

Comparing Health-Related Policies & Practices in Sports: The NFL and Other Professional Leagues

Chapter 2

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Injury Rates and Policies^a

An important measurement of player health is the incidence and type of injuries players may sustain in the course of their work. Additionally, given the importance of player injuries, the manner in which player injuries are handled administratively and reported can indicate a league's approach to player health issues more generally. In this Chapter, we examine the leagues': (1) injury tracking systems; (2) injury rates; (3) injury-related lists; and, (4) policies concerning public reporting of injuries. At the conclusion of this Chapter, Table 3-E will summarize some of the key statistics and policies concerning injuries.

Before beginning our analysis, we provide some background information and qualifications on some of the topics we will discuss.

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1) INJURY TRACKING SYSTEMS AND RATES

As will be discussed below, all of the leagues (except the CFL) have an electronic medical record ("EMR") system into which the club's medical staff enters player injuries and through which the club and league are then able to track player injuries and conduct a variety of statistical analyses, all on a de-identified basis.^b While these data are valuable, they are not routinely made available to the public. Consequently, obtaining data on injury incidence, specifically in the form of injury incidence rates, requires release of the data either by the leagues themselves or through academic studies (many of which have requested the data from the leagues).

There are additional limitations with the injury tracking systems.

As a general matter, injuries in sports are underreported.¹ Players routinely hide their medical conditions from the club. Players principally do this to protect their status on the club and due to fear of being viewed as less tough by the coaches.² Players know that their careers are tenuous and also know that if the club starts perceiving a player to be injury-prone, it is often not long before the club no longer employs that player.³

Similarly, club medical staff might not enter player injuries into the system or might discourage players from seeking help for a medical condition so that it appears players are healthier than they actually are. Medical staff also might not input injuries in order to: (1) make it appear they are doing their job well and keeping players healthy; or, (2) to help the club in a potential dispute with the player. For example, if an NFL club terminates a player's contract while he is injured, the club is responsible for the player's salary for so long as the player is injured. A club's medical staff might not include the full extent of a player's injuries in the system in order to support the club's potential argument that the player was not injured when the club terminated the player's contract. While we do not mean to imply such actions are common, and we have no way of estimating the incidence, in our report Protecting and Promoting the Health of NFL Players: Legal and Ethical Analysis and Recommendations, we discuss evidence from interviews with players who attest that such actions do occur in the NFL.⁴ It is not known whether there is any prescribed punishment in any of the leagues if a club's medical staff fails to fully and accurately report player injuries. Beyond

non-reporting by club medical staff, some injuries might not be documented because the athlete does not report the injury to the medical staff.

In particular, as other scholars have noted, concussions are underreported.⁵ Diagnosing concussions requires review of various criteria, such as whether the player has balance problems, a blank or vacant look, disorientation, or cognitive issues.⁶ Additionally, a concussion diagnosis often requires a player to self-report symptoms, such as headaches, dizziness, vision problems, and/or sensitivity to light or sound.⁷ As a result of the varied diagnostic criteria and the ability of players to hide symptoms, concussion rates are likely higher than the reported statistics.

In light of the above, we emphasize that the injury statistics we provide in this Chapter reflect only those that are reported and that actual injury rates are likely higher. Aside from underreporting, our analysis is also limited by differences between the leagues, including scheduling, EMR systems, and injury definitions.

Injury severity is a potentially interesting statistic to calculate and compare. Indeed, several of the studies discussed below attempt to quantify injury severity by the amount of time players lost, *i.e.*, the number of practices or games a player missed. However, because the leagues' practice and game schedules vary considerably, a cross-league comparison of the severity data would not be useful. For example, NFL clubs play a 16-game regular season and practice four to five times per week. In contrast, MLB clubs play a 162-game regular season and have almost no practices during the season. An injury that might cause an MLB player to miss four or five games might not cause an NFL player to miss any games. Consequently, determining the severity of injuries by the number of games or practices missed does not provide for an accurate comparison across the leagues.⁸

Finally, in this Chapter, unless otherwise indicated, we are only comparing data from *regular season games*, not pre-season or post-season games or practices. We generally limit our analysis in this way because in many cases only regular season injury data are available. Additionally, several other domains we discuss such as the number of games, players, and plays, have more readily available and consistent data in the regular season, permitting better comparisons. Lastly, the number of practices per season in each of the sports varies considerably, making comparisons that include practices problematic. While this method results in reporting lower aggregate injury incidence, we believe statistics focused on injuries per regular season game, and

b Nonetheless, we are uncertain what types of internal statistical analyses the leagues may be performing.

injuries per player-season^c provide the best understanding of the incidence of injury in each sport.

2) INJURY STUDIES

In this Chapter, we utilize data from several studies concerning injury rates in the respective leagues. Several of these studies retrieved data from the leagues' injury tracking system. Consequently, those studies (and our use of that data) are limited in the same way that the injury tracking systems are limited, as discussed above. In addition, we identify other limitations of the studies that are relevant to our analysis. Despite these limitations, the studies we have used are the best publicly-available sources for injury data in the leagues and, we believe, provide useful data. Nevertheless, in light of these limitations and the limited number of studies, we caution the reader about interpreting our findings too strongly. Indeed, one important recommendation we make is that more research is needed on injury rates in the NFL, as well as more sharing of league data on injuries. Similarly, while our focus is on the NFL, it is likely desirable for the other leagues to engage in the same type of research.

3) CONCUSSIONS

Given the above concerns about underreporting of injuries, specifically concussions, it is also important to know what we mean by "concussion." The leading definition of a concussion comes from the 4th International Conference on Concussion in Sport held in Zurich, Switzerland, in November 2012, and published in the British Journal of Sports Medicine. The publication (identified by lead author Paul McCrory of the Florey Institute of Neuroscience and Mental Health in Australia) is a consensus statement from 28 of the leading sports medicine and sports concussion professionals, including many with ties to the leagues and unions.9 The consensus statement (which improves on definitions from prior conferences) defines a concussion "as a complex pathophysiological process affecting the brain, induced by biomechanical forces."10,d In addition, the consensus statement lists symptoms and conditions associated with concussions, including headaches, cognitive impairment, behavioral and emotional changes, loss

of consciousness, amnesia, and sleep disturbance.¹¹ The NFL, MLB, NBA, NHL, and MLS concussion protocols specifically cite the consensus statement's criteria for a concussion.¹²

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Given the nature of this Report, some may wonder why we are not providing analysis of each of the leagues' concussion protocols, that is, the policies that dictate how the clubs treat players who have suffered or are suspected of having suffered a concussion. We have chosen not to discuss these policies in depth because they are substantially similar. The consensus statement sets forth the leading medical opinion as to the appropriate process for evaluating a possible concussion, including the diagnostic tests to be performed (both pre-season and post-concussion), and a recommended return-to-play process, consisting of a graduated increase in activity, provided the player remains free of concussion-symptoms.13 In reviewing the leagues' concussion protocols (or reports describing the protocols where the protocols themselves were not available), it is clear that all of the leagues' protocols are in line with the procedures recommended by the consensus statement.^{14,e}

We acknowledge that at times questions have been raised as to whether certain leagues or clubs are sufficiently following the protocols.¹⁵ While these are important questions, we were unable to find any objective data from which to

c In this Chapter, we utilize the terminology commonly used by experts in sports injury data analysis. As such, the term "player-game" represents one player playing in one game. Similarly, the term "player-season" represents one player playing in one season regardless of how many games that player played in that season.

d We also acknowledge that there are concerns about subconcussive impacts, Steven P. Broglio, et al., Cognitive Decline and Aging: The role of Concussive and Subconcussive Impacts, 40 Exerc. Sport Sci. Rev. 138 (2012), but are unaware of any data on this issue from the leagues discussed in this Report.

e MLS' Concussion Evaluation and Management Protocol does contain two provisions that appear unique and potentially concerning. First, "[th]e Team Physician has the ultimate and absolute authority to decide when a player should be removed for evaluation[.]" In contrast, the NFL empowers both officials and independent athletic trainers to require a player to be removed from a game for evaluation. Second, while the MLS Protocol does require a player who has suffered a concussion to consult with the club's neuropsychologist, "[t]he team neuropsychologist should NOT communicate to the player whether he or she thinks that the player should/should nOT return to play." Instead, "[th]e Team Physician has the ultimate and absolute authority to decide ... whether that player is fit to return to play. In the event of a conflict between the Team neuropsychologist and Team Physician, Dr. Ruben Echemendia, chair of MLS' concussion program, is to be consulted. Nevertheless, the player is being deprived of potentially important medical information concerning his health.

analyze the leagues' compliance. This is an issue that the leagues and unions must investigate and enforce.^f

4) INJURY-RELATED LISTS

In this Chapter, we also discuss injury-related lists—a type of roster on which injured players are placed for a certain number of days or games. All of the leagues have such lists. The lists vary in their meaning and duration, potentially alleviating or creating pressure on the player to play through, or return from, an injury. We will discuss each league's approach to injury lists and analyze their effects in the Analysis Section.

* * *

With this background in hand we now turn to an analysis of each of the leagues on the relevant issues relating to player injuries.



A) Injuries in the NFL

1) INJURY TRACKING SYSTEM

In 1980, the NFL created the NFL Injury Surveillance System ("NFLISS") to document, track, and analyze NFL injuries and provide data for medical research.¹⁶ When an injury occurs, each club's athletic trainer is responsible for opening an NFLISS injury form and recording the medical diagnosis (including location, severity, and mechanism of injury) and details about the circumstances (*e.g.*, date, game or practice, field surface) in which it occurred.¹⁷ Prior to 2015, a reportable injury was defined as only those injuries, football-related or not, associated with any time lost from practice or games or specific conditions regardless of time lost, including but not limited to concussions, fractures, dental injuries requiring treatment, health-related illness requiring IV fluid administration, and injuries or illness requiring special equipment (*e.g.*, a knee brace). Beginning with the 2015 season, all injuries, regardless of whether or not they result in time lost from practice or games, are included in the NFLISS.¹⁸ The athletic trainer is required to update the injury form with details about all medical treatments and procedures the player receives, including surgery.¹⁹ Since 2011, the NFLISS has been managed by the international biopharmaceutical services firm Quintiles.²⁰ Quintiles analyzes injury data and provides reports to the NFL and NFLPA throughout the year.²¹

The NFLISS provides the best available data concerning player injuries and we thus use it here. Although the NFL's past injury reporting and data analysis have been publicly criticized as incomplete, biased, or otherwise problematic, those criticisms have been in response to studies separate from the NFLISS²² and we are not aware of any criticism of the NFLISS.^g The next Section is a compilation of NFLISS data on player injuries, which was reviewed and updated (where necessary) by the NFL. However, in considering this data, it is important to recognize that the NFL's injury reporting systems have undergone substantial change in recent years. An electronic version of the NFLISS was launched as a pilot with five clubs in 2011;²³ the electronic NFLISS expanded to all 32 clubs in 2012;²⁴ then, in 2013, the NFL launched an electronic medical record ("EMR") system on a pilot basis with eight NFL clubs, which was expanded to all clubs in 2014.25 The EMR system integrates with the NFLISS and provides the most accurate injury reporting data in NFL history. Consequently, the different reporting structures over time almost certainly contributed to fluctuations in the injury rates identified below. Therefore, it is not possible to be certain whether injury rates have increased in recent years, or if, instead, the apparent increases are due to improved injury reporting, or some combination of the two. Similarly, increased attention to player injuries in recent years, concussions in particular, might also lead to higher reported injury totals.

f Indeed, the NFL in 2015 and the NHL in 2016 adopted policies whereby they discipline clubs for failing to comply with the concussion protocols. *See* James O'Brien, *NHL Plans on Fining Teams Who Violate New Concussion Protocol*, Pro Hockey Talk (Oct. 11, 2016, 6:30 PM), http://nhl.nbcsports.com/2016/10/11/nhl-plans-on-fining reams-who-violate-new-concussion-protocol, *archived at* https://perma.cc/34YL -VF85; Darin Gantt, *NFL to fine, suspend teams who don't follow injury protocols*, ProFootballTalk (Dec. 17, 2015, 6:00 AM), http://profootballtalk.nbcsports.com/2015 /12/17/nfl-to-fine-suspend-teams-who-dont-follow-injury-protocols/, *archived at* https://perma.cc/8CH3-77F9.

g Other studies of NFL injury rates have been conducted using the clubs' publicly released injury reports. See, e.g., David W. Lawrence, Paul Comper, and Michael G. Hutchison, Influence of Extrinsic Risk Factors on National Football League Injury Rates, Orthopaedic J. Sports Med. (2016); David W. Lawrence, Paul Comper, and Michael G. Hutchison, Descriptive Epidemiology of Musculoskeletal Injuries and Concussions in the National Football League, 2012–2014, Orthopaedic J. Sports Med. (2015). While these studies provide interesting analyses, NFL injury reports are not the best data source, for reasons discussed in Chapter 17: The Media of our Report, Protecting and Promoting the Health of NFL Players: Legal and Ethical Analysis and Recommendations.

2) INJURY STATISTICS

The tables below summarize key injury statistics of NFL players.

Table 2-A:

Number of Practice, Game, and Total Injuries in NFL Pre-season (2009–2015)²⁶

Year	Number of Practice Injuries	Number of Game Injuries	Total Injuries
2009	551	360	911
2010	560	410	970
2011	641	399	1,040
2012	675	431	1,106
2013	688	416	1,104
2014	823	503	1,326
2015	780	498	1,278
Totals	3,138	2,016	7,735

Table 2-B:

Mean Number of Practice, Game, and Total Injuries in NFL Pre-season per Year, over 6 Seasons (2009-2015)^h

Mean Number of	Mean Number of	Mean Number of
Practice Injuries	Game Injuries	Total Injuries
623.0	403.2	1026.8

Table 2-C:

Number of Practice, Game, and Total Injuries, and Mean Number of Injuries Per Game in NFL Regular Season (2009–2015)ⁱ

Year	Number of Practice Injuries	Number of Game Injuries	Total Regular Season Injuries	Injuries per Regular Season Game
2009	165	1,372	1,537	5.36
2010	176	1,346	1,522	5.25
2011	295	1,426	1,721	5.57
2012	262	1,380	1,642	5.39
2013	264	1,500	1,764	5.86
2014	401	1,823	2,224	7.12
2015	336	1,730	2,066	6.76
Totals	1,899	10,577	12,476	N/A

h As a reminder, the injury reporting systems have changed in recent years. Consequently, the figures cannot be strictly compared across the seasons and the mean is not definitively accurate.

i Each year, there are 256 regular season NFL games. Thus, this figure is derived by dividing the number of injuries in the "Games" column by 256.

Table 2-D:

Mean Number of Practice, Game, and Total Injuries per Year, and Mean Number of Injuries per Game in NFL Regular season, over 6 seasons (2009–15)

Mean Number of Practice Injuries	Mean Number of Game Injuries	Mean Number of Total Regular Season Injuries	Mean Number of Injuries per Regular Season Game ^j
271.3	1,511.0	1,782.3	5.90

Table 2-E:

Number of Practice, Game, and Total Concussions, and Mean Number of Concussions per Game in NFL Regular Season (2009–16)²⁷

Year	Number of Practice Concussions (Pre- And Regular Season)	Number of Preseason Game Concussions	Number of Regular Season Game Concussions	Total Concussions	Mean Number of Concussions per Regular Season Game
2009	25	40	159	224	.62
2010	45	50	168	263	.66
2011	37	48	167	252	.65
2012	45	43	173	261	.68
2013	43	38	148	229	.58
2014	50	41	115	206	.45
2015	38	54	183	272	.71
2016	32	45	167	244	.65
Totals	315	359	1,280	1,951	N/A

Table 2-F:

Mean Number of Practice, Game, and Total Concussions, and Mean Number of Concussions per Game in NFL Regular Season, over 8 Seasons (2009–16)²⁸

Mean Number of Practice Concussions (Pre- And Regular Season)	Mean Number of Pre-season Game Concussions	Mean Number of Regular Season Game Concussions	Mean Number of Total Concussions	Mean Number of Concussions per Regular Season Game
39.4	44.9	160.0	243.9	.625

j Each year, there are 256 regular season NFL games. Thus, this figure is derived by dividing the number of injuries in the "Games" column by 256.

