Joseph Angarola, Owen Carter, Deep Shah
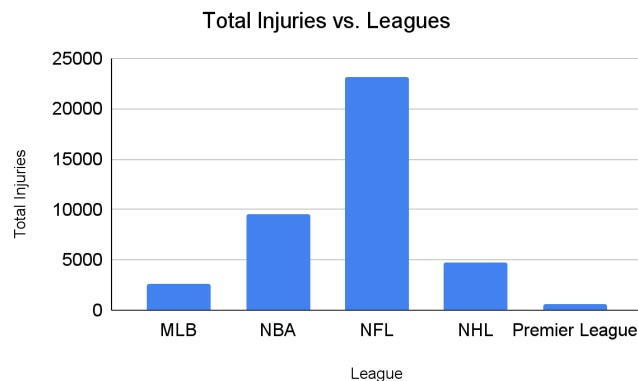EM 570 Data Visualization
7 April 2025

Which Sports are Most Prone to Injury, and What Types of Injuries are Athletes in These Sports Likely to Experience?

Injuries are unfortunate but an expected part of competitive sports. But have you ever wondered which sports are **most** prone to injury? Or what types of injuries are most common in your sport? To answer these questions, we examined injury data across five major sports leagues - MLB, NHL, NBA, NFL, and International Soccer - over five seasons.

By analyzing injury reports and tracking their locations, we can start to see patterns that reflect the unique physical demands of each sport. This blog breaks down those patterns in a way that helps us better understand athlete health and the nature of sports injuries.

Total Injuries by League

To start, we looked at the total number of injuries across all five sports leagues over a five year timeframe. Not surprisingly, the NFL leads with the highest number of injuries with over 22,000 reported. This is followed by the NBA, NHL, MLB and finally Soccer.


Data Visualization 1: Total Injuries per League

This pattern correlates closely with the physicality and intensity of each sport. Football and hockey are full-contact sports, where contact is almost guaranteed, so the injury count would naturally be higher. In contrast, baseball, basketball, and soccer, while physically demanding, involves less contact and has significantly fewer impact situations. What is surprising is the low injury count in the NHL compared to the NBA. This could be due to injury severity and its impact on gameplay or amount of padding and equipment.

Which Injuries Happen Where? Location Trends

While injury volumes tell one part of the story, injury location reveals another - where are you most at risk, and how that varies by sport.

- MLB: The most common injury is to the shoulders. This is a reflection of repetitive throwing motions, especially for pitchers, and frequent sliding into bases.

- NFL: Knee injuries dominate, due to explosive movements and constant resistive impact on other players from tackling.

- NBA: Knee injuries are most frequent thanks to constant sprinting, jumping, and quick directional changes.

- NHL: Upper body injuries are most common, specifically in the shoulders. This can be credited to the heavy and frequent upper body contact with other players and boards.

- Soccer: Players most often suffer hamstring injuries, likely from high intensity, long lasting running and frequent kicking.
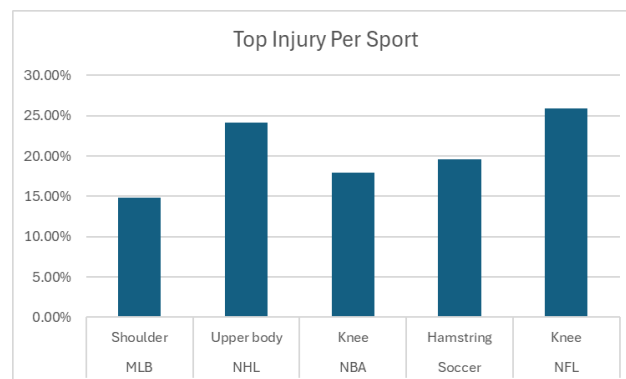
Data Visualization 2: Top Injury Location per Sport

This visualization helps illustrate how each sport wears down athletes in unique ways. The data suggests that while injuries are common across all sports, their location and causes are closely tied to how each sport is played.

Zooming In: Injury Frequency by Sport
We also explored injury frequency within each sport to see which locations are most frequently affected.

