

Epidemiology of Table Tennis-Related Injuries Presenting to Emergency Departments in the United States, 2005–2024: A NEISS Database Analysis

DANIEL ZHAO; PRANEETH TUMMALA; HANEEF A. KHAN, BSE; ASHLEY ROSENBERG, BS; STEPHEN E. MARCACCIO, MD

INTRODUCTION

With a global following estimated at 300–350 million active players and nearly 850 million fans, table tennis is a staple of international recreation.^{1–3} Participation is surging; countries such as Australia report recent growth rates approaching 47%.⁴ Yet the sport offers more than leisure: regular play supports cardiovascular health, coordination, balance, and cognitive function.^{5–7} It also holds therapeutic value for specialized groups, including patients managing spinal cord injuries, Parkinson's disease, and dementia.^{5,6}

Although broadly considered a safe, low-contact activity, table tennis is not free of risk. A recent systematic review cataloged tenosynovitis, muscle strains, sprains, and ligament damage as frequent complaints.⁸ Players face repetitive overhead motions, rapid directional shifts, and sustained postural stress, all of which invite overuse injuries affecting the shoulder, lower back, and lower extremities.^{8,9}

Historically, medical literature has fixated on elite athletes, leaving the recreational majority, who represent the bulk of the player base, largely unexamined.^{8,10,11} Data from professionals offer conflicting incidence rates, swinging wildly from 2.8% to 64.8%.^{12,13} Furthermore, because most studies originate outside the United States, American injury patterns remain opaque.

To bridge this gap, we analyzed data from the National Electronic Injury Surveillance System (NEISS). Maintained by the U.S. Consumer Product Safety Commission, NEISS provides a probability sample of emergency department (ED) visits, offering a reliable window into activity-related trauma.^{14,15} Researchers widely apply this database to map epidemiological trends across sports.^{16–18}

This study aimed to conduct an epidemiological assessment of table tennis injuries presenting to U.S. emergency departments between 2005 and 2024. Our objectives were to determine annual incidence and identify shifts over time, map injury patterns by age and sex, identify common diagnoses, body regions, and mechanisms, and evaluate clinical severity and disposition.

METHODS

Study Design and Data Source

We conducted a retrospective epidemiological analysis using NEISS. This database collects records from approximately

100 stratified probability-sampled hospitals across the United States. Statistical weighting assigns a value to each case, enabling the estimation of national injury burdens.

Case Selection

We isolated table tennis injuries using NEISS product code 1271 for the period spanning January 1, 2005, through December 31, 2024. The dataset included all ED visits linked to this code.

Variables and Statistical Analysis

We extracted variables regarding patient demographics (age, sex, race), injury specifics (diagnosis, affected body part, disposition), and timing. Age stratification defined four cohorts: youth (0–19 years), young adults (20–44 years), middle-aged adults (45–64 years), and seniors (≥65 years). We calculated annual incidence rates per 100,000 person-years using U.S. Census Bureau estimates, and generated national projections via NEISS sample weights. Each NEISS case is assigned a sample weight by the U.S. Consumer Product Safety Commission, reflecting the inverse probability of that hospital being selected in the stratified probability sample. National injury estimates were derived by summing these individual case weights across all 910 sampled cases, yielding a projected total of 35,096 injuries over the 20-year study period (an annual average of approximately 1,755 ED visits). Annual incidence rates per 100,000 person-years were then calculated by dividing each year's weighted estimate by the corresponding U.S. Census Bureau population estimate and multiplying by 100,000. Linear regression assessed temporal trends, defining significance at $p < 0.05$.

RESULTS

Overall Incidence

Between 2005 and 2024, U.S. emergency departments treated 910 unweighted cases, representing an estimated 35,096 injuries nationally (95% CI: 33,341–36,851). The average annual incidence rate stood at 0.55 injuries per 100,000 person-years. The mean patient age was 38.65 years (95% CI: 35.85–41.44). Men dominated the cohort, accounting for 64.4% of cases (95% CI: 60.4–68.4%)—a male-to-female ratio of 1.83:1.

