

CONCUSSION AND HEAD PROTECTION IN LACROSSE

Taking Care of America's Fastest Growing Sport



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DISCLOSURES

- Financial disclosures
 - I have no financial disclosures pertinent to this talk
- Membership disclosures
 - Member, US Lacrosse Sports Science and Safety Committee

LACROSSE


- *Oldest and fastest growing team sport in America*
- *Unique men's, women's and youth games*
- *Played by all age groups*
- *Combination of speed, stick, ball, and contact make for a unique set of injury mechanisms, types, and preventive efforts*



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Taking Care of the Game:
Lacrosse Sports Medicine, Health and Safety
In partnership with US Lacrosse



- US LACROSSE:
The national governing body for men's, women's, and youth lacrosse



US LACROSSE: SPORTING SUCCESS

- Positive Games Experience
- Honoring the Game
- Focus on Youth and Recreational
- Health and Safety a Priority
- Can this Model Succeed ?



SPORTING SUCCESS IN AMERICA

The Entertainment Sports Complex

- Overused Entertainers and Overweight Spectators
- Focus on the Top
 - Professional Model
 - Club vs. Scholastic Play
- Multiple Secondary Gain Issues
 - The “It” Factor
 - College Admission and Scholarships
 - Club vs. Scholastic Play
 - Learning Life’s Lessons and having Fun ?
- Posse / Drop Off Mentality
- Increased Injury Exposure



US LACROSSE

Health and Safety Priorities

- National standards for gender and age specific rules, coaching, and officiating
- One sport: two games
- Concussion and head, face, eye injuries for women's, men's, and youth lacrosse
- ACL tears and other lower extremity injuries
- Sudden cardiac death
- Youth specific rules
- Specific conditions: hand fractures and testicular injuries

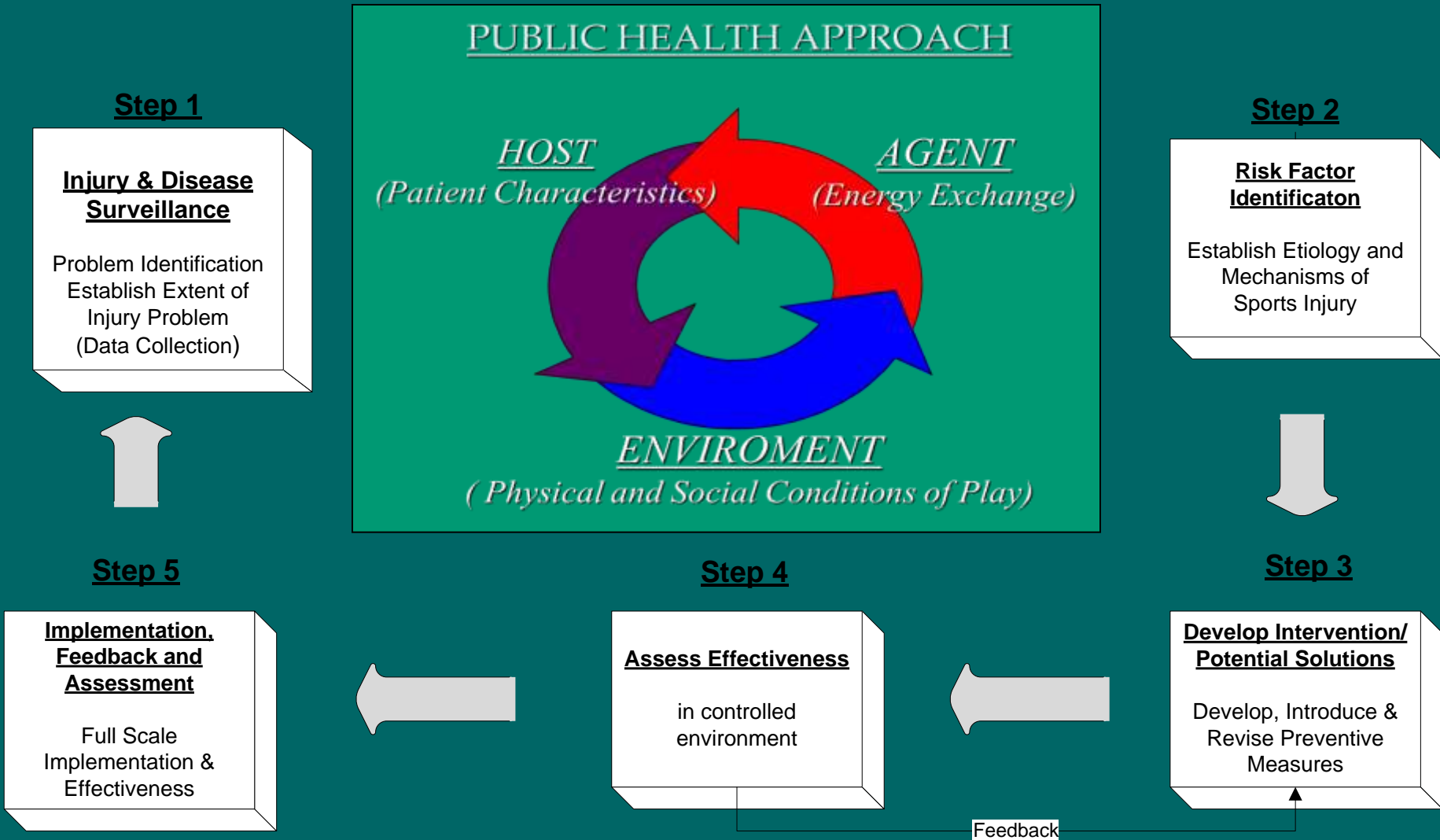
ONE SPORT: TWO GAMES

Differences in Men's and Women's Lacrosse

- Games share
 - Full field, free flowing play
 - Speed, quick change of direction
 - Passing, shooting, stick work
- Men's game
 - Purposeful collision sport
- Women's game
 - Incidental contact
- Game specific
 - Equipment Requirements
 - Injury Prevention Strategies
 - Culture and History
- Women playing Men's Lacrosse



