How AI is involved in player health

By Malcolm Howard

Introduction

- American football is a sport that is played or watched by over 400 million people across the world. It is one of the most popular sports currently.

- During this past season, a number of 801 injuries occurred which includes everything from ankle sprains to concussions.
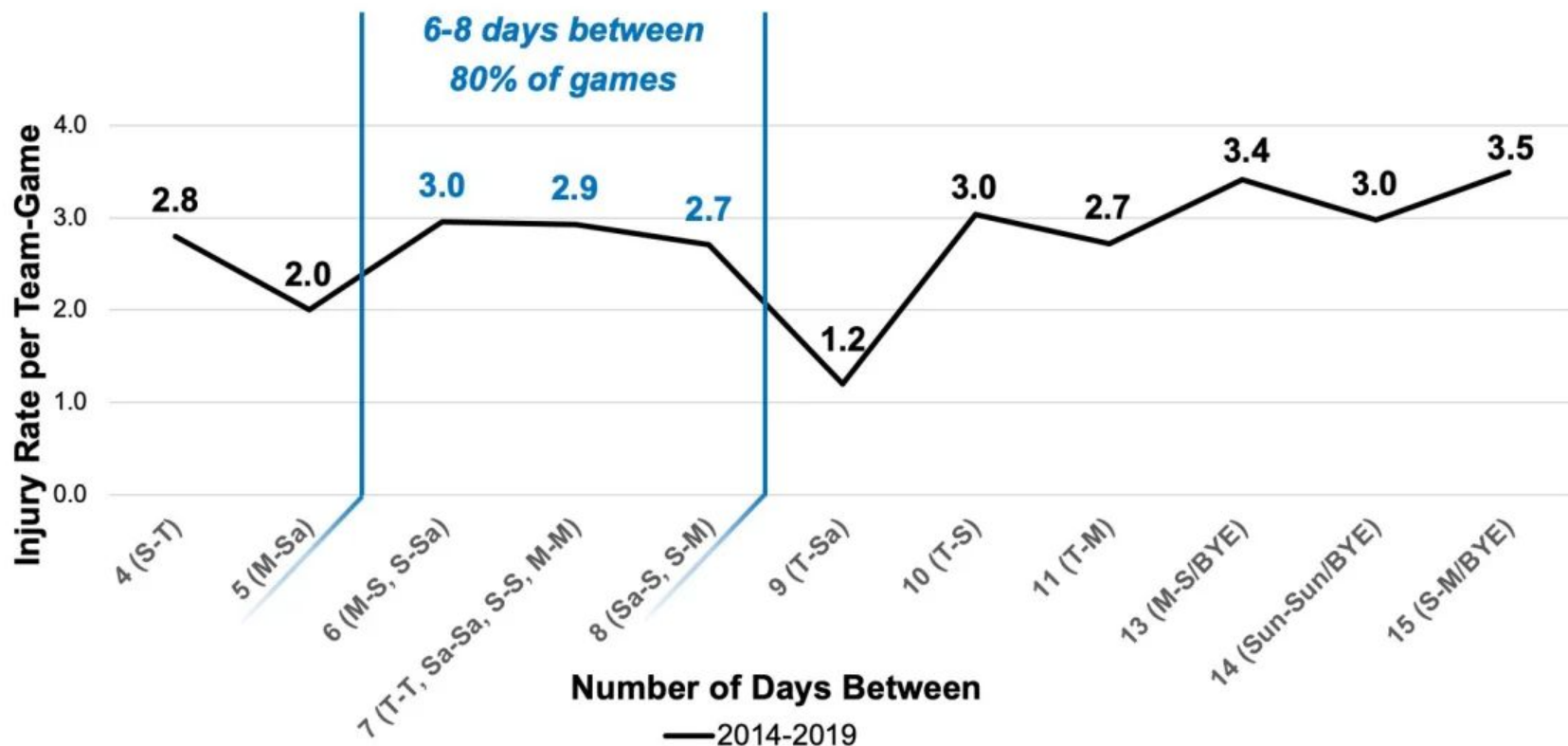
Continued….

- The most common injury in the league is a concussion. All the countless plays of players clashing helmets through the course of a game leads to this.

- The AI responsibility and main goals are to be able to track a players durability, be able to alert when an injury popped up on the body, and and predict the wear and tear on a players body. This is needed so CTE (Chronic traumatic encephalopathy) can be prevented as much as possible.

