

Wisconsin Firearm Deer Hunting Season: Injuries at a Level I Trauma Center, 1999-2004

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ABSTRACT

Context: Hunting continues to be a passion and common pastime for many US citizens, especially in rural areas. Unfortunately, with the large volume of hunters entering the woods each season, hunting injuries continue to be common.

Objective: Review the experience of a level I trauma center during each of Wisconsin's 9-day deer firearm hunting seasons over a 6-year period and identify potential prevention elements based on the findings.

Design: We retrospectively reviewed all hunting-related injury patient data entered into the University of Wisconsin Hospital and Clinic's (UWHC) level I trauma registry from 1999 to 2004, for each 9-day Wisconsin deer hunting firearm season. We compared injury occurrence with Wisconsin DNR statewide hunting-related firearm injury incidence data over the same time frame. The study was conducted at a level I university tertiary referral trauma center. The study included any patient admitted to the UWHC during the study period with a hunting-related injury entered into the trauma registry.

Outcomes Measured: Primary outcomes recorded included patient demographics, mechanism of injury, types of injuries, comorbidities, injury severity scores, and mortality.

Results: Twenty-four patients were treated for hunting-related injuries during the study period. The majority of hunters were male (95%), with an average age of 44.5 years. Treestand injuries accounted for 16 of the 24 injuries treated; the rest of the injuries were firearm-

related. Most of the injuries (18) occurred during the first 3 days of the hunting season, with the remaining 6 injuries taking place around the Thanksgiving holiday period. Injury severity scores (ISS) ranged from 1 to 50. Orthopedic concerns accounted for 79% of the injuries, while general surgical was 50%, and neurosurgical was 12.5%. Two fatalities occurred due to complications from injuries caused by falling from a treestand.

Conclusion: Falls from a tree-stand and firearm shootings represent 2 mechanisms for severe hunting-related injuries during the 9-day deer firearm hunting season in Wisconsin. Formal treestand safety instruction should be emphasized during hunting education classes and all hunters need to heed safe hunting recommendations pertaining to firearms and treestands, and be particularly cautious during the first few days of the hunting season.

INTRODUCTION

The US Fish and Wildlife Services estimate that 10.3 million individuals in the United States participate in deer hunting, or roughly 6% of the general population.¹ Hunters spend an annual average of \$10 billion in their pursuit of game.¹ In many states, the deer firearm season is the most popular. The deer firearm season usually ranges between 1 and 2 weeks and brings hundreds of thousands of individuals into rural areas. According to the Wisconsin Department of Natural Resources, nearly 695,000 deer firearm licenses were sold in 2000 alone.² Due to the sheer volume of individuals with firearms and the methods employed when deer hunting, injuries routinely occur. The most serious trauma injuries are often transported and cared for at a level I trauma center; a center that has been certified by the American College of Surgeons to be capable of providing the highest standard of care to trauma patients. Our study examines all deer hunting-related trauma cases admitted to the University of Wisconsin Hospitals and Clinics (UWHC) level I trauma center during the 5 deer hunting seasons from 1999 to 2004, identifying

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hunting injury mechanism and type, then recommending prevention strategies based on the findings.

METHODS

University of Wisconsin Trauma Registry

The study evaluated data from the University of Wisconsin Hospital and Clinics Trauma Registry, pertaining to all hunting injuries admitted to UWHC for each Wisconsin 9-day deer firearm hunting season from 1999 to 2004. All admissions to the hospital are reviewed on a daily basis for inclusion into the trauma registry. Patients qualify for inclusion into the registry if they sustain a sufficient injury leading to hospital admission for at least 23 hours of observation. Falls from a standing position resulting in open fractures, head injuries, or significant internal injuries are included; falls resulting in an isolated closed fracture are excluded. Minor injuries, emergency department discharges, strangulation events, poisoning occurrences, and patients dead on arrival to the hospital are not recorded in the registry. Patient gender, age, medical comorbidities, mechanism of injury, day of occurrence, type of injury, injury severity, treatment, complications, and outcomes are recorded. Blood alcohol levels are not routinely measured and were not noted in this study. Injury severity was graded based on the Injury Severity Scale (ISS). The ISS is calculated from the Abbreviated Injury Scale (AIS) scoring, which is an anatomically based scoring system.³⁻⁴ Injuries are classified by body region and, based on expert opinion, are assigned values ranging from minor (AIS 1) to currently untreatable (AIS 6). The Injury Severity Score is the sum of the squares of the 3 highest AIS scores in different body regions.