Temporal Trends

Annual incidence rates fluctuated between 0.30 and 0.93 per 100,000 person-years. Rates rose from 0.50 in 2005 to 0.93 in 2024, an 86.8% relative increase. COVID-19 restrictions caused a distinct drop in 2020 (0.30 per 100,000), followed by a rebound. Despite the visual upward trajectory, linear regression revealed no statistically significant trend over the two decades (slope = 0.0018, $p = 0.7392$) [Figure 1].

Figure 1. Table Tennis Injuries: National Estimates (2005–2024)

The estimated annual number of table tennis-related injuries treated in U.S. emergency departments from 2005 to 2024 is visualized. The data demonstrate year-to-year variability with a recent sharp rise in 2024. Overall, injury counts remain relatively stable through the mid-2010s, followed by fluctuations and a marked increase in the most recent year.

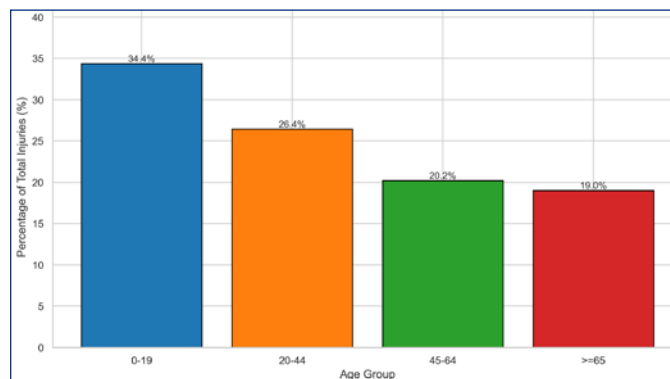


Age-Stratified Distribution

Youth players (0–19 years) incurred 34.4% of injuries, followed by young adults (26.4%), middle-aged players (20.2%), and seniors (19.0%). Combined, players under 45 sustained 60.8% of all injuries, while those 45 and older comprised the remaining 39.2% [Figure 2].

Figure 2. Table Tennis Injuries by Age Group (2005–2024)

The proportion of table tennis-related injuries from 2005 to 2024 is shown by age group. Individuals aged 0–19 experienced the highest share of injuries (34.4%), followed by adults aged 20–44 and 45–64. The ≥65 group accounted for the lowest proportion of cases.



Injury Type and Body Part

Lacerations proved the most frequent diagnosis (24.1%), narrowly outpacing sprains/strains (21.3%). Internal organ injuries (16.1%), fractures (13.3%), and dislocations (10.8%) followed. Anatomically, the face bore the brunt of trauma (15.9%), followed by the head (11.3%), lower trunk (9.4%), hand (8.9%), and knee (8.2%). The specific combination of facial lacerations appeared most often (13.0%), with knee sprains/strains second (6.3%). Together, facial cuts and lower-extremity sprains comprised nearly a quarter of all specific diagnoses [Figures 3,4].

Disposition

Most patients (90.5%) received treatment and were released. Admissions accounted for 5.8%, with negligible rates for transfers (0.7%) or observation (0.1%).

Figure 3. Top Body Parts Injured in Table Tennis (2005–2024)

The distribution of body regions affected in table tennis-related injuries from 2005 to 2024 is visualized. Facial injuries comprised the highest proportion (15.9%), followed by head, lower trunk, hand, and knee injuries. Upper-extremity regions such as the shoulder and upper arm accounted for smaller proportions.

