Epidemiology of Hand and Wrist Injuries in NCAA Men's Football

2009–2010 to 2013–2014

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Background: Participation in National Collegiate Athletic Association (NCAA) football is at an all-time high. This population of athletes experiences a substantial injury burden, with many injuries affecting the upper extremities.

Purpose/Hypothesis: The purpose of this study was to describe the epidemiology of hand and wrist injuries in college football players from the academic years 2009–2010 to 2013–2014. We hypothesized that variables such as event type (practice vs game), mechanism of injury, and player position would have an effect on the injury incidence.

Study Design: Descriptive epidemiological study.

Methods: An epidemiological study utilizing the NCAA Injury Surveillance Program was performed to investigate rates and patterns of hand and wrist injuries in participating varsity football teams from 2009–2010 to 2013–2014.

Results: A total of 725 hand and wrist injuries were captured in 899,225 athlete-exposures. The observed practice injury rate was 0.51 injuries per 1000 athlete-exposures, compared with a game injury rate of 3.60 ($P < .01$). Player-on-player contact was the most common injury mechanism reported, with blocking being the most common activity at the time of injury. Offensive linemen were most likely to experience an injury. Of all injuries sustained, 71.4% resulted in no time loss from competition, whereas 9.8% of injuries resulted in longer than 7 days of time loss. A fracture resulted in the greatest time loss from competition (mean ± SD, 8.3 ± 24.0 days; median, 0 days [range, 0-148 days] for injuries sustained in a practice setting) (mean ± SD, 7.7 ± 15.8 days; median, 0 days [range, 0-87 days] for injuries sustained in a game setting).

Conclusion: Hand and wrist injuries were found to be significantly more common in games when compared with practices. This study provides valuable prognostic data regarding expected time loss on a per-injury pattern basis. Further investigation on specific injury subtypes and expected time loss as a result of these injures would provide trainers, players, and coaches with useful information on an expected postinjury recovery and rehabilitation timeline.

Keywords: athlete; prevention; incidence; surveillance

Participation in National Collegiate Athletic Association (NCAA) football is at an all-time high. During the 2015–2016 season, an estimated 73,660 student-athletes participated in football in Divisions I, II, and III of the NCAA.[29] Data have revealed that between the 2004 and 2009 football seasons, there were more than 41,000 injuries in 25 million athlete-exposures (AEs), accounting for both sanctioned games and practices. This same data set revealed that 16.9% of these injuries affected the upper extremities.[28] As a result of the high injury burden in the NCAA football student-athlete population, player safety remains an utmost concern. This is evidenced by the recently implemented practice guidelines that now recommend the elimination of 2-a-day practices and a reduction in the number of live contact and tackling practices per week.[30]

NCAA football players are frequently exposed to violent collisions, high-velocity ball contact, and ground-level falls throughout the course of competition.[14] Given the multitude of potential mechanisms of injury, hand and wrist injuries, including scaphoid fractures, phalanx and metacarpal fractures, triangular fibrocartilage complex and scapholunate tears, and flexor and extensor tendon ruptures, are prevalent among high-level football players.[3,15] These injuries can be quite debilitating for football players. A number of commentaries have been published that discuss specific hand and wrist injuries in high-level football players and their impact on return to play.[§] Additionally, comprehensive and

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descriptive epidemiological studies looking at hand and wrist injuries in both National Football League (NFL) and United States high school football players have been performed.[6,20,25] Among high school football players, there is a reported incidence of 4.3 injuries per 10,000 AEs. For this particular subset of injuries, football reported the highest incidence among all recorded high school sports.[20] NFL athletes experienced 2244 injuries involving the elbow, forearm, wrist, and hand over a 10-season span.[6,25] Authors have commented on the overall injury rate in NCAA football[22]; however, there remains a paucity of epidemiological data specific to hand and wrist injuries among NCAA football athletes. The NCAA has adopted a data-driven decision-making process when providing recommendations for protecting player safety.[30] Thus, a review of the epidemiology of such injuries could be useful for tailoring effective injury prevention strategies in NCAA football moving forward.[19,21]

Data from the NCAA Injury Surveillance Program (ISP) have been made publicly available and allow for an analysis of the epidemiology of hand and wrist injuries in a convenience sample of NCAA football programs. This study utilized the ISP to describe the epidemiology of hand and wrist injuries in NCAA football during the academic years 2009–2010 to 2013–2014. We hypothesized that variables such as mechanism of injury, player position, and event type (game vs practice) would have an effect on hand and wrist injury incidence rates. This study also commented on hand and wrist injury incidence and severity using time loss from competition as a surrogate marker.

