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Risk Factors Involved in Cheerleading Injuries

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Abstract

Injury prevention is an important aspect of health in which professionals in the field must focus. With a continual increase of risk in activities performed nationwide, health professionals must seek to educate the population on risk factors involved in these activities. For my research, I examined the prevalence of injuries related to cheerleading. I specifically studied cheerleading injuries among female cheerleaders ages fourteen to seventeen. I conducted analyses to study what risk factors contribute to an increased exposure to injury among cheerleaders. METHODS: I used the NEISS database to obtain nationally representative data of patients who reported a cheerleading injury. The data contains 546 reports of injuries from females ages fourteen to seventeen. The injuries can be from cheerleading activity, equipment, or apparel. Descriptive analyses involving frequencies and cross tabulations were used to examine what factors affected the risk of injury most commonly. Data analyses were done using SPSS Statistics software. RESULTS: Findings indicated that the likelihood of an injury within this pool was greatest among fourteen-year-old Caucasians. The most common location of injury was at a sports or recreation center. The most common diagnosis among every age was a strain or sprain, with over ninety-seven percent of cases being treated and released without hospitalization. The most commonly injured body part in every age was a head. CONCLUSIONS: With the high prevalence of cheerleading injuries, health professionals should promote cheerleading safety and educators should give cheerleaders and coaches proper education on injury prevention.

Introduction

Over time, cheerleading has become less about basic moves to encourage a sport's team and more of a high-risk sport of its own. Cheerleaders perform fewer basic maneuvers and more tumbling and stunting. As these skills increase in difficulty, the number of cheerleading-related injuries also increases dramatically. This risk is a primary concern for the female population since they make up a greater majority of cheerleaders. Cheerleading is a sport that is becoming increasingly popular, yet the risk involved is often not recognized. The most common injury experienced by a cheerleader is a ligament sprain, but injuries increase in intensity even to death (Bagnulo, 2012).

There has been a lot of research published in recent years as the injuries of cheerleading have increased so drastically. There are three pieces of literature that I would like to focus on in regards to my thesis. The first study is *Cheerleading injuries, A narrative review of the literature* by Angela Bagnulo. This study acknowledged the growing risk of cheerleading and conducted a literature search to discover the status of the literature available for the sport's risk. The review includes twenty-six articles. The research summarizes the high physical demands of cheerleaders in order to create awareness among the healthcare system. To achieve this, the literature identifies the injury distribution, etiology, and prevention of cheerleading injuries.

The second literature I would like to use for my thesis is *Epidemiology of Cheerleading Fall-Related Injuries in the United States* by Brenda J. Shields and Gary A. Smith. The design used is a prospective injury surveillance study (Shields, 2009b). The objective of the study was to describe the epidemiology of fall-related injuries by the type of team as well as the type of event. There were 412 teams involved and seventy-nine

fall-related injuries were reported. The type of team most commonly affected was among high school cheerleading teams. The event type with the most fall-related injuries was cheerleading practice. The severity of the injury involves many factors, including the height of the fall and the surfacing material.

The final piece of literature that I would like to include in my research is *Cheerleading-Related Injuries in the United States: A Prospective Surveillance Study* by Brenda J. Shields. This study has a prospective injury surveillance design (Shields, 2009a). The objective is to calculate rates of injuries based off the type of cheerleading team and event. There were 9,022 cheerleaders involved in the study and 567 injuries were reported. The study focused on what risk factors and exposure were involved in each case of injury. The study concluded that All Star cheerleaders more often suffered from a fracture or dislocation, while collegiate cheerleaders more often had concussions. After studying the exposure data, Shields and Smith also concluded that many of these injuries were preventable.

