

# The Epidemiology of Hip and Groin Injuries in Professional Baseball Players

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## Abstract

Injuries of the hip and groin among professional baseball players can result in a significant number of disabled list days. The epidemiology of these injuries has not been delineated. The purpose of this study is to describe the incidence, mechanism, type, and rehabilitation course of hip and groin injuries among Major League Baseball (MLB) and Minor League Baseball (MiLB) players.

The MLB injury database for hip and groin injuries from 2011-2014 was analyzed. Occurrence of injuries was assessed based on level of play, field location, activity during which the injury occurred, mechanism of injury, and days missed. The treatment was recorded as nonoperative or surgical. The subsequent rehabilitation and return to play were recorded. Chi-square tests were used to test the hypothesis of equal proportions between the various categories of hip and groin characteristics.

From 2011-2014, 1823 hip and groin injuries occurred among MLB and MiLB players, which accounted for approximately 5% of

all injuries. Of these, 1514 (83%) occurred among MiLB players and 309 (17%) among MLB players; 96% of injuries were extra-articular. Among all players, a noncontact mechanism during defensive fielding was the most common activity causing injury (74%), and infielders experienced the most hip and groin injuries (34%). The majority of extra-articular injuries were treated nonoperatively (96.2%), resulting in an average of 12 days missed. Intra-articular pathology more commonly required surgery, and resulted in an average of 123 days missed.

Hip and groin injuries can be debilitating and result in a significant number of days missed. Intra-articular pathology and athletic pubalgia were usually treated surgically, while the majority of extra-articular hip injuries were treated successfully with nonoperative modalities. Correct diagnosis and appropriate treatment can lead to a high rate of return to play for professional baseball players with injuries to the hip and groin.

Injuries around the hip and groin occurring in professional baseball players can present as muscle strains, avulsions, contusions, hip subluxations or dislocations, femoroacetabular impingement (FAI) causing labral tears or chondral defects, and athletic pubalgia.<sup>1-9</sup> Several recent articles have reported on the epidemiology of musculoskeletal injuries in Major League Baseball (MLB) players<sup>4,8,10</sup> but with little attention to injuries to the hip and groin, likely because prior studies show only a 6.3% overall incidence for these injuries, much

less than the more commonly discussed shoulder or elbow injuries.<sup>8</sup> Despite the lower proportion of hip and groin injuries overall, these injuries lead to a relatively long period of disability for the players and often have a high rate of recurrence.<sup>4,8,9</sup>

The important contribution of hip mechanics and the surrounding muscular function in the kinetic chain during overhead athletic activities, such as a tennis serve or throwing, has recently been discussed.<sup>11,12</sup> In sports requiring overhead activities, trunk rotation is a key component to

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generating force, and hip internal and external rotation is necessary for this trunk rotation to occur.<sup>12,13</sup> Alterations in hip morphology causing constrained motion, as seen in FAI, may predispose an overhead throwing athlete to intra-articular injury such as labral tears or chondral injuries, or to a compensatory movement pattern causing an extra-articular soft tissue injury about the hip.<sup>12</sup> Decreased hip range of motion may also lead to increased forces across the upper extremity during the throwing motion, which puts the shoulder and elbow at increased risk of injury.<sup>12</sup>

Increased awareness of hip and groin injuries, advances in diagnostic imaging, and an understanding of the relationship between the throwing motion in baseball and hip mechanics have improved our ability to appropriately identify and treat athletes with injuries of the hip and groin. Several studies on hip and groin injuries in elite athletes treated both operatively and nonoperatively have reported a high rate of return to sport.<sup>3,7,14-19</sup> A systematic review on return to sport following hip arthroscopy for intra-articular pathology associated with FAI showed a 95% return to sport rate and a 92% rate of return to pre-injury level of play in a subgroup of professional athletes in 9 studies.<sup>20</sup>

Despite the large body of literature on upper extremity injuries, there is no study specifically focusing on the epidemiology of hip and groin injuries in MLB or Minor League Baseball (MiLB) players. The incidence of all injuries in professional baseball players has steadily increased over the last 2 decades,<sup>8</sup> and the reported incidence of hip and groin injuries will likely increase as well. The current incidence of this injury, the positions most at risk, the mechanism of injury, and the time to return to sport are important to understand given the large number of players who participate in baseball not only at a professional level, but also at an amateur level, where this information may also be applicable. This information could improve our efforts at prevention and rehabilitation of these injuries, and can guide efforts to counsel and train players at high risk of a hip or groin injury. To address this gap in the literature, the purpose of this study was to describe the epidemiology of hip and groin injuries in MLB and MiLB players from 2011 to 2014.