METHODS

The NCAA ISP is a prospective injury surveillance program that collects injury data from multiple NCAA sports across several divisions. It is managed by the Datalys Center for Sports Injury Research and Prevention, an independent nonprofit research organization. After receiving approval from our institutional review board, an application to receive data from the ISP was submitted to the Datalys Center. Final study approval was obtained from the research review board of the NCAA. Full details regarding the methodology of the ISP have been described[10] and are briefly summarized below.

Data Collection

Data utilized in this study were from the 2009–2010 to 2013–2014 academic years and were obtained from 25 (annual average number) qualifying football programs from Divisions I, II, and III of the NCAA. Athletic trainers (ATs) or physicians from the participating institutions attended all school-sanctioned events, including team practices, games, and conditioning sessions, after which they recorded the total number of student-athletes participating and any injuries that occurred in a given session. Individually scheduled events such as weight lifting or conditioning sessions were not included in this data set.

Injuries during these sessions were recorded through each institution's electronic health record (EHR). When an injury occurred, ATs or physicians would complete a comprehensive event report including details such as body part affected, diagnosis, mechanism of injury, position, and type of activity. ATs could review or update information as needed to accurately reflect the details of the event such as time to return to sport or updated diagnosis.

Deidentified common data elements from the injury and exposure reports were then extracted from each institution's EHR. Each participating program's EHR had to withstand a data validation process to be certified. Exported data were stripped of identifiers and passed through an automated verification process, which conducted a series of range and consistency checks. After making it through the verification process, data were then compiled into the aggregate research data set that could be distributed to researchers.[10]

Definitions

Injury. A reportable injury was defined as an event that occurred during a sanctioned practice or game that required attention from the team AT or physician. Beginning in the 2009–2010 reporting season, both non–time loss injuries (those that did not result in restriction from play for >24 hours) and time loss injuries (resulting in restriction of play for >24 hours) were reported to the ISP. Hand and wrist injuries were identified under the body part codes "wrist" and "hand/fingers." For the purposes of this study, a wrist injury was defined as involving the distal radius or carpals, a hand injury was defined as involving the metacarpals or metacarpophalangeal joint, and a finger injury was defined as involving any structure distal to the metacarpophalangeal joint.

Athlete-Exposure. A reportable AE was defined as a single student-athlete participating in 1 NCAA-sanctioned practice or game in which he was exposed to the possibility of an athletic injury. Athletes without playing time in a given competition were not included as an AE.

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Ethical approval for this study was obtained from the Mayo Clinic Institutional Review Board (No. 17-005226).

TABLE 1
Events, Athlete-Exposures, and Hand and Wrist Injuries by Academic Year, Division, and Turf[a]

	Events	Athlete-Exposures	Injuries
Academic year			
2009-2010	1998	178,466	135
2010-2011	2312	208,649	144
2011-2012	2161	196,350	167
2012-2013	1719	159,192	128
2013-2014	1769	156,568	151
NCAA Division			
I	5622	527,770	506
I-A	4467	432,957	425
I-AA	1155	94,813	81
II	1396	113,747	73
III	2941	257,708	146
Turf			
Field and synthetic turf	4758	429,020	309
Natural grass	4838	440,623	388
Hard surface[b]	77	6789	5
Other[c]	286	22,793	23

[a]Data are presented as No. NCAA, National Collegiate Athletic Association.
[b]Hard surface includes floor mat, gymnasium or court floor, and hard court.
[c]Other includes ice/snow, other turf, and unknown.

Event Type. Event type was defined as a school-sanctioned event (practice or game) during which the injury occurred.

Injury Mechanism. Injury mechanism was defined as the manner in which the student-athlete sustained his injury. ATs were presented with a standardized list of options from which to choose the most applicable mechanism, including blocking, tackling, running, being blocked, being tackled, receiving pass, throwing pass, kicking, conditioning, general play, and other/unknown.

