The Incidence and Prevention of Catastrophic Injuries in Track and Field Due to Falls: Applications of Haddon’s Injury Prevention Countermeasures and Matrix

Christina Vu; Randi DeLong, MPH; Kristen L. Kucera, PhD, MSPH, ATC, LAT
National Center of Catastrophic Sport Injury Research and Department of Exercise and Sport Science, The University of North Carolina at Chapel Hill

Introduction

- Track and field is the second most popular sport for high school boys and the third most popular for high school girls.1
- Track and field is thought to have lower rates of catastrophic injuries compared to other sports, but they still occur and have devastating effects on the athletes who sustain them.2,3
- From 1982 to 2019, the National Center for Catastrophic Sport Injury Research (NCCSIR) captured 85 catastrophic injuries in track and field.1

Haddon’s Injury Prevention Matrix and Methods

- Dr. William Haddon believed that injury control could be mitigated by modifying the energy transfer among a host, agent, and environment.4
- Haddon’s ten countermeasures identify a general injury reduction strategy to guide the formation of prevention strategies for specific events.3

Methods

Data Collection

- The data used for this study was collected by NCCSIR from 7/1/1982 to 6/30/2019. Cases are captured via publicly available media reports, direct reports from sports and medical organizations and individuals including school and medical staff, and other researchers.
- Additional cases were gathered through ad hoc searches of public media reports through internet search engines from 6/1/2020 to 10/30/2020.

Inclusion Criteria

- High school and collegiate track and field athletes who sustained a direct catastrophic injury from a fall.
- A direct catastrophic injury was defined as any severe injury sustained during a high school or college sponsored sport that resulted in death, permanent disability or temporary disability with full recovery.
- Cases were reviewed to confirm that the injury was the result of a fall. Cases that did not have enough information to confirm a fall were excluded from the analysis.

Statistical Analysis

- Descriptive statistical analyses were performed with SPSS Statistics 26. Fisher’s exact tests were used to determine difference between injury and athlete demographics by sport level and severity. The level of significance was set at < 0.05.

Countermeasure Analysis

- Case details of 3 catastrophic injuries from falls were presented to determine Haddon’s countermeasures.
- A total of 12 cases were selected because of their similar mechanism of injury and because there was an adequate level of detail to complete the analysis.

Results

Incidence

- From 1982 to 2019, NCCSIR captured 61 catastrophic injuries in track and field from falls among high school and collegiate athletes.

Haddon’s Ten Countermeasures

- Countermeasures 9 (Begin to counter damage early from the hazard) and 10 (Stabilize, repair, and rehabilitate the object of damage) were applied to all 12 cases.
- In this study, countermeasure 9 suggests early recognition and implementation of an emergency action plan (EAP), onsite access to an athletic trainer, and rapid activation of EMS. Countermeasure 10 recommends providing definitive medical care.

Table 3. Narrative and Associating Haddon Countermeasure (3/12)

<table>
<thead>
<tr>
<th>Narrative</th>
<th>Countermeasures</th>
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<tbody>
<tr>
<td>A male senior high school athlete was injured during a meet when he was pole vaulting and his pole snapped. It is unknown if his pole was within regulation. He fell into his pole which impacted and struck his orbital bone. He was transported by EMS via ambulance. A full recovery was expected.</td>
<td>9. Begin to counter damage from the hazard (early recognition and implementation of EAP) have onsite access to an athletic trainer, and rapid activation to EMS.</td>
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<tr>
<td>A male sophomore high school athlete was injured during a meet when he was pole vaulting. His pole sailed as he reached the peak of his arch and fell backwards towards the runway. His head struck the concrete and fractured his skull. A full recovery was expected.</td>
<td>10. Stabilize, repair, and rehabilitate the object of damage (provide advanced definitive care)</td>
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<td>A female sophomore high school athlete was injured during an indoor practice when she was pole vaulting. Her pole sailed to the side she fell sideways toward the side mats. As she fell, she mishandled her landing and landed halfway on the mat and her head struck the floor. A full recovery was expected.</td>
<td>5. Separate the hazard from that which is to be protected by time and space (limit the distance from the pit allowed to be vaulted from)</td>
</tr>
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</table>

Conclusions

- Falls in track and field can lead to severe injuries, including fatalities.
- The greatest number and most severe falls were due to pole vaulting.
- Many different prevention measures can be taken to reduce injuries and many of these seemingly small strategies could have the potential to reduce the severity of injuries for athletes.
- These fall-related catastrophic injuries highlight the importance of continued surveillance to improve our understanding of the incidence and injury patterns to develop interventions to reduce the impact these injuries have on athletes.

References


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