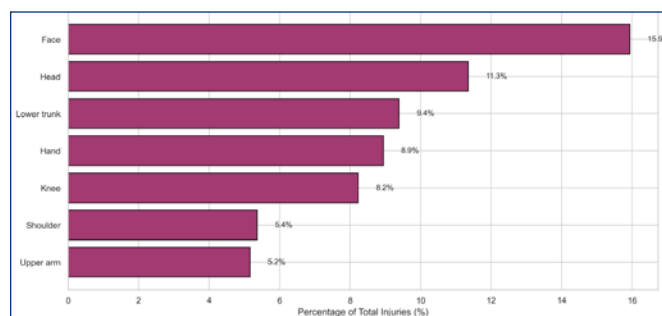


Figure 4. Top Diagnoses in Table Tennis Injuries (2005–2024)

The distribution of diagnoses among table tennis-related injuries from 2005 to 2024 is displayed. Lacerations (24.1%) and sprains/strains (21.3%) were the most common diagnoses, followed by internal organ injury and fractures. Less frequent diagnoses included dislocations, intracranial injuries, and foreign bodies.

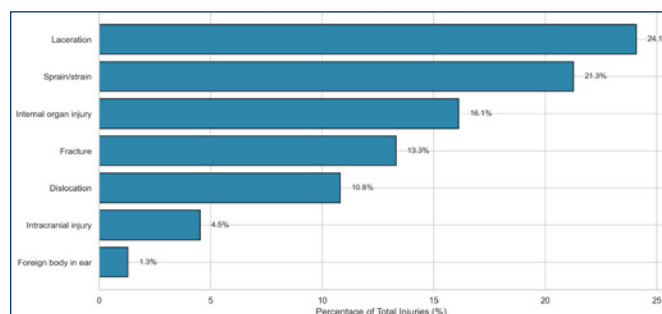
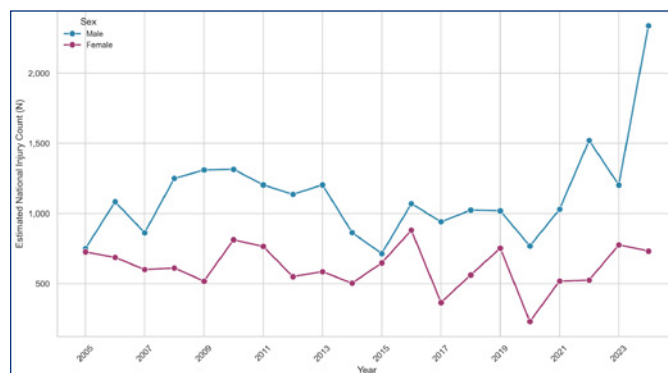


Figure 5. Table Tennis Injuries by Sex: National Estimates (2005–2024)

The estimated annual number of table tennis-related injuries stratified by sex from 2005 to 2024 is displayed. Males consistently account for the majority of injuries across all years. Both groups exhibit fluctuations over time, with 2024 showing the largest increase, driven primarily by male cases.



Sex-Stratified Patterns

Injury profiles differed by sex. Males presented most often with lacerations (28.2%) and sprains/strains (19.5%), sustaining high rates of facial trauma (18.0%). Conversely, females suffered primarily from sprains/strains (24.9%) and fractures (19.8%). Anatomically, women injured the face (12.4%) and knee (10.2%) most frequently [Figure 5].

Alcohol Involvement

Out of 910 sampled cases, 294 had a recorded response to the NEISS alcohol-involvement field, which captures a binary Yes/No indicator of alcohol presence as documented by the treating clinician. Of these, 10 (3.4%) were flagged as ‘Yes’. A narrative text analysis of these 10 cases frequently described falls and lacerations consistent with intoxication-related loss of coordination.

DISCUSSION

We identified 35,096 national cases from 2005 to 2024, with an annual average of 1,755 ED visits. The incidence rate of 0.55 per 100,000 person-years aligns with international data that table tennis carries a lower risk than other racket-based sports.^{8,10}

Temporal Trends and COVID-19 Impact

Incidence rose 86.8% from 2005 to 2024, but the trend was not statistically significant ($p = 0.7392$). This growth may result from increased participation, more comprehensive reporting, or patients having a lower threshold for visiting the ED.¹⁹ The 2020 all-time low (0.30 per 100,000) reflects pandemic lockdowns^{20,21}; as facilities closed, injury rates fell.^{22,23} The rebound after 2021 suggests a return to pre-pandemic activity levels.

