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# Epidemiology of Injuries in National Collegiate Athletic Association Women's Field Hockey: 2014–2015 Through 2018–2019

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***Context:*** The National Collegiate Athletic Association has sponsored women's field hockey since 1981, and team membership as well as student-athlete participation has grown over time.

***Background:*** Routine examinations of injuries sustained by athletes are important for identifying and understanding patterns that can be used to inform sport safety practices.

***Methods:*** Exposure and injury data collected in the National Collegiate Athletic Association Injury Surveillance Program from 2014–2015 through 2018–2019 were analyzed. Injury counts, rates, and proportions were used to describe injury characteristics, and injury rate ratios were used to examine differential injury rates.

***Results:*** The overall injury rate was 6.27 per 1000 athlete-exposures (AEs). Head/face injuries (16.0%) and thigh injuries (12.3%) were the most commonly injured body parts during the 2014–2015 through 2018–2019 academic years. Concussion (8.6%) was the most commonly reported injury, and concussion rates notably decreased between 2017–2018 and 2018–2019.

***Summary:*** Study findings were generally consistent with the existing epidemiologic evidence. Incidence rates and trajectories of commonly observed injuries warrant particular attention in the future.

***Key Words:*** NCAA field hockey, injury surveillance, descriptive epidemiology

**Key Points**

- The overall competition injury rate was higher than the practice injury rate; the competition injury rates fluctuated across the study period while practice injury rates remained relatively stable.
- Head/face injuries and thigh injuries accounted for the largest proportions of all reported injuries, and most reported injuries were classified as strains, contusions, and inflammatory conditions.
- The most common specific injuries reported were concussions and ankle sprains; concussions rates decreased during the last year of the study period.

The sport of field hockey is popular throughout the world, and widespread participation occurs among athletes of all ages.[1] Although field hockey is played by both men and women globally, it is primarily played by women at the collegiate level in the United States. The National Collegiate Athletic Association (NCAA) has sponsored women's field hockey programs at member institutions[2] since 1981–1982. In 2018–2019, 279 member institutions sponsored women's field hockey programs that competed as part of the NCAA. Given the number of NCAA-sponsored women's field hockey programs and the typical number of participants in each of those programs, there is a notable population of collegiate field hockey players in the United States. As such, it is important to understand the nature and frequency of the injuries sustained by NCAA women's field hockey players. Additionally, with the constant development of the game, it is important that the changing landscape of such injuries be assessed periodically in an effort to identify emerging patterns related to injury incidence and outcomes within the sport of women's field hockey.

Sports injury surveillance has been shown to be an effective method of routinely monitoring injury-related patterns in large populations of athletes.[3] The findings of such large-scale surveillance studies have been used to develop etiologic hypotheses, which have in turn driven targeted studies of specific injuries or of specific athlete subgroups.[3,4] One such large-scale injury surveillance system is the NCAA Injury Surveillance Program (ISP). The NCAA has maintained some form of an injury surveillance system since 1982, and after a series of

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adaptations, it is now in its current form (the NCAA-ISP).[5,6] For over 2 decades, the NCAA-ISP has captured data on women's field hockey–related injuries and has been instrumental in understanding and assessing the burden of injury in this group of athletes.[7,8] Previous authors studying NCAA women's field hockey–related injuries have reported overall injury rates of 5.36 per 1000 athlete exposures (AEs).[7] Additionally, in such previous studies of this population, authors have reported higher rates of injury during competition (7.87–8.49 per 1000 AEs) than during practice (3.70–4.32 per 1000 AEs).[7,8] The most commonly injured body parts among NCAA women's field hockey players are the hip/thigh/upper leg and knee during practices and the head/face and hand/wrist during competition.[7] The most common injuries are muscle/tendon strains, ligament sprains, and contusions.[7,8] Although previous work has been done in this population, follow-up is necessary to keep up with the changing landscape of the game as well as to identify temporal differences in injury risk and outcomes. Such follow-up studies and periodic evaluations of injury incidence and outcomes will help identify emerging patterns and inform injury prevention practices in an effort to improve student-athlete safety. As such, the purpose of this study is to describe the epidemiology of field hockey–related injuries captured among NCAA women's field hockey players between 2014–2015 and 2018–2019.