## Materials and Methods

### Population and Sample

US MLB is comprised of the major and minor leagues. The major leagues are divided into 30 clubs, with 25 active players, for a total of 750 active

players. Each club has a 40-man roster consisting of 25 active players and up to 15 additional players who are either not active or optioned to the minor leagues. The minor leagues are comprised of a network of over 200 clubs that are each affiliated with a major league club, and organized by geography and level of play. The minor leagues consist of roughly 7500 players, of whom about 6500 are actively playing at any given time. The entire population of players in the MLB who sustained a hip or groin injury over the study period was eligible for this study.

### Data

The MLB's Health and Injury Tracking System (HITS) is a centralized database that contains the de-identified medical data from the electronic medical record (EMR) system. Data on all injuries are entered into the EMR by each team's certified athletic trainer. An injury is defined as any physical complaint sustained by a player that affects or limits participation in any aspect of baseball-related activity (eg, game, practice, warm-up, conditioning, weight training). The data extracted from HITS only relates to injuries that resulted in lost game time for a player and that occurred during spring training, regular season, or postseason play; off-season injuries were not included. Injury events that were classified as "season-ending" were not included in the analysis of assessing days missed because many of these players may not have been cleared to play until the beginning of the following season. For each injury, data were collected on the diagnosis, body part, activity, location, and date of injury.

### Materials and Methods

Hip and groin injuries were defined as cases having a body region variable classified as "hip/groin" or a Sports Medicine Diagnostic Coding System (SMDCS) that included any "adductor" or "hernia" or "hip pointer" labels. Cases categorized as inguinal and femoral hernia (n = 26) and testicular contusions (n = 87) were excluded. Characteristics about each hip and groin injury were also extracted from HITS. These variables included level of play, player position (activity at the time of injury), field location, injury mechanism, chronicity of the injury, and days missed. Chronicity of the injury was documented as acute, overuse, or undetermined. For level of play, the injury event was categorized as the league in which the game was played when the injury occurred. Players were excluded if they had an unknown level of play or were in the amateur league. The injuries of the hip and groin were

further classified as intra-articular and extra-articular. Treatment for each injury was characterized as surgical or nonsurgical, and correlated with days missed for each type of injury.

### Statistical Analysis

Data for the 2011-2014 seasons were combined, and results presented for all players and separately for MiLB and MLB. Frequencies and comparative analyses for hip and groin injuries were performed across the aforementioned injury characteristics. The distribution of days missed for the variables considered was often skewed to the right, even after excluding the season-ending injuries; hence, the mean days missed was often larger than the median days missed. Reporting the median would allow for a robust estimate of the expected number of days missed, but would down weight those instances when hip and groin injuries result in much longer missed days, as reflected by the mean. Because of the importance of the days missed measure for professional baseball, both the mean and median are presented. Chi-square tests were used to test the hypothesis of equal proportions between the various categories of hip and groin characteristics, with statistical significance determined at the  $P = .05$  level.

In order to estimate exposure, the average number of players per team per game was calculated based on analysis of regular season game participation via box scores that are publicly available. This average number over a season, multiplied by the number of team games at each professional level of baseball, was used as an estimate of athlete exposures in order to provide rates comparable to those of other injury surveillance systems. Injury rates were reported as injuries per 1000 athlete-exposures (AE) for those hip and groin injuries that occurred during the regular season. It should be noted that the number of regular season hip and groin injuries and the subsequent AE rates are based on injuries that were deemed work-related

during the regular season. This does not necessarily include injuries occurring during the course of a game, but injuries in game preparation as well. Due to the variations in spring training games and fluctuating rosters, an exposure rate could not be calculated for spring training hip and groin injuries.

Data analysis was performed in the R statistical computing Environment (R Core Team 2014). Study procedures were approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board.

### Results

#### Overall Summary

A total of 1823 hip and groin injuries occurred from 2011-2014, with 83% occurring in MiLB and 17% occurring in MLB (**Table 1**). There were 1146 acute injuries, 252 overuse injuries, and 425 injuries of undetermined chronicity. The average age of players experiencing a hip and groin injury in MiLB was 22.9 years compared to 29.7 years in MLB. Of the 1514 hip and groin injuries in MiLB, 76 (5.0%) required surgery and of the 309 hip and groin injuries in MLB, 24 (7.8%) required surgery. Compared to league-wide injury events, hip and groin injuries ranked 6th highest in prevalence in MiLB and 8th highest in prevalence in MLB, accounting for 5.4% and 5.6%, respectively, of the 28,116 MiLB and 5507 MLB injury events that occurred between 2011-2014.