Age-Stratified Implications

Over 60% of injuries affected players under 45, possibly due to higher participation or more aggressive play. However, the 39.2% of injuries among middle-aged and senior players shows that the sport is played by people of all ages.²⁴ Aging players face unique risks, such as reduced bone density and muscle mass, which can increase fracture potential and other injury risks.^{5,6} Furthermore, due to declined proprioception and balance, aging players risk falling from rapid lateral movement in the reaction-based sport.^{5,6,25}

Injury Patterns and Mechanisms

Lacerations to the face (13.0%) were a significant source of injury, in contrast with studies on elite populations.^{8,10} These lacerations may result from falls, contact with the paddles, and collisions with the table. As the NEISS coding does not provide sub-regional anatomical specifications, the location of the facial lacerations cannot be localized to a specific region on the face, thus limiting our ability to assess injury proximity to the eye. However, narrative analysis of the 119 unweighted, facial-laceration cases revealed that paddle or racket strikes were the predominant mechanism ($n=66$, 55.5%), followed by contact with the table edge ($n=38$, 31.9%). Falls without direct object contact accounted for a small proportion of cases ($n=7$, 5.9%), while ball-related facial lacerations were rare ($n=1$, 0.8%). This pattern suggests that protective eyewear may be relevant, as the majority of facial lacerations results from paddle strikes, many of which involved the periorbital region such as the eyebrow and eyelid, rather than from falls or contact alone. Use of protective eyewear could be considered, as it is popular in other racket sports but not widely used in table tennis.^{26,27} Alternatively, for lacerations that present on the cheeks or forehead, protective measures such as face masks may be more appropriate than eyewear.

Sprains and strains (21.3%) reflect the sport’s physical demands of rapid pivoting and direction changes.^{8,9} Lower-trunk injuries align with biomechanical evidence of asymmetric rotational loading during strokes.²⁸

Injuries reported as “internal organ” (16.1%) likely indicate strains of the trunk or chest wall rather than visceral damage.¹⁴ Upper-extremity injury rates appeared lower in this study than in studies of professionals,^{8,9} possibly due to the intensity gap between recreational and competitive play.

Sex-Specific Patterns

Men exhibited higher overall incidence and higher likelihood of sustaining lacerations (28.2%) and facial trauma (18.0%), possibly due to more aggressive play styles.²⁹ Previous studies found that male forehand topspin swings generate significantly more speed and power than female forehand topspin swings, engaging larger muscle groups, and potentially increasing the risk of injury.³⁰ Women suffered more fractures (19.8% vs. 9.8%) and knee injuries (10.2% vs.

7.2%). These findings are in line with established epidemiological differences in musculoskeletal health and statistics reported in previous studies examining the rates of male and female injuries in gender-comparable sports.^{31,32} Differing biomechanics, neuromuscular control, and bone mineral density likely contribute.^{32,33} Prevention programs should account for these biological distinctions.^{32,33}

Prevention Strategies

These findings suggest some interventions that could reduce injury. If facial lacerations are confirmed to cluster near the eyes in future studies, adoption of protective eyewear may be warranted; current literature reports that eye injuries occur at a median rate of 93% across racket sports without eyewear use, suggesting meaningful protective potential.^{26,27,34} While we cannot confirm the precise sub-regional distribution of facial lacerations from NEISS coding alone, narrative analysis suggests that paddle strikes frequently involved the periorbital area. This mechanistic pattern supports a targeted rationale for eyewear, though future studies should formally document eye-proximity data before issuing definitive recommendations.