- In the MLB, elbow injuries make up a large portion of injuries which is likely due to repetitive throwing motions by pitchers, which results in UCL surgery known as "Tommy John surgery".
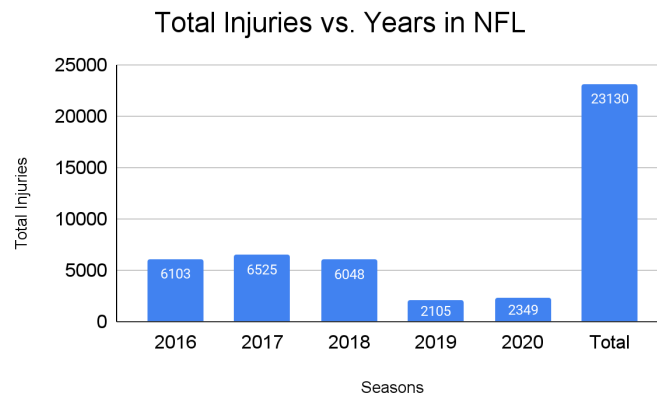
- In the NFL, ankle and knee injuries dominate the sport. This one of the more surprising statistics being that head injuries are so well known and a major priority for sports doctors and researchers. This is understandable due to the amount of running and non head on impact, which is clearly more frequent than head on collisions.

- In the NBA, we see high frequency in lower body injuries, specifically in the legs. Again, this is likely due to frequent sprinting and changing directions. The high frequency of shoulder injuries could be due to frequent throwing motions or falls on contact under the rim.

- In the NHL, shoulder, knee, and head injuries are most common. Again, likely due to high intensity skating and frequent contact.

- In Soccer, leg injuries dominate the sport. Soccer players run the most out of all the sports surveyed and require frequent changes in direction, causing hamstring, knee, and ankle stress.

These insights could help training coaches and medical staff tailor conditioning and recovery programs to better support athletes based on the injury risks to their specific sport.
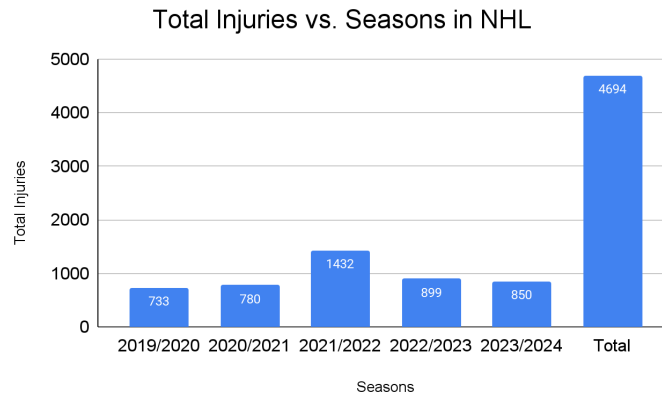
*Data Visualizations 3, 4, 5, 6, and 7 are included in the Appendix

Trends Over Time: Are Injuries Getting Better or Worse?
We also identified injury trends over five seasons of each sport, comparing total injuries per year per sport. While there are small fluctuations year to year, the overall trend suggests that injury rates have decreased in more recent years, especially in high contact sports like football and hockey.

Total Injuries vs. Years in NFL

Season	Total Injuries
2016	6103
2017	6525
2018	6048
2019	2105
2020	2349
Total	23130

Data Visualization 8: Total Injuries per Year (NFL)

Total Injuries vs. Seasons in NHL

	2019/2020	2020/2021	2021/2022	2022/2023	2023/2024	Total
Total Injuries	733	780	1432	899	850	4694

Data Visualization 9: Total Injuries per Year (NHL)

*Data Visualizations 10, 11, and 12 are included in the Appendix

Conclusion: Different Sports, Different Risks

So what have we learned?