Table 2-G:

Number of Regular Season Game Concussions per Player, and Mean Number of Regular Season Game Concussions per Player per Season (2009–2016)^k

Year	Number of Regular Season Game Concussions	Number of Regular Season Players	Rate of Concussions per Player-Season
2009	159	2,123	0.075
2010	168	2,187	0.077
2011	167	2,144	0.078
2012	173	2,183	0.079
2013	148	2,188	0.067
2014	115	2,202	0.052
2015	183	2,251	0.081
2016	167	2,274	0.073
Totals/Rate	1,112	15,278	0.073

In considering the mean number of concussions per playerseason, it is important to point out that the number of players who played in a regular season NFL game includes both players who played all 16 games in a season and those who played only 1 game in a season. Thus, while there is a mean of 0.073 concussions per player per regular season, the mean is likely different for different subsets of players, *i.e.*, depending on how many games a player played in that season.

Table 2-H:

Concussion Incidence by Player Position in the Regular Season (2013)

Position	2013
Offensive Line	19
Running Back	15
Tight End	16
Quarterback	6
Wide Receiver	17
Offense Total	73 (49.3%)
Defensive Secondary	25
Defensive Line	12
Linebacker	11
Defense Total	48 (32.4%)
Special Teams Total	27 (18.2%)

Table 2-I:

Mean Number of Injuries Per Play, NFL Regular Season Games (2013)

Total Number	Total Number	Mean Number of
of Injuries	of Plays ¹	Injuries per Play ^m
1,500	43,090	0.035 injuries/play

m This Report does not include per-play injury data for the other leagues as that data is generally not available and the definition of a "play" in other leagues can vary.

k The number of regular season players' statistics were obtained from official NFL and NFLPA playtime figures. To be clear, these statistics only include players who played in a regular season game and thus do not include players who only played in the pre-season.

I This statistic was obtained from calculations derived from official NFL and NFLPA playtime figures.

As shown in Table 2-I, the mean number of injuries per play in 2013 was 0.035, indicating that there was an injury on 3.5% of all plays. Additionally, from the available information regarding the total number of injuries, total number of players per game, games per year, and years of data, we can calculate the overall rate of injury as 0.064 per playergame.ⁿ In other words for every particular game there is a mean of 5.90 injuries (0.064 injuries per player-game x 92 players per game). That equates to one injury for every 15.6 players in that game.

We can also determine the mean rate of how often concussions occur in a game. Between 2009 and 2016 there were a total of 1,280 regular season concussions. Using the available information regarding the total number of concussions, total number of players per game, games per year, and years of data, we can calculate the overall rate of concussion per player-game as 0.0068 concussions per player-game.^o

We can also determine the rate of injuries per player-season. During the 2009–15 seasons, there were a total of 15,278 player-seasons played.^p During this same time period there were a total of 10,577 game injuries. This equates to an overall rate of 0.69 injuries per player-season (10,577/15,278). Some readers—particularly players—may be surprised that this statistic is not higher. It is important to remember that this statistic is the mean of *all* players who played in the NFL during these seasons, including players who might have only played in one game. Additionally, the statistic does not include injuries that occurred during pre-season practices or games or regular season practices. Thus, while helpful, this statistic is an incomplete picture of the injuries suffered by NFL players during the course of a season.

Readers might be interested in the mean number of games a player plays before suffering an injury. We calculated above that the rate of injuries per player-game was 0.064. Thus, we can calculate that players play a mean of 15.6 games before suffering one injury (1/0.064). We can also calculate the mean number of games a player plays before suffering a concussion. We calculated above that the rate of concussion per player-game was 0.0068. Thus, we can calculate

n This statistic is calculated by dividing the total number of regular season game injuries from 2009–15 (10,577) by the total number of game exposures over the same time period (164,864). The 164,864 statistic is calculated by multiplying 7 seasons by 256 regular season games per season by 92 players per game. Clubs are limited to 46 active players during a game, 2011 NFL CBA, Art. 25, § 1, thus, 92 players have the opportunity to play each week.

 This statistic is calculated by dividing the total number of regular season game concussions from 2009–16 (1,280) by the total number of game exposures over the same time period (188,416). The 188,416 statistic is calculated by multiplying 7 seasons by 256 regular season games per season by 92 players per game.

p In other words, a mean of 2,182.6 players played in a regular season NFL game each season. The number of player-seasons was obtained from official NFL and NFLPA playtime figures. that players play a mean of 147.10 games before suffering one concussion (1/0.0068). With 16 regular season games, players theoretically play a mean of 9.2 seasons before suffering a concussion. For context, although there is a debate about career lengths generally, the mean career length for a *drafted* player is about 5 years.^q Nevertheless, it is important to remember that these are *mean* statistics and thus include players who play very little in the game or players who play positions less likely to suffer injuries or concussions. Players with more game time and players at certain positions are likely to suffer injuries and/or concussions at rates higher than those provided here.

Finally, we can calculate what percentage of player injuries are concussions. Between 2009 and 2015, there were a total of 10,577 regular season injuries (Table 2-C). During this same time period, there were 1,113 regular season concussions (Table 2-E). Thus, concussions represented 10.5 percent of all regular season injuries (1,113/10,577).

Figure 2-A: NFL Regular Season Mean Number of Concussions as Compared to All Other Injuries



q The NFL and NFLPA disagree on the mean career length of NFL players. The NFLPA has long stated that the mean career is about 3.2 years. The NFL insists players' mean career length is about 6 years. The difference arises from which population of players is being examined. The NFLPA seems to include in their calculation every player who ever signed a contract with an NFL club, regardless of whether they ever make the club or play in an NFL regular season game, while also including players who are still active (and whose careers will thus exceed their current length). On the other hand, the NFL's calculation comes from players who made the opening day roster and that played between 1993–2002, a slightly different era from today's NFL. The website sharpfootballanalysis.com ultimately found that players who were drafted between 2002 and 2007 have a mean career length of 5.0 years. Average NFL Career Length, Sharp Football Analysis (Apr. 30, 2014), http://www .sharpfootballanalysis.com/blog/?p=2133, archived at http://perma.cc/KR58-R8DA.

Finally, below is some additional information from the NFLISS:^r

- The most common types of injuries during regular season practices in 2013 were hamstring strains (46), groin adductor strains (10), high ankle sprains (6), and shoulder sprains (6).
- The five most common types of injuries during regular season games in 2013 were concussions (147), hamstring strains (approximately 128°), medical collateral ligament (MCL) sprains (approximately 76), high ankle sprains (approximately 58), and groin adductor strains (approximately 47).
- The most common mechanisms of concussions during regular season games in 2013 were contact with other helmets (49.0%), contact with the playing surface (16.3%), contact with another player's knee (10.2%), and contact with another player's shoulder (7.5%).

3) INJURY-RELATED LISTS

Injured NFL players are placed on different lists depending on the expected duration of the injury and the timing of the injury.

If a player fails the pre-season physical, *i.e.*, the club doctor determines the player is not physically ready to play football, and is unable to participate in training camp but is expected to be able to play later in the season, the player can be placed on the Physically Unable to Perform ("PUP") List. A player on the PUP List cannot practice or play until after the sixth game of the regular season and does not count towards the club's 53-man Active/Inactive List during that time.²⁹

Players who are injured during the pre-season or regular season and are unable to return that season are placed on Injured Reserve, which typically precludes them from practicing or playing further that season. Players on Injured Reserve do not count towards the club's 53-man Active/ Inactive List. In 2012, the NFL and NFLPA amended the rules to permit clubs to allow one player in any season to return from Injured Reserve after a minimum of six weeks.³⁰

Finally, players who suffer short-term injuries are only given a different status on the day of the game. NFL clubs have a 53-man Active/Inactive List.³¹ This is the roster of

players clubs have to choose from each week. On the day of the game, the number of players who are permitted to play, *i.e.*, the Active List, is reduced to 46 players.³² Thus, seven players are declared Inactive and cannot play on each game day. Generally, at least some of the seven players declared Inactive have been so declared due to injury (the rest would be for skill reasons). A player is Inactive for that particular game, but can be Active for the next game. In this way, the Inactive List serves as a short-term, non-durational injured list.

4) INJURY REPORTING POLICIES

The NFL's "Personnel (Injury) Report Policy" ("Injury Reporting Policy") requires each club to report information on injured players to both the NFL and the media each game week ("Injury Report").³³ The stated purpose of this reporting is "to provide a full and complete rendering of player availability" to all parties involved, including the opposing team, the media, and the general public.³⁴ According to the NFL, the policy is of "paramount importance in maintaining the integrity of the game,"³⁵ *i.e.*, preventing gambling on inside information concerning player injuries.³⁶

The Injury Report is a list of injured players, each injured player's type or location of injury, and the injured player's status for the upcoming game. Each injury must be described "with a reasonable degree of specificity," e.g., ankle, ribs, hand. For a quarterback's arm injury or a kicker's or punter's leg injury, the description must designate left or right. No other injuries require the side of the injury to be disclosed. Historically, the player's status for the upcoming game was classified into four categories: "Out (definitely will not play)"; "Doubtful (at least 75 percent chance will not play)"; "Questionable (50-50 chance will not play)"; and, "Probable (virtual certainty player will be available for normal duty)".³⁷ In 2016, the NFL changed the classifications for player injuries by: (1) eliminating the "probable" designation; (2) changing the definition of "questionable" to "uncertain as to whether the player will play in the game"; (3) changing the definition of "doubtful" to "unlikely the player will participate"; and, (4) only using the "out" designation two days before a game.³⁸ The Injury Report also indicates whether a player had full, limited, or no participation in practice, whether due to injury or any other cause (e.g., team discipline, family matter, etc.).

For a typical Sunday game, clubs must issue an Injury Report after practice each Wednesday, Thursday, and Friday of game week. If there are any additional injuries after the Friday deadline, the club must report these injuries to

r This information is from the year-end NFLISS reports prepared by Quintiles for the year 2014, and the reports presented at the NFL's annual Health & Safety Press Conference during the week of the Super Bowl.

s Statistics for injuries other than concussions are only available in bar graph form. Consequently, we estimate the injury figure based on the graph available.

the NFL, the club's opponent, the televising network, and the local media on Saturday and Sunday.

The Injury Reporting Policy dictates that all injury reports be "credible, accurate, and specific within the guidelines of the policy." In "unusual situations," clubs are requested to contact the League's public relations office and, when in doubt, clubs should include a player in the Injury Report. Clubs and coaches that violate the policy are subject to disciplinary action. If a question arises as to why a player did not participate in a game, the club can be required to provide a written explanation to the NFL within 48 hours.

Despite the enforcement system and disciplinary action for abuse (typically fines of \$5,000 to \$25,000³⁹), many in the media along with coaches and players have questioned the Injury Report's accuracy and value. A 2007 USA Today analysis of two-and-a-half seasons of Injury Reports found a high variance in the number of injuries reported by teams, with 527 reported by the Indianapolis Colts versus just 103 by the Dallas Cowboys.⁴⁰ Interviews with coaches in that article as well as others suggested that the different philosophies of coaches to report even minor injuries versus only major injuries accounted for this variance.⁴¹ In the same article, former Pittsburgh Steelers coach Bill Cowher was quoted as saying that he deliberately changed the location of injuries (e.g., reporting hip instead of knee) to protect his players from having their injuries targeted by opponents.⁴² Baltimore Ravens head coach Jim Harbaugh, after being fined for not listing an injured player in 2012, told the media that "[t]here's no credence on the injury report now It doesn't mean anything. It has no value."43 In March 2014, two former players on the New England Patriots stated that head coach Bill Belichick filed inaccurate and false injury reports.44 Many in the media have referred to the Injury Report as a "game" or "joke."45 Nevertheless, some believed that the 2016 changes to the injury reporting policy allowed for even more gamesmanship.46

Many clubs have policies prohibiting players from speaking to the media about injuries.⁴⁷

Finally, to facilitate the Injury Reporting Policy, clubs, request or require players to execute waivers permitting broad disclosure and use of their medical information.⁴⁸

With this understanding of the NFL's policies, we can now begin our comparison to the other leagues.

B) Injuries in MLB

1) INJURY TRACKING SYSTEM

In 2010, MLB—with agreement and assistance from the MLBPA-launched a web-based electronic medical record ("EMR") system "designed to allow trainers to have more and better information at their fingertips."49 The EMR system is linked to MLB's electronic Baseball Information System ("eBIS"),⁵⁰ that clubs use to complete the Standard Form of Diagnosis for Disabled List applications,⁵¹ which will be discussed in more detail below. With the EMR system, clubs' athletic trainers enter data on "all injuries, illnesses, and preventative events"52-whether baseballrelated or not.53 In addition, the EMR system provides MLB with robust data, which - once de-identified and centralized in MLB's Health and Injury Tracking System ("HITS")-MLB can use to monitor, study, and analyze injuries in baseball.54 "HITS includes any injury or physical complaint sustained by a player that affects or limits participation in any aspect of baseball-related activity (e.g., playing in a game, practice, warm up, conditioning, weight training)."55

2) INJURY STATISTICS

MLB's efforts to study injury data should serve as a model for other leagues. Since the creation of MLB's EMR and HITS systems, MLB has undertaken, in partnership with the Johns Hopkins University Bloomberg School of Public Health, to conduct and publish comprehensive studies of injuries by major and minor league baseball players for the purpose of amending policies and practices to better protect player health.⁵⁶ As of the fall of 2016, doctors affiliated with MLB and their research partners have published studies on overall injury trends,⁵⁷ hamstring injuries,⁵⁸ knee injuries,⁵⁹ hip and groin injuries,⁶⁰ and traumatic brain injuries,⁶¹ in major and minor league players. Moreover, additional studies are forthcoming.⁶²

In 2016, the researchers discussed above published a study describing the implementation of the EMR and HITS systems, which included aggregate MLB injury data, shown below in Table 2-J.⁶³ Importantly, "[f]or research studies, injuries are operationally defined as those that are work-related, did not occur in the off-season (i.e., occurred only [in] spring training, the regular season, or the postseason), were a primary diagnosis, and resulted in at least 1 day out of play."⁶⁴ In the Analysis Section at the end of this Chapter, we explain how this definition varies slightly from injury data we provide from other leagues.



Table 2-J:

Number of Injuries during Spring Training, the Regular Season, or Postseason over Five Seasons (2010-14)

Year	2010	2011	2012	2013	2014	Total
Injuries	2,076	1,641	1,347	1,270	1,249	7,583

Importantly, the number of injuries recorded in HITS is considerably more than the number of players placed on the Disabled List ("DL"), as shown in Table 2-K.

The DL is a roster designation for players "unable to render services because of a specific injury or ailment."⁶⁵ During the time players are on the DL, clubs are permitted to replace the player on the club's active roster. However, not all injured players are placed on the DL. DL designations only include injuries that result in time loss.^t Thus, DL data underrepresents the actual total number of injuries and for that reason we do not use it here. Between 2010 and 2014, there were 4,614 spring training games,⁶⁶ 12,150 regular season games,⁶⁷ and 32 postseason games,⁶⁸ for a total of 16,941 games. We can thus estimate that there are 0.45 injuries per game (7,583/16,941). It is important to note that injuries that would occur during practice are included in the total number of injuries and thus the actual mean number of injuries per game is probably lower. However, we think the number of injuries that occur during practice are minimal—players play 162 games in 183 days⁶⁹ and there are very limited practices during the season.⁷⁰

Table 2-K:

Number of Disabled List Designations over Five Seasons (2010–14)⁷¹

Year	2010	2011	2012	2013	2014	Total
Designations	459	515	504	519	488	2,485

We can also calculate a rate of injuries per player-game. A 2015 study conducted by MLB's Medical Director Dr. Gary Green ("Green Study")^{72,u} revealed that during the 2011 and 2012 seasons, players played a total of 138,085 regular season games.73 During this same time period, there were 2,988 injuries.⁷⁴ However, these statistics include spring training and postseason injuries. From the data above, we know that 71.7% of all MLB games between 2010 and 2014 were regular season games (12,150/16,941). If we assume that the rate of injuries is constant among spring training, regular season, and postseason games,^v we can estimate that between 2011 and 2012, there were 2,142 injuries in regular season games (2,988 x 71.7%). We can thus estimate that the rate of injuries per player-game during this time period is 0.016 (2,142/138,085) assuming players only suffer one injury per game.