Older players should have age-appropriate training to mitigate risks of fall and fracture.²⁴ Sex-specific conditioning, focusing on neuromuscular control for women and protective equipment for men, could address the different injury patterns.³⁵⁻³⁷ Additionally, equipment modifications, such as better table padding, could reduce lacerations. Alcohol use may also represent a modifiable risk factor in recreational table tennis. As noted, a subset of cases involved alcohol consumption, with several narratives describing intoxicated players falling, diving recklessly, or being struck during recreational drinking contexts. Given the established cultural association between recreational table tennis and alcohol consumption, awareness campaigns targeting recreational players about the injury risks of playing while intoxicated may be warranted.

Strengths and Limitations

Although this study provides valuable insights, it has some limitations. NEISS only records ED visits, missing injuries treated in primary care or ignored, possibly underestimating the total incidence.³⁸ Without exposure data, we cannot calculate rates per hour of play. Also, inconsistency in documentation, especially in narrative descriptions and coding practices, limit the ability to analyze injury mechanisms.³⁹ Furthermore, lacerations may prompt ED visits more regularly than sprains or strains, which might be managed with less urgency. This may artificially inflate the relative proportion of lacerations in the NEISS dataset and underestimate the true incidence of soft-tissue injury. Additionally, alcohol use could only be assessed through narrative text fields, in which documentation was inconsistent, as only 294 of 910 cases explicitly noted whether alcohol was

consumed. Of these, 10 (3.4%) confirmed alcohol involvement. The remaining 616 cases neither confirmed nor excluded alcohol use, likely underestimating its true contribution as a risk factor.

Future Directions

Future research should conduct video analysis or biomechanical studies to analyze the specific mechanisms of table tennis injury, and experimental trials should evaluate the performance of specific interventions.⁴⁰⁻⁴² These approaches would address current limitations of injury surveillance databases, which lack detailed kinematic and contextual information necessary to characterize injury mechanisms. Future studies should also assess the feasibility of targeted interventions in protective eyewear, neuromuscular training in older players, and technique modifications in real-world recreational settings.

CONCLUSION

Table tennis remains a relatively safe sport, but injuries affect players of all demographics. Distinct age and sex patterns emerge from the data, indicated primarily by biomechanical differences and play styles. Lacerations, specifically to the face, occur most frequently, followed by lower-extremity sprains. The significant injury rate among older adults highlights the need for specific safety modifications. These epidemiological insights should guide clinical practice and safety recommendations. As table tennis grows, targeted prevention is essential to maximize benefits and limit harm.

References

1. Soligard T, Palmer D, Steffen K, et al. Sports injuries and illnesses in the Rio de Janeiro 2016 Olympic Summer Games: a prospective study of 11,274 athletes from 206 countries. *Br J Sports Med.* 2017;51(17):1265-1271.
2. Leivo T, Haavisto AK, Saharavand A. Sports-related eye injuries: the current picture. *Acta Ophthalmol.* 2015;93(3):224-231.
3. Naderi A, Degens H, Rezvani MH, et al. A retrospective comparison of physical health in regular recreational table tennis participants and sedentary control subjects. *J Musculoskeletal Neuronal Interact.* 2018;18(2):200-206.
4. International Table Tennis Federation. Table Tennis Australia registers record 47% increase in participation rates. ITTF News. February 15, 2023.
5. Marta P, Ossolińska A, Huzarski F, et al. Can table tennis extend lifespan? An analysis of its impact on physical health, brain function, and mental well-being. *J Educ Health Sport.* 2025;15(1):123-135.
6. Łosińska K, Maszczyk A. The impact of table tennis on cognitive health: a systematic review and meta-analysis of its effects on Alzheimer's disease, Parkinson's disease, and dementia. *Authorea Preprints.* 2025.
7. Naderi A, Zagatto AM, Akbari F, Sakinepoor A. Body composition and lipid profile of regular recreational table tennis participants: a cross-sectional study of older adult men. *Sport Sci Health.* 2018;14(1):175-182.
8. Ferrandez C, Marsan T, Poulet Y, et al. Physiology, biomechanics and injuries in table tennis: a systematic review. *Sci Sports.* 2021;36(1):1-11.

