

Epidemiology of Severe Foot Injuries in US Collegiate Athletes

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Background: The effects of foot injuries on collegiate athletes in the United States are of interest because of the short 5-year eligibility period in the National Collegiate Athletic Association (NCAA).

Purpose: To discuss the epidemiology of severe NCAA foot injuries sustained over 10 years in 25 sports.

Study Design: Descriptive epidemiology study.

Methods: We utilized the NCAA Injury Surveillance System, which prospectively collects deidentified injury data for collegiate athletes. Severe injuries were classified as season- or career-ending injuries, injuries with >30-day time loss, or injuries requiring operative treatment. Injury rates (IRs) were analyzed per 100,000 athlete-exposures.

Results: Of 3607 total foot injuries, 18.71% (n = 675) were classified as severe, with an IR of 5.73 per 100,000 athletic-exposures. For all severe injuries, the operative rate was 24.3%, the season-ending rate 37.0%, and the career-ending rate 4.4%. The proportion of recurrent injuries was 13.9%. Men's sports with the highest severe foot IRs were basketball (IR = 10.71), indoor track (IR = 7.16), and football (IR = 7.08). Women's sports with the highest severe foot IRs were cross-country (IR = 17.15), gymnastics (IR = 14.76), and outdoor track (IR = 14.65). Among all severe foot injuries, the most common was a fifth metatarsal fracture. The highest contact/noncontact injury ratios were phalangeal fracture, turf toe, and Lisfranc injury. The severe injuries with the highest operative rates were Lisfranc injuries, fifth metatarsal fractures, and midfoot fractures. The severe injuries associated with the highest season-ending IRs were Lisfranc injury, midfoot fracture, and general metatarsal fractures. Severe flexor/extensor injuries had the highest career-ending IRs, followed by turf toe. Severe injuries with the highest median time loss were sesamoidal fractures, calcaneal fractures, and plantar fascial injuries.

Conclusion: Of all collegiate foot injuries sustained over a 10-year period, 18.7% were characterized as severe, and 24.3% of severe injuries required surgery. Basketball was the men's sport with the highest severe IR, and cross-country was the women's sport with the highest severe IR. Overall, female athletes experienced slightly higher severe foot IRs as compared with male athletes.

Keywords: NCAA; foot injury; athlete; severe injury

Foot injuries are common sports-related ailments that can be detrimental to individual athletes and the success of their teams.^{8,10,20} Because of the different physical demands and resources available at different levels of play (high school, National Collegiate Athletic Association [NCAA], professional), it is important to understand the epidemiology of foot injuries for players at each level. The effects of foot injuries on collegiate athletes is of particular interest because of the NCAA's relatively short 5-year eligibility period. As such, it is crucial for health care professionals to maximize each athlete's career through preventative strategies, proper treatment, and rehabilitation.

Despite the variety of studies in the literature examining foot athletic injuries, the majority discuss professional

sports, examine individual injuries, or focus on individual sports.^{7,9,13-15,19} Lievers et al¹⁴ studied foot injuries in collegiate athletes over a 5-year span. However, the authors did not distinguish the injury based on severity, and no analysis on injury mechanism or individual diagnosis was conducted. The goal of our study is to discuss the epidemiology of severe NCAA foot injuries sustained nationally over a 10-year period in 25 unique sports to better understand injury trends across all sports as well as individual sports. Understanding the epidemiology of these injuries is important in understanding the risks that NCAA athletes face and tailoring treatment to mitigate these injuries. The purpose of this study is to provide an epidemiological analysis of severe collegiate foot injuries. We hope that this leads to more informed prevention, treatment, and management of these injuries, allowing athletes to maximize playing time and performance level while minimizing time missed because of injury.

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METHODS

An institutional review board exemption was granted for this study. The NCAA Injury Surveillance System (NCAA-ISS) prospectively collects deidentified injury data for collegiate athletes. We utilized 2 cohorts from the NCAA-ISS: 2004-2005 to 2008-2009 and 2009-2010 to 2013-2014. The complete methodology of NCAA-ISS data collection was also described by Kerr et al.¹² This retrospective study includes data on all foot injuries across 25 NCAA sports. Injury rate (IR) per 100,000 athlete-exposures (AEs), operative rate, annual IR trend, reinjury rate, mechanism of injury, in-season status (preseason, regular season, post-season), and time-loss distribution were compiled and analyzed.

