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Using injury surveillance to assess sport- and recreation-related heat illness

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Objective

To examine the incidence and characteristics of heat illness during sports and recreation.

Introduction

Although heat illness is preventable, it is a leading cause of death among U.S. high school and college athletes (1). Despite this, the total burden of heat illness during sports and recreation is unknown. With over 250 million U.S. residents reporting occasional participation in sports or recreational activities (2), there is a large population at risk.

Methods

We used two national injury surveillance systems to examine heat illnesses in two different U.S. population subsets. We used the National Electronic Injury Surveillance System-All Injury Program (NEISS-AIP) to examine heat illness incidence and characteristics among sports and recreation participants of all ages from 2001 to 2009, and we used the National High School Sports-Related Injury Surveillance Study (High School RIO™) to examine heat illness incidence and characteristics among high school-aged athletes from 2005 to 2009 (Table 1).

NEISS-AIP, operated by the U.S. Consumer Product Safety Commission, monitors consumer product-related injuries treated in a nationally representative sample of 66 U.S. hospital emergency departments (EDs) (3). Trained coders enter demographics, a brief narrative and consumer product information for each injury presenting to their ED. High School RIO™, operated by the Center for Injury Research and Policy at Nationwide Children's Hospital (Columbus, OH), monitors sports injuries in a nationally representative sample of 100 high schools (4). Certified athletic trainers at participating schools report exposure and injury data electronically.

Results

Using NEISS-AIP, we calculated an estimated 5946 (95% confidence interval [CI] = 4194–7698) ED visits for sports- and recreation-related heat illnesses occurred annually from 2001 to 2009. Incidence was highest among males (72.5%) and among persons aged 15–19 years (35.6%) and occurred most commonly during football (24.7%) and exercise (20.4%). Using RIO™, we calculated an estimated 9237 (95% CI = 8357–10,116) heat illnesses resulting in time lost from participation occurred during high school sports annually from 2005 to 2009, most commonly during football (70.7%).

Conclusions

National injury surveillance systems provide a unique opportunity to examine heat illness in sports and recreational settings. NEISS-AIP and High School RIO™ demonstrate different approaches to studying this problem. Results from both analyses indicate that heat illness causes substantial morbidity among sports and recreation participants. We need to find new ways to target effective heat illness prevention messages to those at greatest risk to reduce morbidity and prevent mortality. Continued surveillance is also warranted to monitor trends and evaluate interventional activities.

Keywords

Injury; surveillance; heat illness; NEISS; RIO™

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Table 1. Description of sports- and recreation-related heat illness data collected by two national injury surveillance systems

System	*Reporting institutions*	*Population*	*Heat illness definition*	*Data collected*
NEISS-AIP(3)	66 nationally representative U.S. hospital EDs	Entire U.S. population	Nonfatal ED visits with a reference to heat illness (e.g., "heat exhaustion", "dehydration", etc.) in the narrative description, occurring during a sport or recreational activity	Demographics, brief narrative, consumer product information
High School RIO™ (4)	100 nationally representative U.S. high schools	High school athletes	Dehydration or heat exhaustion/stroke during a practice or competition, assessed by a medical professional, and resulted in ≥1 days of time loss from athletic activity	Exposure, demographics, illness characteristics, event characteristics

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