9. Li L, Ren F, Baker JS. The biomechanics of shoulder movement with implications for shoulder injury in table tennis: a minireview. *Appl Bionics Biomech*. 2021;2021:9988857.
10. Alghosi M, Karimizadeh Ardakani M. Epidemiology of sports injuries in para table tennis. *J Res Sport Rehabil*. 2021;9(17):71-80.
11. Shida Y, Tabata K, Katamoto S, Aoki J. Epidemiology of table tennis injuries at the university level in Japan. *J Jpn Soc Sports Ind*. 1992;2(2):105-112.
12. De la Torre Combarros MR, Pérez Soto J, Palao Andrés JM. Epidemiological study of injuries in the table tennis Spanish national team. *Rev Int Med Cienc Act Fis Deporte*. 2007;7(27):162-175.
13. Shimazaki Y, Noh B, de Souza Vale RG, et al. Epidemiology of injuries in table tennis players in the Brazilian national team. *Rev Bras Med Esporte*. 2012;18(6):389-392.
14. U.S. Consumer Product Safety Commission. NEISS: The National Electronic Injury Surveillance System-A Tool for Researchers. Bethesda, MD: CPSC; 2000.
15. Schroeder T, Ault K. The NEISS sample (design and implementation): 1997 to present. Washington, DC: U.S. Consumer Product Safety Commission; 2001.
16. DeFroda SF, Lemme N, Kleiner J, et al. Incidence and mechanism of injury of clavicle fractures in the NEISS database: athletic and non-athletic injuries. *J Clin Orthop Trauma*. 2019;10(5):954-958.
17. Sabbagh RS, Shah NS, Kanhere AP, et al. Effect of the COVID-19 pandemic on sports-related injuries evaluated in US emergency departments. *Orthop J Sports Med*. 2022;10(3):23259671221075373.
18. Shrestha M, Usmani A, Karlov S, Harris A, Patel DR. Overview of injuries with racket sports in pediatric and adolescent population: a narrative review. *Children*. 2025;12(1):45.
19. Rui P, Ashman JJ, Akinseye A. Emergency department visits for injuries sustained during sports and recreational activities by patients aged 5-24 years, 2010-2016. *Natl Health Stat Report*. 2019;125(1):1-16.
20. Vincent HK, Patel S, Zaremski JL. Impact of COVID on sports injury patterns, changes in mental well-being, and strategies to prepare for future pandemics in sport. *Curr Sports Med Rep*. 2022;21(6):203-209.
21. Johnson MA, Halloran K, Carpenter C, et al. Changes in pediatric sports injury presentation during the COVID-19 pandemic: a multicenter analysis. *Orthop J Sports Med*. 2021;9(4):23259671211010826.
22. Kremen TJ Jr, Wu SY, Upfill-Brown A, et al. Impact of the COVID-19 pandemic hiatus from sports activities on injuries observed among Division I NCAA athletes. *Orthop J Sports Med*. 2023;11(4):23259671231169188.
23. Leipman J, Shahriar R. Effect of the COVID-19 pandemic on injuries related to individual and team sports: an analysis of the NEISS database between 2017 and 2021. *Orthop J Sports Med*. 2023;11(10):23259671231205317.
24. Skelton DA, Beyer N. Exercise and injury prevention in older people. *Scand J Med Sci Sports*. 2003;13(1):77-85.
25. Freire I, Seixas A. Effectiveness of a sensorimotor exercise program on proprioception, balance, muscle strength, functional mobility and risk of falls in older people. *Front Physiol*. 2024;15:1309161.
26. Rodriguez JO, Lavina AM, Agarwal A. Prevention and treatment of common eye injuries in sports. *Am Fam Physician*. 2003;67(7):1481-1488.
27. Mishra A, Verma AK. Sports related ocular injuries. *Med J Armed Forces India*. 2012;68(3):260-266.