## METHODS

### Study Data

Women's field hockey exposure and injury data collected in the NCAA-ISP during the 2014–2015 through 2018–2019 academic years were analyzed in this study. The methods of the NCAA-ISP have been reviewed and approved as an exempt study by the NCAA Research Review Board. The NCAA-ISP methods for the 2014–2015 through 2018–2019 academic years are described separately within this special issue. Briefly, athletic trainers (ATs) at participating institutions contributed exposure and injury data using their clinical electronic medical record systems. A reportable injury was one that occurred due to participation in an organized intercollegiate practice or competition and required medical attention by a team certified AT or physician (regardless of time loss [TL]). Scheduled team practices and competitions were considered reportable exposures for this analysis. Data from 8 (3% of membership) participating field hockey programs in 2014–2015, 9 (3% of membership) in 2015–2016, 14 (5% of membership) in 2016–2017, 13 (5% of membership) in 2017–2018, and 32 (12% of membership) in 2018–2019 qualified for inclusion in analyses. Qualification criteria are detailed further in the methods manuscript.[9]

### Statistical Analysis

Injury counts and rates (per 1000 AEs; 1 AE was defined as 1 athlete participating in 1 exposure event) were examined across event types (practice, competition), competition levels (Division I, Division II, Division III), season segments (preseason, regular season, postseason), and by TL (TL, non-TL [NTL]). Poststratification sample weights by sport and division are established within the surveillance system to compute national estimates of injury events based on the sampled teams; weighted and unweighted rates were estimated for this study, and results are presented in terms of unweighted rates unless otherwise specified (because of low frequencies of injury observations across levels of certain covariates). Temporal trends in injury rates across the study period were described using rate profile plots stratified by levels of the aforementioned variables. Similarly, temporal trends in rates of most commonly reported injuries were also described across the study period. Injury counts and proportions were characterized by TL (TL, NTL), body part injured, mechanism of injury, injury diagnosis, player position, and activity at the time of injury. Injury rate ratios (IRRs) were used to examine differential injury rates across event types, competition levels, and season segments. Injury rate ratios with associated 95% CIs excluding 1.00 were considered statistically significant, and all analyses were conducted using SAS 9.4 (SAS Institute).

## RESULTS

A total of 781 women's field hockey injuries from 124 643 AEs were reported to the NCAA-ISP during the 2014–2015 through 2018–2019 academic years (rate = 6.27 per 1000 AEs). This equated to a national estimate of 15 510 injuries during the same time period (Table 1). Across the study period, the competition injury rate was higher than the practice injury rate (IRR = 2.17; 95% CI = 1.88, 2.50). Competition injury rates fluctuated across the study period and were highest in 2017–2018 (Figure A). In comparison, practice injury rates were less heterogeneous, particularly during the 2015–2016 through 2018–2019 academic years (Figure A). Across the study period, the overall Division I injury rate (4.49 per 1000 AEs) was lower than the Division II (6.12 per 1000 AEs) and Division III (9.18 per 1000 AEs) injury rates. Statistically significant differences were observed when comparing Division I and Division II rates (IRR = 0.49; 95% CI = 0.41, 0.58), as well as Division II and Division III rates (IRR = 0.67; 95% CI = 0.56, 0.79).

### Injuries by Season Segment

A total of 213 preseason injuries (national estimate = 4148), 521 regular-season injuries (national estimate = 10 837), and 47 postseason injuries (national estimate = 525) were reported between 2014–2015 and 2018–2019 (Table 2). No statistically significant differences were observed among season segments. Preseason injury rates steadily increased between 2014–2015 and 2017–2018, then decreased during the final year of the study (Figure B). In comparison, regular-season injury rates fluctuated throughout the study period (Figure B).

### Time Loss

Nearly one-third of all reported injuries (29.2%) resulted in TL of $\geq$1 day (TL was not reported in approximately 27% of all injuries). Time-loss injuries accounted for comparable proportions of both competition (28.3%) and practice injuries (29.8%). Competition-related injury rates decreased steadily between 2014–2015 and 2017–2018, then increased slightly thereafter (Figure C). In comparison, practice-related injury rates remained relatively stable throughout the study period (Figure C).