- Football has the highest injury rates.
- Hockey does not have as many injuries as expected, possibly due to added protection.
- Soccer, baseball, and basketball expose athletes to frequent soft tissue injuries due to demand for sprinting and rapid direction changes.
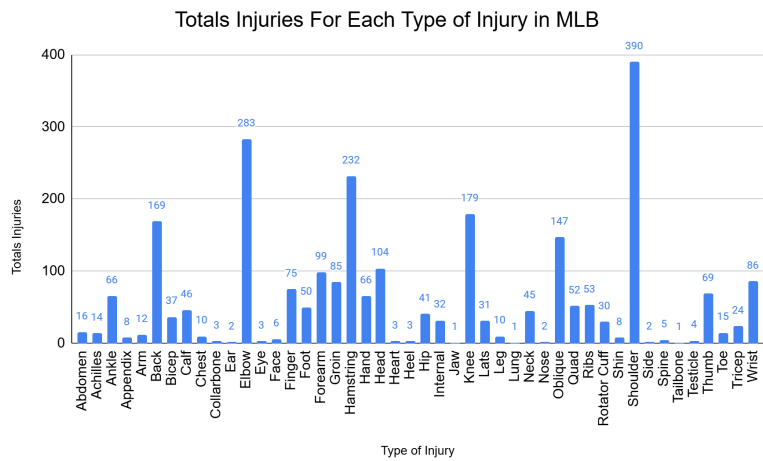
Ultimately, no sport is "safe", but understanding where injuries happen, and why, allows us to manage them better. Whether you're a fan, athlete, or someone working in sports medicine, knowing the risks tied to each sport can shape training, prevention, and appreciation for what athletes can experience each game.
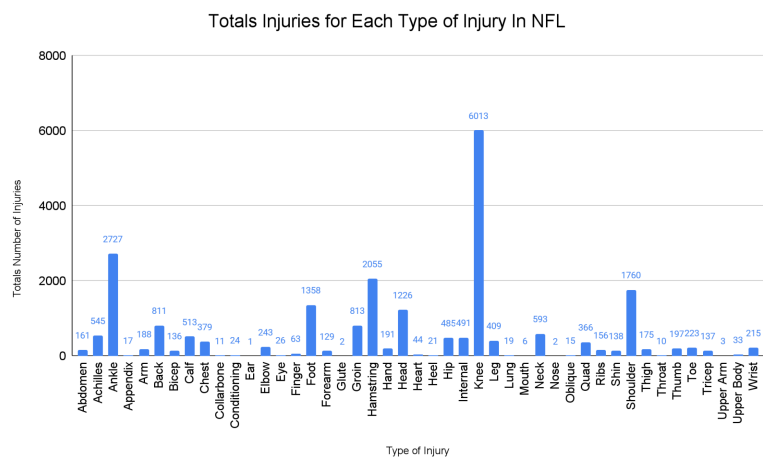
Datasets:
1. MLB Data:
   https://github.com/robotallie/baseball-injuries/blob/master/injuries.csv
2. NHL Data:
   https://nhlinjuryviz.blogspot.com/2015/11/nhl-injury-database.html
3. NBA Data:
   https://www.kaggle.com/datasets/ghopkins/nba-injuries-2010-2018?resource=download
4. Soccer Data:
   https://www.kaggle.com/datasets/amritbiswas007/player-injuries-and-team-performance-dataset?resource=download
5. NFL Data:
   https://github.com/jchernak96/NFL-Injury-Data-PFR-/blob/master/Data/PFR_2019_Injuries.csv

Appendix

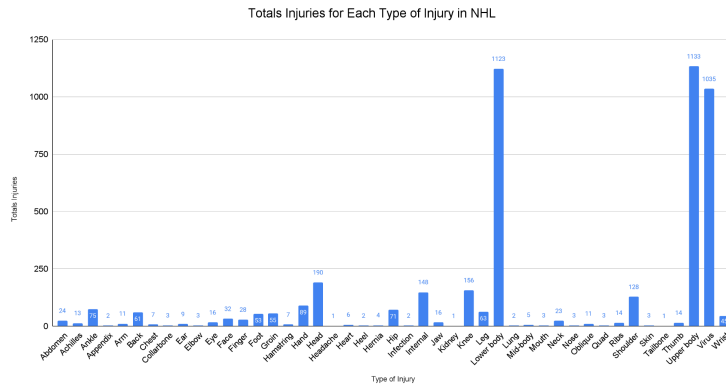## *Data Visualization 3: MLB Injury Location Frequency*

Totals Injuries For Each Type of Injury in MLB

Data Visualization 4: NFL Injury Location Frequency

Totals Injuries for Each Type of Injury In NFL

Data Visualization 5: NBA Injury Location Frequency

Totals Injuries for Each Type of Injury in NBA
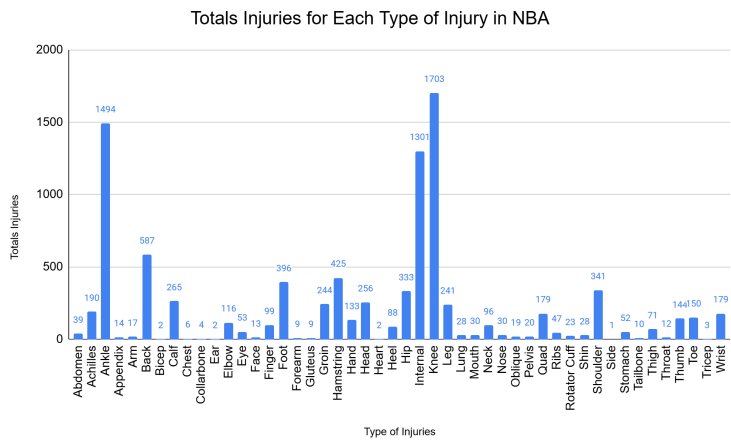
Data Visualization 6: NHL Injury Location Frequency