I cheered for fourteen years and had countless cheerleading-relating injuries, so this literature is both interesting and applicable to me. I would like to use the stated literature sources, as well as the data provided on NEISS, to summarize my findings on cheerleading injuries. I would like to study what risk factors are involved and how those risks can be prevented. I will complete my study by a literature search and analysis design. I would like to create understandable graphs that clearly depict the factors associated with cheerleading-related injuries, as well as the high prevalence of such injuries. I would like to describe the epidemiology of cheerleading injuries, as well as calculate and thoroughly analyze the factors involved with these injuries.

Methods

Dr. Ches Jones and I utilized SPSS Statistics software to analyze the data found in the National Electronic Injury Surveillance System (NEISS). NEISS is a sample of hospital data collected from the Consumer Product Safety Commission (CPSC). Patient information is collected by each NEISS affiliated hospital nationwide. From this sample, the total number of product-related injuries treated in hospital emergency rooms nationwide can be estimated (NEISS). A benefit of this database is that the public can retrieve the data online. Users can also select variables such as gender, age, and date in which they would like to focus.

The data I analyzed came from a pool of 546 reported cheerleading injuries from females ages fourteen to seventeen. I analyzed this data to discern which demographic factors had the highest frequencies of cheerleading injuries. I also completed frequency analyses to see what locations the most injuries occurred in, as well as what diagnosis was most common and what body part was most frequently injured. I then ran cross tabulations to see if these findings were consistent with every age group (ages fourteen to seventeen).

Results

Findings indicated that the likelihood of an injury depends on many factors. The frequency analyses (shown on the following pages) show what factors are most common among cheerleading injuries. Within the 546 injuries deported, the frequency of injuries was directly proportional to the age. The age group with the most injuries was age fourteen, followed by fifteen, then sixteen, and seventeen-year-olds had the least amount of cheerleading injuries. The frequency analysis based on race showed the highest rates

of injury among Caucasians. However, almost thirty-one percent of reports did not specify race. Additionally, the majority of the population is Caucasian. As far as location is concerned, the most common place that the injuries occurred was at a sports or recreation place. The second most common place is at a school. The disposition analysis revealed that over ninety-seven percent of the injuries reported were seen and released, without prolonged hospital care. As supported by the research reported in my introduction, my analyses showed the most frequent diagnosis as a strain or sprain. Sixteen percent of the reports did not state the diagnosis, but two other highly reported diagnoses were concussions and contusions/abrasions. Head injuries were the most common reported injuries, followed by knees and ankles.

After configuring the frequency analyses, I thought it would be interesting to see if the findings were consistent among each age group. Therefore, I ran cross tabulations comparing diagnoses and body parts injured in each age. My age and diagnosis cross tabulation shows that a strain/sprain was the most commonly reported injury in each age. For age fourteen, the second most common diagnosis was a fracture. For ages fifteen through seventeen, the second most common diagnosis was a concussion. My second cross tabulation compared which body part was most commonly injured in each age group. The most common body part in each injury was the head. For ages fourteen and seventeen, the second most common injury involved the knee. For ages fifteen and sixteen, the second most common injury involved the ankle.

Table 1: Frequency of Cheerleading Injury Based on Age

Statistics

age

N	Valid	546
	Missing	0

age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	14	151	27.7	27.7	27.7
	15	142	26.0	26.0	53.7
	16	137	25.1	25.1	78.8
	17	116	21.2	21.2	100.0
	Total	546	100.0	100.0	

Table 2: Frequency of Cheerleading Injury Based on Race

Statistics

race

N	Valid	546
	Missing	0

race

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	168	30.8	30.8	30.8
	1	260	47.6	47.6	78.4
	2	89	16.3	16.3	94.7
	3	26	4.8	4.8	99.5
	4	3	.5	.5	100.0
	Total	546	100.0	100.0	

0= Not specified 1= Caucasian 2= African American 3= Other 4= Asian

Table 3: Frequency of Cheerleading Injury Based on Location of Activity

Statistics

location

N	Valid	546
	Missing	0

location

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	64	11.7	11.7	11.7
	1	2	.4	.4	12.1
	5	4	.7	.7	12.8
	8	227	41.6	41.6	54.4
	9	249	45.6	45.6	100.0
	Total	546	100.0	100.0	