**Table 1. Reported and National Estimates of Injuries, Athlete-Exposures (AEs), and Rates per 1000 AEs by Event Type Across Divisions[a]**

| | Number<br>AEs<br>Rate per 1000 AEs (95% CI) | | | | | |
|---|---|---|---|---|---|---|
| | Overall | | Practices | | Competitions | |
| Division | Reported | National Estimate | Reported | National Estimate | Reported | National Estimate |
| I | 228 | 2895 | 140 | 1705 | 88 | 1191 |
| | 50 745 | 727 248 | 38 948 | 560 974 | 11 797 | 166 274 |
| | 4.49 (3.91, 5.08) | 3.98 (3.40, 4.56) | 3.59 (3.00, 4.19) | 3.04 (2.44, 3.63) | 7.46 (5.90, 9.02) | 7.16 (5.60, 8.72) |
| II | 251 | 1185 | 156 | 607 | 95 | 578 |
| | 41 014 | 222 455 | 32 842 | 177 875 | 8173 | 44 580 |
| | 6.12 (5.36, 6.88) | 5.33 (4.57, 6.08) | 4.75 (4.00, 5.50) | 3.41 (2.67, 4.16) | 11.62 (9.29, 13.96) | 12.97 (10.63, 15.30) |
| III | 302 | 11 429 | 177 | 6725 | 125 | 4704 |
| | 32 884 | 1 066 355 | 24 056 | 779 287 | 8828 | 287 068 |
| | 9.18 (8.15, 10.22) | 10.72 (9.68, 11.75) | 7.36 (6.27, 8.44) | 8.63 (7.55, 9.71) | 14.16 (11.68, 16.64) | 16.39 (13.90, 18.87) |
| Overall | 781 | 15 510 | 473 | 9037 | 308 | 6473 |
| | 124 643 | 2 016 059 | 95 846 | 1 518 137 | 28 797 | 497 922 |
| | 6.27 (5.83, 6.71) | 7.69 (7.25, 8.13) | 4.93 (4.49, 5.38) | 5.95 (5.51, 6.40) | 10.70 (9.50, 11.89) | 13.00 (11.81, 14.19) |

[a] Data presented in the order of reported number, followed by athlete exposures (AEs), estimated injury rates, and associated 95% Confidence Intervals (CIs) for each cross-tabulation of division and event types. Data pooled association-wide are presented overall, and separately for practices and competitions. National estimates were produced using sampling weights estimated on the basis of sport, division, and year. All CIs were constructed using variance estimates calculated on the basis of reported data. A reportable injury was one that occurred due to participation in an organized intercollegiate practice or competition, and required medical attention by a team Certified Athletic Trainer or physician (regardless of time loss). Only scheduled team practices and competitions were retained in this analysis.

## Injury Characteristics

Head/face injuries (16.0%), and thigh injuries (12.3%) accounted for the largest proportions of all reported injuries during the 2014–2015 through 2018–2019 academic years. Knee injuries and hand/wrist injuries were also common (Table 3). Head/face injuries accounted for a notably larger proportion of competition injuries (21.8%) than practice injuries (12.3%). Nearly one-third of all reported injuries were attributable to equipment/apparatus contact mechanisms (28.4%), and a considerably larger proportion of competition (41.2%) than practice injuries (20.1%) resulted from equipment/apparatus contact. Noncontact (22.9%) and overuse injuries (18.7%) also accounted for a notable proportion of all reported injuries overall, and larger proportions of practice injuries than competition injuries were attributable to both mechanisms (Table 3).

Overall, most women's field hockey injuries reported during the 2014–2015 through 2018–2019 academic years were broadly classified into diagnostic groups of strains (16.8%), contusions (16.1%), and inflammatory conditions (13.4%). Contusions accounted for a larger proportion of competition (24.0%) than practice injuries (11.0%). Conversely, strains and inflammatory conditions accounted for

**Table 2. Reported and National Estimates of Injuries, Athlete-Exposures (AEs), and Rates per 1000 AEs by Season Segment Across Divisions[a]**