Finally, we can calculate the rate of injuries per playerseason. Approximately 1,337 players played in an MLB regular season game in 2014.⁷⁵ During 2014, there were 1,249 injuries. Thus, the rate of injuries per player during the 2014 regular season was 0.93 per player-season (1,249/1,337). There are two important points concerning this statistic: (1) this statistic represents a per player per season statistic, regardless of whether they played one game or all 162 games; and, (2) there is likely variation in injury rates among the different positions on the field.

Between 2011 and 2014, the five most commonly injured body parts were upper leg (thigh) (724 injuries), shoulder/ clavicle (672), hand/finger/thumb (501), elbow (430), and knee (410).⁷⁶

We turn now to the incidence of concussions in MLB. The Green Study focused on exactly this issue.

The Green Study reported that there were 41 concussions in MLB during the 2011 and 2012 seasons, but only 36 occurred during games.⁷⁷ It is important to note that the Green Study acknowledged that the possible underreporting of concussions was a limitation of its study.⁷⁸ Nevertheless, the Green Study offers the most reliable data on MLB concussions and we thus use it here.

t Between 1998 and 2015, the average duration of a player's time on the DL was 55.1 days. Stan Conte, Christopher L. Camp and Joshua S. Dines, *Injury Trends in Major League Baseball Over 18 Seasons: 1998–2015*, 45 Am. J. Orthopedics 116, 118 (2016).

u According to MLB, the study was conducted pursuant to its partnership with Johns Hopkins and MLB did not provide any funding or financial support.

v This is likely not the case, as more injuries may be suffered as the season goes on due to cumulative strain. See Randall Dick et al., Descriptive Epidemiology of Collegiate Men's Baseball Injuries: National Collegiate Athletic Association Injury Surveillance System, 1988–89 through 2003–04, 42 J. Athletic Training 183 (2007). Nevertheless, any variance in the injury rates is challenging to determine and thus proceed based on this assumption. While imperfect, we still believe the data and these calculations are sufficiently reliable and useful.

With 4,860 regular season MLB games occurring during these two seasons,⁷⁹ there is a mean of 0.007 concussions per game (36/4,860). From the available information regarding the total number of concussions, total number of players per game, games per year, and years of data, we can calculate the overall rate of concussion as 0.00026 per player-game.^w

Finally, we can estimate the rate of concussions per playerseason. As stated above, in 2014, 1,337 players played in an MLB regular season game. In the same year, players were placed on the DL due to a concussion or concussionlike symptoms 21 times.^x Thus, in 2014, the rate of concussion per player-season was 0.016 (21/1,337).

The Green Study also examined the number of concussions by "athlete exposures," or "AE." The Green Study based the number of AEs on the actual number of games played by players.⁸⁰ This methodology resulted in 138,085 AEs over the two seasons. With 36 concussions occurring in the two seasons, that is the equivalent of 0.26 concussions per every 1,000 AEs, or, put another way, players experienced 0.26 concussions for every 1,000 games played. The Green Study also found that catchers experience more concussions than fielders,⁸¹ and "struck by batted ball" is the most likely mechanism by which a player sustains a concussion.⁸²

Readers might be interested in the mean number of games a player plays before suffering an injury. We calculated above that the rate of injuries per player-game was 0.016. Thus, we can calculate that players play a mean of 62.5 games before suffering one injury (1/0.016). We can also calculate the mean number of games a player plays before suffering a concussion. We calculated above that the rate of concussion per player-game was 0.00026. Thus, we can calculate that players play a mean of 3,846.15 games before suffering one concussion (1/0.00026). With 162 regular season games, players theoretically play a mean of 23.74 seasons before suffering a concussion. For context, the mean career length for a drafted player is about 5.6 years.⁸³ Nevertheless, it is important to remember that these are mean statistics and thus includes players who play very little in the game or players who play positions less likely to suffer injuries or concussions. Players with a lot of play time and players at

certain positions are likely to suffer injuries and/or concussions at rates higher than those provided here.

Finally, we can calculate what percentage of player injuries are concussions. In 2014, there were 1,249 injuries and 22 instances in which players were placed on the DL due to a concussion or concussion-like symptoms. Concussions thus represented 1.8% of all injuries (22/1,249).

Figure 2-B: MLB Regular Season Mean Number of Concussions as Compared to All Other Injuries



3) INJURY-RELATED LISTS

MLB has three DLs: a 7-day DL, which is exclusively for players who have suffered "acute" concussions;84 a 10-day DL; and, a 60-day DL.85 To place a player on one of the DLs, a club must submit an application to MLB that includes the Standard Form of Diagnosis (appended to the MLB CBA) and a separate document indicating the estimated time period of recovery.86 The club doctorprepared Standard Form of Diagnosis provides MLB with information about the nature of the player's injury (including "Body Side," "Part of Body Injured," and "Body Part Detail"), the date of the injury, and the club doctor's diagnosis.87 MLB may request "that a Club provide additional information in support of a Disabled List placement before the application is approved[.]"88 Once MLB has accepted a DL application, the player covered by the application must remain inactive for at least the number of days enumerated in the title of the DL to which he has been assigned.89

w This statistic is calculated by dividing the total number of regular season game concussions from 2011–12 (41) by the total number of game exposures over the same time period (138,024). The 138,024 statistic is calculated by multiplying 2 seasons by 2,430 regular season games per season by 28.4 players per game. The Green Study provided that there were 69,043 games played per season. With 2,430 regular season games per season, we can thus calculate that a mean of 28.4 player ers play in each MLB game.

x MLB has a 7-day DL "solely for the placement of players who suffer a concussion." 2012 MLB CBA, Att. 36, ¶ 2. Given the specific nature of this DL, there are likely very few (if any) instances in which a player suffered a concussion and was not placed on the DL.

4) INJURY REPORTING POLICIES

Unlike the NFL, MLB does not obligate clubs to report player injuries publicly. However, the CBA permits clubs to disclose the following "about *employment-related* injuries: (a) the nature of a Player's injury, (b) the prognosis and the anticipated length of recovery from the injury, and (c) the treatment and surgical procedures undertaken or anticipated in regard to the injury."⁹⁰ Despite this permission, club doctors are "prohibited from making any public disclosure of a Player's medical information absent a separate, specific written authorization from the Player authorizing such public disclosure."⁹¹ Thus, club officials, such as coaches or the general manager (and not the doctor), are most likely the ones to update the media on player injuries.

As a matter of course, clubs effectively report injuries through roster transactions. An MLB club's active roster is limited to 25 players (except during September).⁹² If a player is injured and placed on the DL, his spot on the active roster will be filled by another player. Clubs publicly update their active rosters and DL as needed. Thus, when a player is moved from the active roster to the DL, the club is indicating that the player is injured.



C) Injuries in the NBA

1) INJURY TRACKING SYSTEM

Since 2012, the NBA has employed an EMR system, called HealtheAthlete. Cerner Corporation, the creator of HealtheAthlete, describes the "secure electronic platform" as "enhanc[ing] the standard of medical record keeping for all NBA athletes."93 The system allows each player to have an integrated record of their care, gives medical personnel easy access to these records, and improves the NBA's ability to track trends in player health and healthcare.94 The EMR system also "allow[s] for authorized academic researchers to access the data (on a de-identified basis) and conduct studies designed to improve player health and broaden medical knowledge" (with the NBPA's approval, which cannot be unreasonably withheld).95 The CBA specifically permits disclosures of player health information to be made via "secure systems" with EMRs to the extent that medical disclosures are otherwise allowed by the CBA.96

Prior to the EMR system, the National Basketball Athletic Trainers Association ("NBATA"), comprised of all athletic

trainers working for an NBA club, maintained a record of "all injuries and illnesses sustained by NBA players."97 An injury or illness was considered reportable if it: (1) required physician referral, prescription medication, or both; (2) resulted in a missed game or practice; or, (3) necessitated emergency care.98 Entries into the NBATA system were "completed by the team's athletic trainer and cosigned by the team physician."99 The reported data included pathology, time and place of injury or onset of illness, activity, and the mechanism of injury.¹⁰⁰ The HealtheAthlete system collects the same data formerly recorded by the athletic trainers.¹⁰¹ In reviewing a draft of this Report, the NBA stated that the HealtheAthlete system also provides additional unspecified information. Additionally, since 2014, the NBA has worked with the international biopharmaceutical services firm Quintiles to analyze injury data and provide reports to the NBA and NBPA.¹⁰²

2) INJURY STATISTICS

The most recent comprehensive study on NBA injury rates was led by Dr. Mark C. Drakos and published in *Sports Health* in 2010.¹⁰³ The study looked at injury data from the NBATA injury database for 17 seasons (1988–89 through 2004–05).¹⁰⁴ The Drakos study stated that it did not examine injury rates "for practices and pre-season games" due to "unreliable reporting methods and lack of a standardized protocol."¹⁰⁵ Given the source of the data, "injuries" as defined in the study included those: (1) requiring physician referral, prescription medication, or both; (2) resulting in missed games or practices; and, (3) those requiring emergency care.¹⁰⁶ Additionally, the study only included injury data for injuries that occurred during the NBA regular season.¹⁰⁷

The Drakos study acknowledged that it was limited by the fact that the injury data may be underreported for a variety of reasons.¹⁰⁸ Additionally, the length of study complicates the analysis, as it seems likely that over the 17 seasons knowledge about injuries and attitudes towards reporting injuries changed, resulting in changes in the data over time. Nevertheless, the Drakos study provides the most reliable publicly-available data on NBA player injuries and we thus use it here.

Like the Green Study discussed above in MLB, the Drakos study examined injury rates through AEs, defined as "1 athlete appearing in 1 game."¹⁰⁹ During the time period studied, there were 6,287 injuries in regular season games.¹¹⁰ The study determined there was an injury rate of 19.1 per 1,000 AEs.¹¹¹

Using the data from the Drakos study, we can also calculate several other statistics. Over the 17 seasons, there was a mean of 369.8 injuries per season (6,287/17). Also, during the time period studied, there were 38,268 regular season NBA games.^y Thus, there were 0.16 injures per regular season NBA game (6,287/38,268).

To determine additional statistics, we used data from basketball-reference.com for the 17 seasons covered by the Drakos study. During these seasons, players made a total of 387,673 game appearances. Thus, the injury rate per player-game was 0.016 (6,287/387,673). Additionally, during the seasons of the study, there were a total of 7,115 player-seasons.^z Using the Drakos study's calculation of 6,287 injuries, we can calculate that the injury rate per player-season was 0.88 (6,287/7,115). Again, there are two important limitations to this statistic: (1) this statistic represents a per player-season statistic, regardless of whether he played one game or all 82 games; and, (2) there is likely variation in injury rates among the different positions on the court.

According to data in the Drakos study, the most commonly injured body parts during regular season games were ankles (66.1 injuries per season), knee (29.5), femur (28.4), lumbar spine (28.3), and tibia (25.4).¹¹² Ankle sprains (distinct from *all* ankle injuries) were the most common injury (62.7 per season).¹¹³

Concussions were among the least-reported injuries in the study. During the 17-year period, there were only 53 reported concussions that occurred during games, which accounted for only 0.8% of total injuries reported during games and contributed to only 0.4% of games missed.¹¹⁴ With 38,268 games played during the period, a diagnosed concussion occurred only once every 722.0 games, or a mean of 0.0014 per game. Over the length of the Drakos study, the rate of concussion was 0.00014 per player-game (53/387,673). During the 2013–14 season, there were only nine reported concussions,¹¹⁵ a mean of one every 136.7 games, or 0.007 per game. Players made 25,618 game appearances during the 2013-14 season,¹¹⁶ and therefore suffered a per player-game concussion rate of 0.00035 (9/25,618). Additionally, during the 2013-14 season, 483 players played in the NBA. Thus, there were 0.019 concussions reported per player-season (9/483).

y NBA clubs play 82 games a season, except in the 1998–99 season they only played 50 due to a lockout. Additionally, the NBA added clubs prior to the 1989–90, 1995–96 and 2004–05 seasons. Readers might be interested in the mean number of games a player plays before suffering an injury. We calculated above that the rate of injuries per player-game was 0.016. Thus, we can calculate that players play a mean of 62.50 games before suffering one injury (1/0.016). We can also calculate the mean number of games a player plays before suffering a concussion. We calculated above that the rate of concussion per player-game was 0.00035. Thus, we can calculate that players play a mean of 2,857.14 games before suffering one concussion (1/0.00035). With 82 regular season games, players theoretically play a mean of 34.8 seasons before suffering a concussion. For context, the mean career length for a player is about 4.8 years.¹¹⁷ Nevertheless, it is important to remember that this is a mean statistic and thus includes players who play very little in the game. Players with more game time are likely to suffer concussions at rates higher than those provided here.

Finally, as stated above, during the time period of the Drakos Study (1988–2005), concussions represented only 0.8% of game injuries. Based on increased attention to concussions since 2005, it seems likely that this proportion has increased. However, we do not have more recent injury data against which to compare recent concussion data.^{aa} For this reason, we also do not provide a Figure showing concussions as a percentage of injuries, as we do for the NFL, MLB, and NHL.

3) INJURY-RELATED LISTS

NBA rosters are generally limited to 15 players, divided between an Active List and an Inactive List.¹¹⁸ A club typically has 12 or 13 players on its Active List, who are eligible to play in games, and then has 2 to 3 players on the Inactive List who cannot play.¹¹⁹ While NBA clubs generally place their injured players on the Inactive List, healthy players can also be on the Inactive List.¹²⁰ Thus, the NBA has no list specific to injured players. Moreover, players are not required to be on the Inactive List for any specific period of time. Consequently, like in the NFL, NBA clubs can declare players inactive for as little as one game at a time.

4) INJURY REPORTING POLICIES

Like the NFL, the NBA obligates clubs to report player injuries publicly, including the nature of the player's injury.¹²¹ The CBA authorizes each club to make public

z This statistic was calculated by adding together the number of players who played in at least one NBA game in each of the 17 seasons covered by the Drakos study. During the seasons in question, a range of 353 to 464 players would make an appearance in an NBA game during any given season.

aa If we assume that the total number of player injuries in a season has remained constant at the mean of 369.8 observed during the period studied in the Drakos Study, we can calculate that the 9 concussions that occurred during the 2013–14 season represented 2.4% of all player injuries (369.8/9). Nevertheless, because the data is not from the same year, this calculation method is of questionable validity.

injury information relating to its players, so long as the information relates solely to the reasons that a player is not rendering his services as a player.¹²² Further, a player or his immediate family (where appropriate) "shall have the right to approve the terms and timing of any public release of medical information relating to any injuries or illnesses suffered by that player that are potentially life- or career-threatening, or that do not arise from the player's participation in NBA games or practices."¹²³

In practice, NBA clubs release injury reports prior to every game, describing a player's status (out, doubtful, questionable, probable) and the nature of the player's injury, including the injured body part.



D) Injuries in the NHL

1) INJURY TRACKING SYSTEM

The NHL's injury tracking system is part of the Athlete Health Management System ("AHMS"). The AHMS is the NHL's "electronic health records system focusing on the diagnosis, treatment and rehabilitation of injuries suffered by athletes in the course of athletic competition and training."¹²⁴ The AHMS "has an injury surveillance component," which requires "NHL Athletic Team Trainers/ Therapists and Team Physicians [to] document[] all injuries using a standardised 'injury/illness event' (IIE) form for each event causing a player to miss one or more games."¹²⁵ "Medical staff [are] also instructed to create an IIE for each event needing medical assessment and treatment, regardless of time loss."¹²⁶

2) INJURY STATISTICS

The most comprehensive study on NHL injury rates was led by Carly McKay and published in the *British Journal of Sports Medicine* in 2014.¹²⁷ The study looked at injury data from the AHMS for six seasons (2006–07 through 2011–12).¹²⁸

The McKay study acknowledged that it was limited by the potential underreporting of injuries,¹²⁹ as is a common and complex occurrence in injury surveillance. Additionally, it acknowledged the possibility that athletic trainers' practices in reporting injuries vary among the clubs.¹³⁰ Nevertheless, the McKay study provides the best available data on NHL player injuries and we thus use it here.

Like the MLB and NBA studies discussed above, the McKay study examined injury rates through AEs. This study defined 1 AE as 1 player participating in 1 game.¹³¹ During the time period studied, there were 4,368 injuries during regular season games.¹³² Thus, using this methodology, there was an injury rate of 15.58 injuries per 1,000 AEs.

