

REVIEW
EPIDEMIOLOGY AND CLINICAL MEDICINE

Spectator injuries in sports

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ABSTRACT

INTRODUCTION: Injury documentation and prevention has largely focused on the athletes participating in the sporting event. However, spectators are at risk for injury as well depending on the sport and venue. No study to date has recorded and analyzed spectator injuries in sports. The purpose of this study was to document spectator injuries across different sports.

EVIDENCE ACQUISITION: Scholarly articles and internet search engines were used to generate a list of spectator injuries across a variety of sports. Information gathered regarding each specific spectator injury included sport type, injury type, and injury mechanism.

EVIDENCE SYNTHESIS: A total of 181 spectator injuries were collected. The sport with the most spectator injuries found was automobile/motorcycle racing (N.=123), followed by cycling (N.=25), cricket (N.=12), baseball (N.=10), and hockey (N.=8). The majority of spectator injuries were related to the sport and not the behavior of the surrounding spectators. Among documented injuries sustained by spectators, automobile/motorcycle racing had the greatest number of mortalities (N.=38), followed by cycling (N.=17), hockey (N.=4), baseball (N.=2), and cricket (N.=1).

CONCLUSIONS: Although uncommon, spectators at sporting events are at risk for injury. Some of these injuries are serious and even fatal. Future work needs to focus on implementing safety measures to protect spectators while still allowing them to enjoy live sporting events.

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KEY WORDS: Sports medicine - Wounds and injuries - Safety.

Introduction

Significant research has been performed on injuries sustained by athletes during sporting events.¹⁻⁶ Due to their high level of activity, athletes routinely subject their bodies to significant stresses during play and are at higher risk for sustaining musculoskeletal injuries when compared to the general population. There have been many recent rule changes during sporting events to help deter actions that may pose a greater injury risk to athletes.⁷⁻⁹

In contrast, little attention has been given to the risks that spectators face when viewing live sporting events. Spectators often come to sporting events as a form of entertainment without fear of injury. However, spectators can become injured during sporting events, sometimes even fatally. To date, no study has comprehensively documented injuries sustained by spectators.

The purpose of this study was to document spectator injuries across various sports. Furthermore, we sought to identify any trends and potential areas where safety measures could be implemented to protect spectators.

Evidence acquisition

Scholarly databases (Pubmed and Embase) and an online search engine (www.google.com) were utilized to document publicized spectator injuries across a variety of sports. Keywords used in these online searches included “spectator injuries,” “spectators injured at sports,” and “spectator fatalities.” Three health professionals conducted the searches independently.

Data regarding each specific spectator injury was documented. Video, when available, was also viewed to confirm details regarding the injury. Recorded data included

the type of sporting event, the mechanism by which the injury occurred, type of injury, setting in which the injury occurred, and whether the injury was fatal. Any discrepancy in data between the independent searches were reviewed by all health professionals to arrive at consensus decision.

Evidence synthesis

The searches produced a total of 181 publicly documented spectator injuries. The sporting events involved included cycling, automobile and motorcycle racing, hockey, and baseball, and cricket.

The sport with the greatest number of documented spectator injuries was automobile and motorcycle racing (N.=123). Automobile and motorcycle racing included National Association for Stock Car Auto Racing (NASCAR), Dakar Rally racing series, Baja racing, motocross, Isle of Man motorcycle racing series, Mount Olivers racing series, and Championship Auto Racing Teams (CART) series racing. Among documented injuries sustained by spectators, automobile/motorcycle racing had the greatest number of mortalities (N.=38), followed by cycling (N.=17), hockey (N.=4), baseball (N.=2), and cricket (N.=1). Table I provides a summary of the findings.¹⁰⁻³⁴ Supplementary Digital Material 1 (Supplementary Table I) is a detailed list of the spectator injuries organized by sport.

Discussion

This is the first study to document spectator injuries across various sports. Spectator injuries do occur and can sometimes be fatal.

The sporting event in which the greatest number of spectator injuries was documented was motor vehicle racing. One mechanism by which injury was associated with racing sports involved incidents where athletes wrecked vehicles into the crowd. Predicting a potential crash is very difficult. However, event planners should take measures to help protect spectators without compromising the viewing

experience of the spectator during the event. For motor vehicle racing, such measures may entail constructing a greater number of impenetrable clear barriers that prevent the vehicle from entering the spectator area. Furthermore, some of the injuries were the result of debris entering the spectator area. Thus, it is important to make the barriers impermeable to debris in order to protect spectators.