Data Collection

The NCAA-ISS collects self-reported data across all 25 sports. Participation in the NCAA-ISS is available to all collegiate institutions but is ultimately voluntary. Therefore, the NCAA-ISS collects data from just a sample of collegiate programs. The NCAA-ISS data sets are then weighted and extrapolated to create national estimates representative of all collegiate athletes nationwide. Therefore, it is possible that not all regions or athletic divisions are equally represented.¹² Health care professionals (athletic trainer or physician) report the details of injury incidence and exposure information. The report includes the injury or condition/circumstances, body part, diagnosis, and mechanism of injury. The data are reviewed by quality control staff and updated as necessary to report treatment and time to return to play. Deidentified data are then extracted from the electronic medical record and exported through an automated verification process. These exported data are reviewed and compiled into an aggregate research database made available to researchers.

Definitions

A reportable injury was defined as any injury that occurred during a team-sanctioned event that required attention from an athletic trainer or physician. We identified all foot injuries by manually searching through the NCAA-ISS database by diagnosis. Injuries were grouped into the following categories: calcaneal fracture, midfoot fracture, metatarsal fractures, fifth metatarsal fracture, Lisfranc injury, phalangeal fracture, sesamoid fracture, turf toe, plantar fascia, and flexor/extensor injuries. The following

injuries were classified as “other”: pes cavus, fat pad syndrome, contusion, infection, spasm, bone spur, pes planus, cuboid subluxation, metatarsalgia, osteoarthritis, sinus tarsi syndrome, talus avascular necrosis, nail avulsion, and other foot injury. Ankle injuries were excluded to examine the epidemiology of severe foot injuries in this cohort. For this article, we considered talus fractures as foot injuries. Achilles and deltoid ligament fractures were considered ankle injuries and thus excluded.

We subclassified severe injuries as those that were season- or career-ending, injuries with >30-day time loss, or operative injuries. A reportable AE was defined as 1 athlete participating in 1 NCAA-sanctioned practice or competition in which he or she was exposed to the possibility of an athletic injury regardless of the time associated with that participation. Operative injuries were defined as injuries in which athletes underwent surgical treatment for the reported injury. Recurrence was defined as injuries that occurred again in the same athlete after return to play. Season-ending injuries were defined as injuries in which the athletes did not return to sports during the academic year in which the injury was sustained, which included season- and career-ending injuries. Time loss was defined as the number of days missed after an injury in athletes who ultimately returned to play in the same season. Season- and career-ending injuries were excluded from time-loss calculations. Career-ending injuries were defined as those in which the player did not play the same sport at any point after the injury occurred.

Injury mechanism was defined as contact or noncontact. Contact mechanisms included contact with player, surface, equipment, or out-of-bounds object, while noncontact mechanisms were defined as overuse, illness, infection, or noncontact-related force. Whether the injury occurred during preseason, regular season, or postseason was also recorded.

Statistical Analysis

IRs per 100,000 AEs and percentages were calculated using injury counts over AEs. The overall rate, rate by sex, individual sports rate (25 sports), and annual injury trend were reported. Rate of operative injury, recurrence, injury mechanism, season of play, season-ending injury, and time loss were calculated by total counts of foot injuries. The distributions of the injury counts and time loss were examined. The incidence rate of foot injuries was calculated by measuring the total number of injuries among the overall AEs at risk. We used a Poisson regression model in which the

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injuries were the outcome with the offset of AEs to estimate the incidence rate with the corresponding 95% CI for the count data. The same model was used to estimate the incidence rate ratio by including sex/contact as an independent variable. The proportion of subgroup injury was provided with the corresponding permutation 95% CI. The point estimate as well as the robust 95% CI for the ratio of the male/contact injury proportion versus the female/noncontact injury proportion was obtained using the generalized estimating equation model with Poisson distribution to control for mild violation of the Poisson distribution assumption. Time loss was summarized as median and interquartile range because of a skewed distribution. The analyses were performed using SAS Version 9.4 (SAS Institute).

RESULTS

A total of 3607 foot injuries were reported in 25 NCAA sports from the 2004-2005 to 2013-2014 academic years, resulting in an overall IR of 30.62 per 100,000 AEs. Among all foot injuries, the operative rate was 4.6%, the season-ending rate 6.9%, and the career-ending rate 1.0%. For athletes who missed time for non-season-ending injuries, 55.1% returned to play within 1 week of injury, and 10.8% missed >30 days. The men's sports with the highest foot IRs were soccer (IR = 56.20), cross-country (IR = 38.91), basketball (IR = 38.77), and football (IR = 34.98). The women's sports with the highest foot IRs were gymnastics (IR = 88.58), cross-country (IR = 52.88), soccer (IR = 46.48), and outdoor track (IR = 46.28).

