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Bull Riding Injuries in Professional Rodeo

Data for Prevention and Care

Dale J. Butterwick, MSc, CAT(C)

Willem H. Meeuwisse, MD, PhD

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ABSTRACT

BACKGROUND: Recent tragedies in bull riding have highlighted the need for prospective epidemiologic investigation of injury patterns.

OBJECTIVE: To document the frequency, type, severity, anatomic location, and mechanism of injury to bull riders participating in professional rodeo in Canada.

DESIGN: Five-year prospective cohort study examining 4,375 competitor exposures during bull riding events at selected rodeos. Certified athletic therapists gathered data at 63 of 323 professional rodeos in Canada from 1995 through 1999. Data were included when a registered bull rider was injured and the Canadian Pro Rodeo Sport Medicine Team was officially present and providing services. The main outcome measures were the frequency, severity, and anatomic location of injuries to bull riders.

RESULTS: According to the injury classification system (severe, minor, or other), 36% of injuries to bull riders were severe. Fractures were the most common severe injury. Concussions constituted 10.6% of all injuries; neck injuries and concussion with other head and facial injuries accounted for 28.9%. About half (48%) of injuries were minor. The knee and shoulder were the most commonly injured joints.

CONCLUSION: Injuries to the head, neck, and face may deserve more attention by both researchers and those interested in preventing injury to bull riders. Epidemiologic information will give on-site physicians a better foundation in preparing to care for injured rodeo participants.

Rodeo announcers throughout North America introduce bull riding as "the most dangerous 8 seconds in sport." Bull riding has the highest injury rate of all major events in professional rodeo.¹ Recently, bull riders in Canada and the United States have sustained highly publicized severe injuries, including quadriplegia, incidents of mild-to-moderate permanent neurologic motor deficits, and three fatalities (per conversation with the Canadian Professional Rodeo Association [CPRA] Calgary, Alberta, Canada, April 2002). These tragedies have raised concerns about the frequency, severity, and nature of injuries that occur in this sport. Although some epidemiologic investigations

of rodeo and bull riding injuries exist,¹⁻⁶ we are unaware of any prospective epidemiologic reports that have specifically investigated bull riding in North America.

The Canadian Pro Rodeo Sport Medicine Team (CPRSMT) has completed three prospective epidemiologic injury assessments in major events in professional rodeo in Canada, including bull riding.¹⁻³ Whereas those studies were epidemiologic assessments of all major rodeo events, the purpose of this project was to specifically examine more closely the rates, types, anatomic location, and mechanisms of injury to bull riders competing in Canadian professional rodeos.

Methods

This investigation of bull riding injuries is a subset analysis of a 5-year prospective study.¹ Certified athletic therapists from the CPRSMT collected data during

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For author disclosure of financial relationships and mention of unlabeled use of drugs, see the next page.

the Canadian professional rodeo seasons in each of the 5 years from 1995 through 1999.^{1,2} Injury data were collected on bull riders at 63 of 323 major professional rodeos in Canada. Data were entered into a Microsoft Excel spreadsheet for descriptive analysis of injury severity, type, anatomic location, frequency, and injury rates. Information about contestants' injuries was included in the data, with their permission, when care was administered in the arena by CPRSMT staff, or when contestants voluntarily reported to the CPRSMT following injury. This investigation met with the standards of the University of Calgary Conjoint Medical Research Ethics Board.

Injury was recorded when transient neurologic symptoms occurred to the head, neck, or spine; when treatment was required by the CPRSMT; when the athlete missed 1 or more competition days; or when a physician referral was required. Injuries were reported by location, severity, and the types of injury sustained. Concussions were reported separately from other head injuries (eg, fractures, lacerations, dental injuries) due to recent interest in mild traumatic brain injury.

All competitors were male professional bull riders from Australia, Brazil, New Zealand, the United States, and Canada. Although age was not recorded for every participant, the sample was a very homogeneous group of athletes; the vast majority were between 18 and 28 years old. The oldest competitor is well known and was 50 years old in 2001.