For regular season games, it was estimated that there were 1,197,738 MiLB and 276,608 MLB AE from 2011-2014. The overall hip and groin rate across both MLB and MiLB was 1.2 per 1000 AE, based on the 238 and 1152 regular season hip and groin injuries in MLB and MiLB, respectively. The rate of hip and groin injury was 1.5 times more likely in MiLB than in MLB ( $P < .0001$ ) (rate of 1.26 per 1000 AE in MiLB and 0.86 per 1000 AE in MLB).

#### Characteristics of Injuries

Injury activity was based on the position being played at the time of injury, with categories of

Table 1. General Summary of 1823 Hip and Groin Injuries, 2011-2014

	N	Age (Mean [SD])	Mean (Median) Days Missed	Required Surgery
MiLB	1514 (83.0%)	22.9 (3.7)	13.8 (7.0)	76 (5.0%) <sup>a</sup>
MLB	309 (17.0%)	29.7 (4.1)	14.7 (5.0)	24 (7.8%) <sup>a</sup>
Total	1823			

<sup>a</sup>Percent within level of play. Abbreviations: MiLB, Minor League Baseball; MLB, Major League Baseball.

infield and outfield corresponding to fielding activities (defense), with batting and base runner categories corresponding to activities while on offense (Table 2). The occurrence of hip and groin injuries while players are fielding on defense (MiLB 33.0%, MLB 37.2%, all players 33.8%) was significantly greater compared to injuries while batting and base running on offense (MiLB 24.9%, MLB 21.7%, all players 24.3%) (all *P* values < .001). There was a high percentage of missing data for the event position variable, which resulted from this field not being available in HITS for 2011. Time lost due to hip and groin injuries was similar across leagues with respect to injury activity, ranging on average between 8 and 18 days.

There were statistically significant differences for MiLB and MLB separately, and combined, in the number of hip and groin injuries by field location (all *P* values < .0001) (Table 2). For MiLB, MLB, and

across both leagues, by injury location, the majority of hip and groin injuries occurred in the infield (MiLB 34.1%, MLB 35.3%, all players 34.3%). As a single location, the pitcher's mound accounted for a large proportion of hip and groin injuries (MiLB 19.2%, MLB 23.3%, all players 19.9%). Time lost due to hip and groin injuries was similar across leagues with respect to field location, ranging on average between about 10 and 22 days. Among all players, injuries on the pitcher's mound resulted in the largest mean days missed after injury.

There were statistically significant differences across the mechanisms of injury for MiLB and MLB, as well as both leagues combined (all *P* values < .0001) (Table 2). The majority of hip and groin injuries were noncontact-related (MiLB 73.7%, MLB 75.7%, all players 74.1%) compared to those resulting from some form of contact (MiLB 11.4%, MLB 12.6%, all players 11.7%) or other mecha-

Table 2. Description of 1823 Minor and Major League Players with Hip and Groin Injury, 2011-2014