| | Number<br>AEs<br>Rate per 1000 AEs (95% CI) | | | | | |
|---|---|---|---|---|---|---|
| | Preseason | | Regular Season | | Post Season | |
| Division | Reported | National Estimate | Reported | National Estimate | Reported | National Estimate |
| I | 55 | 680 | 154 | 2006 | 19 | 210 |
| | 12 743 | 181 604 | 34 403 | 489 898 | 3598 | 55 746 |
| | 4.32 (3.18, 5.46) | 3.74 (2.60, 4.89) | 4.48 (3.77, 5.18) | 4.09 (3.39, 4.80) | 5.28 (2.91, 7.66) | 3.77 (1.39, 6.14) |
| II | 75 | 304 | 157 | 829 | 19 | 52 |
| | 12 044 | 61 614 | 26 521 | 154 177 | 2449 | 6664 |
| | 6.23 (4.82, 7.64) | 4.93 (3.52, 6.34) | 5.92 (4.99, 6.85) | 5.38 (4.45, 6.30) | 7.76 (4.27, 11.25) | 7.80 (4.31, 11.29) |
| III | 83 | 3164 | 210 | 8002 | 9 | 263 |
| | 8311 | 267 948 | 23 322 | 759 846 | 1251 | 38 561 |
| | 9.99 (7.84, 12.14) | 11.81 (9.66, 13.96) | 9.00 (7.79, 10.22) | 10.53 (9.31, 11.75) | 7.19 (2.49, 11.89) | 6.82 (2.12, 11.52) |
| Overall | 213 | 4148 | 521 | 10 837 | 47 | 525 |
| | 33 098 | 511 167 | 84 247 | 1 403 920 | 7298 | 100 972 |
| | 6.44 (5.57, 7.30) | 8.11 (7.25, 8.98) | 6.18 (5.65, 6.72) | 7.72 (7.19, 8.25) | 6.44 (4.60, 8.28) | 5.20 (3.36, 7.04) |

[a] Data presented in the order of reported number, followed by athlete exposures (AEs), estimated injury rates, and associated 95% Confidence Intervals (CIs) for each cross-tabulation of division and event types. Data pooled association-wide are presented overall, and separately for practices and competitions. National estimates were produced using sampling weights estimated on the basis of sport, division, and year. All CIs were constructed using variance estimates calculated on the basis of reported data. A reportable injury was one that occurred due to participation in an organized intercollegiate practice or competition, and required medical attention by a team Certified Athletic Trainer or physician (regardless of time loss). Only scheduled team practices and competitions were retained in this analysis.