However, the study also presented injury rates per hours of ice time, where exposure was measured in terms of the number of hours on the ice. Using this methodology, the study determined that there were 49.4 injuries per 1,000 hours on the ice.¹³³ The study explained that the approximately threefold increase in injury rate is due to the fact that no player (other than the goaltender) plays the entire 60-minute game.¹³⁴

Using the data from the McKay study, we can also calculate several other statistics. During the time period studied, there were 7,380 NHL regular season games.¹³⁵ Thus, there were 0.59 injuries per game (4,368/7,380).

From the available information regarding the total number of injuries, total number of players per game, games per year, and years of data, we can calculate the overall rate of injury per player-game as 0.015.^{ab} Additionally, during the seasons of the study, there were a total of 5,145 player-seasons.¹³⁶ With 4,386 injuries during this span, there was thus a mean of 0.85 injuries per player-season (4,386/5,145). Again, there are two important limitations to this statistic: (1) this statistic represents a per playerseason rate, regardless of whether they played one game or all 82 games; and, (2) there is likely variation in injury rates among the different positions on the ice.

The study found that the most common injuries were to the head (16.8%), thigh (14.0%), and knee (13.0%).¹³⁷ Additionally, body checks were the most frequent cause of injury at 28.6%.¹³⁸

ab This statistic is calculated by dividing the total number of regular season game injuries from 2006-12 (4,368) by the total number of game exposures over the same time period (299.136). The 299.136 statistic is calculated by multiplying 6 seasons by 1,312 regular season games per season by 38 players per game. Although NHL clubs are permitted to have 20 players active for each game, see Jay Levin, The Business of the Game: Roster Limits, Nashville Predators, July 11, 2008, http://predators.nhl.com/club/news.htm?id=439739, archived at http://perma.cc/ W9FB-MUW8 (describing "a 20-player 'dressed list' for games"); Bounty of riches for Carbonneau; Wounded return, Montreal Gazette, Oct. 17, 2008, available at 2008 WLNR 28430795 (Montreal Canadians coach discussing challenge of choosing which 20 players will dress for the game), the backup goalie normally does not play, making 19 players per game per club a more accurate statistic. See Brian Benson et al., A Prospective Study of Concussions Among National Hockey League Players During Regular Season Games: The NHL-NHLPA Concussion Program, 183 Canadian Med. Ass'n J. 905, App. 2 (2011) (basing athlete-exposure calculations on only "one goalie playing per team, per game").

Turning to concussions in the NHL, there are two principal studies.^{ac} In an independent study led by Dr. Richard A. Wennberg and published in the Canadian Journal of Neurological Sciences in 2008 examined concussion as reported in the media for ten NHL seasons (1997-98 through 2007–08).¹³⁹ While media reported concussion data is not the ideal data set, the NHL and NHLPA declined our requests for data on the number of concussions suffered over the last ten years. The Wennberg study concluded that the concussion incident rate during these seasons was 1.45 per 1,000 AEs, with an AE defined as one player playing in one NHL game.¹⁴⁰ The Wennberg study reported that there was a total of 688 concussions over the ten years studied,¹⁴¹ which we can calculate equals a mean of 68.8 reported concussions per season, or .058 per regular season game.^{ad} From data provided by the Wennberg study, we can calculate that player exposures (*i.e.*, games played) was a total of 477,240 games during the seasons studied.¹⁴² Thus, the rate of concussions per player-game is 0.0014 (0.688/477,240).

In 2011, the doctors in charge of the NHL/NHLPA Concussion Program¹⁴³ published their own study concerning NHL concussion rates.¹⁴⁴ The NHL/NHLPA study examined concussions reported by club doctors on standardized injury reporting forms for the seasons of 1997–98 through 2003–04.¹⁴⁵ The NHL/NHLPA study reported a total of 559 concussions during the time period studied,¹⁴⁶ equaling a mean of 79.9 concussions per season, or 0.068 per regular season game.^{ae} If we estimate that 38 players play per game,^{af} we can estimate that during the seasons analyzed by the NHL/NHLPA study, players played a total of 313,158 games.^{ag} Thus, according to the data from the NHL/ NHLPA study, the rate of concussions per player-game is

ac An additional study on concussions in the NHL worth considering is Michael G. Hutchison et al., A systematic video analysis of National Hockey League (NHL) concussions, part 1: who, when, where and what? Br. J. Sports Med. 1 (2013). This study analyzed the situational factors associated with concussions in the NHL, such as contact with an opponent and position. The study analyzed concussions that occurred during the 2006–07, 2007–08, 2008–09, and 2009–10 seasons. However, the analysis did not include all concussions that occurred during the 2009–10 season. Instead, the authors stopped their data collection as of December 31, 2009. Consequently, the data from this study is not the best data for determining the number of concussions that occur during an NHL regular season.

ad This statistic was calculated by dividing 688 concussions by 11,931 regular season games. There are 82 regular season games in the NHL each season. The number of games per season, however, depends on the number of clubs. There were 26 clubs in 1997–98, 27 in 1998–99, 28 in 1999–00, and 30 from 2000–01 and beyond. Thus, the total number of games played by clubs during this time equals 23,862 [(26 clubs x 82 games x 1 season) + (27 clubs x 82 games x 1 season) + (28 clubs x 82 games x 1 season) + (30 clubs x 82 games x 7 seasons)]. Because each game involves two clubs, you then divide the total number of games (23,862) by 2 to reach the number of unique games.

- ae This statistic was calculated by dividing 559 concussions by 8,241 regular season games. The 8,241 regular season game statistic was calculated using the same methodology as described in footnote ad.
- af See footnote ab for an explanation of this assumption.
- ag This statistic was calculated by multiplying 8,241 regular season games (see footnote ad for methodology) by 38 players per game.

0.0018 (559/313,158). The NHL/NHLPA study also calculated those statistics as the equivalent of 1.8 concussions per 1,000 player-hours on the ice.¹⁴⁷

As awareness of concussions has grown, and reporting of concussions has likely improved, more recent data concerning concussions are more useful. The NHL does not make its concussion data publicly available like the NFL, but, nevertheless, it was reported that there were 78 concussions during the 2012-13 regular season and 53 concussions during the 2013-14 regular season.¹⁴⁸ However, because of a work stoppage, there were only 48 games during the 2012–13 regular season, rather than the normal 82. We can extrapolate that 78 concussions during 48 regular season games is the equivalent of 133 concussions during a normal 82 game regular season.^{ah} 53 concussions reportedly suffered during a full-length 2013-14 regular season is considerably less (60.2%) than the 133 concussions during a hypothetical full-length 2012-13 regular season, which necessarily calls the data into question. Nevertheless, as stated earlier, the NHL and NHLPA declined to provide more recent or reliable data on concussions and thus we rely on the best available data.

There were a total of 1,950 regular season games in the 2012–13 and 2013–14 regular seasons.^{ai} With 131 concussions having occurred during these season, we can calculate that a concussion occurred once every 14.9 regular season games,^{ai} equivalent to a rate of 0.067 per regular season game.^{ak} Again, estimating that 38 players play per game, we can estimate that players played a total of 74,100 games during the 2012–13 and 2013–14 seasons.^{al} We can thus calculate that the rate of concussions per player-game during those seasons was 0.0018 (131/93,480). This rate is slightly more than that from the Wennberg study and matches the rate calculated using data from the NHL/ NHLPA study.

- ah This statistic is calculated by dividing 82 by regular season games by 48 regular season games and multiplying it by 78 concussions that occurred during the shortened 2012–13 regular season.
- ai The number of games in the 2012–13 season is calculated by multiplying 30 clubs x 48 regular season games and then dividing by 2 clubs per game, to reach 720 games. The number of games in the 2013–14 season is calculated by multiplying 30 clubs x 82 regular season games and then dividing by 2 clubs per game, to reach 1,230 games. 720 + 1,230 = 1,950.
- This statistic was calculated by dividing 1,950 regular season games over the two seasons by 131 concussions.
- ak This statistic was calculated by dividing 131 concussions by 1,950 regular season games.
- al This statistic is calculated by multiplying 1,950 regular season games over the two seasons by 38 players.

We can also try to calculate the number of concussions per player-season. Using the extrapolated concussion data for the 2012–13 season, we can estimate a hypothetical total of 186 concussions during the 2012–13 and 2013–14 seasons. Using data from the McKay study, we can calculate that there during the time period studied (2006–12), a mean of 857.3 players played each season.¹⁴⁹ If we assume that the mean number of players played for the 2012–13 and 2013–14 seasons was the same as during the time period of the McKay study, we can estimate that there are 0.108 concussions per player-season (186/1,714.6).^{am}

Readers might be interested in the mean number of games a player plays before suffering an injury. We calculated above that the rate of injuries per player-game was 0.016. Thus, we can calculate that players play a mean of 62.5 games before suffering one injury (1/0.016). We can also calculate the mean number of games a player plays before suffering a concussion. We calculated above that the rate of concussion per player-game was 0.0018. Thus, we can calculate that players play a mean of 555.56 games before suffering one concussion (1/0.0018). With 82 regular season games, players theoretically play a mean of 6.8 seasons before suffering a concussion. For context, the mean career length for a player is about 5.6 years.¹⁵⁰ Nevertheless, it is important to remember that this is a mean statistic and thus includes players who play very little in the game. Players with more game time are likely to suffer concussions at rates higher than those provided here.

Finally, by combining data from the different studies, we can estimate what percentage of player injuries are concussions. The McKay study found that there was a mean of 728 injuries per season during the 2006–07 through 2011–12 regular seasons. Again in an effort to use the most recent data, there was an estimated mean of 93.0 concussions per season during the 2012–13 and 2013–14 regular seasons, assuming the 2012–13 season was normal length (186/2). Based on these statistics, we can estimate that 12.8% of regular season injuries are concussions (93/728).^{an}

Figure 2-C: NHL Regular Season Mean Number of Concussions As Compared to All Other Injuries



3) INJURY-RELATED LISTS

Like the NFL, injured NHL players are placed on different lists depending on the expected duration of the injury and the timing of the injury.

First, the Injured Reserve List ("IR") is for a player "reasonably expected to be injured, ill or disabled and unable to perform his duties as a hockey Player for a minimum of seven (7) days from the onset of such injury, illness or disability."¹⁵¹ NHL club rosters are limited to 23 players.¹⁵² During the time a player is on IR, the club can replace him on the roster.¹⁵³

Second, players who fail the pre-season physical are placed on the Injured Non-Roster list.¹⁵⁴ A player on the Injured Non-Roster list does not count against the club's 23-man roster.¹⁵⁵ NHL clubs are permitted to have up to 50 players under contract,¹⁵⁶ thus, the purpose of the Injured Non-Roster list is unclear.

Third, like the NFL, players injured for only a short period of time are only temporarily declared inactive. NHL clubs have 23-man rosters. But clubs are only permitted to have 20 players play in each game. Thus, clubs declare three players inactive for each game. As in the NFL, the players declared inactive are frequently players with an injury that is expected to keep them out of only for a game or two.

am Readers should be cautioned that this calculation applies statistics from the time period of the McKay study to other years. In normal statistical methods, this is not preferred as it makes assumptions that various considerations do not change over time. We are unaware of any policy or practice changes that would have caused a meaningful change in the number of players per regular season between the years of the McKay study (2006–12) and the years of the most recent concussion data (2012–14). However, we again caution that we are extrapolating data from the 2012–13 season as if it were a full 82 game regular season.

an As explained in the preceding footnote, this estimate is limited by the fact that we are comparing data from two different time periods.

4) INJURY REPORTING POLICIES

Like the NFL, the NHL requires clubs to report publicly information about player injuries. Specifically, clubs are "required to disclose that a player is expected to miss a game due to injury, or will not return to a game following an injury."¹⁵⁷ Additionally, "Clubs are prohibited from providing untruthful information about the nature of a player injury or otherwise misrepresenting a player's condition."¹⁵⁸

The CBA authorizes clubs to publicly disclose the nature of a player's injury, the prognosis and anticipated recovery time, and the treatment and surgical procedures that have been or will be undertaken.^{159,ao} Nevertheless, unlike in the NFL, clubs are not required "to disclose the specific nature of player injuries."¹⁶⁰ Accordingly, individual clubs may disclose information as they see fit, and designations such as "upper-body injury" and "lower-body injury" are both common and acceptable.¹⁶¹ The NHL may fine clubs for failing to abide by the policy, but the NHL does not publicly disclose those fines.¹⁶²



E) Injuries in the CFL

1) INJURY TRACKING SYSTEM

Research has not revealed any injury tracking system in use by the CFL.

2) INJURY STATISTICS

There has not been a comprehensive study of general injury rates in the CFL, perhaps because CFL clubs are not required to publicly report injuries, as will be discussed below.¹⁶³

In 2010, the CFL implemented a concussion protocol, requiring the standardization of concussion reporting and allowing the League to more accurately track concussions.¹⁶⁴ In the first year of the new protocol, there were 50 reported concussions in 85 CFL games for a mean of 0.59 per game.¹⁶⁵ It is unclear whether this data includes preseason or postseason games.¹⁶⁶

The CFL does not publicize its concussion data in the same manner as the NFL. Thus, it is challenging to find more recent statistics concerning the number of concussions in the CFL. However, in a 2015 news article, Dr. Dhiren Naidu, the club doctor for the CFL's Edmonton club, stated that in 2014, there was a mean of slightly more than eight concussions per club.¹⁶⁷ With nine CFL clubs, that means there were slightly more than 72 concussions in the CFL in 2014. In the same article, it was reported that concussions in the CFL "dropped by 25 percent in 2015."¹⁶⁸ Thus, if we assume that the number of concussions in 2014 was 76 (which is closer to eight per club than nine per club), a 25% reduction would mean that there were 57 concussions in 2015. Thus, in 2015, there was an estimated mean of 0.704 concussions per game.^{ap}

Using this estimated number of concussions in 2015, total number of players per game, and games per year, we can calculate a rate of 0.0080 concussions per player-game.^{aq} With this statistic we can also calculate that the mean number of games a player plays before suffering one concussion is 125.0 (1/0.0080). With 18 regular season games, players theoretically play a mean of 6.9 seasons before suffering a concussion. Nevertheless, it is important to remember that this is a *mean* statistic and thus includes players who play very little in the game or players who play positions less likely to suffer concussions. Players who play a lot and players at certain positions are likely to suffer concussions at rates higher than those provided here.

3) INJURY-RELATED LISTS

CFL clubs maintain a 44-player active roster, a two-player reserve list,¹⁶⁹ and a 10-player practice-squad roster.¹⁷⁰ In the event that a player is injured, his club may place him on either a six-game or one-game Injured List, depending on the severity of the injury.¹⁷¹ Players on either Injured List do not count toward the club's roster limits.¹⁷²

ao Despite the authorizations contained in the CBA, *in re: Nat'l Hockey League Players' Concussion Injury Litigation*, 120 F. Supp.3d (D. Minn. 2015), the Court expressed that the NHL's disclosure of player medical information might violate the Americans with Disabilities Act ("ADA") confidentiality provisions. *See id.* at 951.

ap This statistic is calculated by dividing the estimated number of concussions (57) by the total number of games in a regular season (81). We can calculate that there are 81 regular season games by multiplying the number of CFL clubs (9) by the number of regular season games each club plays (18), and dividing by two to factor in that in each game there are two clubs playing.

aq This statistic is calculated by dividing the estimated number of concussions (57) by the total number of game exposures over the same time period (7,128). The 7,128 statistic is calculated by multiplying 81 regular season games per season by 88 players per game. CFL clubs maintain a 44-player active roster. *Rosters Glossary*, CFLDB, https://cfldb.ca/glossary/rosters/ (last visited Sept. 22, 2015), *archived at* http://perma.cc/77LF-2E4Y.