	All Players (N = 1823)		Minor League (N = 1514)		Major League (N = 309)	
	n (%)	Mean Days Missed (Median)	n (%)	Mean Days Missed (Median)	n (%)	Mean Days Missed (Median)
<b>Injury Activity</b>						
Infield	510 (28.0)	14.8 (8.0)	412 (27.2)	14.9 (8.0)	98 (31.7)	14.2 (6.5)
Outfield	105 (5.8)	10.8 (6.0)	88 (5.8)	11.0 (7.5)	17 (5.5)	9.7 (2.0)
Batter	128 (7.0)	8.5 (4.0)	104 (6.9)	8.0 (4.0)	24 (7.8)	11.2 (5.0)
Base runner	315 (17.3)	11.8 (7.0)	272 (18.0)	12.3 (8.0)	43 (13.9)	9.0 (3.0)
Missing/NA <sup>a</sup>	765 (42.0)	15.7 (7.0)	638 (42.1)	15.1 (7.0)	127 (41.1)	18.4 (7.0)
	<i>P</i> < .0001 <sup>b</sup>		<i>P</i> < .0001 <sup>b</sup>		<i>P</i> = .0004 <sup>b</sup>	
<b>Injury Location</b>						
Home Plate	175 (9.6)	9.7 (4.0)	137 (9.0)	9.7 (4.0)	38 (12.3)	9.9 (5.0)
Pitcher's mound	362 (19.9)	18.0 (11.0)	290 (19.2)	17.5 (11.0)	72 (23.3)	20.2 (11.0)
Infield	626 (34.3)	11.8 (6.0)	517 (34.1)	12.1 (7.0)	109 (35.3)	10.5 (4.0)
Outfield	204 (11.2)	11.9 (6.0)	172 (11.4)	11.0 (6.5)	32 (10.4)	16.3 (3.0)
Foul/bullpen	92 (5.0)	13.3 (9.0)	78 (5.2)	11.6 (10.0)	14 (4.5)	21.7 (6.5)
Other	364 (20.0)	17.3 (6.0)	320 (21.1)	17.3 (6.0)	44 (14.2)	17.0 (10.0)
	<i>P</i> < .0001 <sup>c</sup>		<i>P</i> < .0001 <sup>c</sup>		<i>P</i> < .0001 <sup>c</sup>	
<b>Mechanism of Injury<sup>d</sup></b>						
Contact with ball	47 (2.6)	3.9 (1.0)	41 (2.7)	2.8 (1.0)	6 (1.9)	NP <sup>e</sup>
Contact with ground	120 (6.6)	8.9 (5.0)	97 (6.4)	9.0 (6.0)	23 (7.4)	8.4 (2.5)
Contact between players	31 (1.7)	7.4 (3.0)	24 (1.6)	5.8 (3.0)	7 (2.3)	NP <sup>e</sup>
Other contact	14 (0.8)	12.2 (2.0)	11 (0.7)	6.7 (4.0)	3 (1.0)	NP <sup>e</sup>
Noncontact	1350 (74.1)	14.9 (8.0)	1116 (73.7)	14.8 (8.0)	234 (75.7)	15.3 (5.0)
Other	261 (14.3)	14.3 (7.0)	225 (14.9)	14.3 (6.0)	36 (11.7)	14.5 (10.0)
	<i>P</i> < .0001 <sup>c</sup>		<i>P</i> < .0001 <sup>c</sup>		<i>P</i> < .0001 <sup>c</sup>	

<sup>a</sup> Missing/Not Available (NA) are largely due to the event position variable in Health and Injury Tracking System not being available for 2011.

<sup>b</sup> *P* value reflects a one-sided hypothesis testing offense (infield and outfield) vs defense (batter and base runner). Missing/NA data were excluded from these tests.

<sup>c</sup> *P*-value reflects the two-sided hypothesis testing equal proportions across the categories.

<sup>d</sup> Contact with ball includes batted or pitched ball. Contact with ground is from a fall or dive. Contact between players is from player collision. Contact with other can include contact with boundaries, contact with bat, or missing.

<sup>e</sup> Average time lost not presented (NP) due to small sample size.

nisms. Time lost across these mechanisms varied, ranging on average between 4 and 15 days with noncontact-related hip and groin injuries resulting in the largest time lost.

### Surgery

The 1823 hip and groin injuries across both leagues were further classified using the SMDCS descriptions as intra-articular (N = 84) or extra-articular (N = 1739) (Table 3). A much larger percentage

of hip and groin injuries were extra-articular (MiLB 95.6%, MLB 94.4%, all players 95.4%) compared to those classified as intra-articular (Table 3).

The most common extra-articular injuries were strains or contusions of the adductor, iliopsoas, or gluteal muscles, making up 79.1% of this group of injuries. The most common intra-articular injuries were FAI and a labral tear, accounting for 80.9% of these injuries. Only a small percentage of the extra-articular cases required surgery (MiLB 3.4%,

Table 3. **Specific Diagnostic Categories From the SMDCS for Classifying Hip and Groin Injuries as Intra-Articular and Extra-Articular. All MiLB and MLB Players, 1823 Hip and Groin Injuries, 2011-2014**