0: unknown

1: home

5: other public property

8: school

9: sports or recreation place

Table 4: Frequency of Cheerleading Injury Based on Disposition

***Shows the intensity of the injury**

Statistics

disposition

N	Valid	546
	Missing	0

disposition

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	533	97.6	97.6	97.6
	2	3	.5	.5	98.2
	4	9	1.6	1.6	99.8
	6	1	.2	.2	100.0
	Total	546	100.0	100.0	

1: Treated and released, or examined and released without treatment

2: Treated and transferred to another hospital

4: Treated and admitted for hospitalization

6: Left without being seen

Table 5: Frequency of Cheerleading Injury Based on Diagnosis

Statistics

diag

N	Valid	546
	Missing	0

diagnosis

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	52	71	13.0	13.0	13.0
	53	64	11.7	11.7	24.7
	55	9	1.6	1.6	26.4
	57	48	8.8	8.8	35.2
	58	3	.5	.5	35.7
	59	13	2.4	2.4	38.1
	60	4	.7	.7	38.8
	61	1	.2	.2	39.0
	62	53	9.7	9.7	48.7
	64	191	35.0	35.0	83.7
	66	1	.2	.2	83.9
	71	88	16.1	16.1	100.0
	Total	546	100.0	100.0	

52: Concussion

53: Contusions/Abrasions

55: Dislocation

57: Fracture

58: Hematoma

59: Laceration

60: Dental injury

61: Nerve damage

62: Internal organ injury

64: Strain or Sprain

66: Hemorrhage

71: Other/Not stated

Table 6: Frequency of Cheerleading Injury Based on Body Part

Statistics

body_part

N	Valid	546
	Missing	0

body_part

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	30	28	5.1	5.1	5.1
	31	32	5.9	5.9	11.0
	32	18	3.3	3.3	14.3
	33	17	3.1	3.1	17.4
	34	27	4.9	4.9	22.3
	35	58	10.6	10.6	33.0
	36	9	1.6	1.6	34.6
	37	58	10.6	10.6	45.2
	75	131	24.0	24.0	69.2
	76	35	6.4	6.4	75.6
	79	31	5.7	5.7	81.3
	80	1	.2	.2	81.5
	81	5	.9	.9	82.4
	82	8	1.5	1.5	83.9
	83	8	1.5	1.5	85.3
	85	6	1.1	1.1	86.4
	88	10	1.8	1.8	88.3
	89	35	6.4	6.4	94.7
	92	22	4.0	4.0	98.7
	93	6	1.1	1.1	99.8
	94	1	.2	.2	100.0
	Total	546	100.0	100.0	

30: Shoulder	**37: Ankle**	**83: Foot**
31: Upper trunk	**75: Head**	**85: Over 50% of body**
32: Elbow	**76: Face**	**88: Mouth**
33: Lower arm	**79: Lower trunk**	**89: Neck**
34: Wrist	**80: Upper arm**	**92: Finger**
35: Knee	**81: Upper leg**	**93: Toe**
36: Lower leg	**82: Hand**	**94: Ear**

Table 7: Age/Diagnosis Cross Tabulation

age * diag Crosstabulation

Count

		diag						
		52	53	55	57	58	59	60
age	14	13	22	0	17	1	3	0
	15	19	12	3	14	1	3	0
	16	24	18	3	9	1	3	4
	17	15	12	3	8	0	4	0
Total		71	64	9	48	3	13	4

61	62	64	66	71	Total
0	16	52	0	27	151
1	17	57	0	15	142
0	12	42	1	20	137
0	8	40	0	26	116
1	53	191	1	88	546