4) INJURY REPORTING POLICIES

The CFL does not require public disclosure of injuries, but clubs report injuries to the CFL through the process of placing a player on the Injured List, and clubs must report concussions to the League.¹⁷³



F) Injuries in MLS

1) INJURY TRACKING SYSTEM

Like the NBA, MLS uses the "HealtheAthlete" EMR system for recording player medical information and tracking injuries.¹⁷⁴ Cerner Corporation, the creator of HealtheAthlete, describes the "secure electronic platform" as providing the ability to "improve the standard of medical record keeping for injured athletes, as well as ease communication between the athlete's key care providers."¹⁷⁵ Additionally, according to Cerner, the platform "allows MLS athletic trainers to increase the accuracy of injury documentation by accessing the platform from any location and integrating care-related media, like notes, X-rays, and MRIs, directly into the athlete's injury report."¹⁷⁶ Athletic trainers are required to "document soccer related Player complaints, injuries, treatments, [and] medications, including over-thecounter medications[.]"¹⁷⁷

2) INJURY STATISTICS

The only study ever done of MLS injury rates was performed by San Jose Earthquakes athletic trainer Bruce E. Morgan following MLS' inaugural 1996 season.¹⁷⁸ The study determined that MLS players suffered injuries at a rate of 35.3 per 1,000 hours of game play.¹⁷⁹

Data from the MLS' HealtheAthlete system are not publicly available and thus it is difficult to provide current MLS injury data. More helpful data can be derived from studies or reports concerning injury rates in the Union of European Football Associations ("UEFA"), a European soccer organization whose members generally include the best soccer clubs in the world and who play in some of the best soccer leagues in the world (such as the English Premier League and Spain's La Liga). While UEFA and MLS are different soccer organizations, we nonetheless believe that data from UEFA, an elite soccer organization like MLS, can be instructive of the injury rates in MLS. Indeed unless and until MLS makes its own data public, we think the UEFA data provides the best proxy estimate of the underlying injury rate in that league.

In 2014, UEFA released a report on injuries suffered by players playing for a selection of 29 (out of 54) UEFA member clubs ("UEFA Report").¹⁸⁰ The UEFA Report does not provide a definition for a reportable injury. Nevertheless, the UEFA Report stated that the mean match injury incidence for all clubs was 23.2 injuries per 1,000 hours of match play during the 2013–14 season.¹⁸¹ Additionally, a study done of UEFA injuries from 2001 to 2008 determined that players suffered injuries at a rate of 27.5 per 1,000 hours of game play.¹⁸²

The UEFA Report acknowledges two relevant limitations. First, it acknowledged that the Report only includes injuries from one season.¹⁸³ Second, the UEFA Report acknowledged that there is variation among the clubs in injury incidence,¹⁸⁴ which might be explained by different practices in the reporting of injuries. For example, the UEFA Report does not discuss a standardized injury reporting system or process among the clubs. Nevertheless, the UEFA Report provides the most reliable data on UEFA player injuries and we thus use it here.

The UEFA Report determined that the body parts most commonly injured during games are thigh (27.0%), knee (17.5%), ankle (14.6%), hip/groin (13.8%), and lower leg/ Achilles tendon (7.6%).¹⁸⁵

Using the data from the UEFA Report, we can also calculate several other statistics. The UEFA Report included data from 29 clubs.¹⁸⁶ Additionally, the UEFA Report found there to be a total of 739 injuries from games,¹⁸⁷ for a mean of 25.5 injuries per club for the 2013–14 season (739/29).

The UEFA report also reported that the clubs participating in the study played a mean of 59 games,¹⁸⁸ for a total of 1,711 games played by the clubs (59 x 29). To provide an accurate analysis of the injuries per game, we can only count games in which the clubs played against one another as one game, *i.e.*, we only count the unique games. We thus reviewed the 2013–14 seasons of the 29 clubs (which participate in 12 different leagues) and determined that the clubs played 327 games against one another. Thus, the clubs played in a total of 1,384 unique games (1,711 less 327). With this number of games, we can calculate that there were 0.53 injuries per UEFA game (739/1,384).

We can also calculate injury rates per player. Data on player participation during the 2013–14 season was not readily available. Thus, we make our best estimates. There are generally 11 players per club in a soccer game at a time. FIFA's¹⁸⁹ rules limit clubs to three substitutions in official games.¹⁹⁰ Thus, we can estimate that 14 players play in each game per club, assuming clubs use all of their substitutions. As a result, we can estimate that were 19,376 player appearances during 2013–14 games (14 x 1,384). We can then estimate a rate of 0.038 injuries per player-game (739/19,376). We again remind the reader there is likely variation among the different positions on the field.

The UEFA Report found that the most common injuries were to the thigh (27.1%), knee (18.5%), and hip/groin (14.5%).¹⁹¹

The UEFA Report reported 14 concussions during games.¹⁹² Using the above statistic of 1,384 unique games, we can calculate a mean of 0.010 concussions per game (14/1,384). With an estimated 19,376 player appearances, we can thus also estimate that the rate of concussion per player-game was 0.00072 (14/19,376).

Readers might be interested in the mean number of games a player plays before suffering an injury. We calculated above that the rate of injuries per player-game was 0.038. Thus, we can calculate that players play a mean of 26.32 games before suffering one injury (1/0.038). We can also calculate the mean number of games a player plays before suffering a concussion. We calculated above that the rate of concussion per player-game was 0.00072. Thus, we can calculate that players play a mean of 1,388.89 games before suffering one concussion (1/0.00072). Nevertheless, it is important to remember that this is a *mean* statistic and thus includes players who play very little in the game. Players who play a lot are likely to suffer concussions at rates higher than those provided here.

Finally, we can calculate what percentage of injuries were concussions. The UEFA report found that 14 of 739 injuries were concussions, equal to 1.9%.

MLS, without explanation, has refused to publicly release data on the number of concussions suffered by its players.¹⁹³

3) INJURY-RELATED LISTS

MLS club rosters are limited to 28 players.¹⁹⁴ Injured players can be placed on two different lists, depending on the severity of the injury.

First, players with "short-term" injuries are placed on the Disabled List ("DL") and replaced on the roster with another player.¹⁹⁵ The player must remain on the DL for a minimum of six matches.¹⁹⁶ Second, players who have suffered season-ending injuries are placed on the Season Ending Injury List.¹⁹⁷ These players are then replaced on the club's roster.¹⁹⁸

4) INJURY REPORTING POLICIES

Like NFL clubs, MLS clubs are required to submit injury reports about players' statuses.¹⁹⁹ MLS requires clubs to include in their "Match Notes" information about player injuries.²⁰⁰ Match Notes are programs of pre-game information including rosters, statistics, and other information about the game that are publicly available. In the Match Notes, the clubs must designate a player either as "out" or "questionable," indicate the affected part of the body, and provide an injury diagnosis.²⁰¹ According to the MLS Medical Manual, the "injury reports should be as accurate as possible."²⁰²

Policies concerning the public reporting of injuries can seem somewhat contradictory. The CBA dictates that public reporting of player injuries be limited to medical information relating to why the player "ha[s] not been, [is] not, or may not be rendering playing services as an MLS player."²⁰³ However, the MLS Medical Manual directs that "[i]n circumstances where a player injury or illness requires a complex medical examination (e.g., to review a surgical procedure)," the club doctor or athletic trainer can publicly describe "the nature of the injury or illness, the prescribed treatment or rehabilitation, and the excepted timing of the player's return to action."²⁰⁴ While the MLS Manual does say the club doctor or athletic trainer should first consult with the player,²⁰⁵ there is no indication the player can prevent the club doctor or athletic trainer from discussing his medical condition.

G) Analysis

Tables 2-L and 2-M on the next page summarize some of the key injury-related statistics and policies. Nevertheless, it is important to understand the limitations of the injury statistics. At the beginning of this Chapter, we identified various limitations with analyzing injury statistics, including that injuries in sports are likely underreported and that there are important differences between the leagues including practice and game scheduling, EMR systems, and injury definitions. Moreover, for each of the leagues, we described various limitations or statistical assumptions we made to calculate the statistics discussed in these tables. Additionally, for the reasons discussed above, the injury statistics for MLS include MLS-specific data as well as the data provided by the UEFA Report.

Table 2-L: Comparison of Leagues' Regular Season Injury Statistics^{ar}

	NFL	MLB	NBA	NHL	CFL ^{as}	UEFA	MLS ^{at}
Electronic Tracking System	Yes	Yes	Yes	Yes	No	N/A ^{au}	Yes
Mean Injuries Per Seasonav	1,511.0	1,516.6	369.8	728.0	N/A	N/A	N/A
Rate of Injuries Per Player-Season	0.69	0.93	0.88	0.85	N/A	N/A ^{aw}	N/A
Mean Concussions Per Season ^{ax}	160.0	18.0	9.0	93.0	57.0 ^{ay}	N/A ^{az}	N/A ^{ba}
Rate of Concussions Per Player-Season	0.073	0.016	0.019	0.108	N/A ^{bb}	N/A ^{bc}	N/A
Concussions As Percentage of Injuries ^{bd}	10.5%	1.8%	2.4%	12.8%	N/A	1.9%	N/A
Mean Injuries Per Game	5.90	0.45	0.16	0.59	N/A	0.53	N/A
Rate of Injury Per Player- Game	0.064	0.016	0.016	0.016	N/A	0.038	N/A
Regular Season Games Per Player-Injury	15.60	62.50	62.50	62.50	N/A	N/A	N/A
Most Common Injury/ Injured Body Part ^{be}	Concus- sion	Upper leg (thigh)	Ankle Sprain	Head	N/A	Thigh	N/A
Concussions Per Game	0.625	0.007	0.007	0.067	0.704	0.010	N/A
Rate of Concussion Per Player-Game ^{bf}	0.00679	0.00026	0.00035	0.00180	0.00800	0.00072	N/A
Games Per Concussion Per Player	147.10	3,846.15	2,857.14	555.56	125.00	1,388.89	N/A

ar We remind the reader that we use the data that we consider the most reliable—and generally the most recent—in order to provide the most accurate assessment of injury rates in sports today. We also remind the reader that our data is limited to regular season data.

- as $% \left(A_{1}^{2}\right) =0$ As mentioned above, there was no publicly available data on CFL injuries.
- at There is no recent data concerning player injuries in MLS.
- au As mentioned above, UEFA is not a league but instead an organization of member clubs who participate in many different leagues. Consequently, our review of UEFA here is constrained to injury data and does not include an analysis of the policy issues covered in this Chart.

av This statistic includes injuries that occurred during regular season games, not practices, except for MLB. Data for MLB only includes as injuries those injuries that caused a player to be placed on the Disabled List, regardless of the reason the player was placed on the Disabled List. Nevertheless, we remind the reader that practices are infrequent during the MLB regular season.

aw The UEFA Report did not provide data on how many players played in the games for which injury data was compiled and, due to the variations in season types and lengths among the different UEFA clubs, this figure is difficult to calculate.

- ax This statistic only includes concussions that occurred during regular season games.
- ay It is unclear whether the CFL data concerning concussions includes pre-season or postseason games.
- az The UEFA Report only provided data from a select number of clubs.
- ba MLS refuses to provide data on the number of concussions suffered by its players.
- bb Although some concussion data are available concerning the CFL, reliable data on the number of players per season are not.

bc The UEFA Report did not provide data on how many players played in the games for which injury data was compiled and, due to the variations in season types and lengths among the different UEFA clubs, this figure is difficult to calculate.

bd It is important to remember that this statistic is a relative statistic — it does not reflect the actual number of concussions in the leagues.

be Here, we use the terminology from the studies relevant to each of the leagues — some identify the most common injury while others identify the most commonly injured body part.

bf We emphasize that this statistic is a mean of all player positions. As discussed in the full Report, we know that rates vary depending on a player's position. Unfortunately, we do not have sufficient data to do position-by-position analysis. Nevertheless, even in the absence of that data we think the comparison of means is useful.

Table 2-M: Comparison of Leagues' Injury Policies

	NFL	MLB	NBA	NHL	CFL	UEFA	MLS
Authorized to Disclose Injuries (Existence and Nature)	By waiver	Yes	Yes	Yes	No	N/A	Yes
Required to Disclose Existence of Injuries	Yes	No	Yes	Yes	No	N/A	Yes
Required to Disclose Nature of Injuries	Yes	No	Yes ^{bg}	No	No	N/A	Yes

Before proceeding with our analysis, there are some important limitations to our comparison of injury statistics across the leagues that should be noted.

First, in describing the leagues' injury statistics, we are limited by the injury definitions used by the leagues and studies. These definitions vary slightly among the leagues. Generally speaking, the NFL, NBA, and NHL report all player injuries that result in treatment, regardless of whether the injury causes the player to miss a practice or game. In contrast, MLB's publicly available injury data (through the research studies conducted by its partners and affiliates), only includes injuries that cause a player to miss "at least 1 day . . . of play." Thus, MLB's injury data is low as compared to the other leagues.

Second, the data comes from different time periods. Generally speaking, the injury data for the NFL is from 2009–16, for MLB from 2010–14, for the NBA from 1988–2005, and the NHL from 2006–12. It is possible that injury rates and injury reporting practices have changed over time. Nevertheless, we believe that this is still sufficiently reliable and transferrable to the present and thus provides useful information for examining the injury rates across the different sports leagues.

With these limitations in mind, we turn now to an analysis of the data.

The NFL's injury rates appear to be much higher than those of the other leagues. Indeed, if one combines the estimated mean number of injuries suffered per game in MLB, the NBA, and the NHL, the estimated mean number of injuries suffered per game in the NFL is approximately 4.9 times higher than the sum of those other leagues. Additionally, if one combines the per-game concussion rates of all of the non-football leagues (including UEFA), the NFL's concussion rate is approximately 6.9 times higher than the sum of those other leagues.

Nevertheless, it is important to point out one area in which the NFL may not be more injurious. The NFL's rate of concussions per player-season is 0.073; the NHL's is 0.108. Thus, if one were to imagine a comparison of one NFL player and one NHL player, the NHL player would be *more likely* to suffer a concussion in his next regular season than the NFL player during his next season. However, this discrepancy is due to the fact that the NHL plays substantially more regular season games than the NFL (82 versus 16). When comparing concussion statistics on a per game basis, an NFL player is approximately 3.8 times more likely to suffer a concussion in a regular season game as compared to an NHL player (0.00679/0.00180).

In addition, limiting our analysis to the leagues' regular season games (a function of available data) underestimates injury rates. As shown in Section II.A on NFL injury rates, there are a significant number of injuries and concussions sustained during NFL practices and during the pre-season (90 concussions in 2015 practices and pre-season games). In particular, pre-season NFL training camps can often be extremely physical as players fight to prove themselves and make the club.^{bh} With that increased level of intensity and physicality comes injuries and concussions. The reader should bear this limitation in mind.

It is beyond our expertise to recommend specific on-thefield rule changes for professional football, but we acknowledge that the rules of play can have an important impact on minimizing player injury. Rule changes have historically

bg However, a player or his immediate family (where appropriate) "shall have the right to approve the terms and timing of any public release of medical information relating to any injuries or illnesses suffered by that player that are potentially life- or career-threatening, or that do not arise from the player's participation in NBA games or practices." 2017 NBA CBA, Art. XXII, § 4(e).

bh While the other leagues also have pre-season training camps and practices, it is generally believed that the physical intensity and competitiveness of an NFL training camp surpasses the training camp environment in the other leagues.

been implemented to increase the safety of the game, and that trend continues today.²⁰⁶ However, the effects of these changes are not always clear at the outset: some injuryreducing rule changes may inadvertently induce other types of risk-taking behavior, or reduce certain injuries while exacerbating others. As in any contact sport, a certain number of injuries in football are unavoidable. Which on-the-field changes would be desirable depends on a multi-factorial analysis of the benefits and drawbacks of the current version of the game (in regards to health and otherwise), the benefits and drawbacks of moving to a radically different game, and a method of weighing those benefits and drawbacks against the welfare consequences of injuries to players and players' own desires and goals as they define them. Thus, while we welcome recommendations for rule changes to improve player safety made by appropriate experts, evaluated in light of what players themselves want, we are not in a position to make these determinations as a definitive matter. Ultimately, we conclude that we are likely to be far more effective in protecting and promoting player health via off-the-field intervention than by suggesting that the game itself fundamentally change.

In our efforts to improve and promote player health, we instead focus our analysis on three of the issues discussed above: (1) injury tracking systems; (2) injury-related lists; and, (3) policies concerning public reporting of injuries.

1) INJURY TRACKING SYSTEMS

Each of the Big Four leagues and MLS has an injury tracking system of some kind. Discussions with experts on this issue indicated that the injury tracking systems are generally comparable; each of them is a sophisticated and modern system that should enable accurate reporting and provide interesting and useful data. The differences may come in how the leagues use the data that is available to them.

The NFL and NBA employ Quintiles, a health information technology firm, to perform sophisticated data analysis concerning player injuries. While the studies discussed above demonstrate that the other leagues have occasionally made injury data available for analysis, our research has not revealed whether the other leagues perform an ongoing annual analysis like Quintiles does for the NFL and NBA. The academic studies discussed above demonstrate that such analyses are possible. We will discuss this issue and others in the Recommendations Section below.