Injury Rates by Duration Between Games 2014-2019

6-8 days between 80% of games

Injury Rate per Team-Game (y-axis): 0.0, 1.0, 2.0, 3.0, 4.0

Data points:
- 4 (S-T): 2.8
- 5 (M-Sa): 2.0
- 6 (M-S, S-Sa): 3.0
- 7 (T-T, Sa-Sa, S-S, M-M): 2.9
- 8 (Sa-S, S-M): 2.7
- 9 (T-Sa): 1.2
- 10 (T-S): 3.0
- 11 (T-M): 2.7
- 13 (M-S/BYE): 3.4
- 14 (Sun-Sun/BYE): 3.0
- 15 (S-M/BYE): 3.5

Number of Days Between

—— 2014-2019

2014 includes injuries that met a "reportable injury" definition; 2015-2019 includes injuries that resulted in removal from participation and inability to return to play or take full part in future football activities following the injury. Injuries with unknown game dates and injuries from the first regular season game were excluded from this analysis.

AI tools used

- **Digital Athlete:** A computer simulation model of an NFL player. Using the computer simulation, they'll be able to test different game scenarios without putting actual players at risk.

- **ATC Spotters:** to observe play on the field and monitor the broadcast feed of that game to identify players who may potentially be injured on a play, with an emphasis on concussions and other head and neck injuries.

- **Radio Frequency Identification (RFID) tags:** embedded within equipment to collect information on which piece of equipment – including the component parts of each, from a helmet's chin strap to its facemask – players are wearing.

- **MoNo(In Works):** Detects the intensity of a hit to the helmet and supposed to detect if players are concussed or not.

"As soon as players step out of the locker room and onto the field, the tags are activated by radio waves that send data to a central digital inventory management system. This data is collected for every player, for every practice and every game….Mouthguard sensors are also collecting head kinematic data—like how fast and in what direction a player's head moves within a helmet. They help the league to collect more information than ever before about the duration and direction of head impacts players experience based on their positions, both during practices and games….The data is so precise that the NFL's engineers can analyze it position-by-position to develop insights into exactly what types of impacts players are most likely to experience and then work directly with helmet manufacturers to share these learnings so that they can design position-specific equipment to better protect against those impacts." -John Pollard, vice president of business development, Zebra Technologies

