

Major League Baseball's Health and Injury Tracking System (HITS)

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Overview

Professional athletes as an occupational group

Partnership between Johns Hopkins University and Major League Baseball (MLB)

Describe MLB's Health and Injury Tracking System (HITS) and lessons learned for occupational injury prevention



Professional Athletes

U.S. Department of Labor BLS: “Athletes and Sports Competitors”

Job task: participate in organized, officiated sporting events to entertain spectators

Work environment: “Athletes and sports competitors often work irregular hours, including evenings, weekends, and holidays. They usually work more than 40 hours a week for several months during their particular sports season. They may be exposed to all weather conditions.”



Professional Athletes

Very few athletes become paid professional athletes

“And when they do, professional athletes often have short careers with little job security”

Athletes who play a contact sport, such as football or hockey, are highly susceptible to injuries

No mention on DOL/BLS site of non-contact sports, little attention in research

Major League Baseball



A CENTURY OF SAVING LIVES—MILLIONS AT A TIME 1916/2016

Injury Surveillance: Disabled List (DL)

Teams remove their injured players from the roster in order to summon healthy players; opens up a spot on active roster

15-day or the 60-day DL; player may be shifted from the 15-day to the 60-day DL at any time, but not vice-versa

The player may not rejoin the team until 15 or 60 days has elapsed; however, can be out for a longer length of time

Limitations



JHU/MLB Partnership



In 2009 MLB referred to JHCIRP; developed strong research partnership

Studies must be cleared by Office of the Commissioner, and the MLBPA

Johns Hopkins Bloomberg School of Public Health IRB



HITS

Health and Injury Tracking System (HITS) is a centralized database containing the de-identified medical data from the EMR system

League-wide surveillance system

Injury Definition: Includes any injury or physical complaint sustained by a player that affects or limits participation in any aspect of baseball-related activity (e.g., game, practice, warm up, conditioning, weight training)



HITS

Variables: Level of play, body region, body side, event position, injury mechanism, injury activity, injury location, ICD-9, re-injury, injury date, medical clearance, time lost, surgery and outcomes, treatment, session (game, practice, etc.), inning, field surface

Exposure: Injury research using HITS defines athlete exposures (AE) as the average number of players/team/game calculated based on analysis of regular season game participation via (publically available) box scores. This average number over a season, multiplied by the number of team games at each professional level of baseball yields an estimate of AE



HITS

Can link deterministically HITS, medical data, performance data (# throws, hits), exposure data (games played, # times to bat, etc.)

Several studies have been published using HITS. These have included studies of injuries to the hamstring (Ahmad et al., 2014), knee (Dahm et al., 2015), hip and groin (Coleman et al., 2015), head/TBI (Green et al., 2015), and shoulder (under review)



HITS

A total of 43,527 injuries were included in the HITS from 2010-2014; 83% occurred in the Minor League.

Level of Play	No. of Injuries by Year					Total
	2010	2011	2012	2013	2014	
Major League	2,076	1,641	1,347	1,270	1,249	7,583
Minor League	7,828	7,234	6,704	6,909	7,269	35,944
Total	9,904	8,875	8,051	8,179	8,518	43,527
Missing information ^b	18.0	17.0	<1.0	<1.0	<1.0	

Pollack KM, D'Angelo J, Gary G, Conte S, Fealy S, Marinak C, McFarland E, Curriero F. Developing and Implementing Major League Baseball's Health and Injury Tracking System. American Journal of Epidemiology 2016; 183(5); 490-496.



Body Region	Major League			Minor League		
	No.	%	Rank	No.	%	Rank
Upper leg (thigh)	724	13.1	1	3,218	11.4	2
Shoulder/clavicle	672	12.2	2	4,280	15.2	1
Hand/finger/thumb	501	9.1	3	2,908	10.3	3
Elbow	430	7.8	4	2,755	9.8	4
Knee	410	7.4	5	1,761	6.3	5
Lower back/sacrum/ pelvis	385	7.0	6	1,510	5.4	6
Chest/sternum/ribs/ upper back	322	5.8	7	983	3.5	13
Lower leg/Achilles tendon	303	5.5	8	1,247	4.4	9
Abdomen	268	4.9	9	839	3.0	15
Foot/toes	254	4.6	10	1,175	4.2	10.5 ^b
All other injuries	1,238	22.5	NA	7,440	26.5	NA
Total	5,507			28,116		

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Factor	No. of Injuries	Percent^b
Event position detail		
Pitcher	6,330	32.4
Batter	4,936	25.2
Base runner	3,332	17.0
Injury mechanism		
Noncontact	17,873	55.3
Contact with ball	4,456	14.1
Contact with ground	3,183	9.8
Injury activity		
Batting/hitting	6,290	19.2
Pitching	6,273	19.1
Fielding	6,070	18.5
Injury location		
Home plate	7,775	24.2
Pitcher's mound	6,477	20.1
Other ^c	5,084	15.8

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HITS: Strength

Link data to ascertain individual level variables and develop precise measures of exposure

Recording of all player illnesses and injury in the EMR and injuries that result in lost time in the HITS system

New opportunities for prospective research



HITS: Challenges

Ensuring high data quality and that variables are consistently measured and analyzed across projects

Measuring exposure

- Should exposure depend on position and/or activity (batting, fielding, running, other)?
- What about offensive vs. defensive?
- Plate appearance vs. at-bats?
- For pitchers, should we separate starters vs. relievers?



Concluding Thoughts

Athletes are workers, albeit a specific subset;
generalizability limitations

Good example of an academic-private partnership

Ability to inform prevention and affect policies,
programs, and treatment



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Thank you!

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