28. Cumps E, Verhagen E, Meeusen R. Prospective epidemiological study of basketball injuries during one competitive season: ankle sprains and overuse knee injuries. *J Sports Sci Med*. 2007;6(2):204-211.
29. Sallis RE, Jones K, Sunshine S, Smith G, Simon L. Comparing sports injuries in men and women. *Int J Sports Med*. 2001;22(6):420-423.
30. Bańkosz Z, Winiarski S, Malagoli Lanzoni I. Gender Differences in Kinematic Parameters of Topspin Forehand and Backhand in Table Tennis. *Int J Environ Res Public Health*. 2020;17(16):5742.
31. Brant JA, Johnson B, Brou L, Comstock RD, Vu T. Rates and patterns of lower extremity sports injuries in all gender-comparable US high school sports. *Orthop J Sports Med*. 2019;7(10):2325967119873059.
32. Shi H, Jiang Y, Ren S, Hu X, Huang H, Ao Y. Sex differences in the knee orthopaedic injury patterns among recreational alpine skiers. *BMC Sports Sci Med Rehabil*. 2020;12:77.
33. Collins JE, Katz JN, Donnell-Fink LA, Martin SD, Losina E. Cumulative incidence of ACL reconstruction after ACL injury in adults: role of age, sex, and race. *Am J Sports Med*. 2013;41(3):544-549.
34. Mazarelo JFD, Winter SL, Fong DTP. (2024). A Systematic Review on the Effectiveness of Eyewear in Reducing the Incidence and Severity of Eye Injuries in Racket Sports. *The Physician and Sportsmedicine*. 2024;52(2):115-124.
35. Liddle N, Taylor JM, Chesterton P, Atkinson G. The effects of exercise-based injury prevention programmes on injury risk in adult recreational athletes: a systematic review and meta-analysis. *Sports Med*. 2024;54(1):83-103.
36. Stephenson SD, Kocan JW, Vinod AV, Kluczynski MA, Bisson LJ. A comprehensive summary of systematic reviews on sports injury prevention strategies. *Orthop J Sports Med*. 2021;9(10):23259671211035776.
37. Herman K, Barton C, Malliaras P, Morrissey D. The effectiveness of neuromuscular warm-up strategies, that require no additional equipment, for preventing lower limb injuries during sports participation: a systematic review. *BMC Med*. 2012;10:75.
38. Stokes M, Ozanne-Smith J, Harrison J, Weir-Tolman W. Validation of an injury surveillance epidemiological data system used within emergency departments. *Int J Consumer Product Saf*. 2000;7(4):219-233.
39. Bouchouar E, Hetman BM, Hanley B. Development and validation of an automated emergency department-based syndromic surveillance system to enhance public health surveillance in Yukon: a lower mainland perspective. *BMC Public Health*. 2021;21(1):1093.
40. Gilchrist J, Saluja G, Marshall SW. Interventions to prevent sports and recreation-related injuries. In: *Handbook of Injury and Violence Prevention*, Springer. 2007;117-134.
41. Fong DTP, Hong Y, Chan LK, Yung PSH, Chan KM. A systematic review on ankle injury and ankle sprain in sports. *Sports Med*. 2007;37(1):73-94.
42. Taylor JB, Ford KR, Nguyen AD, Terry LN, Hegedus EJ. Prevention of lower extremity injuries in basketball: a systematic review and meta-analysis. *Sports Health*. 2015;7(5):392-398.

Authors

Daniel Zhao, Brown University, Providence, RI.
 Praneeth Tummala, Brown University, Providence, RI.
 Haneef A. Khan, BSE, The University of South Carolina School of Medicine, Columbia, SC.
 Ashley Rosenberg, BS, School of Medicine, New York Medical College, Valhalla, NY.
 Stephen E. Marcaccio, MD, Department of Orthopaedics, Warren Alpert Medical School of Brown University, Providence, RI.

Disclosures

None

Ethical Approval: Ethical approval is not applicable for this article.

Correspondence

Daniel Zhao
 Daniel_Zhao@brown.edu