Estimating Concussion Incidence Using Sports Injury Surveillance Systems

Complexities and Potential Pitfalls

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KEYWORDS

• Concussion • Surveillance • Sports injury • National Collegiate Athletic Association • High School Reporting Information Online • Traumatic brain injury

KEY POINTS

- Numerous sports injury surveillance systems exist with the capability of tracking concussion incidence data, but it is important to understand their strengths and limitations.
- Current sports injury surveillance lacks access to sports with lower visibility and settings that lack medical staff.

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- Potential variations in the definitions of injury and at-risk exposure may affect comparability across findings.
- Sports injury surveillance is able to assess both the immediate and longitudinal effects of rule/policy changes.

INTRODUCTION

Concussions remain a high-profile topic given the research that has elucidated both potential short- and long-term effects.[1–4] Because of this burgeoning research, it is imperative to obtain valid and reliable estimates of concussion incidence.[5] Although estimates related to those individuals presenting at emergency departments or other traditional health care system touchpoints are important,[6–10] they do not fully capture the breadth of concussions that occur as a result of participation in sport and recreational activities.[10–14] Partially because of this known limitation, numerous studies have utilized sports injury surveillance systems to estimate the incidence of sport-related concussion across multiple levels of competition, including youth,[10,15–17] high school,[14–16,18–24] collegiate,[15,16,25–28] and professional[29–35] (**Table 1**). These estimates can be used to monitor trends over time, help identify individuals most at risk, examine the settings and characteristics that exacerbate risk, inform the development of interventions/prevention strategies to reduce the incidence and severity of concussion, and help improve management and care. In addition to research and clinical uses, surveillance findings can be informative to the numerous stakeholders within a sports setting, including parents, players, coaches, policy makers, and industry.[36]

Like all public health surveillance systems, sports injury surveillance systems are focused on capturing and distributing timely information that monitors a clearly defined problem. Given these time pressures, the data captured by surveillance systems are not guaranteed to be high-quality research data. Thus, it is important for all consumers of the sports injury surveillance data to understand the strengths and limitations of estimating sport-related concussion incidence using data captured by sports injury surveillance systems.

Previous research examining general methodologies and data quality of sports injury surveillance systems[37,38] was broad and did not examine specific injuries such as concussion. This article describes some issues pertinent to system design and data analysis that can affect the interpretation and understanding of concussion incidence data captured by sports injury surveillance systems. Such understanding will help improve decision making based on these data and could inform the design of future sports injury surveillance systems and research studies aiming to identify risk factors and develop and evaluate prevention strategies.

WHO COLLECTS THE DATA?

To date, most sports injury surveillance systems have relied upon sports medicine clinicians to collect and report data. In some parts of the world (eg, Europe, Australia, New Zealand), sports injury surveillance systems have traditionally been established in settings where athletic teams are covered by trained sports medicine clinical teams including physiotherapists and physicians.[33,34] In those settings, the team medical staff is capable of collecting and reporting high quality data to sports injury surveillance systems. In the United States, such extensive clinical coverage is usually