Time Loss. Time loss was defined as the time in days between the original injury and a student-athlete's ability to return to play at a competitive level.

Statistical Analysis

Descriptive statistics were used to present demographic data with means and percentages, as appropriate. Athletes who experienced injuries during practices were compared with those who experienced injuries in a game setting using the Fisher exact test for proportions. Nonparametric methods, namely the Kruskal-Wallis rank-sum test, were used to compare nominal values such as time loss to ensure that testing was appropriate for nonnormal data. $P < .05$ was considered statistically significant. Analyses were performed using R 3.4.3 (R Development Core Team).

RESULTS

The records of 9959 NCAA football events, comprising a total of 899,225 AEs, were reviewed between 2009–2010 and 2013–2014 using the NCAA ISP (Table 1). A total of 725 hand and wrist injuries, resulting in 1539 days lost from competition, were captured during this period. The overall injury rate was 0.81 injuries per 1000 AEs. The majority of participants were Division I athletes (56.5%), followed by Division III athletes (29.5%) and Division II athletes (14.0%). There was a near-equal distribution of events occurring on field or synthetic turf (47.8%) and natural grass (48.6%), with slightly more injuries occurring in events taking place on natural grass surfaces.

Injury rates were calculated for practice and game settings (Table 2). The overall practice injury rate was observed to be 0.51 injuries per 1000 AEs, which was significantly lower than the overall game injury rate of 3.60 ($P < .01$). The practice injury rate was found to be highest in the preseason when compared with the regular season and postseason for this cohort.

When comparing player demographics for injuries sustained during practices and games, significant differences were observed based on player level of seniority, player position, activity performed at the time of injury, and mechanism of injury ($P < .01$) (Table 3). Freshmen were the most common class of players injured during practices (38.7%), whereas juniors were the most commonly injured class of players during games (28.3%), with decreased concurrent freshman injury rates observed (16.6%). Offensive linemen were the most likely to be injured in the practice setting (21.4% of injuries), whereas in the game setting, the most commonly injured players were defensive backs (17.5% of injuries). While injuries were most commonly observed during blocking during practices (28.0%), these decreased during games, with tackling being the most common mechanism of injury (21.3%; previously 15.6% during practices).

Of all sustained injuries, 71.4% resulted in the player being able to return to competition within the same session and with no time loss, whereas 9.8% of injuries resulted in longer than 7 days of time loss (Table 4). A fracture (distal radius, carpal, metacarpal, phalanx) resulted in the greatest mean time loss from competition (8.3 ± 24.0 vs 7.7 ± 15.8 days for injuries sustained in practices vs games, respectively; $P = .97$). A hand injury led to greater mean time loss (3.8 ± 15.4 vs 3.9 ± 12.9 days for injuries sustained in practices vs games, respectively; $P = .35$) compared with nail/subungual, finger, and wrist injuries.

When assessing hand injuries, over half of injuries were sustained by 3 position groups: defensive backs (n = 45; 19.0%), followed by defensive linemen (n = 43; 18.1%) and offensive linemen (n = 40; 16.9%). A metacarpal fracture resulted in the greatest time loss of all documented hand injuries, with 25.0% requiring a surgical intervention (Table 5). In total, 7.4% (n = 54) of all injuries resulted in a documented surgical intervention. Of these, the most common injuries requiring surgery were metacarpal fractures (n = 14), gamekeeper's thumb (ie, ulnar collateral ligament [UCL] injuries of the thumb) (n = 6), phalanx fractures (n = 5), and scaphoid fractures (n = 5).

