of these injuries thus makes it an important health concern and prevention target.

We are conscious that our study has a number of limitations. It is important to note that the injuries described do not represent all injuries in Canada, only those seen at the emergency departments of the 15 hospitals in the CHIRPP network. Indeed, the data of this retrospective study has been compiled with the use of a limited questionnaire in selected hospitals, thus underestimating the real number of injury (ie: native people, people who live in rural areas, etc).

In our sample, the age group we found to be most at **risk of moderate to severe injuries was the 5 to 9 years old age group**. Interestingly, the most important mechanism of cheerleading injury in this age group, **tumbling** (involved in 43% of injuries in AG 1), differed from that of the other three age groups we studied. This finding leaves two possible explanations for the increased severity of injuries in this age group; either tumbling inherently increases the risk of injury and is practiced predominantly by younger children, or this age group is more susceptible to injury while tumbling. Moreover, the **developmental stage of 5 to 9 years old children could explain their vulnerability to injury.** Indeed, this particular period of childhood is the key moment to gain flexibility, but children of this age have not yet reached the level of physical maturity necessary to develop skills, stamina, or strength. Furthermore, on a cognitive level, they have not yet reached the concrete operation stage which implies that their understanding of the dangerosity of a situation is still underdeveloped [2].

All our results demonstrate that while cheerleading can be a fun part of a healthy lifestyle, guidelines need to be emitted in order to make its practice as safe as possible.

Cheerleading in Canada is officially represented by Cheer Canada, an organisation whose mission is to "lead, support, and promote cheerleading in Canada." However, this governing body has not emitted unifying security recommendations that would apply to all 10 Provinces.

The prevention of these injuries should involve implementation of mandatory national safety guidelines [3] for the practice of this sport across Canada taking into account the following principles:

- To raise awareness about cheerleading injuries amongst coaches and provide security guidelines for them to apply adapted to the reality of school settings as they are the most common site in which injuries occur.
- To raise awareness about cheerleading injuries amongst participants (and their families) and promote the presence of trained spotters in order to prevent falls.
- To create security norms concerning the location in which cheerleading is practiced, including norms concerning flooring type and ceiling height.
- To regulate the equipment used in cheerleading in order to reduce the risk of injury related to improper garments or dysfunctional props.

In the context of the obesity epidemic affecting Canadian youth, with an estimated 8.6% obesity rate in children 6 to 17 years old, and 88% of youth not meeting the Canadian physical activity guidelines, **cheerleading appears as an interesting, easy, and inexpensive option to get children involved in physical activity regardless of their BMI [4].**

References

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