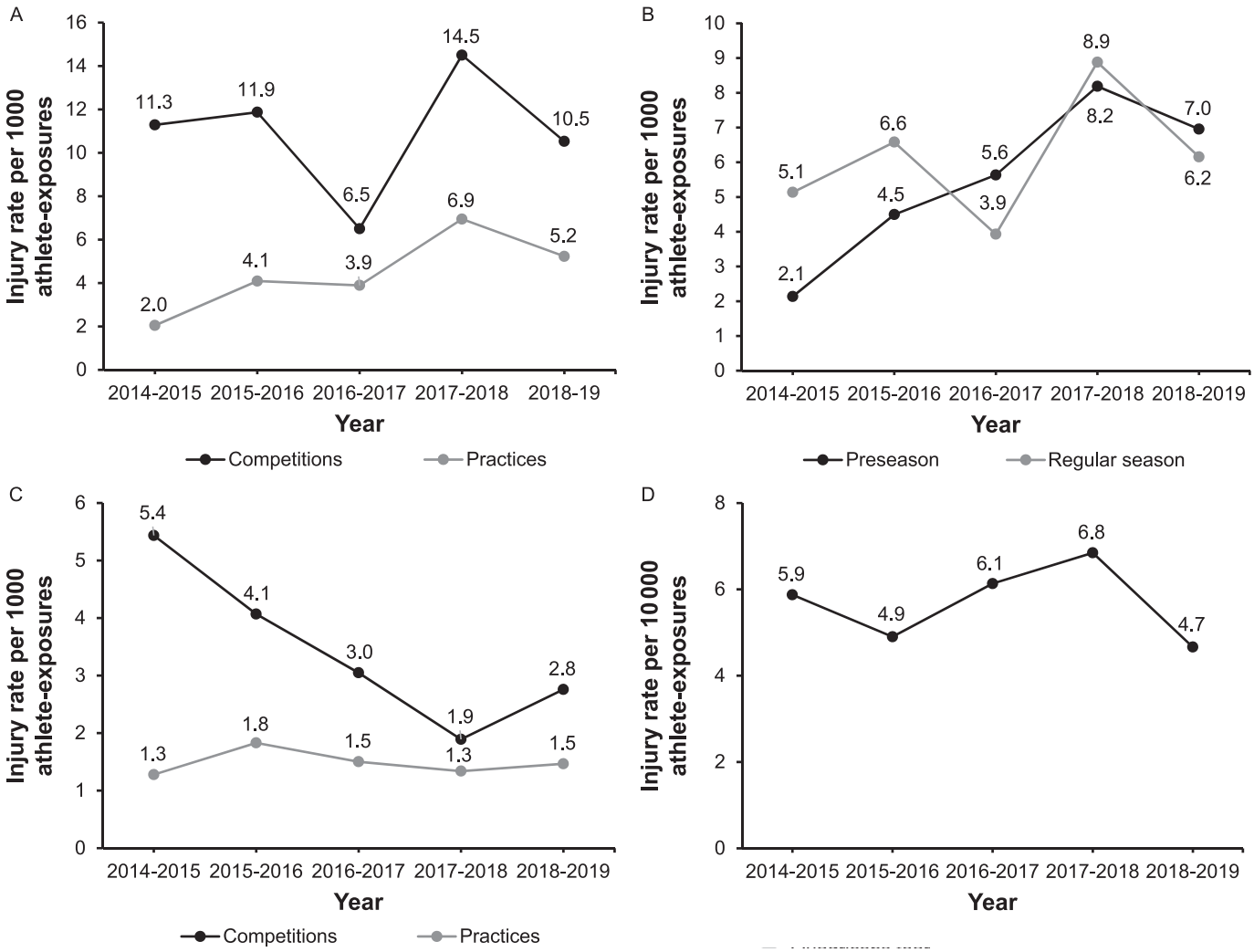


**Figure. Temporal patterns in injury rates between 2014–2015 and 2018–2019. A, Overall injury rates (per 1000 athlete-exposures [AEs]) stratified by event type (practices, competitions). B, Injury rates (per 1000 AEs) stratified by season segment (postseason rates not displayed because of low injury frequencies reported). C, Rates (per 1000 AEs) of time-loss injuries stratified by event type (practices, competitions). D, Rates (per 10 000 AEs) of most commonly reported injuries. Rates presented in all figures are unweighted and based on reported data.**

larger proportions of practice than competition injuries (Table 3). The most commonly reported specific injuries during the study period were concussions (8.6%), and partial or complete lateral ligament complex tears (ankle sprains) (6.7%). Concussion rates remained relatively stable between 2014–2015 and 2018–2019; however, a notable decrease in the rate (upon visual inspection of temporal patterns) was observed during the last year of the study (Figure D). Temporal patterns in rates of lateral ligament complex tears were not examined because of low frequencies reported during certain years of the study period.

### Injuries by Field Hockey–Specific Activities and Playing Positions

Most injuries in women's field hockey during the 2014–2015 through 2018–2019 academic years occurred during general play (36.6%). Defending also accounted for a considerable proportion (12.6%) of all injuries, and a larger proportion of competition (21.4%) than practice injuries (6.8%) was attributable to this activity. Conversely, general play accounted for comparable proportions of competition (33.8%) and practice injuries (38.5%). With regard to playing positions, defenders, midfielders, and forwards/attackers all accounted for comparable proportions of injured field hockey players during the study period (Table 4).

## SUMMARY

We aimed to describe the epidemiology of sports-related injuries that occurred among NCAA women's field hockey players during the 2014–2015 through 2018–2019 academic years. Across the study period, practice and competition injury rates were comparable to those reported in previous studies of NCAA women's field hockey injuries.[7,8] It also continued to hold true that the rates of injury during competition remain higher than those of practice.[7,8] After a sharp increase, competition injury rates declined from 2017–2018 to 2018–2019. Although the driving factor of this decline remains unknown, it is important that these rates continue to be monitored to determine any continuation in this trend. Further, significant differences in injury rates across divisions were observed, with highest injury rates in