A descriptive analysis of the data was then performed. Two distinct patient groups were identified, accounting for all patients injured by a firearm and all patients injured due to falling from a hunting treestand. A student T-test was used to compare the age differences between the firearm and treestand groups. Study data regarding frequency of injury and specific day the injury occurred within the deer season was also compared to statewide deer hunting firearm injury data collected by the Wisconsin Department of Natural Resources (DNR) over the study timeframe.⁵⁻¹⁰ The study was approved by the University of Wisconsin Internal Review Board.

RESULTS

A total of 24 patients with deer hunting-related injuries were identified in the UWHC trauma registry over the study period. Sixteen patients (66%) suffered injuries due to falling from a treestand, and 8 patients (33%)

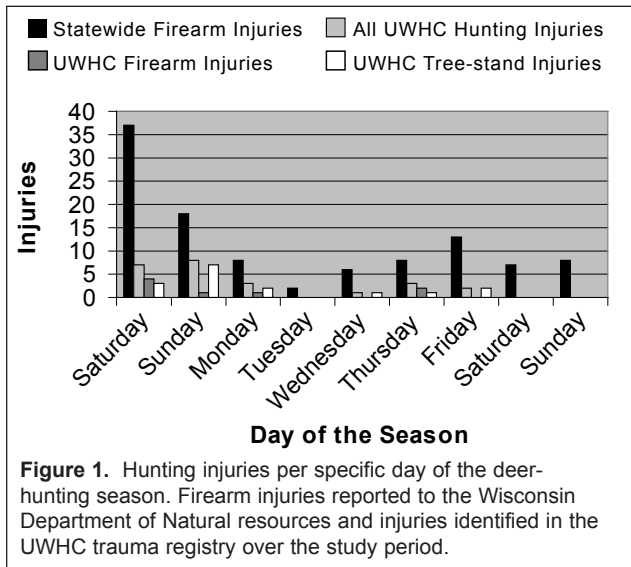
were injured due to a firearm. Sixty-two percent of all injuries occurred during the first 2 days of the season (Figure 1). Males accounted for 23 of the 24 patients. The mean age was 44.5 years, with a range of 12.9-72 years.

The prevalence of patients with comorbidities included 8 with cardiac issues, 6 with pulmonary issues, 5 with diabetes mellitus, and 3 who were obese. The mean severity of injury score was 13, and ranged from 1 to 50. Twenty patients (84%) suffered orthopedic injuries, 12 patients (50%) required general surgical care, and 3 patients (13%) suffered intra-cranial trauma. Two thirds of all patients required operative treatment. Orthopedic injuries included 3 patients with spine fractures, 2 with pelvic fractures, 18 with extremity trauma, and 3 who suffered clavicle fractures. Two patients did not survive (8% mortality); 1 died of complications from a closed head injury and the other died after suffering a pulmonary embolism while being treated for an acetabular fracture and lung contusion. Both victims had fallen from treestands while hunting.

The first 3 days of the deer season proved to be the most dangerous for both the patients injured by firearms and the hunters injured due to treestands. These first days produced 6 of the 8 firearm injuries and 12 of the 16 treestand incidents. The rest of the injuries for both groups occurred on days 5-7, which correlate to the Wednesday, Thursday, and Friday of the Thanksgiving holiday. The clustering of injuries around the opening few days of the season and the Thanksgiving holiday is also reflected in the statewide firearm injury occurrence data reported by the DNR over the same timeframe (Figure 1). There was no statistical difference in age between firearm-injured patients (35 years \pm 21) and treestand-associated events (49 years \pm 11); the average ISS was 11 \pm 9 and 13 \pm 11 for the 2 groups, respectively. The majority of the injuries in the treestand group were orthopedic in nature (90%); the treestand group included the 3 patients who suffered intracranial injuries and also contained the 2 patients who did not survive. Injuries in the firearm group were divided evenly between general surgical-assigned treatments and orthopedic pathology.