DISCUSSION

This study demonstrates the burden of hand and wrist injuries, with 725 injuries captured over a 5-year period,

TABLE 2
Practice and Game Injury Rates[a]

	Practice			Game		
	No. of AEs	No. of Injuries	Injury Rate (per 1000 AEs)	No. of AEs	No. of Injuries	Injury Rate (per 1000 AEs)
Division I						
Preseason	157,722	136	0.86	109	0	0.00
Regular season	290,252	150	0.52	47,665	211	4.43
Postseason	30,101	7	0.23	1921	2	1.04
Total	478,075	293	0.61	49,695	213	4.29
Division II						
Preseason	37,512	17	0.45	0	—	—
Regular season	290,252	18	0.06	9831	38	3.87
Postseason	0	—	—	0	—	—
Total	327,764	35	0.11	9831	38	3.87
Division III						
Preseason	79,440	46	0.58	205	0	0.00
Regular season	145,167	37	0.25	26,465	63	2.38
Postseason	5509	0	0.00	922	0	0.00
Total	230,116	83	0.36	27,592	63	2.38
Overall total	812,107	411	0.51	87,118	314	3.60

[a]Dashes indicate null entries as no injuries occurred and thus no injury rate could be calculated. AE, athlete-exposure.

resulting in 1539 days lost from competition and an overall injury rate of 0.81 injuries per 1000 AEs. The injury rate reported in this study is slightly higher than rates reported for other commonly sustained injuries among NCAA football athletes including a rate of 0.142 anterior cruciate ligament injuries per 1000 AEs, 0.306 hamstring strains per 1000 AEs, and 0.1 high ankle sprains per 1000 AEs.[9,12,26] There was a significant difference in the practice injury rate (0.51 per 1000 AEs) and game injury rate (3.60 per 1000 AEs) ($P < .01$). To our knowledge, no previous data exist reporting an increased risk of hand and wrist injuries for NCAA football players in the game setting. The increased game injury rate seen in this study is consistent with the results of previous studies assessing hand and wrist injuries at both the high school and the professional levels.[6,20,25] When examining the overall injury burden in NCAA football, the game injury rate was found to be 9 times greater than the in-season practice injury rate.[11] A possible explanation for this finding is that games expose athletes to increased player-on-player contact and a higher intensity of play.

Previous studies have demonstrated increased speed, strength, power, and body mass in professional athletes compared with collegiate athletes in the same sport.[1,2] The injury rate among professional football players is well reported, with a hand/first ray/finger injury rate of 0.6 per 1000 AEs and a wrist injury rate of 0.11 per 1000 AEs reported for NFL athletes.[6,25] Interestingly, the overall hand and wrist injury rate of 0.81 injuries per 1000 AEs observed in this study was higher than that reported among professional athletes. It is possible that the skill difference and improved technique that are acquired with years of experience could allow for greater injury avoidance. Results from this study show that freshmen accounted for the largest proportion of injuries sustained in practices at 38.7%, whereas seniors only accounted for 11.2% of injuries during practices, thus providing some support for this claim. A study by McCunn et al[27] assessed the effect of playing experience on the overall injury rate among NCAA football players and provided contrasting results in that seniors were found to be at greatest risk during training.

It is well documented that player-on-player contact is the most common mechanism of injury among NCAA football players.[22,23,27] This is consistent with results from this study, which demonstrated that an overwhelming majority of all hand and wrist injuries resulted from player-on-player contact. When evaluating the activity at the time of injury, blocking and tackling resulted in 42.9% of all hand and wrist injuries. Not surprisingly, offensive linemen and defensive backs were 2 of the most commonly affected position groups.

A number of protective devices and techniques are available to athletes to assist with injury prevention. Taping, bracing, and glove use provide additional stability to the joints of the hand and wrist, thus minimizing the risk of injuries resulting from direct blows from player contact, ball contact, or playing surface contact. Additionally, they provide an additional barrier of defense to aid in the prevention of lacerations or abrasions. Recognizing the players at an increased risk and the most common mechanisms of injury could lead to the better utilization of and improvement in the design of existing protective equipment in an effort to reduce the injury rate. As suggested in our results, targeting position groups such as offensive linemen and defensive backs, who have been shown to be at an increased risk for player-on-player contact injuries, may result in improved overall injury prevention.