**Table 3. Distribution of Injuries by Body Part, Mechanism, and Injury Diagnosis, Stratified by Event Type[a]**

| | Overall | | Competitions | | Practices | |
|---|---|---|---|---|---|---|
| | Injuries Reported, No. (%) | National Estimates, No. (%) | Injuries Reported, No. (%) | National Estimates No. (%) | Injuries Reported, No. (%) | National Estimates, No. (%) |
| Injury site | | | | | | |
| Head/face | 125 (16.01) | 2528 (16.30) | 67 (21.75) | 1722 (26.60) | 58 (12.26) | 806 (8.92) |
| Neck | 8 (1.02) | 202 (1.30) | 7 (2.27) | 189 (2.92) | 1 (0.21) | 13 (0.14) |
| Shoulder | 25 (3.20) | 302 (1.95) | 15 (4.87) | 202 (3.12) | 10 (2.11) | 100 (1.11) |
| Arm/elbow | 7 (0.90) | 85 (0.55) | 1 (0.32) | 3 (0.05) | 6 (1.27) | 82 (0.91) |
| Hand/wrist | 87 (11.14) | 1490 (9.61) | 52 (16.88) | 1010 (15.60) | 35 (7.40) | 480 (5.31) |
| Trunk | 67 (8.58) | 1442 (9.30) | 24 (7.79) | 401 (6.19) | 43 (9.09) | 1041 (11.52) |
| Hip/groin | 54 (6.91) | 1059 (6.83) | 10 (3.25) | 189 (2.92) | 44 (9.30) | 870 (9.63) |
| Thigh | 96 (12.29) | 1874 (12.08) | 29 (9.42) | 506 (7.82) | 67 (14.16) | 1368 (15.14) |
| Knee | 91 (11.65) | 1689 (10.89) | 34 (11.04) | 568 (8.77) | 57 (12.05) | 1122 (12.42) |
| Lower leg | 68 (8.71) | 1829 (11.79) | 20 (6.49) | 549 (8.48) | 48 (10.15) | 1280 (14.16) |
| Ankle | 67 (8.58) | 1239 (7.99) | 24 (7.79) | 531 (8.20) | 43 (9.09) | 707 (7.82) |
| Foot | 51 (6.53) | 1211 (7.81) | 19 (6.17) | 462 (7.14) | 32 (6.77) | 749 (8.29) |
| Other | 35 (4.48) | 560 (3.61) | 6 (1.95) | 141 (2.18) | 29 (6.13) | 419 (4.64) |
| Mechanism | | | | | | |
| Player contact | 66 (8.45) | 1469 (9.47) | 46 (14.94) | 1132 (17.49) | 20 (4.23) | 338 (3.74) |
| Surface contact | 45 (5.76) | 786 (5.07) | 19 (6.17) | 416 (6.43) | 26 (5.50) | 371 (4.11) |
| Equipment/apparatus contact | 222 (28.43) | 4079 (26.30) | 127 (41.23) | 2634 (40.69) | 95 (20.08) | 1445 (15.99) |
| Noncontact | 179 (22.92) | 3515 (22.66) | 48 (15.58) | 890 (13.75) | 131 (27.70) | 2625 (29.05) |
| Overuse | 146 (18.69) | 3895 (25.11) | 36 (11.69) | 932 (14.40) | 110 (23.26) | 2963 (32.79) |
| Other/unknown | 123 (15.75) | 1765 (11.38) | 32 (10.39) | 470 (7.26) | 91 (19.24) | 1294 (14.32) |
| Diagnosis | | | | | | |
| Abrasion/laceration | 33 (4.23) | 512 (3.30) | 19 (6.17) | 359 (5.55) | 14 (2.96) | 153 (1.69) |
| Concussion | 67 (8.58) | 1496 (9.65) | 36 (11.69) | 1002 (15.48) | 31 (6.55) | 495 (5.48) |
| Contusion | 126 (16.13) | 2260 (14.57) | 74 (24.03) | 1429 (22.08) | 52 (10.99) | 832 (9.21) |
| Dislocation/subluxation | 6 (0.77) | 79 (0.51) | 4 (1.30) | 46 (0.71) | 2 (0.42) | 33 (0.37) |
| Fracture | 43 (5.51) | 832 (5.36) | 24 (7.79) | 519 (8.02) | 19 (4.02) | 313 (3.46) |
| Illness/infection | 2 (0.26) | 60 (0.39) | 0 (0.0) | 0 (0.0) | 2 (0.42) | 60 (0.66) |
| Inflammatory condition | 105 (13.44) | 2716 (17.51) | 22 (7.14) | 649 (10.03) | 83 (17.55) | 2067 (22.87) |
| Spasm | 29 (3.71) | 620 (4.00) | 5 (1.62) | 29 (0.45) | 24 (5.07) | 591 (6.54) |
| Sprain | 100 (12.80) | 1838 (11.85) | 46 (14.94) | 890 (13.75) | 54 (11.42) | 949 (10.50) |
| Strain | 131 (16.77) | 2654 (17.11) | 40 (12.99) | 863 (13.33) | 91 (19.24) | 1790 (19.81) |
| Other | 139 (17.80) | 2442 (15.74) | 38 (12.34) | 687 (10.61) | 101 (21.35) | 1754 (19.41) |

[a] Data presented in the order of reported number, followed by the proportion of all injuries attributable to a given category. Data pooled across event types are presented overall, and separately for practices and competitions. National estimates were produced using sampling weights estimated on the basis of sport, division, and year. A reportable injury was one that occurred due to participation in an organized intercollegiate practice or competition, and required medical attention by a team Certified Athletic Trainer or physician (regardless of time loss). Only scheduled team practices and competitions were retained in this analysis.