2) INJURY-RELATED LISTS

The NFL, NBA, and NHL all permit their clubs to declare players inactive one game at a time,²⁰⁷ which is generally advantageous to players. We use the NFL as an example. In the NFL, clubs have a 53-man Active/Inactive List, only 46 of whom can be active for the game each week. The remaining seven players are placed on the Inactive List for the game, *i.e.*, benched, either for injury or skill purposes, but are available to play in the next week's game. This arrangement permits players the opportunity to remain on the roster but to rest and treat an injury without immediately rushing back to play. At the same time, because clubs are constantly struggling with having the best players available as well as likely having multiple injured players, players will still likely feel pressure to return as soon as possible so that the club can deactivate other injured players and avoid seeking a replacement.

The Active/Inactive List is also interrelated with the Injured Reserve list, designated for players with longer-term injuries. Generally, once a player is on Injured Reserve, he is no longer eligible to play that season. However, by placing the player on Injured Reserve, the club can replace the player on the 53-man Active/Inactive List. Thus, there are important implications in determining whether the player's injury is short-term and the club only has to declare him inactive for a game or two, or whether the player's injury is more severe and requires the player to be placed on Injured Reserve (which also allows the club to obtain a replacement player to join the 53-man roster).

The interplay between the short-term Inactive List and the longer term Injured Reserve list is particularly important concerning concussions. As discussed in the full Report, concussions present uncertain recovery times, are challenging to diagnose and treat, and present particularly acute long-term concerns. MLB is the only sport with a concussion-specific injured list. We discuss this in more detail in the Recommendations Section.

3) INJURY REPORTING POLICIES

There are three variations in the leagues' injury reporting policies.

First, the NFL, NBA, NHL, and MLS require clubs to disclose publicly players' injury statuses.

Second, the NFL, NBA and MLS require clubs to disclose publicly the nature of player injuries. While the NHL requires clubs to disclose whether a player will miss a game or not return to a game due to injury, the NFL and NBA (in practice) require that the club identify the player's body part that is injured. Below, we make a recommendation concerning this issue.

Third, in MLB, the NBA, the NHL, and MLS, the CBAs specifically describe what type of information the clubs are permitted to disclose publicly. The NFL CBA is silent on this issue. Instead, NFL clubs seemingly rely on players' individually executed waivers to obtain permission to disclose publicly player health information.

In considering whether the NFL should make changes to its Injury Reporting Policy, it is important to understand what the concerns might be with the current Policy. We discuss two possibilities.

First, there is a general concern about an individual's medical information being made publicly available. Codes of ethics²⁰⁸ and laws²⁰⁹ relevant to the medical profession generally prohibit the disclosure of an individual's medical information to a third party without permission. These codes and laws are grounded in the historical notion that an individual's health information is "sacred."210 However, the relevant codes of ethics and laws also permit an individual's medical information to be disclosed to a third party without permission in certain contexts, including where the employer is providing healthcare to an employee,²¹¹ as is the case in the NFL. These laws recognize that in certain situations employers have a legitimate interest in an employee's medical information, such as where the employee's medical information pertains to the employee's ability to perform the job or for workers' compensation purposes.²¹²

Nevertheless, disclosure to employers is different from disclosure to the general public. The question is then whether the public or the NFL has sufficient interest in a player's medical information to override a player's right to keep his medical information confidential. The reasons the NFL favors disclosure are also relevant to our second concern with the NFL's Injury Reporting Policy.



The second concern with publicly disclosing player health information relates to the potential for targeting injuries. The NFL's Injury Reporting Policy requires clubs to disclose the location of a player's injury. This disclosure creates the possibility that opposing players will target the location of a player's injury in an attempt to knock the player out of the game. For example, prior to the 2015 Super Bowl, New England Patriots cornerback Brandon Browner said he would encourage his teammates to target and try to hit the injured shoulder of Seattle Seahawks safety Earl Thomas and the injured elbow of Seahawks cornerback Richard Sherman.²¹³ Similarly, in the 2012 NFC Championship game, New York Giants special teams players Jacquian Williams and Devin Thomas discussed targeting San Francisco 49ers kick returner Kyle Williams due to his history of concussions.²¹⁴ We discuss this concern further in the Recommendation Section.

The purpose for the NFL's Injury Reporting Policy, including the requirement that the nature of a player's injury be disclosed, largely relates to gambling. The NFL's Injury Reporting Policy was created specifically for the purpose of preventing gamblers from having inside information about player injuries.²¹⁵ More specifically, the NFL is concerned with how the importance of inside information might affect the integrity of its games. Gamblers will seek inside information, including player injury information, and there is no better source for player injury information than the players themselves. Inside information about player injuries can lead to closer relationships between gamblers and players, leading to concern that gamblers might cause players (through pay or intimidation) to alter their play, diminish their effort, or intentionally try to lose to benefit the gamblers.²¹⁶ If that is the case, the legitimacy of the games is undermined and, if exposed, public confidence and interest in the games would likely erode.²¹⁷ Consequently, the NFL prohibits players from having any association with gamblers or gambling institutions.²¹⁸

The NFL's stance on gambling was established in the 1960s when gambling was closely associated with organized crime.²¹⁹ And the NFL's concerns were well-founded. Among other incidents, in 1963, two of the leagues' best players, Alex Karras of the Detroit Lions and Paul Hornung of the Green Bay Packers were suspended one year for betting on NFL games and associating with known criminals.²²⁰

All that said, it is debatable whether the NFL's gamblingrelated concerns are sufficiently substantial today to justify overriding a player's right to have his health information treated confidentially. These questions are beyond the scope of this report. In particular, it would be important to consider federal law enforcement's opinions on the state of organized crime and the role of gambling within organized crime's activities. Without this information, we cannot recommend that the NFL no longer obligate clubs to report information on the status of players.²²¹

An additional purpose of the NFL's Injury Reporting Policy also concerns the integrity of the game. Certain types of injuries on certain players are more important than other types of injuries. For example, an injury to the starting quarterback's throwing shoulder has the potential to impact the game more than a leg injury. Similarly, an injury to a defensive back's ankle is generally more important than whether he has a hand injury. Nevertheless, disclosure of the nature of a player's injury presupposes that it is somehow unfair if the other club does not know the nature of the opposing club's player injuries. That is not necessarily the case. If neither club knows the nature of the other club's injuries, both clubs have an equal (and fair) level of uncertainty.

Having identified areas of concern, we now turn to Recommendations for change.

H) Recommendations

Recommendation 2-A: The NFL, and to the extent possible, the NFLPA, should: (a) continue to improve its robust collection of aggregate injury data; (b) continue to have the injury data analyzed by qualified professionals; and, (c) make the data publicly available for re-analysis.

As explained above, each of the Big Four leagues and MLS seems to have a quality injury tracking system, allowing for the accumulation of current information about the nature, duration, and cause of player injuries. As stated above, we rely on this data in this Report because it provides the best available data concerning player injuries, although we cannot independently verify the data's accuracy. Nevertheless, if accurately collected, this data has the potential to improve player health through analysis by qualified experts so long as it is made available to them. In particular, analysis potentially could be performed to determine, among other things, the effects of rule changes, practice habits, scheduling, new equipment, and certain treatments, while also identifying promising or discouraging trends and injury types in need of additional focus.²²² Notably, the NFL already conducts this type of analysis through Quintiles.

However, the NFL does not publicly release its aggregate injury data (nor does any other league).²²³ The NFL does release some data at its annual Health & Safety Press Conference at the Super Bowl. However, the data released at the Press Conference is minimal compared to the data available and the analyses performed by Quintiles. For the data to have the potential meaningful applications mentioned above, it must be made available in a form as close to its entirety as possible. Such disclosure would permit academics, journalists, fans, and others to analyze the data in any number of ways, likely elucidating statistical events, trends, and statistics that have the opportunity to improve player health. To be clear we are recommending the release of more *aggregate* data, not data that could lead to identification of the injuries of any particular player or cause problems concerning gambling.

Publicly releasing injury data, nevertheless, comes with complications that we must acknowledge. While more transparency in injury reporting is necessary, the nuances of such data can easily be lost on those without proper training. Sports injury prevention priorities in public health can be swayed by public opinion and heavily influenced by those with the most media coverage. Making injury data publicly available may allow those with the media access to dictate the agenda regardless of the actual implications of the data. As a result, it may be harder for injury trends that may be more hazardous, but less visible in the media, to get the attention they need, even when the data clearly shows the importance of these issues. Thoughtful, balanced, peer-reviewed results may have difficulty competing against those statistics which garner the most media attention. For this and other reasons, in our report *Protecting and Promoting the Health of NFL Players: Legal and Ethical Analysis and Recommendations*, we recommended that "[t]he media . . . engage appropriate experts, including doctors, scientists, and lawyers, to ensure that its reporting on player health matters is accurate, balanced, and comprehensive."²²⁴ The medical, scientific, and legal issues concerning player health are extremely complicated, which demands that the media take care to avoid making assertions that are not supported or that do not account for the intricacies and nuance of medicine, science, and the law.

In light of these concerns, one possible intermediate solution is to create a committee of experts that can review requests for data and determine whether or not the usage of the data is appropriate and will advance player health. Indeed, the Datalys Center for Sports Injury Research and Prevention performs this role concerning access to NCAA student-athlete injury data.²²⁵ Moreover, such committees have also been formed in the clinical research setting.²²⁶

Recommendation 2-B: Players diagnosed with a concussion should be placed on a short-term injured reserve list whereby the player does not count against the Active/ Inactive 53 man roster until he is cleared to play by the NFL's Protocols Regarding Diagnosis and Management of Concussions.^{bi}

According to the leading experts, 80–90% of concussions are resolved within seven to ten days.²²⁷ Thus, concussion symptoms persist for longer than ten days for approximately 10–20% of athletes. In addition, there are a variety of factors that can modify the concussion recovery period, such as the loss of consciousness, past concussion history, medications, and the player's style of play.²²⁸ Consequently, a player's recovery time from a concussion can easily range from no games to several games. The uncertain recovery times create pressure on the player, club, and club doctor. Each roster spot is valuable and clubs constantly add and drop players to ensure they have the roster that gives them the greatest chance to win each game day. As a result of the uncertain recovery times for a concussion, clubs might debate whether they need to replace the player for that week or longer. The club doctor and player might also then feel pressure for the player to return to play as soon as possible. By exempting a concussed player from the 53 man roster, the club has the opportunity to sign a short-term replacement player in the event the concussed player is unable to play. At the same time, the player and club doctor would have some of the return-to-play pressure removed.

In fact, MLB already has such a policy. MLB has a seven-day Disabled List (as compared to its normal 10- and 60-day Disabled Lists) "solely for the placement of players who suffer a concussion."²²⁹

Why treat concussions differently than other injuries in this respect? This is a fair question to which there are a few plausible responses. First, in terms of the perception of the game by fans, concussions have clearly received more attention than any of the other injuries NFL players might experience and thus the future of the game depends more critically on adequately protecting players who suffer from them. Second, concussions are much harder to diagnose than other injuries, such that there may be a period of uncertainty in which it would be appropriate to err on the side of caution.²³⁰ Third, both players and medical professionals have more difficulty anticipating the long-term effects of concussions as compared to other injuries, given current scientific uncertainties concerning brain injury.²³¹ Fourth, and perhaps most importantly, it is much harder to determine the appropriate recovery times for concussions as compared to other injuries.²³² These reasons all support a recommendation to exclude concussed players from a club's Active/Inactive roster, but we recognize that the key feature of players potentially feeling or facing pressure to return before full recovery may be shared across any injury a player may experience. Thus, it may also be reasonable to consider extending this recommendation to injuries beyond concussions.^{bj}

In reviewing a draft of our Report, *Protecting and Promoting the Health of NFL Players: Legal and Ethical Analysis and Recommendations*, the NFL argued that "[t]he current NFL roster rules actually provide greater flexibility" than is recommended here.²³³ The NFL explained that because "[t]here is no limitation on how long a player may be carried on the 53-man roster throughout the season without being 'activated,' . . . a player who is concussed routinely is carried on his club's 53-man roster without being activated until he is cleared."²³⁴ However, for the reasons explained above, we believe concussions should be treated differently. All 53 spots on the roster are precious to both the club and the players. The uncertainty surrounding recovery from a concussion presents unique pressures that can be lessened with the approach recommended here.

bi This recommendation also appears as Recommendation 7:1-E in our Report *Protecting and Promoting the Health of NFL Players: Legal and Ethical Analysis and Recommendations.* Due to the fact that the recommendation was inspired by MLB's concussion-specific DL list, we include it here as well.

bj We recognize that this new injured reserve list is subject to gaming by clubs, whereby a club might designate a player as concussed in order to add another player and effectively expand the roster. We do not view this this concern to be sufficient to outweigh the health benefits of the proposal. Moreover, all injury lists are subject to some risk of being gamed in this manner, and thus the issue is not unique to what we propose.

Recommendations Concerning Injury Rates and Policies – continued

Indeed, the NFL's practice has been to treat concussions differently from other injuries. As part of its Concussion Protocol, players suspected of having suffered a concussion during a game are examined by doctors unaffiliated with the club, and to be cleared to play in the next game they must be cleared by doctors unaffiliated with the club. For all other injuries, club doctors are the only ones to examine and clear players to play. Additionally, in 2016, the NFL sent a memo to all clubs directing them not to comment on a player's progress in returning from a concussion.²³⁵ Instead, the NFL directed clubs to state only "that the player is in the concussion protocol under the supervision of the medical team, and the club will monitor his status."²³⁶ This is in contrast to the clubs' open discussion of players' other injuries.

The Washington football club essentially proposed our recommendation at the 2016 owners' meetings. Washington proposed amending the NFL bylaws to provide that a player who has suffered a concussion, and who has not been cleared to play, be placed on the club's Exempt List, and be replaced by a player on the club's Practice Squad on a game-by-game basis until the player is cleared to play. Unfortunately, the proposal was not adopted.

Recommendation 2-C: The NFL should consider removing the requirement that clubs disclose the location on the body of a player's injury from the Injury Reporting Policy.

In our Report *Protecting and Promoting the Health of NFL Players: Legal and Ethical Analysis and Recommendations*, we recommend the NFL consider fining and/or suspending players if they discuss or encourage targeting another player's injury.²³⁷ However, the need for this Recommendation would be reduced if the NFL's Injury Reporting Policy did not openly disclose the location on the body of players' injuries, a requirement imposed only by the NFL, NBA and MLS.

The gambling-related interests of full disclosure likely do not outweigh the risks of targeting by other players created by the Injury Reporting Policy.²³⁸ While additional data—including from federal law enforcement authorities—could inform this analysis—it seems unlikely that the risks of injury information being sold on a black market are so high to justify a known risk of players intentionally aiming to hit a player in an area known to be injured because of the Injury Reporting Policy. Similarly, we see no inequity in clubs not knowing the full extent of an opposing club's player injuries. Consequently, we recommend that the NFL consider removing the requirement that clubs disclose the location of a player's injury from the Injury Reporting Policy.

Endnotes

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- 10 *ld.* at 1.
- 11 *ld.*
- 12 See 2011 MLB CBA, Att. 36 (MLB Concussion Protocol); NFL Head, Neck and Spine Committee's Protocols Regarding Diagnosis and Management of Concussions, Nat'l Football League, http://images.nflplayers .com/mediaResources/lyris/pdfs/NFL_Diagnosis_Mgmt_Concussion .pdf (last visited Sep. 18, 2015), archived at http://perma.cc/H2M7-U2KL

(NFL Concussion Protocol); NHL Concussion Evaluation and Management Protocol 2015/16 (on file with authors); *Concussion Evaluation and Management Protocol*, MLS (2015) (on file with authors). Information about the NBA's concussion protocol was provided by the NBA— we did not review the protocol directly.