Additionally, the NCAA has taken measures to reduce the injury rate among NCAA football athletes. In 2016, the

TABLE 3
Player Demographics for Hand and Wrist Injuries Sustained in Practice and Game Settings[a]

	Practice (n = 411)	Game (n = 314)	*P* Value
Player year			**<.01**
Freshman	159 (38.7)	52 (16.6)	
Sophomore	69 (16.8)	57 (18.2)	
Junior	83 (20.2)	89 (28.3)	
Senior	46 (11.2)	72 (22.9)	
Unknown	54 (13.1)	44 (14.0)	
Player position			**<.01**
Quarterback	14 (3.4)	18 (5.7)	
Wide receiver	56 (13.6)	28 (8.9)	
Linebacker	38 (9.2)	43 (13.7)	
Offensive tight end	18 (4.4)	7 (2.2)	
Running back/slotback	25 (6.1)	39 (12.4)	
Offensive lineman	88 (21.4)	46 (14.6)	
Defensive lineman	78 (19.0)	47 (15.0)	
Defensive back	68 (16.5)	55 (17.5)	
Special teams[b]	8 (1.9)	17 (5.4)	
Other	18 (4.4)	14 (4.5)	
Injury activity			**<.01**
Running	3 (0.7)	6 (1.9)	
Passing/throwing	8 (1.9)	3 (1.0)	
Receiving pass	29 (7.1)	11 (3.5)	
Blocking	115 (28.0)	65 (20.7)	
Being blocked	46 (11.2)	22 (7.0)	
Tackling	64 (15.6)	67 (21.3)	
Being tackled	18 (4.4)	33 (10.5)	
Kicking	3 (0.7)	0 (0.0)	
General play	91 (22.1)	64 (20.4)	
Conditioning	1 (0.2)	0 (0.0)	
Unknown	33 (8.0)	43 (13.6)	
Injury mechanism			**<.01**
Contact	372 (90.5)	259 (82.5)	
Person	285	216	
Surface	40	30	
Equipment	47	13	
Noncontact	9 (2.2)	8 (2.5)	
Overuse/gradual	2 (0.4)	0 (0.0)	
Other or unknown	28 (6.8)	47 (15.0)	
Injury category			.07
Avulsion	2 (0.5)	0 (0.0)	
Contusion	56 (13.6)	55 (17.5)	
Dislocation	51 (12.4)	28 (8.9)	
Fracture	55 (13.4)	62 (19.7)	
Infection	1 (0.2)	1 (0.3)	
Laceration	7 (1.7)	6 (1.9)	
Sprain/strain	226 (55.0)	149 (47.5)	
Tenosynovitis	0 (0.0)	1 (0.3)	
Other[c]	13 (3.2)	12 (3.8)	

[a]Data are presented as n (%). Bolded *P* values indicate a statistically significant difference between practice and game settings .
[b]Kickoff coverage or return, field goal or point after touchdown defense or offense, and punt coverage or return.
[c]Includes volar plate avulsions.

Sport Science Institute and the College Athletic Trainers' Society hosted the second Safety in College Football Summit, where they proposed eliminating 2-a-day practices. They also recommended that only 3 practices in a 7-day period in the preseason setting be live, defined as "any practice that involves live tackling to the ground and/or live or full speed blocking."[30] The impetus for these changes was largely a result of increased attention paid to head and neck injury prevention and the increasing concussion rate among athletes. Nevertheless, based on the results of this study, limiting player-on-player contact with these changes could reduce the rate of hand and wrist injuries among athletes. Research investigating hand and wrist injuries in the time period after the implementation of these guidelines would allow for a direct comparison of injury rates and in turn allow researchers to evaluate the effectiveness of the practice guideline changes.

The most commonly recorded injury in this study was hand or wrist sprains/strains, followed by fractures and contusions. Injury definitions often vary between injury surveillance databases; however, other studies have demonstrated similar results, showing that direct trauma resulting in contusions or fractures accounts for a large proportion of sustained injuries.[6,25] Despite this relatively substantial injury burden, our data show that only a small proportion of injuries (9.8%) resulted in time loss longer than 7 days. An even smaller proportion of injuries resulted in emergency transport (1.4%). The relatively small proportion of injuries resulting in significant time loss may be a product of the definition of "injury" as used by the ISP as being any event requiring attention by an AT. Nevertheless, players and coaches alike can be reassured that very few hand or wrist injuries will lead to extended time away from competition.