Intra-articular (N = 84, 4.6%)		Extra-articular (N = 1739, 95.4%)	
Diagnosis Code	n (%)	Diagnosis Code	n (%)
Hip femoral acetabular	40 (47.6%)	Adductor groin strain	710 (40.8%)
Hip labral tear	28 (33.3%)	Iliopsoas strain	369 (21.2%)
Hip capsulitis	8 (9.5%)	Other hip injury	239 (13.7%)
Hip degenerative/osteoarthritis	6 (7.1%)	Medial rotator strain	109 (6.3%)
Hip chondromalacia	1 (1.2%)	Hip contusion	85 (4.9%)
Hip loose body	1 (1.2%)	Adductor spasm	45 (2.6%)
		Gluteus medius strain	37 (2.1%)
		Gluteus maximus strain	33 (1.9%)
		Sports hernia	32 (1.8%)
		Lateral rotator strain	23 (1.3%)
		Greater trochanteric bursitis	17 (1.0%)
		Piriformis syndrome	11 (0.6%)
		Adductor contusion	9 (0.5%)
		Adductor groin tear/Rupture	6 (0.3%)
		Hip abrasion	6 (0.3%)
		Hip pointer (Iliac crest contusion)	2 (0.1%)
		Iliopsoas bursitis	2 (0.1%)
		Aiis apophysitis/Avulsion	1 (0.1%)
		Gluteus medius tear	1 (0.1%)
		Hip arterial disorder	1 (0.1%)
		Obturator nerve entrapment	1 (0.1%)

Abbreviations: MiLB, Minor League Baseball; MLB, Major League Baseball; SMDCS, Sports Medicine Diagnostic Coding System.

Table 4. **Summaries of Intra- and Extra-Articular Hip and Groin Injuries, by Surgery Required and Level of Play, 2011-2014**

	All Players (N = 1823)		Minor League (N = 1514)		Major League (N = 309)	
	n (%)	Mean Days Missed (Median)	n (%)	Mean Days Missed (Median)	n (%)	Mean Days Missed (Median)
<b>Intra-articular</b>	84		67		17	
Surgery	34 (40.5)	122.5 (145.5)	27 (40.3)	139.7 (150.0)	7 (41.2)	NP <sup>a</sup>
No Surgery	50 (59.5)	22.2 (9.0)	40 (59.7)	24.9 (11.5)	10 (58.8)	13.8 (1.0)
<b>Extra-articular</b>	1,739		1447		292	
Surgery	66 (3.8)	54.6 (6.4)	49 (3.4)	66.6 (69.0)	17 (5.8)	20.1 (8.0)
No Surgery	1673 (96.2)	12.4 (6.0)	1398 (96.6)	12.0 (7.0)	275 (94.2)	14.6 (5.0)

<sup>a</sup>Average time lost not presented (NP) due to small sample size.

MLB 5.8%, all players 3.8%) (Table 4). This finding was in contrast to the larger percentage of intra-articular cases requiring surgery (MiLB 40.3%, MLB 41.2%, all players 40.5%). Time lost varied greatly by surgery status, as well as extra-articular or intra-articular, as would be expected even after excluding season-ending injuries. For both types of injuries, the average time lost was consistently greater for injuries that required surgery versus the ones that did not result in surgery.

## Discussion

The incidence of overall injuries in MLB players is increasing.<sup>8</sup> Injuries to the hip and groin for professional baseball players continue to be of concern both in the number of injuries and the potential for these injuries to be debilitating or to recur. The correct diagnosis of hip injuries can be challenging in these athletes due to the complex anatomy of the region. However, our understanding of the pathoanatomy of hip and groin injuries, combined with the utilization of improved magnetic resonance imaging (MRI,) has aided in making the correct diagnosis more reliable. Although upper extremity injuries have traditionally been the focus of MLB injury reporting, hip injuries have been shown to cause an average of 23 days missed per player.<sup>4</sup> This was similar to the more commonly highlighted elbow and knee injuries in the same study (23 and 27 days, respectively). The purpose of this study was to explore the epidemiology of hip and groin injuries in MLB. The lack of existing data on this issue is important for sports injury research. Exploring these injuries increases the understanding of which players are at risk, and how we can tailor training programs for prevention or rehabilitation programs for those players who suffer these injuries.