52: Concussion

53: Contusions/Abrasions

55: Dislocation

57: Fracture

58: Hematoma

59: Laceration

60: Dental injury

61: Nerve damage

62: Internal organ injury

64: Strain or Sprain

66: Hemorrhage

71: Other/Not stated

Table 8: Age/Body Part Cross Tabulation

age * body_part Crosstabulation

Count

		body_part										
		30	31	32	33	34	35	36	37	75	76	79
age	14	6	8	6	5	11	17	4	16	29	10	8
	15	11	10	6	3	4	9	4	12	39	5	4
	16	5	9	3	6	7	13	0	16	37	14	8
	17	6	5	3	3	5	19	1	14	26	6	11
Total		28	32	18	17	27	58	9	58	131	35	31

80	81	82	83	85	88	89	92	93	94	Total
1	0	2	2	2	1	12	8	2	1	151
0	4	3	2	2	3	8	11	2	0	142
0	1	2	2	1	4	7	1	1	0	137
0	0	1	2	1	2	8	2	1	0	116
1	5	8	8	6	10	35	22	6	1	546

30: Shoulder
31: Upper trunk
32: Elbow
33: Lower arm
34: Wrist
35: Knee
36: Lower leg
37: Ankle
75: Head
76: Face
79: Lower trunk
80: Upper arm
81: Upper leg
82: Hand
83: Foot
85: Over 50% of body
88: Mouth
89: Neck
92: Finger
93: Toe
94: Ear

Discussion

This research has indicated that there are many commonalities present within the reports of cheerleading injuries. For one, younger girls are the ones most frequently injured. I would assume this correlates to them being less experienced in the sport, as well as their bones being less developed. To help prevent injuries among young girls, strength training and conditioning should be part of the cheerleading practice. This training could help prevent ankle sprains and back injuries, as well as increase overall body strength. Secondly, the majority of cheerleading injuries happen either at school or a recreation place. Therefore, the majority of injuries probably occur at cheerleading practice. With coaches and teammates surrounding these cheerleaders as they practice, health educators must do better at providing quality training to promote safety at these cheerleading practices.

The research also shows commonalities within the diagnoses. Most diagnoses are strains/sprains, concussions, or contusions/abrasions. With approximately sixty percent of reported injuries fitting into one of those three diagnoses, our education can be specific to how to prevent those injuries from occurring. Training can also be specific to protecting cheerleaders' heads, ankles, and knees since almost half of reported injuries involve these body parts. I think a coaching license should be acquired before coaching any type of team that involves gymnastic maneuvers or lifting people in the air. With the rates of injuries rising as the sport becomes more competitive, the safety education for the sport is more essential than ever. Coaches should also be trained in knowing the signs of an athlete with a concussion. Knowing these signs can diagnose a concussion early and will also prevent coaches from using the same techniques that caused the concussion.

Another way to promote safer practices is to ensure that all practices are done on a safe surface. New tricks should be perfected on mats before ever moving to hard surfaces, such as a gym floor. Overall, the high frequency of cheerleading injuries shows a severe gap in the education and implementation of safety standards within cheerleading.

When I compared these results to the data reported by Children's Hospital Colorado Orthopedics Institute, I found that we produced very similar results. In a current ranking noted by this institute, cheerleading is ranked sixteenth among the most dangerous sports (Cheerleading, 2014). One reason the institute had for this that I did not consider is that cheerleading is year-round, so there is not an off-season period to rest like in most sports. Matching my results, this study also reported the most common injuries as strains and sprains. It also reported the most common body parts to be injured are heads (due to concussions) and ankles. These results also correspond with my findings.

Conclusion

There are many correlations shown in the cheerleading injuries reported in this study. While causal factors cannot be concluded, there are significant findings that show specific risk factors related to cheerleading injuries. These factors include age and practice location. There is also a commonality among the injuries reported, which show a huge majority of cases involving the same body parts and diagnoses. Since cheerleading will only continue to increase in difficulty and competitive nature, it is essential that our health educators take the appropriate steps to promote and implement the safety of the athletes within the sport of cheerleading.

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