Fractures resulted in substantially greater time loss when compared with other injury categories, with metacarpal fractures specifically resulting in a mean of 12.3 ± 25.8 days lost from competition. Data show that NFL athletes with similar fractures often experience increased time lost compared with college counterparts, with an average of 16 days out of competition after an injury.[25] This may be because of factors including severity of injury, timing of injury during the season, or position of the injured player. Nevertheless, this suggests variability among treating orthopaedic surgeons regarding the management of common sports-related hand and wrist injuries in college versus professional athletes. This difference is further evidenced by a study that polled 37 consultant hand surgeons for teams in the NFL, National Basketball Association, and Major League Baseball. In this study, surgeons completed a survey regarding the management of 10 common hand injuries, and there was found to be variability in their responses regarding initial management, return to protected play, and return to unprotected play.[13] Given the multitude of factors influencing time to return to play, continued emphasis has been placed on individualized treatment plans, especially in elite athletes. While tailored treatment plans are at the crux of caring for high-level athletes, having an estimated timeline for return to play after an injury is crucial when days lost can have a significant impact on athlete and team performance. Further research into optimal management and expected return to play after common hand and wrist injuries in

TABLE 4
Time Loss by Injury Category and Location[a]

	Practice (n = 411)	Game (n = 314)	*P* Value
Time loss due to injury, n (%)			**.04**
None	197 (47.9)	174 (55.4)	
Returned within session	88 (21.4)	59 (18.8)	
1-6 d	79 (19.2)	41 (13.1)	
7-13 d	15 (3.6)	10 (3.2)	
14-29 d	8 (1.9)	8 (2.5)	
≥30 d	7 (1.7)	5 (1.6)	
Out for rest of season	5 (1.2)	13 (4.1)	
Unknown	12 (2.9)	4 (1.3)	
Time loss by injury category, d			
Avulsion	0.0 ± 0.0; 0 (0-0)	—	—
Contusion	0.9 ± 2.9; 0 (0-15)	0.2 ± 0.8; 0 (0-5)	**.02**
Dislocation	0.4 ± 1.7; 0 (0-10)	3.0 ± 8.4; 0 (0-37)	.36
Fracture	8.3 ± 24.0; 0 (0-148)	7.7 ± 15.8; 0 (0-87)	.97
Infection	0.0 ± 0.0; 0 (0-0)	0.0 ± 0.0; 0 (0-0)	>.99
Laceration	1.9 ± 4.1; 0 (0-11)	1.2 ± 2.2; 0 (0-5)	.93
Sprain/strain	1.5 ± 6.0; 0 (0-55)	0.7 ± 2.0; 0 (0-10)	.46
Tenosynovitis	—	0.0 ± 0.0; 0 (0-0)	—
Other[b]	7.6 ± 17.4; 0 (0-55)	13.5 ± 27.9; 0 (0-74)	.86
Time loss by injury location, d			
Nail/subungual	0.0 ± 0.0; 0 (0-0)	0.0 ± 0.0; 0 (0-0)	>.99
Finger	1.6 ± 6.7; 0 (0-55)	1.1 ± 4.2; 0 (0-37)	.91
Hand	3.8 ± 15.4; 0 (0-148)	3.9 ± 12.9; 0 (0-87)	.35
Wrist	1.3 ± 3.7; 0 (0-27)	2.6 ± 8.5; 0 (0-58)	.77
Emergency transport needed, n (%)			.53
No	404 (98.3)	311 (99.0)	
Yes	7 (1.7)	3 (1.0)	

[a]Data are presented as mean ± SD; median (range) unless otherwise indicated. Bolded *P* values indicate a statistically significant difference between practice and game settings. Dashes represent null entries as no tenosynovitis injuries occurred in the practice setting and no avulsion injuries occurred in the game setting.
[b]Includes volar plate avulsions.

TABLE 5
Hand Injuries With Associated Time Loss, Emergency Transport, and Surgical Management[a]

	Time Loss, d	Emergency Transport, n (%)	Surgical Management, n (%)
Metacarpal fracture	12.3 ± 25.8; 2.5 (0-148)	0/62 (0.0)	14/56 (25.0)[b]
Hyperextension	1.8 ± 3.0; 0 (0-7)	1/5 (20.0)	2/5 (40.0)
MCP joint dislocation	1.8 ± 3.5; 0 (0-10)	0/8 (0.0)	1/8 (12.5)
Laceration	1.6 ± 3.3; 0 (0-11)	1/13 (7.7)	1/13 (7.7)
MCP joint sprain	0.9 ± 2.6; 0 (0-13)	0/42 (0.0)	1/42 (2.4)
Contusion	0.5 ± 1.7; 0 (0-13)	0/95 (0.0)	0/92 (0.0)[c]
Interdigital skin tear	0.4 ± 1.2; 0 (0-4)	0/11 (0.0)	1/11 (9.1)
Infection	0.0 ± 0.0; 0 (0-0)	0/1 (0.0)	0/1 (0.0)

