

Original Contributions



TEN YEARS OF EQUINE-RELATED INJURIES: SEVERITY AND IMPLICATIONS FOR EMERGENCY PHYSICIANS

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Abstract—Background: The size, speed, and unpredictable nature of horses present a significant risk for injury in all equine-related activities. **Objective:** We sought to examine the mechanism, severity, frequency, body regions affected, surgical requirements, rehabilitation needs, safety equipment utilization, and outcomes of equine-related injured patients. **Methods:** Records of inpatients who sustained an equine-related injury from 2002–2011 with International Classification of Diseases, Ninth Revision codes E828 and E906 were retrospectively reviewed for pertinent data. **Results:** Ninety patients, 70% female, age (mean $\pm$ SD) 37.3 ± 19.4 years, length of stay 3.7 ± 4.5 days, Injury Severity Score 12.9 ± 8.4 . Predominant mechanism of injury was fall from horse (46.7%). The chest (23%) was most frequently injured, followed by brain/head (21.5%). Thirty patients (33%) required 57 surgical procedures. Twenty percent of patients required occupational therapy and 33.3% required physical therapy while hospitalized. Only 3% required rehabilitation, with 90% discharged directly home. Safety equipment was not used in 91.9% of patients. One patient sustained a cord injury. Six patients expired, all from extensive head injuries. **Conclusion:** The majority of equine-related injuries occur while pursuing recreational activities and are due to falls. Our patients experienced more severe injuries to the trunk and head and required more surgical intervention for pelvic, facial, and brain injuries than previously reported. Failure to use safety

equipment contributes to the risk of severe injury. Education and injury prevention is essential. The need for complex surgical intervention by multiple specialties supports transfer to Level I trauma centers. © 2015 Elsevier Inc.

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INTRODUCTION

The previously functional role of horses for transportation and in farming has evolved throughout the years to predominately sporting and leisure pursuits. The size and unpredictable nature of horses correlates to significant risk for injury in equestrian-related activities. The average horse weighs 1100 pounds, with a saddle height of 6 feet, putting the rider's head at a height of 10 feet off the ground. Horses at full gallop are capable of speeds up to 40 mph (1). Horseback riding has been noted as being more dangerous than motorcycle or auto racing, skiing, rugby, or football (2). One in five riders will suffer a serious injury resulting in hospitalization, surgery, or a long-term disability during their lifetime while participating in pleasure or competitive equestrian activities (3,4). Even while not mounted on the horse, humans standing nearby are still at risk of significant injury as the force of a horse's kick has been calculated to be up to one ton (5).

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The U.S. Consumer Product Safety Commission's National Electronic Injury Surveillance System (NEISS) 2009 data estimates that 78,499 injuries occurred from horseback riding (6). Of those injured, just over 50,000 were female, with the greatest number of injuries in the 25–64-year age range (44,688), followed by 15–24-year-olds (15,743). According to NEISS, the majority of these riding injuries were treated without hospitalization (67,196), whereas 11,250 equestrians were seriously injured, either requiring hospitalization or were dead on arrival. These statistics do not include data from all other equine-related injuries sustained during 2009.

The mechanism of injury in equine-related injuries is as varied as the horses themselves. Previous studies conducted in the United States, Great Britain, Canada, the United Arab Emirates, and Switzerland have all identified falls from horses and being kicked by a horse as the two most common mechanisms of injury (1–5,7–17). Injuries also occur from being trampled or crushed by a horse, having the horse roll over onto the patient, being thrown, bucked, or otherwise ejected.

As a Level I trauma center, we have treated equine-related injuries sustained throughout 11 counties in southwestern Michigan and one county in northern Indiana encompassing 5338 square miles. The purpose of this study was to examine the frequency with which these injuries occur, and identify the mechanism, types of injury, and surgical interventions required to care for this population.

PATIENTS AND METHODS

After approval from our Institutional Review Board, all patients admitted for inpatient care were identified from a query of the trauma registry (Trauma One, Lancet Technology, Boston, MA) from January 1, 2002 through December 31, 2011 with the International Classification of Diseases, Ninth Revision codes E 828 and E 906. Charts of patients meeting the study inclusion criteria were then reviewed. Patients of any age admitted to our institution whose injuries were described as being caused by equine-related activity including falls, being kicked, bucked, thrown, ejected, trampled, crushed, dragged, rolled over, pinned, or bitten, were included in the study. Patients who were injured while horseback riding, participating in rodeo or racing, handling, grooming, shoeing and other farming-related contact with horses were also included. Data points collected included gender, age, length of stay (LOS), Injury Severity Score (ISS), mechanism of injury, diagnosis, county in which the injury occurred, safety equipment worn, years of riding (if applicable), surgical procedures, complications, need for occupational or physical therapy, hospital charges, insurance status, and discharge disposition,

including need for inpatient rehabilitation. Due to the similarity of the mechanisms of being bucked (horse plants both front feet on ground then throws hind end upwards), thrown (horse jumps, stops dead, or lowers a shoulder in an effort to remove rider), and ejected (rider catapulted off), all three mechanisms were counted as “ejected” for statistical purposes and clarity of reporting results. Documentation for the use of safety equipment was obtained from three sources: emergency medical services run sheet and report, trauma flow sheet where helmet use is a standard question, and physician history and physical examination. Surgical procedures were counted as discrete interventions per operation (e.g., pelvis operation that involved internal fixation of pubic symphysis and percutaneous screw of left sacroiliac joint was counted as two procedures).

Patient characteristics and related outcomes were summarized using descriptive statistics and compared between groups using chi-squared or Fisher's exact test for categorical variables. Kruskal-Wallis test was performed for analysis of more than two groups. A 5% level of significance was used to evaluate statistical significance in all analyses.

RESULTS

A total of 90 patients were admitted for equine-related injuries over the 10-year study period. Ages ranged from 3–76 years, with mean age (mean $\pm$ SD) of 37.3 ± 19.4 years, and included 23 patients under the age of 18 years. Female gender predominated, 63/90 (70%). Mean LOS was 3.7 ± 4.5 days, with a range of 1 to 33 days, and ISS of the entire study group was 12.9 ± 8.4 , with a range of 1 to 41 (Table 1).

The majority (83/90) of patients were on or near the horse for recreational purposes, 4 were working with or nearby, 2 were cowboys in a rodeo, and 1 was a sulky driver. The most common mechanism of injury was fall from the horse (46.7%), followed by ejected from horse (28.9%), kicked by horse (23.3%), horse rolled on patient (13.3%), trampled (3.3%), dragged (2.2%), and other (3.3%). Eighteen patients sustained more than one mechanism of injury, and 83/90 (92%) were injured while engaged in recreational equine pursuits. ISS in patients who were crushed was 17.8 ± 16.3 , kicked 14.5 ± 11.2 , ejected 13.0 ± 6.9 , fell from the horse 12.8 ± 8.8 , trampled 11.3 ± 2.3 , rolled upon 11.1 ± 6.7 , dragged 7.5 ± 3.5 , and not otherwise specified 10.5 ± 12.0 . Thirty-eight percent of patients had injuries in more than one body area, with the most commonly injured area being chest (23%), followed by brain/head (21.5%). Injuries to the spine (14.1%) were the next most frequently injured body region, with the lumbosacral spine being the most prevalent spinal trauma

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