DISCUSSION

Hunting remains a popular sport in Wisconsin, with thousands of people enjoying the activity each year. Although the absolute rate of injury is low compared to other sports, the potential for sustaining a life-threatening injury is not insignificant. Our study represents a sample of the most seriously injured patients who were



deemed to require care at a level I trauma center. Within this seriously injured sample, only 2 mechanisms of injury were identified: falls from a treestand and wounds inflicted from a firearm. Attempts to reduce serious hunting injuries should apply prevention resources and strategies to the problems presented by treestand and firearm use while hunting.

Firearm Injury Prevention

The first few days of the deer season and the time around the Thanksgiving holiday appear to be the most dangerous time for hunters; these times most likely correlate with the greatest number of hunters in the field, leading to an increased risk for mishap. Hunters need to be particularly careful during these high volume times. Other investigators have focused on firearm-related injuries suffered in Mississippi,¹¹ Pennsylvania,¹² and New York¹³ throughout all hunting seasons, including both small and large game. Factors related to injury were found to be other hunters being mistaken for game, being positioned in the shooter's line of fire or out of the shooter's view, unintentional firearm discharge, and being struck by a bullet's ricochet.

Unintended shootings during "deer drives" accounted for the greatest number of firearm injuries reported to the Wisconsin DNR during the study period. The deer drive method of harvesting animals involves an individual or group of individuals walking through a wooded area, "pushing" deer from hiding areas toward other individuals waiting for an opportunity to shoot. Although deer drives can be very productive, and members enjoy the camaraderie before and after the "drive," great care must be taken by all members involved. Deer are often running, giving hunters only a brief moment to make a critical decision to shoot or not to shoot dur-

ing a drive. In addition, it is common for the animals to run between members of the "drive." Therefore, unless the exact location of the other hunters is known, and shooters display strict discipline regarding safe shooting lanes, unintended shootings can occur.

In most states, including Wisconsin, hunter education is now required before a hunting license will be issued. The hunting education classes stress the importance of avoiding intoxicating substances while hunting, proper firearm care and transport, and safe practices in the field.

Blaze orange clothing is also required in many states during the firearm seasons to cut down on mistaking hunters for game, especially in low light conditions. Wisconsin requires at least 50% of clothing above the waist be blaze orange and strongly recommends hunters wear 100% blaze orange clothing during a hunt. In only 5% of 117 firearm-related injuries in which hunters were mistaken for game in New York were the hunters found to be wearing blaze orange clothing.¹³ In addition, even though we identified the use of treestands as a risk for serious injury due to falls, treestand use is thought to decrease the number of gun-related injuries since they allow better visualization. Table 1A lists firearm safety recommendations.

Treestand Injury Prevention

The Consumer Product Safety Commission reviewed several surveys from *Deer and Deer Hunting* magazine and *The Topeka Capital Journal*. These surveys indicate that 75%-78% of deer hunting time is spent in treestands.¹⁴ Unfortunately, no formal records of treestand-related incidents have been recorded in Wisconsin. In Georgia, a state that mandates the reporting of all hunting-related injuries, the annual rate of deer hunting treestand incidents over a 10-year period was 8.9 injuries per 100,000 hunting licenses sold, 52% of which were associated with a fall.¹⁵ Based on the Georgia figures, Wisconsin would have experienced an estimated 31 treestand fall injuries per year over our study timeframe.