Severe Injury

Of the 3607 total foot injuries, 18.71% (675) were classified as severe, with an IR of 5.73. For athletes with severe foot injuries, the operative rate was 24.3%, the season-ending rate 37.0%, and the career-ending rate 4.4%. The proportion of recurrent injuries was 13.9%. The proportion of athletes with severe injuries who experienced recurrence was significantly higher than the recurrence proportion for all injuries. The proportion of severe contact injuries was significantly lower than the proportion of all contact injuries. The proportion of severe noncontact injuries was significantly greater than the proportion of all noncontact injuries (Table 1).

Injury Type

Among all 3607 injuries, the most common, outside of "other," were turf toe, fifth metatarsal fracture, and flexor/extensor injuries. Injuries with the highest contact/noncontact ratios were phalangeal fractures, Lisfranc injury, and turf toe. Injuries with the highest severe/non-severe injury ratios were fifth metatarsal fractures, midfoot fractures, and sesamoid fractures. The injuries with the highest operative rate were Lisfranc injury, fifth metatarsal fracture, and midfoot fracture. The injuries with the highest season-ending rates were Lisfranc injuries, midfoot fracture, and fifth metatarsal fractures. Injuries with the

TABLE 1
Proportion of Severe Foot Injuries

Foot Injuries	Injuries, %		Severe/All Ratio (95% CI)	P Value ^a
	Severe	All		
Operative	24.30	4.55	5.34 (4.37-6.53)	<.0001
Nonoperative	75.11	94.34	0.80 (0.76-0.83)	<.0001
Recurrence	13.93	9.59	1.45 (1.17-1.80)	.0006
Season ending	37.04	6.93	5.34 (4.58-6.24)	<.0001
Career ending	4.42	0.99	4.47 (2.56-7.82)	<.0001
Contact	42.07	49.93	0.84 (0.77-0.93)	.0004
Noncontact	57.48	47.55	1.21 (1.12-1.30)	<.0001
Male	62.07	62.74	0.99 (0.93-1.05)	.7446
Female	37.93	37.26	1.02 (0.92-1.13)	.7422

^aBold P values indicate statistical significance.

highest median time loss were fifth metatarsal fractures, sesamoid fractures, and midfoot fractures (Table 2).

Among all severe foot injuries, the most common injuries were fifth metatarsal fractures. The highest contact/noncontact injury ratios were phalangeal fracture, turf toe, and Lisfranc injury. The severe injuries with the highest operative rates were Lisfranc injuries, fifth metatarsal fractures, and midfoot fractures. The following severe injuries were associated with the highest season-ending IRs: Lisfranc injury, midfoot fracture, and general metatarsal fractures. Severe flexor/extensor injuries had the highest career-ending IRs, followed by turf toe. Severe injuries with the highest median time loss were sesamoid fractures, calcaneal fractures, and plantar fascial injuries (Table 3).

Sex

Across all sports, the severe IR for women (IR = 5.89) was slightly higher than for men (IR = 5.64). The men's sports with the highest severe foot IRs were basketball (IR = 10.71), indoor track (IR = 7.16), and football (IR = 7.08). The women's sports with the highest severe foot IRs were cross-country (IR = 17.15), gymnastics (IR = 14.76), and outdoor track (IR = 14.65). Male athletes had a significantly higher operation rate for severe foot injuries as compared with female athletes. Severe injuries sustained by male athletes were significantly more likely to be season-ending than severe injuries sustained by female athletes. These injuries were also more likely to be career-ending for male athletes. Finally, severe injuries sustained by male athletes were more likely to be due to contact than in female athletes (Table 4).

Severe injuries that occurred via contact mechanism were significantly more likely to be season-ending, whereas severe noncontact injuries were significantly more likely to be career-ending. For men's sports, the proportion of severe contact injuries was significantly greater than noncontact, whereas in women's sports, the proportion of severe noncontact injuries was significantly greater than the proportion of severe contact injuries (Table 5).