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- 14 Compare Consensus Statement with NFL Concussion Protocol, supra note 12; MLB Concussion Protocol, supra note 12; NBA.com: Official— Concussion Policy Summary, Nat'l Basketball Ass'n, http://www.nba .com/official/concussion_policy_summary.html (last visited Sep. 18, 2015), archived at http://perma.cc/D84E-JHLM; NHL Concussion Protocol, supra note 12; CFL Concussion Guidelines 2014 (on file with author); MLS discusses concussion protocol, ESPN, Jan. 7, 2012, http://espn.go.com/sports/soccer/news/_/id/7436065/mls-medical -staffers-target-concussion-protocol, archived at http://perma.cc/78EF -6DWZ (describing MLS Concussion Protocol); Concussion Evaluation and Management Protocol, MLS (2015) (on file with authors).
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- 24 Id.
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- 26 These tables were created by examining the year-end NFLISS reports prepared by Quintiles for the year 2014, and the reports presented at the NFL's annual Health & Safety Press Conference during the week of the Super Bowl.
- 27 The reports do not provide postseason data.
- 28 The reports do not provide postseason data.
- 29 See 2012 NFL Constitution and Bylaws, § 12.3(E).
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¹⁹ *ld.*

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- 36 For additional information on gambling's role in the NFL, see Christopher R. Deubert, I. Glenn Cohen, Holly Fernandez Lynch, Protecting and Promoting the Health of NFL Players: Legal and Ethical Analysis and Recommendations, § 18(A) (2016).
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- 51 See MLB CBA, Attachment 5 (Standard Form of Diagnosis); MLB CBA, Attachment 36, Ex. B (Concussion Diagnostic Form for 7-Day Disabled List Placement).
- 52 It is unclear what is meant by a "preventative event." Preventative events typically include specific strength or balance training and exercise programs for the purpose of injury prevention and are common in sports. The programs are coordinated by athletic trainers or strength and conditioning coaches to improve specific strength or coordination in order to preemptively avoid injuries. However, it is unclear what the authors meant by preventative events in this case.
- 53 Pollack, *supra* note 50. Players must provide consent for their records to be included in the system. *Id. See also* Christopher S. Ahmad et al., *Major and Minor League Baseball Hamstring Injuries: Epidemiologic Findings From the Major League Baseball Injury Surveillance System*, 42 Am. J. Sports Med. 1464, 1466 (2014) ("In the MLB EMR, athletic trainers record all injuries, illnesses, and preventative visits for both baseball-related and non-baseball related events for all players on their respective team as their medical-legal record.")
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- 55 Keshia M. Pollack et al., *Developing and Implementing Major League Baseball's Health and Injury Tracking System*, 183 Am. J. Epidemiology 1, 3 (2016).
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- 68 Each of the 30 clubs plays 162 regular season games against another club, resulting in 2,430 games per season (162 x 15). 2,430 games x 5 seasons = 12,150 games.
- 69 See World Series Winners, Records, and Results and Postseason Series, Baseball-Reference.com, http://www.baseball-reference.com/ postseason/ (last visited Oct. 14, 2016), archived at https://perma.cc/ KP2W-NRXR.
- 70 MLB CBA, Art V.
- 71 See Gary A. Green et al., *Mild Traumatic Brain Injury in Major and Minor League Baseball Players*, 43 Am. J. Sports Med. 5, 1118, 1125 (2015) (describing "the few practices in professional baseball").
- 72 See Dr. Gary Green named Medical Director of Major League Baseball, Major League Baseball, April 14, 2010, http://mlb.mlb.com/news/press _releases/press_release.jsp?ymd=20100414&content_id=9290282 &vkey=pr_mlb&fext=.jsp, archived at http://perma.cc/5EW8-7XRP.
- 73 See Gary A. Green et al., *Mild Traumatic Brain Injury in Major and Minor League Baseball Players*, 43 Am. J. Sports Med. 5, 1118, 1121 (2015).
- 74 See Disabled List Data, Baseball Heat Maps, http://www .baseballheatmaps.com/disabled-list-data/, (last visited Jan. 21, 2016), archived at http://perma.cc/2VNP-GD9P (providing spreadsheets of all players placed on the DL for the 2010–15 seasons by gathering data from MLB.com).
- 75 This figure was gathered from MLB.com's "Sortable Player" statistics page by adding together all players who had a plate appearance and all pitchers, and then removing those pitchers that also had a plate appearance.
- 76 Keshia M. Pollack et al., *Developing and Implementing Major League Baseball's Health and Injury Tracking System*, 183 Am. J. Epidemiology 1, 5 (2016).
- 77 Gary A. Green et al., *Mild Traumatic Brain Injury in Major and Minor League Baseball Players*, 43 Am. J. Sports Med. 5, 1118, 1118–21 (2015). By comparison, a 2014 study examining DL data from 2001 to 2010 found only 33 concussions over that 10-season period. Leslie E. Schwindel et al., *Epidemiology and Outcomes of Concussions in Major League Baseball*, 2 Annals of Orthopedics & Rheumatology 3, 1022, 1022 (2014). The smaller figures were likely the result of lesser awareness and failure to diagnose concussions in the earlier seasons. Indeed, the study found that 0 concussions were reported in 2001, while 10 were reported in 2010. *Id.*
- 78 Gary A. Green et al., Mild Traumatic Brain Injury in Major and Minor League Baseball Players, 43 Am. J. Sports Med. 5, 1118, 1125 (2015).
- 79 Each of the 30 clubs plays 162 games, resulting in a total of 2,430 games per season (because each game involves two clubs, we multiplied 162 x 15). Thus, in two seasons, there are 4,860 games (2,430 x 2).
- 80 Gary A. Green et al., *Mild Traumatic Brain Injury in Major and Minor League Baseball Players*, 43 Am. J. Sports Med. 5, 1118, 1120 (2015) ("To estimate exposure, we based the average number of players per team per game on analysis of regular-season game participation via box scores that are publicly available. This average number over a season, multiplied by the number of team games . . . was used as an estimate of game exposures[.]")
- 81 Green, supra note 77 at 1122 (finding catchers accounted for 40% of concussions); see also Schwindel, supra note 77, at 1022–23 (finding

that 30.3% of concussions were suffered by catchers).

- 82 Green, *supra* note 77 at 1122; *see also* Schwindel, *supra* note 77 at 1022–23.
- 83 William D. Witnauer, Richard G. Rogers & Jarron M. Saint Onge, *Major league baseball career length in the 20th century*, 26 Population Res. & Pol'y Rev. 4, 371–386 (2007).
- 84 MLB CBA, Attachment 36 § 2(A). "Acute" is not defined in the CBA.
- 85 Major League Rule 2(g)(1); *MLBPA, MLB Announce Details of New Labor Agreement*, MLBPA (Dec. 2, 2016), http://www.mlbplayers.com/ ViewArticle.dbml?DB_0EM_ID=34000&ATCLID=211336390, *archived at* https://perma.cc/4XUA-2DAW (announcing replacement of 15-day DL with 10-day DL).
- 86 MLB CBA, Attachment 5 (Standard Form of Diagnosis). There is a different form for clubs attempting to place a player who has suffered a concussion on the 7-day DL. MLB CBA, Attachment 36, Ex. B (Concussion Diagnostic Form for 7-Day Disabled List Placement). The Concussion Diagnostic Form for 7-Day Disabled List requires clubs to provide such information as the date of injury, diagnosis description, event that cause the injury, whether the player was removed from the game, and the basis of the concussion diagnosis (including the SCAT2 Assessment Form). The form also requests video information if available. *Id.*
- 87 MLB CBA, Attachment 5 (Standard Form of Diagnosis).
- 88 MLB CBA, Art. XIII(C).
- 89 See Major League Rule 2(g)(1). For example, a player placed on the 15day DL is not eligible to play in an MLB game until at least 15 days have passed, though he may remain out of play longer if his rehabilitation is not complete after 15 days
- 90 MLB CBA, Art. XIII(G)(4) (emphasis added).
- 91 Id.
- 92 Major League Rule 2(a).
- 93 Center to Standardize Health Care for NBA Players with Easy-to-Use and Automated System "HealthAthlete", Globe Newswire, Nov. 14, 2012, http://globenewswire.com/news-release/2012/11/14/505082 /10012449/en/Cerner-to-Standardize-Health-Care-for-NBA-Players-With -Easy-to-Use-and-Automated-System-HealtheAthlete.html, archived at http://perma.cc/8TEG-9LKQ.
- 94 See id.
- 95 NBA CBA, Art. XXII, § 8.
- 96 NBA CBA, Art. XXII, §§ 3, 7.
- 97 Mark C. Drakos, Benjamin Domb, Chad Starkey, Lisa Callahan, Answorth A. Allen, *Injury in the National Basketball Association: A 17-Year Overview*, 2 Sports Health 284, 285 (2010).
- 98 *ld.*
- 99 *ld.*
- 100 *ld.*
- 101 See Athletic Health Management, Cerner Corp., https://www.cerner.com /solutions/individuals_and_families/athletic_health_management/ (last visited Sept. 22, 2015), archived at http://perma.cc/4BGH-HNB5.
- 102 Baxter Holmes and Tom Haberstroh, *The Cutting Edge: Injury Prediction and Prevention*, ESPN (Jun. 7, 2016), http://www.espn.com/nba/story /_/id/16009403/cutting-edge-injury-prediction-prevention, *archived at* https://perma.cc/PF6G-GDTZ.
- 103 Mark C. Drakos, Benjamin Domb, Chad Starkey, Lisa Callahan, Answorth A. Allen, *Injury in the National Basketball Association: A 17-Year Overview*, 2 Sports Health 284 (2010).
- 104 Id. at 285.
- 105 *ld.*
- 106 *ld.*
- 107 *ld.*
- 108 *ld.* at 289–90.
- 109 *ld.* at 285.
- 110 Id.at 286.
- 111 Id. at 286.

- 112 Mark C. Drakos, Benjamin Domb, Chad Starkey, Lisa Callahan, Answorth A. Allen, *Injury in the National Basketball Association: A 17-Year Overview*, 2 Sports Health 284, 287 (2010). The Drakos Study provided the total number of game-related injuries by body part. To obtain the figures in this Report, we divided these totals by the 17 seasons of the study.
- 113 *Id.* at 288. There were 1,066 ankle sprains during the 17 years of the study, equaling 62.7 per year (1,066/17).
- 114 *ld.*
- 115 Jeff Stotts, *Only 9 NBA Players Got Concussion This Year*, FiveThirtyEight (May 21, 2014, 1:43 pm), http://fivethirtyeight.com/datalab/only-9-nba -players-got-concussions-this-year/, *archived at* http://perma.cc/KY4L -B32Y.
- 116 This data was gathered from basketball-reference.com.
- 117 Susan Konig, *Financial Planning for the Pros*, 34 Registered Representative (Apr. 2010), *available at* 2010 WLNR 26366417.
- 118 See Larry Coon, NBA Salary Cap FAQ, CBA FAQ, July 8, 2015, http://www.cbafaq.com/salarycap.htm#Q79, archived at http://perma.cc /X3CS-F58N; NBA CBA, Art. XXIX § 2.
- 119 Coon, *supra* n. 118.
- 120 *ld.*
- 121 This information was provided by the NBA—we did not review the policy directly.
- 122 NBA CBA, Art. XXII, § 4(d).
- 123 NBA CBA, Art. XXII, § 4(e).
- 124 Athlete Health Management System, Athlete RMS, http://athleterms .com/Solutions/AHMSPro.aspx (last visited Sept. 22, 2015), archived at http://perma.cc/7L67-4AZT.
- 125 Carly D. McKay et al., *The Epidemiology of Professional Ice Hockey Injuries: A Prospective Report of Six NHL Seasons*, 48 Brit. J. Sports Med. 57, 57 (2014).
- 126 *ld.*
- 127 *ld.*
- 128 Id.
- 129 Id. at 61.
- 130 *ld.*
- 131 Id. at 58. The study calculated total AEs by multiplying 82 games per season per club by 30 NHL clubs by 19 players per game, equaling 46,740 per season. The 19 players per game figure is the equivalent of a club's entire roster each night, less a backup goaltender. We find this calculation to be reliable. Unlike in other sports, every player on an NHL club's roster will play every game, except for the backup goaltender.
- 132 See id. at 59.
- 133 *ld.*
- 134 Id. at 60.
- 135 There are 82 games per season and 30 NHL clubs. Thus, this statistic was determined by multiplying 82 by 15 (30 NHL clubs divided by 2 clubs per game) by the 6 seasons in the study.
- 136 The study provides the following number of players for each season:
 840 in 2006–07; 843 in 2007–08; 837 in 2008–09; 838 in 2009–10;
 891 in 2010–11; and, 895 in 2011–12. See McKay at 58.
- 137 Id. at 59.
- 138 Id. at 60.
- 139 Richard A. Wennberg & Charles H. Tator, *Concussion Incidence and Time Lost from Play in the NHL During the Past Ten Years*, 35 Can. J. Neurological Sci. 647, 649 (2008).
- 140 See id. at 649.
- 141 Id.
- 142 *Id.* at Table 2.
- 143 The NHL/NHLPA Concussion Program, launched in 1997, was the first professional sports working group program that addressed concussions. *See Frequently Asked Questions About Concussions*, Nat'l Hockey League, Feb. 7, 2011, http://www.nhl.com/ice/news.htm?id=551900,

archived at http://perma.cc/63YK-8C8H. Through input from the NHLPA, physicians, and athletic trainers, the Concussion Program has sought to better understand concussions. *See id.* The Program has resulted in the implementation of mandatory neurophysiological baseline testing for all players, as well as changes to rules, equipment, and the playing environment. *Id.*

- 144 Brian Benson et al., A Prospective Study of Concussions Among National Hockey League Players During Regular Season Games: The NHL-NHLPA Concussion Program, 183 Can. Med. Ass'n J. 905 (2011).
- 145 *See id.*
- 146 *ld.* at 907.
- 147 See id.
- 148 James Wisniewski, NHL still grappling with concussions, ESPN, June 8, 2014, http://espn.go.com/nhl/playoffs/2014/story/_/id/11051889/nhl -says-concussions-decreased-protocol-remains-imperfect, archived at http://perma.cc/YD2R-CPUE ("According to data from STATS provided to The Associated Press, there were 53 concussions during the regular season, a sharp decline from the 78 reported during the league's last full season two years ago.")
- 149 The study provides the following number of players for each season:
 840 in 2006–07; 843 in 2007–08; 837 in 2008–09; 838 in 2009–10;
 891 in 2010–11; and, 895 in 2011–12. See McKay at 58.
- 150 Average Length of an NHL Player Career, QuantHockey.com, http://www .quanthockey.com/Distributions/CareerLengthGP.php (last visited Aug. 28, 2015), archived at http://perma.cc/95QB-X9P9.
- 151 NHL CBA, § 16.11(a).
- 152 NHL CBA, § 16.4(a).
- 153 NHL CBA, § 16.11(d)
- 154 NHL CBA, § 16.11(a).
- 155 Id. Although clubs have a 23-man Active Roster, only 20 players (18 skaters and 2 goaltenders) are permitted to dress for each game. NHL Official Rules, Rule 5.1 (2014–15).
- 156 See 2013 NHL CBA, Art. 1 (defining "Reserve List" as, among other things, "all Players signed to a[] [Standard Player Contract]," and limiting the Reserve List to "[n]o more than 50 Players signed to a[] [Standard Player Contract]").
- 157 Stu Hackel, The Morning Skate: N.H.L.'s New Injury-Disclosure Policy Draws Heavy Criticism, Slapshot Blog, N.Y. Times (Nov. 10, 2008, 3:26 p.m.), http://slapshot.blogs.nytimes.com/2008/11/10/the-morning -skate-nhls-new-injury-disclosure-policy-draws-heavy-criticism/, archived at http://perma.cc/X5FS-JD9Q (quoting the policy).
- 158 *ld.*
- 159 CBA, Art. 34, § 3(c)(iii).
- 160 Stu Hackel, *The Morning Skate: N.H.L.'s New Injury-Disclosure Policy Draws Heavy Criticism*, Slapshot Blog, N.Y. Times (Nov. 10, 2008, 3:26 p.m.), http://slapshot.blogs.nytimes.com/2008/11/10/the-morning -skate-nhls-new-injury-disclosure-policy-draws-heavy-criticism/, archived at http://perma.cc/X5FS-JD9Q.
- 161 See Curtis Rush, The "Upper-Body" Injury from Pat Quinn's Brain to NHL Lexicon, Toronto Star, Mar. 18, 2014, http://www.thestar.com/sports /leafs/2014/03/18/the_upperbody_injury_from_pat_quinns_brain_to _nhl_lexicon.html, archived at http://perma.cc/7KDB-B6Q6; see also NHL Injuries, ESPN, http://espn.go.com/nhl/injuries (last visited Oct. 28, 2015).
- 162 A.J. Perez, NHL Unlikely to Get Closer to Ending Little Disclosure on Injuries, CBS Sports, Mar. 24, 2011, http://www.cbssports.com/nhl/story /14850387/nhl-unlikely-to-get-closer-to-ending-little-disclosure-on -injuries, archived at http://perma.cc/5YED-UDL7.
- 163 See Chris Zelkovich, CFL Concussions Not Always Revealed to Fans, Toronto Star, Apr. 7, 2011, http://www.thestar.com/sports/football/argos /2011/04/07/cfl_concussions_not_always_revealed_to_fans.html, archived at http://perma.cc/T308-2AZW.
- 164 Mark Masters, 'Awareness Is Half The Battle' for CFL and Concussions, Nat'l Post, Apr. 7, 2011, http://sports.nationalpost.com/2011/04/07

/awareness-is-half-the-battle-for-cfl-and-concussions/, *archived at* http://perma.cc/T3Q8-2AZW ("There were 50 concussions recorded in 85 CFL games last year").