Division III. These differences may be multifactorial in nature and may have resulted from variations in AT staffing and off-season training patterns.[10] Clinicians should also be aware of additional factors that influence injury reporting, such as external pressures and player roles, which may also both vary across divisions.[11–13] Additionally, the overall injury rate was similar throughout all segments of the season (preseason, regular season, and postseason). Although regular-season injury rates fluctuated slightly, preseason injuries increased slightly from 2014–2015 to 2017–2018 before leveling off in 2018–2019. Preseason and regular-season injury rates remained comparable across the study period. This differs from previous findings that have suggested a higher injury rate during the preseason and a significantly lower injury rate during the postseason.[7] Given the results of this study and the findings of previous studies, both preseason and postseason injury risk should be further assessed and explored in this population. Albeit in other sporting contexts, reducing preseason injuries has been shown to have a protective effect with regards to injury risk in later segments of the season (as a result of preventing initial injuries that may predispose athletes to recurrent or related injuries).[14] With that said, in examining the injury rates presented here, the challenge of precisely measuring at-risk exposure time must also be considered within this context. This has been previously discussed as it relates to sports injury surveillance,[15] and may have affected the injury rates estimated in this study because of the nature of the sport of field hockey. Representing exposure time in terms of aggregated AEs may not precisely capture at-risk exposure time in field hockey because of the fluid nature of the sport. Future authors may consider alternative methods for capturing exposure time (for instance, with wearable devices) more accurately, which can then be used to provide robust estimates of injury risk overall and during specific season segments.

Women's field hockey injuries reported during the 2014–2015 through 2018–2019 academic years were most commonly classified into diagnostic groups of strains, contusions, and inflammatory conditions, which remains

**Table 4. Distribution of Injuries by Women's Field Hockey–Specific Activities and Player Position**

| | Overall | | Competitions | | Practices | |
|---|---|---|---|---|---|---|
| | Injuries Reported, No. (%) | National Estimates, No. (%) | Injuries Reported, No. (%) | National Estimates No. (%) | Injuries Reported, No. (%) | National Estimates, No. (%) |
| Activity | | | | | | |
| Ball handling | 25 (3.20) | 478 (3.08) | 13 (4.22) | 293 (4.53) | 12 (2.54) | 185 (2.05) |
| Blocking shot | 20 (2.56) | 513 (3.31) | 13 (4.22) | 312 (4.82) | 7 (1.48) | 201 (2.22) |
| Conditioning | 28 (3.59) | 681 (4.39) | 0 (0.0) | 0 (0.0) | 28 (5.92) | 681 (7.54) |
| Defending | 98 (12.55) | 1767 (11.39) | 66 (21.43) | 1273 (19.67) | 32 (6.77) | 494 (5.47) |
| General play | 286 (36.62) | 6558 (42.28) | 104 (33.77) | 2353 (36.35) | 182 (38.48) | 4205 (46.53) |
| Goaltending | 43 (5.51) | 779 (5.02) | 11 (3.57) | 184 (2.84) | 32 (6.77) | 595 (6.58) |
| Chasing/diving for ball | 22 (2.82) | 493 (3.18) | 10 (3.25) | 348 (5.38) | 12 (2.54) | 146 (1.62) |
| Penalty corner/shot | 18 (2.30) | 230 (1.48) | 11 (3.57) | 147 (2.27) | 7 (1.48) | 83 (0.92) |
| Passing | 15 (1.92) | 208 (1.34) | 5 (1.62) | 30 (0.46) | 10 (2.11) | 178 (1.97) |
| Receiving pass | 18 (2.30) | 262 (1.69) | 11 (3.57) | 135 (2.09) | 7 (1.48) | 127 (1.41) |
| Shooting | 25 (3.20) | 441 (2.84) | 11 (3.57) | 284 (4.39) | 14 (2.96) | 157 (1.74) |
| Running | 73 (9.35) | 1339 (8.63) | 12 (3.90) | 279 (4.31) | 61 (12.90) | 1060 (11.73) |
| Other/unknown | 110 (14.08) | 1760 (11.35) | 41 (13.31) | 834 (12.88) | 69 (14.59) | 926 (10.25) |
| Position | | | | | | |
| Goalkeeper | 72 (9.22) | 1233 (7.95) | 17 (5.52) | 281 (4.34) | 55 (11.63) | 952 (10.53) |
| Defender | 207 (26.50) | 4727 (30.48) | 94 (30.52) | 2088 (32.26) | 113 (23.89) | 2639 (29.20) |
| Midfielder | 226 (28.94) | 3846 (24.80) | 95 (30.84) | 1759 (27.17) | 131 (27.70) | 2087 (23.09) |
| Forward/attacker | 215 (27.53) | 4721 (30.44) | 87 (28.25) | 1967 (30.39) | 128 (27.06) | 2754 (30.47) |
| Other/unknown | 61 (7.81) | 982 (6.33) | 15 (4.87) | 378 (5.84) | 46 (9.73) | 604 (6.68) |