There were 4,375 bull rides in the study period. Each bull ride or rered was included as one competitor exposure (CE). The CE data were provided as part of the official records of each rodeo, courtesy of the CPRA.

TABLE 1. Classification and Frequency of Severe Injuries in Canadian Professional Bull Riding, 1995 to 1999

Type	Site or Degree	Number
Fractures (n = 18)	Maxilla	3
	Other facial bones	3
	Fibula	3
	Tibia	2
	Femur	2
	Clavicle	2
	Scaphoid	1
	Nose	1
	Teeth	1
Dislocations (n = 5)	Glenohumeral joint	4
	Metatarsophalangeal joint	1
Subluxations or labral tears (n = 3)	Glenohumeral joint	2
	Elbow	1
Complete ligament tears (n = 8)	Acromioclavicular joint	2
	Posterior cruciate ligament	2
	Medial cruciate ligament	2
	Anterior cruciate ligament	1
	Ulnocarpal ligament	1
Pneumothorax (n = 1)	Chest	1
Concussion (n = 15)	First degree	6
	Second degree	1
	Third degree	0
	Lost to follow-up	8
Neurotrauma* (n = 1)	Brachial plexus neurapraxia	1
Total		51

* No episodes of quadriplegia, serious neurologic trauma, or fatalities occurred.

Results

Injuries were recorded in 141 of 4,375 bull rides, an injury rate of 32.2/1,000 CE. Injury rates were calculated as the number of injuries per number of CE. Analysis of the injury distribution by anatomic location (table 1) shows that shoulders and knees were the

Mr Butterwick and Dr Meeuwisse are professors in the faculty of kinesiology at the University of Calgary Sport Medicine Centre in Alberta, Canada.

Address correspondence to Dale J. Butterwick, MSc, CAT(C), Faculty of Kinesiology, University of Calgary, 2500 University Dr NW, Calgary, AB,

Canada T2N 1N4; e-mail to butterwi@ucalgary.ca.

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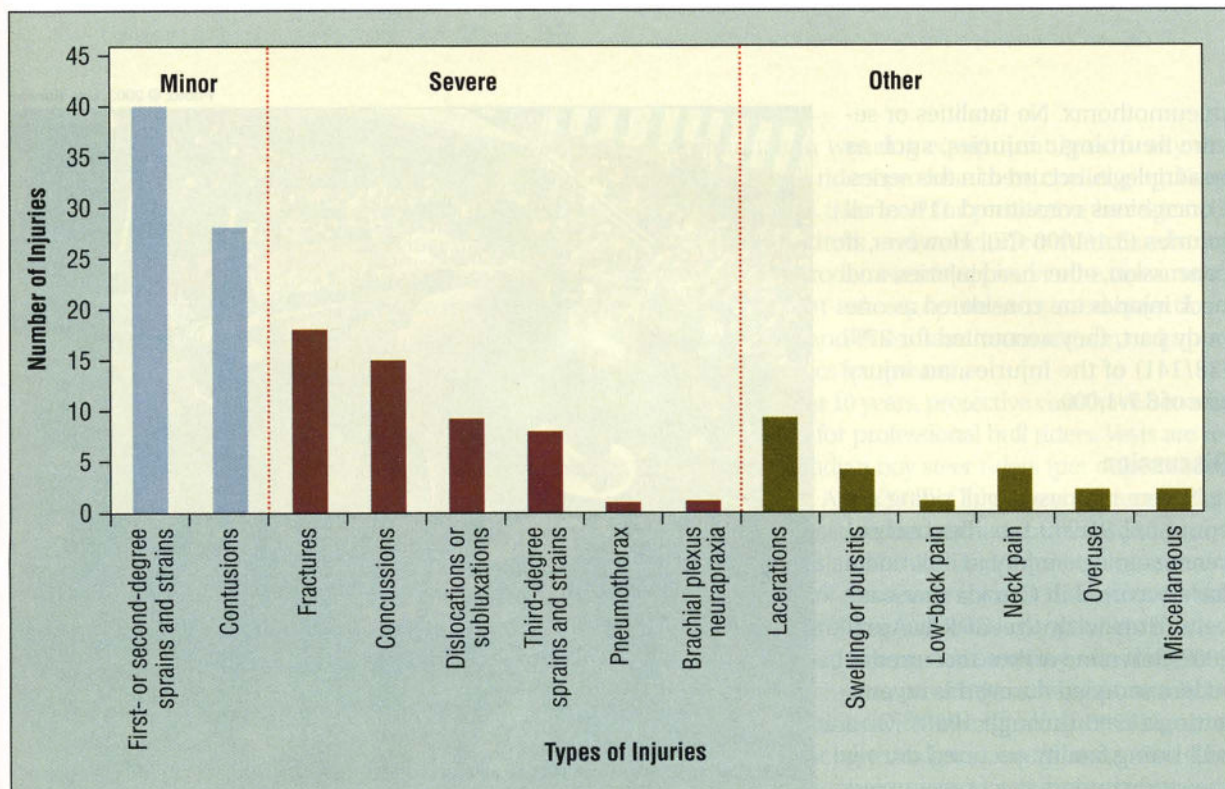