Throughout the medical literature, others have reported on treestand-related injuries. As in our study, orthopedic injuries were the most common pathology reported due to treestand falls, and alcohol was a potential factor in 17%-18% of the cases reported.¹⁶⁻¹⁸ A survey conducted by the International Hunter Education Association (IHEA) in 2002 of 1056 hunters in North Carolina and Vermont found that 7% of hunters reported a treestand related injury within the last 10 years, with 1.5% requiring medical attention. The majority of these accidents (75%) occurred while entering or exiting the treestand. Faulty placement of

stands, use of homemade stands, and failure to wear an approved safety harness are also contributing factors to treestand injuries.

The issue of safety harness use is an evolving topic. Previously, the Treestand Manufacturers Association (TMA) had endorsed single strand safety belts; however, the Consumer Product Safety Commission (CPSC) has reported 8 asphyxiation deaths related to waist belt safety restraints and has called for the banning of these devices.¹⁴ The US Air Force studied several different fall restraint systems, noting that although full body harnesses are safer than single stranded belts, a body harnesses can still cause injury if a person has to hang in the device for more than 30 minutes.¹⁹ In compliance with CPSC, TMA now recommends the use of a full body harness when using a treestand and suggests that hunters practice hanging and extracting themselves from the harness prior to using the device in the field. Hunters should also have a knife readily available to aid in extraction and a cell phone or other means of communication to call for help when assistance is needed. Table 1B lists treestand safety recommendations.

CONCLUSION

Serious injuries are often a result of large transfers of energy to a victim. Our study documents 2 mechanisms for such larger transfers of energy leading to significant hunting injuries: firearm shootings and falls from tree-stands. While the Wisconsin DNR follows firearm incidents closely, the incidence of treestand injuries in Wisconsin is not well documented. To reduce these serious hunting injuries we recommend:

1. Physicians counsel their hunting patients regarding best safety practice for firearm and tree-stand use
2. The inclusion of comprehensive tree-stand safety instructions in Wisconsin's hunting education class
3. Physicians stress that hunters need to be extra vigilant during the opening days of deer season and during the Thanksgiving holiday when the volume of hunters is presumed to be at a peak.

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Table 1. Hunting Safety Recommendations

A. Firearm Safety

Human Factors

Take a hunter's education course
 Never carry a firearm when intoxicated
 Assume every gun is loaded
 Never shoot at movement or noise; identify your target
 Only point a gun at what you plan to kill
 Only fire when sure of your target and beyond
 Keep your finger off the trigger until ready to shoot
 Wear hunter blaze orange at all times

Equipment Factors

Keep firearm unloaded during transportation
 Service your firearm on a regular basis
 Assume every gun is loaded
 Secure, locked storage of firearm when not in use

Environmental Factors

Take extra care in low light conditions to identify target
 Know what is beyond your target; bullets may ricochet off of water and hard objects
 Know the position of other hunters in your area
 Always make certain your firearm is unloaded prior to climbing over an obstruction or when walking on a slippery surface
 Take great caution when on a "deer drive"; hunters are trusting each other with their lives!

B. Treestand Safety

Human Factors

Choose only healthy, mature, and straight trees in which to place a stand
 Always wear non-skid footwear when hunting from a treestand
 Never enter a treestand when tired or intoxicated
 Take special care when entering and leaving your stand
 Be familiar with your equipment and safety harness
 Always wear a safety harness; NEVER use a single strap safety belt
 Tell others where you will be hunting
 Carry a form of emergency communication or signal (cell phone, whistle)
 Hunt with a buddy when possible

Equipment Factors

Read and follow manufacturer's recommendations
 All surfaces should be covered with non-slip material
 Check equipment for wear before each use and as recommended by the manufacturer
 Never leave a stand for >2 weeks without checking its safety upon your return
 Never modify a manufactured treestand
 Understand your fall restraint system and how to extricate yourself
 Always use a haul line to raise and lower UNLOADED firearms and equipment

Environmental Factors

Clear all rocks, sticks, and debris from the area below the stand
 Take extra care or avoid the use of a stand under wet, windy, or icy conditions
 Never place a treestand >20 feet off the ground

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