

## **Catastrophic and Severe Injuries in Organized and Recreational Softball during the period 1985-2020**

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Softball is a sport played by millions of Americans each year. The participation of potentially vulnerable populations including youth, elderly, and individuals at levels of high competition creates an increased risk for catastrophic injury. Knowledge of the prevalence and types of catastrophic injuries affecting softball participants will inform prevention measures at all levels of play. Data from the National Center for Catastrophic Sports Injury Research (NCCSIR) and the National Electronic Injury Surveillance System (NEISS) were used to describe catastrophic and severe traumatic injuries at all levels of organized softball play. The NCCSIR captures organized high school, middle school, college, and competitive youth data, but does not include recreational leagues. According to the NEISS data, there were an estimated 4,922 severe injuries and 170 fatalities among individuals participating in softball during the period 2001-2020. The most common modality of injury was facial/skull fracture (49.3%), followed by internal organ injury (34.1%) and Other (15%), which included incidences of sudden cardiac arrest, myocardial infarction, seizure, heat exhaustion, heatstroke, and ruptured eye. Brain hemorrhage including subdural hematoma and subarachnoid hemorrhage, nerve damage, and lightning strike accounted for the remaining 0.8%, 0.4%, and 0.3% of injuries respectively. The NCCSIR database captured 9 fatal and 17 non-fatal injuries during the period 1985-2020. Among the fatal events 6 were due to sudden cardiac arrest, 1 due to traumatic brain injury, 1 due to commotio cordis, and 1 unknown. 35.3% of non-fatal injuries were due to facial/skull fracture, followed by 23.5% due to brain hemorrhage, 17% due to cervical spine injury, and one instance each of lower leg injury, hypertrophic cardiomyopathy, and unknown. The distribution of non-fatal catastrophic and severe injuries varied between the two data sources. The NCCSIR demonstrated a high percentage of brain hemorrhage and relatively high percentage of cervical spine injuries, both of which were represented at a low percentage in the NEISS. The high number of cardiac events resulting in fatalities suggests that participant EKG screening, access to AEDs and CPR training for coaching personnel may prevent cardiac events and improve the chance of survival. In addition, facial fractures comprised the highest percentage of catastrophic injury across both databases. Increased usage of protective face guards at high levels of competitive play could significantly decrease the number of catastrophic facial fractures.