[a] Data presented in the order of reported number, followed by the proportion of all injuries attributable to a given category. Data pooled across event types are presented overall, and separately for practices and competitions. National estimates were produced using sampling weights estimated on the basis of sport, division, and year. A reportable injury was one that occurred due to participation in an organized intercollegiate practice or competition, and required medical attention by a team Certified Athletic Trainer or physician (regardless of time loss). Only scheduled team practices and competitions were retained in this analysis.

mostly consistent with previous studies.[7,8] Injuries diagnosed as contusions and injuries to the head/face and wrist/hand accounted for greater proportions of competition than practice injuries, whereas injuries diagnosed as strains and inflammatory conditions accounted for greater proportions of practice than competition injuries. Notably, NCAA regulations permit the use of hand protection in women's field hockey, and given the results observed here, it may be salient for future authors to examine the effectiveness of hand protection in preventing hand/wrist injuries (such as hand/finger contusions, which were also a commonly reported injury during this time period) in this population.[16] Additionally, almost one-third of injuries sustained were the result of contact with equipment/apparatus. Previous researchers have shown similar proportions of competition-related head/face injuries among this population, as well as similar proportions of competition injuries being caused by contact with equipment/apparatus.[7,8] Although the analyses presented here do not allow for etiologic inferences, these results highlight continued trends in injury incidence that warrant further exploration. Regulations have been adopted at other levels of play in an effort to prevent head/face (specifically eye) injuries, including the requirement of eye protection at the high school level beginning in 2011.[17] Additionally, and although not required, many teams have adopted the use of full-face masks during defensive corners. Both of these activities may be used to reduce the burden of head/face injuries, yet smaller, pointed studies should be conducted to address their efficacy, as head/face injuries remain one of the most prevalently reported injuries among NCAA field hockey athletes.

The most commonly reported specific injuries during the study period were concussions and ankle sprains. The concussion rates in previous studies vary greatly from those observed here,[7] and over the study period concussion incidence slowly rose before a notable decline during the last year. Importantly, ISP participation among NCAA field hockey programs also improved across the study period, and it may be reasonable to suggest that estimates from the latter years of this study offer a more stable representation of injury incidence in this population (as compared with the earlier years). Because concussions have garnered much attention in the media in recent years and the body of evidence-based literature surrounding concussion has evolved greatly, the observed fluctuation may be attributed to numerous factors. These factors may include, but are not limited to, greater awareness of concussive injury, a potential lack of knowledge related to signs, symptoms, and severity of the injury, as well as team culture and other perceived internal and external pressures.[18–20] With that said, surveillance-based studies are best positioned for hypothesis generation, and the trends observed here warrant further, targeted attention. Smaller-scale studies of concussions affecting this population in the future are needed to further inform and understand these variations as well as others that may exist by division or season segment. In examining these findings, it is yet important to acknowledge that these results may not be representative of all NCAA women's field hockey athletes. Although ISP participation among women's field hockey programs has continually grown since its inception, participation varies across NCAA divisions. Because of the potential variability in the competitive season structure and access to sports medicine resources across these divisions, this differential participation is pertinent to these findings.

Further insights and more information about the changing landscape of the injury burden in NCAA women's field hockey will require the continued monitoring of this population. Such routine injury surveillance should also involve monitoring the trajectory of most commonly reported specific injuries. In the interim, ATs providing care to field hockey athletes can use these findings to inform their clinical practice by ensuring that they are poised to recognize common injuries sustained during field hockey practice and competition, as well as to develop and implement prevention programs that may help to limit the occurrence of such injuries. As mentioned above, although surveillance-based studies are important in identifying emerging temporal patterns, future studies with more targeted aims should work to reconcile the observed results and begin to explore the etiology of the epidemiologic patterns described here.

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