FIGURE 1. Number, severity, and type of injury in a 5-year prospective study of bull riding in professional rodeos in Canada.

most frequently injured joints, but concussions were the most frequently occurring injury. Table 2 shows the annual CE, injuries, and injury rates.

Injury was categorized as minor, severe, or other (figure 1). Most of the injuries (68/141) were minor (48%; 20.6/1,000 CE). Minor injuries were defined as first- and second-degree sprains or strains and contusions. "Other" injuries (22/141) included bursitis, overuse injuries, lacerations, nondescript pain and swelling, and a costal cartilage separation. Minor and other

injuries constituted 64% of the total.

One particular injury of interest in bull riding is the groin strain, which accounted for 9 of 141 injuries (6%). First- or second-degree groin strains (iliopsoas or hip adductors) occurred to 9 competitors, but no third-degree strains occurred in this study.

About one third (51/141; 36%) of the injuries were severe (11.7/1,000 CE), including fractures, concussions, joint dislocations or subluxations, complete ligament rupture, brachial plexus neurapraxia, and a

continued

TABLE 2. Summary by Year of Injury in Selected Canadian Professional Bull Riding Events

Year	1995	1996	1997	1998	1999	Total
Number of rodeos	13	14	12	11	13	63
Competitor exposures (CE)	714	875	926	1,004	856	4,375
Injuries	33	37	29	19	23	141
Injuries/1,000 CE	46.2	42.2	31.3	18.9	26.8	32.2*

* = Average for all years.

pneumothorax. No fatalities or severe neurologic injuries, such as quadriplegia, occurred in this series. Concussions constituted 11% of all injuries (3.4/1000 CE). However, if concussion, other head injuries, and neck injuries are considered as one body part, they accounted for 27% (38/141) of the injuries, an injury rate of 8.7/1,000.

Discussion

Severe injuries in bull riding are common. Recent fatalities and severe neurologic injury to bull riders have occurred in Canada (per conversation with the CPRA, April 2002), but none of these occurred at rodeos sampled during this investigation (1995 through 1999). One bull riding fatality occurred during the study period at a nonsampled rodeo in Canada.

The most life-threatening injury in this series was a pneumothorax without rib fracture that occurred when the cowboy was bucked off and landed flat on his back. The patient healed completely and uneventfully. Fractures (7 to the lower extremity, 3 to the upper extremity, and 8 to the head and face) were the major category (35%) of serious bull riding injuries. Most injuries occurred when the contestant was struck by the bull's head, stepped on, or thrown to the ground.