https://www.youtube.com/watch?v=_ZakgWNTPPM&t=65s

Concussions: Preseason and Regular Season

2015-2021

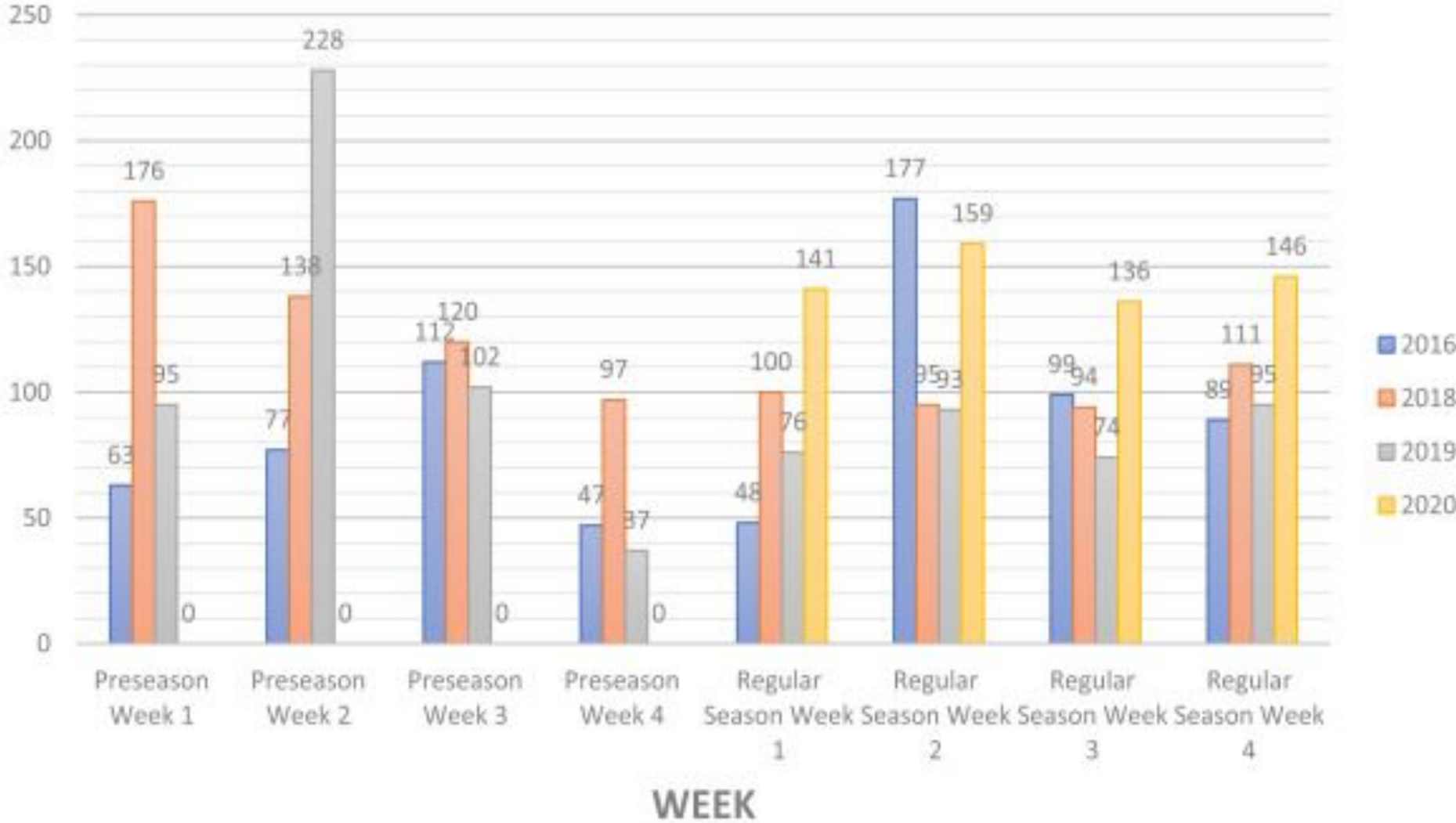| Year	Preseason			Regular Season			Preseason + Regular Season		
	Game	Practice	Total	Game	Practice	Total	Game	Practice	Total
2015	54	29	**83**	183	9	**192**	237	38	**275**
2016	45	26	**71**	166	6	**172**	211	32	**243**
2017	46	45	**91**	178	12	**190**	224	57	**281**
2018	34	45	**79**	127	8	**135**	161	53	**214**
2019	49	30	**79**	136	9	**145**	185	39	**224**
2020*	N/A	30	**30**	129	13	**142**	129	43	**172**
2021**	22	29	**51**						

*2020 was markedly different from other seasons due to the COVID-19 pandemic. There were no preseason games in 2020.

Discussion

- Injuries are a thing that you cannot just completely stop from happening but trying to reduce the number is a goal the NFL is trying to reach. The human brain is an essential organ for us to survive and having a whole career in the NFL can cause major brain damage post career.
  - Ex of players who died from CTE: Junior Seau, Ollie Matson, Tommy Nobis, Frank Gifford, Ken Stabler, Aaron Hernandez
  - Ex of players who have CTE: Scott Ross, Dwight Clark, Joe Perry…. List goes on.
- It is hard to track the last two seasons because of COVID and the time off the players had to themselves. All that time off led to higher numbers in injuries than usual.

Discussion cont.

- They have added even more rules into play so players would not harm themselves because players tended to hit with the crown of their helmet.
    - "The kickoff rules changes that were implemented in 2018 were made permanent. In 2018, the restrictions resulted in a 35% decrease in concussions on kickoff plays when compared to the 2017 season."
    - The blindside block is eliminated, expanding protection of defenseless players. It is now prohibited for a blocker to initiate forcible contact with his head, shoulder or forearm when his path is toward or parallel to his own end line.
- The NFL also has invested more into research and innovation on ways they can help players with helmets. They recently funded 13 teams of helmet providers over $1.55 million dollars to help speed up the process of getting new and safer helmets on the field.

Citations/References

- Ai in sports: Are you ready for artificial intelligence in games? Day One: AI Development Services , App Development Company. (2021, June 11). Retrieved October 27, 2021, from https://www.day1tech.com/ai-in-sports-are-you-game-for-artificial-intelligence/
- .Karina Lichtenstein on 09/20/2019 2:00 PMSource: MedicineNet Health News. (2019, September 20). The most common NFL sports injuries and recovery. MedicineNet. Retrieved October 27, 2021, from https://www.medicinenet.com/script/main/art.asp?articlekey=224549.
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