[a]Data are presented as mean ± SD; median (range) unless otherwise indicated. MCP, metacarpophalangeal.
[b]Six patients with unknown surgical management.
[c]Three patients with unknown surgical management.

athletes could be a valuable asset for players, coaches, ATs, and orthopaedic surgeons.

Only 7.4% of injuries in this study resulted in a known surgical intervention, with metacarpal fractures, UCL injuries of the thumb, phalanx fractures, and scaphoid fractures being most common. This relatively low rate of surgical interventions is likely influenced by a number of factors. One such factor is the relatively loose definition of an injury utilized by the ISP. By nature, having a more broad definition of an injury captures more events and increases the injury incidence rate. As such, the rate of severe injuries or injuries requiring a surgical intervention can appear lower than if a more strict definition of an injury had been utilized. Nevertheless, significant advancements in immobilization techniques have been made, with well-documented nonoperative management options for a

number of bony hand injuries including thumb, metacarpal, and phalanx fractures.[7] Having an orthopaedic surgeon or AT on staff who has experience with in-season casting or splinting techniques could result in quicker return to play for athletes with fractures amenable to nonoperative management. Despite these advances, 14 of 56 (25.0%) athletes who sustained metacarpal fractures required a surgical intervention, thus suggesting the difficulty of managing these injuries nonoperatively.

Trends in the surgical management of hand and wrist injuries among athletes are changing with time. In this study, 6 of 80 (7.5%) cases of UCL injuries of the thumb required a surgical intervention. In a study in which 128 NCAA Division I team surgeons were polled, most treated UCL injuries of the thumb with casting and return to play. Nevertheless, the same study demonstrated that there was an increase from 6% to 10% of surgeons who surgically treated this injury when comparing 2008 and 2016 data.[8] Data from Werner et al,[33] looking at outcomes after UCL repair in collegiate football players, showed that athletes were able to return to a similar level of play compared with before the injury and had acceptable clinical outcomes. Interestingly, the same authors showed that skill position players had decreased time to surgery and greater time lost from competition after surgery when compared with non–skill position players. The demands placed on skill position and non–skill position athletes are drastically different, often leading to differences in injury management protocols.[33] This again speaks to the importance of having reliable data regarding expected time away from competition when counseling athletes, trainers, and coaches on injury management.

This study has several limitations. Our data came from a convenience sample of NCAA football programs. The 25 (annual average number) qualifying football programs from Divisions I, II, and III of the NCAA included in this sample constitute a small portion of all NCAA institutions with football teams. Therefore, the generalizability of these data to the NCAA at large or to other playing levels, including high school and professional football, remains in question. Additionally, data used in this study were collected between 2009–2010 and 2013–2014, which is before the recently implemented guidelines limiting the number of live practices. As such, the practice injury rates reported in this study may not perfectly represent the current rates of hand and wrist injuries in the practice setting. As previously mentioned, the ISP utilizes a relatively loose definition of an injury. Ultimately, this results in a greater number of captured injury events and a potentially inflated injury incidence. It is important to keep this in mind when drawing inferences on results such as the rate of injuries requiring a surgical intervention and the rate of injuries resulting in significant time loss, which are likely lower than if a stricter definition of an injury had been used.

CONCLUSION

Hand and wrist injuries were found to be significantly more common in games when compared with practices. This study provides valuable prognostic data regarding expected time loss on a per-injury pattern basis. Further investigation on specific injury subtypes and expected time loss as a result of these injures would provide trainers, players, and coaches with useful information on an expected postinjury recovery and rehabilitation timeline. Ultimately, we hope that these findings will result in improved preventative measures that will decrease the prevalence of hand and wrist injuries in high-level athletes.

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