Although the CPRSMT members have examined many bull riders who had complete distal biceps tendon ruptures over the past 18 years, none occurred in this series. In fact, no complete tendon ruptures occurred. Knee and elbow ligaments sustained complete ruptures in this investigation (see table 1). Knee ligament injury often occurs when the cowboy hits the ground but can also happen if the bull rope accidentally wraps around the rider's ankle while he is dismounting. This causes a whipping effect at the knee joint. Elbow ligament injury can occur during the ride or when the bull rider gets "hung up" (figure 2). This happens when his hand remains wrapped in the bull



FIGURE 2. A bull rider becomes "hung up" if he is thrown from the bull when his hand is entangled in the rope that encircles the bull's chest. This occurrence is often a mechanism of injury for elbow ligaments.

rope after he gets bucked off. Two bull fighters assist in freeing the cowboy while the bull is still bucking.

Dislocations and subluxations occurred primarily to the shoulder (glenohumeral joint) and the elbow. Traumatic shoulder dislocations occurred to both the free arm and the riding arm. Unfortunately, this was not a question that was asked prospectively, and thus specific data are not presented regarding the incidence of free arm or riding arm dislocations of the glenohumeral joint.

Concussions accounted for 11% of all injuries, a rate that was similar in another report.⁶ The injury rate of 8.7 per 1,000 CE to the head, neck, and face of bull riders is higher than otherwise reported.^{1,4-6} Causes of concussions^{1,4,7} in bull riding injury include the contestant's head hitting the bull's head while riding; hitting the ground, chute, or gate; and being kicked or stepped on by a bull. These same mechanisms cause an assortment of other injuries, including fractures.

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Incomplete information regarding patients who had concussions occurred because many of these contestants were lost to follow-up when they were transported by emergency medical services. Those with concussion who were lost to follow-up were reported as a discrete group in our study. Because these patients were transported to hospitals, we can assume that their symptoms endured more than 15 minutes; therefore, most of those lost to follow-up would have had at least second-degree concussions. Since concussions and other head or neck injury occur regularly, they may deserve more research and clinical attention.

Limitations

The limitations of the voluntary reporting system^{1,3} may underestimate injury rates, but the CPRSMT has been attending Canadian professional rodeos for 19 years, and the certified athletic therapists are well known to competitors. Since no competitors refused to allow the collection of their injury data or entry of the data into the database, the effect of voluntary reporting on underestimation of injury may be minimal. It is impossible to quantify the incidents of injured contestants who failed to report their conditions. Data were not collected from bull riding-only events, nor were data included when the cowboy sought medical attention from CPRSMT personnel if the injury occurred at a nonsampled rodeo or at practice.

Fortunately, many injuries that occur to professional bull riders who compete in Canada are minor. The same observation can be made for all rodeo contestants.¹ The injury rates for all other major rodeo events are well below that of the bull riders.¹ Serious injury does occur in other rodeo events; however, it is most likely to occur to bull riders.

Proactive Injury Prevention

Injury and reinjury prevention are starting to gain the attention of competitors, rodeo organizers, researchers, and the media. Gradual efforts toward the prevention of severe bull riding injuries have included occasional use of hockey-style helmets and soft cervical collars when riding particularly infamous bulls or when recovering from recent injury. Another recent device is a face mask designed specifically for bull riders. The evolution of facial and head protection and

compliance in wearing equipment specifically designed for bull riders promise to be challenging. Ketai et al⁸ assessed the need for protective headgear in rodeo competitors and concluded that mandatory helmet use in rodeo events appears to be unwarranted. We did not ask equipment-related questions prospectively, and thus these issues remain as important future topics for research.

Over the past 10 years, protective vests have become standard dress for professional bull riders. Vests are required for Canadian boy steer riders (per conversation with the CPRA, April 2002). Only one equipment-related evidence-based report has been published.⁹

Concussions and other head injuries constituted a major portion of the severe injuries that occur to bull riders during professional rodeo competition. Further attention to head injuries and reinjury rates following concussion, including preventive strategies, would be helpful. In addition, evidence regarding the design and efficacy of specially designed equipment would be welcome additions to rodeo-related research.

Rodeos are receiving more media exposure and are commonly televised. Physicians are more often present as staff at major North American rodeos, and, therefore, epidemiologic information is a valuable tool for increasing excellence in on-site care. **FSM**

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