In similar fashion, expanding the netting in baseball may help protect spectators. There were six cases of a spectator sustaining an injury after being struck by foul ball, with one of these incidents being fatal. In fact, just recently, all 30 Major League Baseball team have agreed to extend the protective netting to the far ends of both dugouts.³⁵ However, this still leaves several fans seated just beyond the dugouts in danger of being struck by high speed foul balls. The same concept could be translated to hockey, where larger barriers may have prevented high speed pucks from reaching spectators. Such expansion of barriers will promote the safety of the spectators without significant compromise to the viewing experience. Furthermore, there were seven cases of a cricket spectators being hit by a “six” that entered the stands, with one of those being fatal. Cricket venues tend to lack protective netting and barriers, which places spectators at increased risk of injury from balls hit into the audience. Cricket venues should follow the changes implemented by Major League Baseball with extended netting to protect spectators from injuries with high speed balls.

While the nature of the sport itself may expose spectators to increased risk, that is not the only cause of injury at these events. In fact, the majority of injuries that occurred at cycling events were not related to cycling itself. Five spectators were injured by a publicity caravan, three were injured by a security guard motorcycle, and twelve were injured after being struck by a tanker truck. Similarly, at motor vehicle racing events there were incidents in which support staff wrecked vehicles into the crowd. This finding suggests that factors such as crowd control, event planning, and staff training also play important roles in specta-

TABLE I.—*Injuries among spectators at various sporting events.*

Sport	Number of events (N.)	Injury due to sport N. (%)	Injury due to crowd behavior N. (%)	Fatalities** N. (%)
Cycling ¹⁰⁻¹⁷	25	10 (40%)	21 (84%)	17 (68%)
Auto/motorcycle racing ¹⁸⁻²⁵	123	102 (83%)	1 (1%)	38 (31%)
Hockey ²⁶	8	8 (100%)	0 (0%)	4 (50%)
Baseball ^{27, 28}	10	8 (80%)	5 (50%)	2 (20%)
Cricket ²⁹⁻³⁴	12	8 (67%)	4 (33%)	1 (8%)

*Values for injury due to sport and injury due to crowd behavior do not add to 100% because some injuries were due to both; **this only represents fatalities in injuries at sporting events that have been reported; the overall incidence of spectator fatalities at sporting events is extremely low.

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tor safety. In addition to protecting spectators from injury due to the sport, attention should be given to all components of the event to ensure that sports fans can safely enjoy their experience.

An important point to note is the fact that the overall incidence of serious spectator injuries remains low. The risk exposure is large, yet there are not a large number of publicized spectator injuries. A study of medical clinic utilization in the alpine environment of the winter Olympics found that 1103 of 410,160 (roughly 0.3%) spectators utilized on-site care, and only 50 of 410,160 (0.01%) spectators required further interventions or care at an official medical facility.³⁶ A study completed pertaining to spectator utilization of medical care at baseball games found that 247 of 1,582,000 spectators utilized healthcare stations during the 2003 baseball season.³⁷ It is unclear whether utilization of on-site care was even related to the sporting event though. Nonetheless, given that some of these spectator injuries can be serious and even fatal, spectators should maintain increased awareness during game play to potentially avoid serious injuries.

Unfortunately, there is no central database for recording the occurrence of injuries to spectators during sporting events. This makes it difficult to monitor and assess if the rates of injuries are increasing or decreasing and if protective measures taken by sporting organizations are efficacious. Such a database would provide much insight into the risk spectators face, but the challenges in creating one are several. Coordination of multiple governing bodies across multiple countries would be required. Additionally, a threshold of what is considered an injury would have to be agreed upon.

Limitations of the study

This study is not without limitations. Foremost, this study is a retrospective study. Second, the data obtained in the study is largely from web-based searches. There may be several spectator injuries that were missed due to the lack of publicity. However, there currently is no database to capture spectator injuries. Third, among the documented spectator injuries there was bias towards fatal injuries. Such injuries are much more likely to draw publicity and thus be captured via our searches when compared to minor injuries.

Conclusions

There are risks spectators assume when attending live sporting events. Though the risk is likely minimal, specta-

tors can incur serious injuries and some of these may be fatal. Further research is needed to document the epidemiology of such injuries and implement safety measures to keep spectators safe during sporting events.

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