TABLE 2
Injury Characteristics Stratified by Type of Injury^a

Diagnosis	Overall Rate, %	Ratio			Rate, %				Time Loss, d, Median (IQR)
		Male / Female	Contact / Noncontact	Severe / Nonsevere	Operative	Recurrence	Season Ending	Career Ending	
Other	54.48	1.68	1.42	0.11	1.98	7.43	2.75	0.50	4 (1-8)
Turf toe	11.53	4.40	1.99	0.09	0.96	10.82	3.13	1.52	3 (1-8)
Fifth metatarsal fracture	11.01	1.76	0.48	2.03	21.16	17.13	24.94	2.41	35 (16-51)
Flexor / extensor injuries	9.40	1.22	0.40	0.07	0.59	6.78	2.36	1.83	4 (1-9)
Plantar fascia	4.30	0.74	0.09	0.09	0.65	14.84	2.58	0.00	0 (0-0.5)
Other metatarsal fractures	3.44	1.25	0.98	1.14	6.45	12.10	21.77	1.61	25.5 (6-44)
Midfoot fracture	1.83	0.61	0.28	1.75	15.15	21.21	28.79	0.00	28 (7-59)
Phalangeal fracture	1.47	1.52	7.83	0.18	0.00	1.89	3.77	0.00	8.5 (4-21)
Lisfranc injury	1.28	3.60	4.00	1.09	28.26	8.70	36.96	0.00	11 (6-45)
Sesamoid fracture	0.69	1.50	0.92	1.50	12.00	20.00	16.00	0.00	33.5 (6.5-104)
Calcaneus fracture	0.58	0.75	0.50	0.75	0.00	9.52	14.29	0.00	25 (0-60)

^aIQR, interquartile range.

TABLE 3
Severe Injury Characteristics Stratified by Type of Injury^a

Diagnosis	Overall Rate, %	Ratio		Rate, %				Time Loss, d, Median (IQR)
		Male / Female	Contact / Noncontact	Operative	Recurrence	Season Ending	Career Ending	
Fifth metatarsal fracture	38.27	2.02	0.56	31.58	14.66	37.22	3.52	48 (39-62)
Other	27.77	1.61	0.96	20.21	14.51	27.98	4.35	45 (33-63)
Other metatarsal fractures	9.50	1.20	1.20	12.12	9.09	40.91	2.50	44 (39-53)
Midfoot fracture	6.04	0.56	0.24	23.81	21.43	45.24	0.00	60 (40-90)
Turf toe	5.18	6.20	3.00	11.11	16.67	36.11	16.00	38 (33-47)
Flexor / extensor injuries	3.31	1.30	0.35	8.70	13.04	34.78	21.05	43 (34-52)
Lisfranc injury	3.45	5.00	1.88	54.17	8.33	70.83	0.00	58 (48-86)
Sesamoid fracture	2.16	2.00	1.50	20.00	6.67	26.67	0.00	81 (40-199)
Plantar fascia	1.87	0.44	0.00	7.69	15.38	30.77	0.00	64 (58-65)
Calcaneus fracture	1.29	0.80	0.29	0.00	11.11	33.33	0.00	64 (45-77)
Phalangeal fracture	1.15	1.00	3.00	0.00	0.00	25.00	0.00	46 (40-70)

^aIQR, interquartile range.

TABLE 4
Severe Injury Characteristics by Sex^a

Severe Foot Injury	Sex, %		Male/Female Ratio (95% CI)	P Value ^b
	Male	Female		
Operative	31.26	12.89	2.43 (1.71-3.44)	<.0001
Nonoperative	68.26	86.33	0.79 (0.73-0.86)	<.0001
Recurrence	14.80	12.50	1.18 (0.80-1.76)	.405
Season ending	45.11	23.83	1.89 (1.48-2.41)	<.0001
Career ending	6.02	1.90	3.18 (1.10-9.17)	.033
Time loss, median (IQR), d	45 (35-60)	48 (38-66)	—	.106
Contact	53.22	23.83	2.23 (1.76-2.83)	<.0001
Noncontact	46.54	75.39	0.62 (0.55-0.70)	<.0001

^aIQR, interquartile range. The dash indicates the ratio was not calculated for this variable.

^bBold P values indicate statistical significance.

TABLE 5
Severe Injury Characteristics by Contact Mechanism^a

Severe Foot Injury	Mechanism, %		Contact / Noncontact Ratio (95% CI)	P Value ^b
	Contact	Noncontact		
Operative	27.82	21.39	1.30 (1.00-1.70)	.054
Nonoperative	72.18	77.58	0.93 (0.85-1.02)	.116
Recurrence	11.27	15.98	0.71 (0.47-1.05)	.086
Season ending	44.72	29.90	1.50 (1.22-1.83)	<.0001
Career ending	6.96	2.56	2.72 (1.19-6.25)	.0183
Time loss, d, median (IQR)	45 (35-60)	48 (36-64)	—	.51
All men's sports	78.52	50.26	1.56 (1.39-1.75)	<.0001
All women's sports	21.48	49.74	0.43 (0.34-0.55)	<.0001

^aIQR, interquartile range. The dash indicates the ratio was not calculated for this variable.