- 165 Id. The only other study our research revealed concerning CFL injuries concerned concussions suffered by CFL players during the 1997 season. J. Scott Delaney et al., Concussions During the 1997 Canadian Football League Season, 10 Clin. J. Sport Med. 9 (2000). The data was self-reported in the form of a voluntary questionnaire and the understanding of concussions has changed considerably since 1997. For these reasons, the data in the study cannot be considered useful today. Nevertheless, of the 289 players who responded to the questionnaire, 8.4% reported that they had suffered a concussion, but 44.8% reported one or more concussion symptoms. Based on these responses, the researchers concluded that concussions are likely substantially underreported. Id.
- 166 The nine CFL clubs each play 18 regular season games, for a total of 81 games. In addition, there are five playoff games, for a total of 86 regular season and postseason games. It is thus unclear what games may or may not have been included to reach a figure of 85 games.
- 167 Marika Washchynshyn, *Is the Canadian Football League Safer than the NFL?*, Complex (Nov. 25, 2015), http://www.complex.com/sports/2015 /11/cfl-concussions, *archived at* https://perma.cc/G47Y-RTT5.
- 168 *ld.*
- 169 The reserve list consists of two players who do not dress for a club's game. *Rosters Glossary*, CFLdb, https://cfldb.ca/glossary/rosters/ (last visited Sept. 22, 2015), *archived at* http://perma.cc/77LF-2E4Y. Players on the injured list do not count toward the reserve list. *Id*.
- 170 *The Game,* Can. Football League, http://www.cfl.ca/page/game_rule _ratio (last visited Sept. 22, 2015), *archived at* http://perma.cc/5RRT -RSGZ.
- 171 See Rosters Glossary, CFLdb, https://cfldb.ca/glossary/rosters/ (last visited Sept. 22, 2015), archived at http://perma.cc/77LF-2E4Y; CFL CBA, § 14.02(F).
- 172 See Id.
- 173 See Zelkovich, supra note 163; CFL CBA, Art. 29 § 2.
- 174 Cerner Collaborates With Major League Soccer to Improve Medical Care for Professional Athletes, Cerner Corp., August 9, 2011, http://phx .corporate-ir.net/phoenix.zhtml?c=118401&p=irol-newsArticle&ID =1594607, archived at http://perma.cc/R74X-993X.
- 175 *ld.*
- 176 *ld.*
- 177 MLS Medical Policies and Procedures Manual § V.11 (2015).
- 178 Bruce E. Morgan and Michael A. Oberlander, *An Examination of Injuries in Major League Soccer*, 29 Am. J. Sports Med. 426 (2001).
- 179 Id. at 427.
- 180 /14 Season Report—UEFA Elite Club Injury Study, UEFA (2014), http://www.uefa.org/MultimediaFiles/Download/uefaorg/Medical/02/19 /04/32/2190432_DOWNLOAD.pdf, archived at http://perma.cc/Q6GL -RTAA.
- 181 Id. at § 5.2.1.
- 182 Jan Ekstrand, Martin Haägglund, and Markus Waldén, *Injury Incidence and Injury Patterns in Professional Football: The UEFA Injury Study*, 45 Brit. J. Sports Med. 553, 553 (2011).
- 183 Id. at 3.
- 184 *ld.*
- 185 /14 Season Report UEFA Elite Club Injury Study, § 5, Table 1, UEFA (2014), http://www.uefa.org/MultimediaFiles/Download/uefaorg/Medical /02/19/04/32/2190432_DOWNLOAD.pdf, archived at http://perma.cc/ Q6GL-RTAA.
- 186 *ld.* at § 1, § 4.
- 187 *ld.* at § 5.
- 188 Id. at § 4.
- 189 The Federation International de Football Association ("FIFA") is the international governing body for the sport of soccer. See Who We Are,

FIFA, http://www.fifa.com/about-fifa/who-we-are/index.html (last visited Sept. 22, 2015), *archived at* http://perma.cc/GH54-3XKS.

- 190 *Law of the Game 2013–2014,* FIFA (2013), http://www.fifa.com/mm/ document/footballdevelopment/refereeing/81/42/36/log2013en_neutral .pdf, *archived at* http://perma.cc/VJJ8-6G7V, at p. 17.
- 191 /14 Season Report UEFA Elite Club Injury Study, § 5, Table 1, UEFA (2014), http://www.uefa.org/MultimediaFiles/Download/uefaorg/Medical /02/19/04/32/2190432_DOWNLOAD.pdf, archived at http://perma.cc/ Q6GL-RTAA.
- 192 Id. at Table 2.
- 193 See Concussion policies by league, USA Today, Oct. 11, 2012, http://www.usatoday.com/story/sports/2012/10/11/concussions-nascar -nfl-mlb-nhl-nba/1628129/, archived at http://perma.cc/WV7S-5PG3.
- 194 *Roster Rules and Regulations*, Major League Soccer, http://pressbox .mlssoccer.com/content/roster-rules-and-regulations (last visited Sept. 22, 2015), *archived at* http://perma.cc/9BLN-R7QD.
- 195 *ld.*
- 196 *ld.*
- 197 *ld.*
- 198 Id.
- 199 Major League Soccer Fines LA Galaxy for Violating Injury Report Policy, Major League Soccer, June 24, 2011, http://pressbox.mlssoccer.com /content/major-league-soccer-fines-la-galaxy-violating-injury-report -policy, archived at http://perma.cc/EC3H-HY5C.
- 200 MLS Medical Policies & Procedures Manual, § IX.B (2015).

- 202 Id.
- 203 MLS CBA, Ex. 2.
- 204 MLS Medical Policies & Procedures Manual, § IX.B.11 (2015).
- 205 Id.
- 206 See Christopher R. Deubert, I. Glenn Cohen, Holly Fernandez Lynch, Protecting and Promoting the Health of NFL Players: Legal and Ethical Analysis and Recommendations, App. I (2016) (discussing and providing history of health-related rule changes in the NFL). See also Joseph S. Torg et al., The National Football Head and Neck Injury Registry, 14-Year Report on Cervical Quadriplegia, 1971- Through 1984, 254 J. Am. Med. Ass'n 3439 (1985) (discussing NCAA rule changes in response to player health data).
- 207 Short-term inactive lists are not practical in MLB. MLB rosters are limited to 25 players, including the five-man starting pitching staff, each of whom only pitches every fifth game. Players on the club's Disabled List do not count towards a club's 25-man roster. Thus, if MLB's Disabled List did not include time requirements and clubs could place players on the Disabled List one game at a time, the club could place the starting pitchers on the Disabled List and only take them off the list when they were going to pitch. If, on any given day, four of the five starting pitchers are on the Disabled List, the club could then have four other players on the roster in their place, effectively creating a 29-man roster since the starting pitchers would return to action without having missed any games in which they were scheduled to pitch.
- 208 See, e.g., AMA Code Opinion 3.1.5—Professionalism in Relationships with Media, Am. Med. Ass'n, available at http://www.ama-assn.org/ama /pub/physician-resources/medical-ethics/code-medical-ethics.page (last visited Aug. 1, 2016), archived at https://perma.cc/ZR8K-FC93 ("To safeguard patient interests when working with representatives of the media, all physicians should: (a) Obtain consent from the patient or the patient's authorized representative before releasing information; (b) Release only information specifically authorized by the patient or patient's representative or that is part of the public record"); Fédération Internationale de Médecine [du Sport, Code of Ethics, ¶ 11 ("[n]o information about an athlete may be given to a third party without the consent of the athlete.")
- 209 See, e.g., Mark A. Hall, et al., Health Care Law and Ethics 168–69 (2003) (collecting cases and statutes for the proposition that doctors have

²⁰¹ Id.

both common law and statutory obligations to keep patient information confidential); Health Insurance Portability and Accountability Act ("HIPAA"), 45 C.F.R. § 164.502 (prohibiting use or disclosure of health information except in certain situations, including where patient has provided consent).

- 210 See, e.g., Charles A. Welch, Sacred Secrets The Privacy of Medical Records, 435 N. Eng. J. Med. 371 (2001); Mark A. Rothstein, Improve Privacy in Research By Eliminating Informed Consent? IOM Report Misses the Mark, 37 J.L. Med. & Ethics 507, 510 (2009) (describing the confidentiality of medical information as a "sacred trust" with healthcare providers). See also U.S. v. Westinghouse Elec. Corp., 638 F.2d 570, 577 ("Information about one's body and state of health is matter which the individual is ordinarily entitled to retain within the private enclave where he may lead a private life.") (Internal quotations and citations omitted).
- 211 See Christopher R. Deubert, I. Glenn Cohen, Holly Fernandez Lynch, Protecting and Promoting the Health of NFL Players: Legal and Ethical Analysis and Recommendations, § 2(C) (2016) (discussing NFL club doctors' legal and ethical obligations to keep player health information confidential, including when such information can be provided to the clubs).
- 212 See id.
- 213 Josh Alper, Brandon Browner on Earl Thomas, Richard Sherman: Hit that shoulder, hit that elbow, ProFootballTalk (Jan. 26, 2015, 3:15 PM), http://profootballtalk.nbcsports.com/2015/01/26/brandon-browner -on-earl-thomas-richard-sherman-hit-that-shoulder-hit-that-elbow/, archived at http://perma.cc/B5YF-NT3C.
- 214 Mike Florio, Concussions take on a strategic component, ProFootball-Talk (Jan. 23, 2012, 10:09 PM), http://profootballtalk.nbcsports.com /2012/01/23/concussions-take-on-a-strategic-component/, archived at http://perma.cc/5D6N-AMVT.
- 215 Mike Florio, *Disclosure of injury information continues to put NFL players in a delicate spot*, ProFootballTalk (July 10, 2015, 12:34 PM), http://profootballtalk.nbcsports.com/2015/07/10/disclosure-of-injury -information-continues-to-put-nfl-players-in-a-delicate-spot/, *archived at* http://perma.cc/PYL4-KMRY ("When it comes to disclosing injury information, the NFL has struggled at times to strike the right balance. To create a sense of transparency (and in turn to discourage gamblers from pursuing inside information by cozying up to players, coaches, and other team employees), the NFL has developed an injury-reporting system far more complex than, for example, hockey's upper-body/lower-body shell game.")
- 216 Id.
- 217 See NFL League Policies for Players, 52 (2013) ("The NFL opposes all forms of illegal gambling, as well as legal betting on NFL games or other professional, college or Olympic sports. Such activity negatively affects the interests, welfare and integrity of the NFL, its games, clubs, players and coaches, and diminishes public confidence in legitimate sport. Equally important, even social gambling among co-workers can lead to discord, violence and a loss of team cohesion.")
- 218 See NFL League Policies for Players, 52–58 (2013) ("League policy strictly prohibits NFL Personnel [including players] from participating in or facilitating any form of illegal gambling," "League policy prohibits advertising or promotional activities by NFL Personnel [including players] that reasonably can be perceived as constituting affiliation with or endorsement of gambling or gambling-related activities").
- 219 See Christopher R. Deubert, I. Glenn Cohen, Holly Fernandez Lynch, Protecting and Promoting the Health of NFL Players: Legal and Ethical Analysis and Recommendations, § 18(A) (2016).
- 220 See Michael B. Engle, The No-Fantasy League: Why the National Football League Should Ban Its Players from Managing Personal Fantasy Football Teams, 11 DePaul J. Sports L. & Contemp. Probs. 59, 85 (2015) (discussing Karras and Hornung cases).
- 221 Additionally, gambling on football represents approximately 45% of all

legal gambling. *See* David Purdum, *Wagers, Bettor Losses Set Record,* ESPN (Jan. 30, 2015), http://espn.go.com/chalk/story/_/id/12253876 /nevada-sports-bettors-wagered-lost-more-ever-2014, *archived at* http://perma.cc/RKR8-WPD7. Thus, there is substantially less gambling in the other sports, which might explain their less robust injury reporting policies.

- 222 For examples of such studies in high school and college sports, see Barry P. Boden et al., Catastrophic Injuries in Pole Vaulters, A Prospective 9-Year Follow-up Study, 40 Am. J. Sports Med. 1488 (2012); Frederick 0. Mueller and Robert C. Cantu, Catastrophic injuries and fatalities in high school and college sports, fall 1982–spring 1988, 22 Med. & Sci. in Sports & Exercise 737 (1990).
- 223 Some of the studies discussed in this Report were the result of the leagues' willingness to provide some injury data upon request. While it is commendable that the leagues occasionally provide the data when requested, this does not entirely address the concerns outlined in Recommendation 1.
- 224 Christopher R. Deubert, I. Glenn Cohen, Holly Fernandez Lynch, *Protecting and Promoting the Health of NFL Players: Legal and Ethical Analysis and Recommendations*, Recommendation 17:1-B (2016).
- 225 See The Datalys Center for Sports Injury Research and Prevention, NCAA, http://www.ncaa.org/health-and-safety/medical-conditions /datalys-center-sports-injury-research-and-prevention (last visited Aug. 3, 2016), archived at https://perma.cc/2M75-B24L.
- 226 See, e.g., Data transparency, GlaxoSmithKline, http://www.gsk.com/ en-gb/behind-the-science/innovation/data-transparency (last visited June 20, 2016), archived at https://perma.cc/M5HN-NLHN; Frequently Asked Questions, the YODA Project, http://yoda.yale.edu/frequently -asked-questions-faqs#Data (last visited June 20, 2016), archived at https://perma.cc/2298-R7HC.
- 227 See Paul McCrory et al., Consensus statement on concussion in sport: the 4th Int'l Conference on Concussion in Sport held in Zurich, November 2012, 47 Br. J. Sports Med. 250, 251 (2013).
- 228 *Id.* at 253.
- 229 MLB CBA, Att. 36, ¶ 2.
- 230 See Paul McCrory et al., Consensus statement on concussion in sport: the 4th Int'l Conference on Concussion in Sport held in Zurich, November 2012, 47 Br. J. Sports Med. 250, 250–58 (2013) (discussing the challenges of and best practices for diagnosing concussions).
- 231 See id.
- 232 *See id.* at 252–58 (discussing generally the challenges of determining when an athlete has recovered from a concussion).
- 233 Letter from Larry Ferazani, NFL, to authors (July 18, 2016).
- 234 Id.
- 235 Mike Florio, *NFL tells teams to stop commenting about concussed players,* ProFootballTalk (Nov. 11, 2016, 7:50 PM), http://profootballtalk .nbcsports.com/2016/11/11/nfl-tells-teams-to-stop-commenting-about -concussed-players/, *archived at* https://perma.cc/Z7ML-ZP7W.
- 236 *ld.*
- 237 Christopher R. Deubert, I. Glenn Cohen, Holly Fernandez Lynch, *Protecting and Promoting the Health of NFL Players: Legal and Ethical Analysis and Recommendations* Recommendation 7:4-B (2016).
- 238 Mike Florio, *Disclosure of injury information continues to put NFL players in a delicate spot*, ProFootballTalk (July 10, 2015, 12:34 PM), http://profootballtalk.nbcsports.com/2015/07/10/disclosure-of-injury -information-continues-to-put-nfl-players-in-a-delicate-spot/, *archived at* http://perma.cc/PYL4-KMRY ("many players would like to keep [injury information] secret, in order to keep an opponent from hitting, poking, and/or kicking the injured region.")