Totals Injuries for Each Type of Injury in NHL

Data Visualization 7: Soccer Injury Location Frequency

Totals Injuries for Each Type of Injury In Soccer
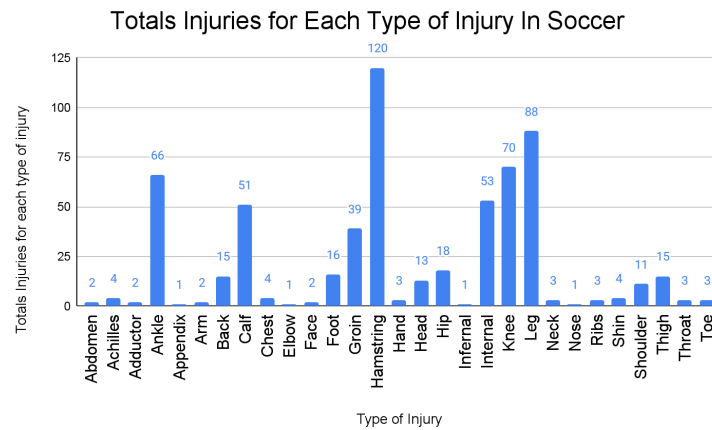
Data Visualization 10: Total Injuries per Year (MLB)

Total Injuries vs. Seasons in MLB
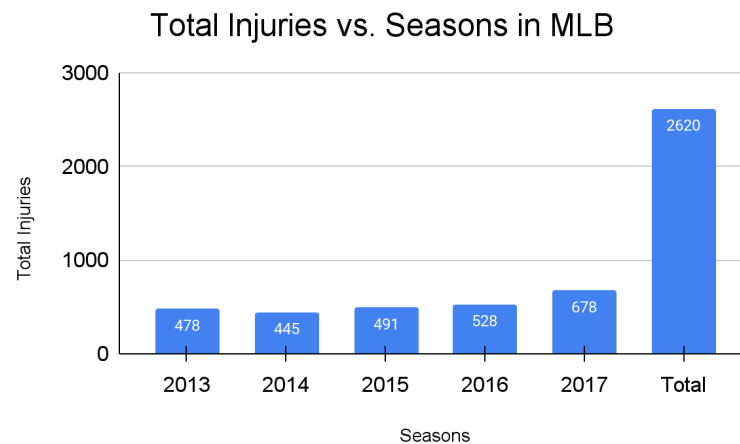
Data Visualization 11: Total Injuries per Year (NBA)

Total Injuries vs. Years in NBA

Year	Total Injuries
2016	569
2017	2740
2018	1240
2019	2469
2020	1370
Total	8388
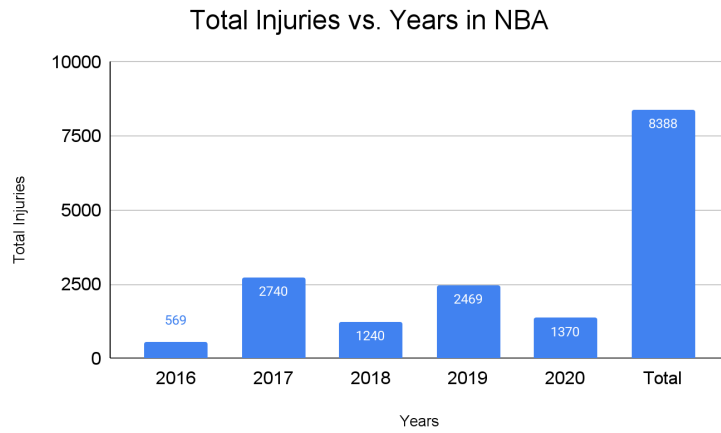
Data Visualization 12: Total Injuries per Year (Soccer)

Total Injuries vs. Seasons in Premier League

Season	Total Injuries
2019/2020	160
2020/2021	130
2021/2022	124
2022/2023	88
2023/2024	112
Total	614