^bBold P values indicate statistical significance.

DISCUSSION

The overall IR was 30.62 per 100,000 AEs, with an overall operative rate of 4.6%. In comparison with other studies, hip/groin injuries in NCAA athletes had an IR of 53.06 per 100,000 AEs, but only 1.3% of these patients required surgery.¹¹ Hamstring strains had an IR of 30.5 per 100,000 AEs, and quadriceps strains had an IR of 10.7 per 100,000 AEs.^{4,5} Similar numbers were reported for hip flexor and hip adductor strains.⁶ It is also important to compare foot IRs with knee IRs, as the knee is a common location for lower extremity injury in sports. To our knowledge, no recent study has reported on knee IRs in the NCAA; however, there are data on the incidence of knee injuries in high school athletes as well as the rates for specific ligamentous injuries in collegiate athletes.^{1,21} One study examining 5 years of high school athletic data cited a knee IR of 29.8 per 100,000 AEs.²¹ A study describing the epidemiology of NCAA anterior cruciate ligament (ACL) injuries in individual sports found football to be the men's sport with the highest IR (17 per 100,000 AEs) and lacrosse to be the women's sport with the highest IR (23 per 100,000 AEs).¹ The overall IRs for all sports were not indicated in this study.

Hunt et al⁹ reported on the epidemiology of collegiate foot injuries across 37 sports teams over 2 consecutive seasons at a single institution. This study indicated an IR of 3.80 per 1000 AEs, the equivalent of 380 per 100,000 AEs, which would be much higher than our rate of 30.62 using the NCAA-ISS database. The same study by Hunt et al cited higher foot IRs and time missed in women's sports. Consistent with their results, female athletes were more likely to miss >30 days because of injury. Conversely, we found similar IRs for men and women for all injuries as well as severe injuries. Furthermore, the following were significantly higher for male athletes when compared with female athletes: operative rates for all foot injuries, season-ending injuries, and proportion of contact injuries. Finally, Hunt et al reported an operative rate of 2.0%, whereas we found a higher operative rate of 4.6% using the NCAA-ISS database.

In the present study, a significant portion of all injuries were relatively minor and did not result in prolonged functional impairment: 55.1% resulted in a time loss between 0 and 6 days, with median time loss of 4 days. Furthermore, the operative rate for all injuries was low at 4.6%. Among all foot injuries, 6.9% were season-ending, and 1.0% were career-ending. Similarly, Lievers et al¹⁴ examined the epidemiology of all foot injuries in NCAA athletes using the same database, yet there are numerous fundamental differences between our studies. We examined 10 years of severe injuries across 25 unique teams, whereas Lievers et al looked at 5 years of data across 15 unique teams and did not differentiate by injury severity.¹⁴

It is important to note that some of our findings may be directly influenced by the way in which we defined "severe" injury. For example, >37% of severe injuries were season-ending. This is likely influenced by the fact that our definition requires ≥ 30 days to be missed and/or the presence of operative intervention. For many collegiate sports, 30 days may represent one-third or one-fourth of an entire season; therefore, the timing in which the injury occurred in relation to the season may influence whether it was determined to be season-ending. Additionally, many injuries that require surgery may cause a player to miss >30 days, which could contribute to this finding.

Within the severe injury subcategory, we examined individual diagnosis outcomes, mechanisms of injury, operative rates, sex-based discrepancies, and whether the injury was season- and/or career-ending. In terms of sex, men and women had similarly severe overall IRs. Severe foot injuries in men were most common in basketball, followed by indoor track and football. For women, severe injuries were most common in cross-country, followed by gymnastics and outdoor track. This is consistent with our findings that severe injuries in women are more likely to occur via a noncontact mechanism, whereas severe injuries in men are more likely to occur via contact (ie, football or basketball). Our findings suggest that women may be more likely to sustain significant overuse injuries, ultimately leading to a greater percentage of noncontact injuries.