In addition to the increased awareness of hip injuries, there has been a recent focus on the contribution of hip range of motion, leg drive, and pelvic rotation to the overall mechanics of overhead activities such as throwing, a tennis serve, or pitching.<sup>12</sup> Pelvic rotation and leg drive have been correlated to throwing velocity,<sup>21</sup> and therefore if hip range of motion is inhibited by pain or a structural issue such as FAI, there will likely be altered upper extremity mechanics leading to less power and possibly injury.<sup>12</sup> Additionally, it has been shown that limited hip range of motion due to FAI is correlated with compensatory lower extremity muscular injuries such as hamstring and adductor strains as well as overload of the lumbar spine and sacroiliac joint.<sup>22</sup>

In the current study, extra-articular injuries about the hip were the most common, making up 95.4% of the total injuries. Many (79.1%) of these were strains or contusions of the adductor, iliopsoas, or gluteal muscles. This is consistent with other articles reporting hip injuries in athletes.<sup>3,9</sup> A study on hip injuries in the National Football League found that strains and contusions comprised 92% of all hip injuries.<sup>3</sup> Another report on European professional football found that 72% of hip injuries over a 7-season period were adductor or iliopsoas injuries.<sup>9</sup> This prior study also reported that 15% of the hip and groin strains were re-injuries. Intra-articular injuries comprised only 4.6% of the hip injuries in our study. FAI and labral tears were the most common intra-articular diagnosis at 80.9%.

Almost all (96.2%) of the extra-articular hip injuries in this series were able to be treated nonoperatively and caused a mean of 12.4 days missed. Those which required operative treatment caused a mean of 54.6 days missed. For intra-articular injuries, 40.5% were treated surgically and these players missed a mean 122.5 days. Those treated nonsurgically missed an average of 22.2 days. Whether treated surgically or nonsurgically, the mean days missed following an intra-articular injury was approximately twice that of extra-articular injuries. Our findings regarding time or games missed are similar to other reports studying hip injuries in professional athletes.<sup>2,3,9</sup> Intra-articular injuries such as FAI, chondral injuries, or labral tears caused between 46 and 64 days missed compared to 3 to 27 days missed for extra-articular injuries in professional soccer players.<sup>9</sup> Feeley and colleagues<sup>3</sup> found a mean of 5.07 to 33.6 days missed for extra-articular injuries such as strains or contusions, and 63.5 to 126.2 days missed for intra-articular injuries including arthritis, labral tears, subluxations, dislocations, and fractures. A report on National Hockey League players found that intra-articular injuries made up 10.6% of all hip and groin injuries and caused significantly more games missed than extra-articular injuries.<sup>2</sup>

In both minor and major league players, for all reported positions at the time of hip or groin injury, infield players collectively were more commonly injured than outfielders, batters, or base runners, and fielding was the most common activity being performed at the time of injury. The pitcher's

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mound was the most common single location for injuries and these players had the longest time missed following injury. The correlation between hip and groin pathology and upper extremity injuries in overhead athletes has been discussed in previous studies.<sup>12,21</sup> Interestingly, we found that the specific location on the field with the highest incidence of hip and groin injuries was the pitcher's mound. As we follow these players over time, a future correlation between the incidence of hip and groin injuries and the incidence of shoulder and elbow injuries may be noted. A noncontact injury was the most frequent mechanism of injury. This corroborates the finding that muscle strains and contusions made up the majority of injuries in this series. Other series on hip injuries have also found that noncontact mechanisms are common.<sup>3</sup>

Although this was one of the first studies exploring the epidemiology of hip and groin injury, there are some limitations of this study. The retrospective nature of this study relied upon the reporting of injuries in the MLB database. As such, there may be underreporting of injuries into the official database by players or medical staff for a variety of reasons. Differences in technique for diagnosis and treatment among the medical staff for different teams were not controlled for. Due to the wide range of hip and groin pathology, and the often difficult diagnosis, a specific injury was not always provided. Therefore, the category of "other" hip injury was entered in to the database when symptoms were nonspecific or not all details were provided. Fortunately, this category made up a small percentage of the reported injuries, but does remain a confounding factor in describing the etiology of hip injuries in these players. Our data were taken from professional baseball players only, and so we cannot recommend extrapolation to other sports or nonprofessional baseball athletes.

Despite the inherent limitations of reporting registry data, this study serves as the initial report of the occurrence of hip and groin injuries in professional baseball players, and improves our knowledge of the positions and situations that put players at most risk for these injuries. An understanding of the overall epidemiology of these injuries serves as a platform for more focused research in this area in the future. We can now focus research on specific positions, such as pitchers, that have a high incidence of injury to determine the physiologic and environmental factors which put them at higher risk for injury in general and for more significant injuries with more days missed.

This information can help to guide position-specific training programs for injury prevention as well as improve rehabilitation protocols for more efficient recovery and return to sports.

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