These findings are consistent with a study by Ristolainen et al,¹⁸ which found female athletes to be at increased risk of overuse injuries to the ankle when compared with men. The exact cause of this difference is unclear, but 1 possible explanation is the female athlete triad. There is evidence in the literature showing that certain women's sports place pressure on women to maintain certain body weights, which can contribute to a triad of low energy, menstrual dysfunction, and decreased bone mineral density.¹⁶ These athletes are at significantly increased risk for certain overuse injuries, such as stress fractures.¹⁶ While the NCAA-ISS database does not provide any information regarding the health of individual athletes, this is 1 possible explanation that may contribute to our findings.

Interestingly, male athletes in our study had a much higher proportion of severe injuries to nonsevere injuries than female athletes. This contrasts prior data suggesting that female athletes experience more severe injuries than male athletes in high school and college sports.^{17,23} The discrepancy between male and female athletes with regard to men experiencing significantly more season- and career-ending foot injuries may be the result of several possibilities, including biological sex or hormone differences or training behaviors as well as differences in rules, regulations, or training protocols in sports.¹⁸ One consideration is the effect of estrogen on athletes, with studies showing that estrogen levels may affect performance and IRs, specifically placing women at increased risk for ligament injury.³ While women may be at increased risk for ligamentous injuries as a result of higher estrogen levels, the majority of injuries classified as severe in our study were fractures and other bony injuries, which may explain the increased career- and season-ending IRs in the male cohort. That said, the literature as it pertains to sex-based differences is somewhat limited, and there is presently no consensus for why we see these discrepancies.

Contact mechanisms were responsible for a greater percentage of all injuries, whereas noncontact mechanisms were responsible for a greater percentage of severe injuries. While this may seem counterintuitive, this is in line with other severe lower extremity injuries, such as ACL tears, which have been shown to occur because of a noncontact mechanism as often as 75% of the time.² Our findings, however, contradict a recent study examining 10 years of NCAA basketball ankle injury data, which show contact mechanisms to be responsible for a greater percentage of injuries.²² This discrepancy may be due to the fact that the study did not differentiate between all injuries and severe injuries. Furthermore, foot injuries were not included in their study, and only basketball was evaluated. Of note, stress fractures and other overuse injuries that occur secondary to a noncontact mechanism may be more likely to occur in the foot, given that the foot bears a larger load than other areas of the body during weight-bearing exercise.

Because noncontact mechanisms contributed to the majority of severe injuries in our study, this suggests that noncontact mechanisms are responsible for the majority of

severe foot injuries. However, it should be noted that season- and career-ending injuries were more likely to occur via a contact mechanism, suggesting that contact injuries may pose a greater threat to an athlete's career.

The present study has several limitations. First, this is a database study coded by athletic trainers and team physicians with no specific central guidelines. While some data are objective measurements, there are many variables with subjective components, including the diagnosis of injury. However, all the injuries are coded per the final diagnosis released by the athletic team, and NCAA-ISS has a rigorous data-monitoring and quality control system, limiting potential bias. Second, because of the subjectivity of the coding process, we created a subclassification of severe versus non-severe injuries. We based our cohort on time loss and/or operative intervention, which are significant factors but ultimately not the only criteria for an orthopaedist in determining whether an injury was severe. Additionally, as this is a database study, there is no standardized decision-making process for whether to pursue operative intervention across all athletes and providers.

Because we were not able to evaluate athletes after graduation, it is possible that certain seniors characterized as having career-ending injuries may not have actually had them. As a result, we may have slightly overestimated the prevalence of severe career-ending foot injuries. This is a limitation for which we could not control within the methodology of our study. Additionally, a season-ending injury may be influenced by the time of year in which it occurred. While the NCAA-ISS collects data from the first preseason practice through the final postseason game, to our knowledge, it does not specify which phase of the season an injury occurred. Therefore, we are unable to comment on severe IR differences among the preseason, regular season, and postseason. Finally, >50% of all included injuries in this study were grouped into the "other" category. While this is but a small portion of our statistical analysis, it suggests that 1 or more common injuries were not evaluated because they were grouped into the "other" category. However, only 27.77% of severe injuries were characterized as such, suggesting that, in line with the purpose of our study, the majority of severe injuries were included.

CONCLUSION

Foot injuries in NCAA athletes range from minor to devastating. Severe injuries are especially of interest to orthopaedic and sports medicine providers. Of all collegiate foot injuries sustained over a 10-year period, 18.7% were characterized as severe, and 24.3% of severe injuries required surgery. Basketball was the men's sport with the highest severe IR, and cross-country was the women's sport with the highest severe IR. Overall, female athletes experienced slightly higher severe foot IRs than male athletes. Future directions include breakdown of severity by all sports as well as the specific injuries most common to individual sports.

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