CONCUSSION AND HEAD PROTECTION IN LACROSSE



Sports Injury Surveillance Systems

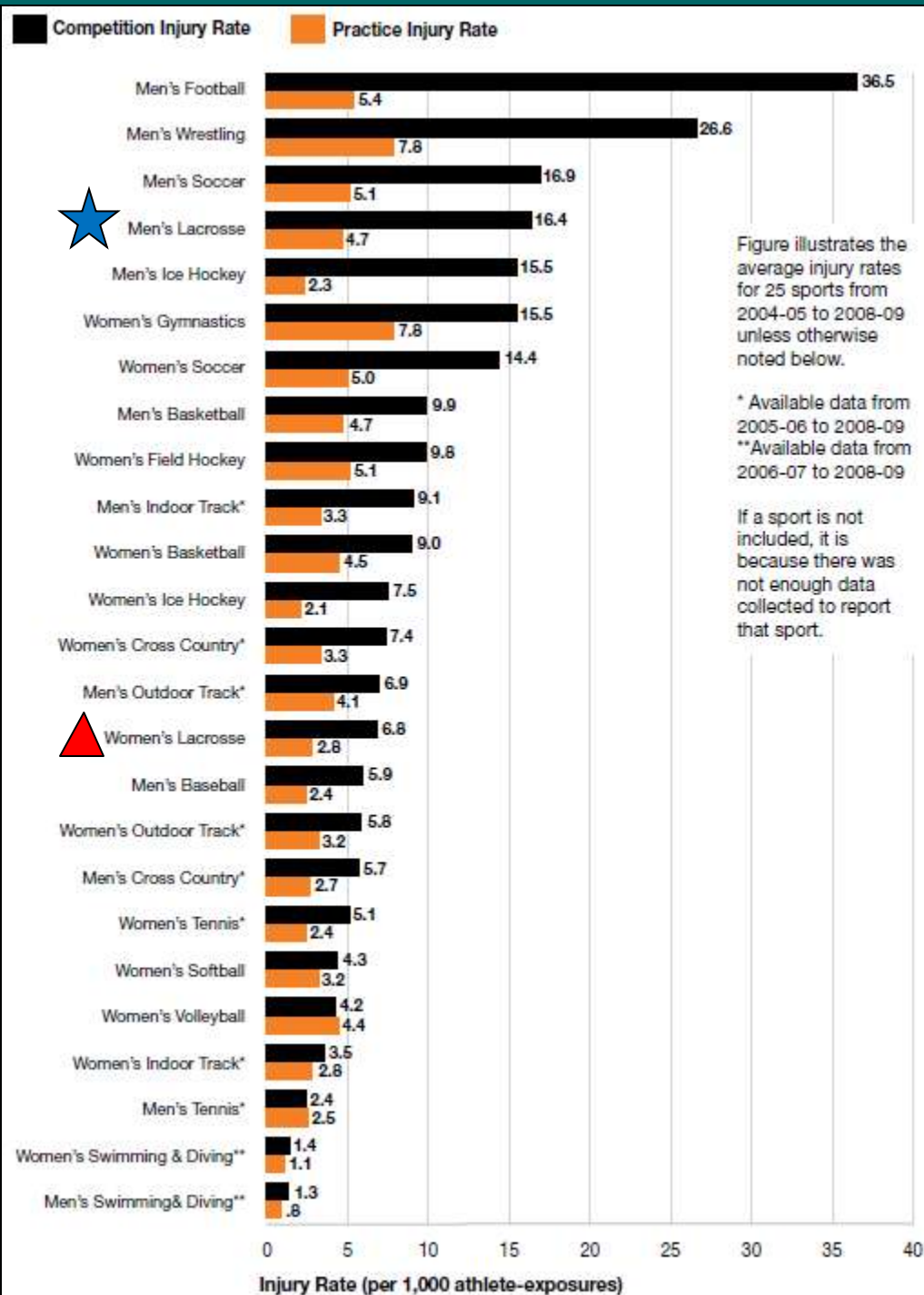
System	Administrator	Pros	Cons	Example study
NCAA Injury Surveillance System (ISS)	Datalys Center	<ul style="list-style-type: none"> •Web-based •High capture rate •National sample 	<ul style="list-style-type: none"> •Variability in data coding(?) •Limited # of participating colleges 	Validity of Soccer Injury Data in NCAA (2011)
Injury Treatment & Tracking System (ITTS)	Fairfax County (VA) Public Schools	<ul style="list-style-type: none"> •Daily electronic capture of 25 high schools & 27 sports •Includes time-loss and no time loss injuries 	<ul style="list-style-type: none"> •Representative of a single geographic area/school district 	Trends in concussion incidence in high school sports (2011)
Reporting Information Online (RIO)	Nationwide Children's Hospital	<ul style="list-style-type: none"> •Web-based •100 participating high schools with AT •National sample of 12 sports 	<ul style="list-style-type: none"> •Variability in data coding(?) 	Sex Differences in Concussion Symptoms of High School Athletes (2011)
National Center for Catastrophic Sport Injury Research	University of North Carolina at Chapel Hill	<ul style="list-style-type: none"> •Death and permanent disability sports injury data that involve brain and/ or spinal cord injuries 	<ul style="list-style-type: none"> •Based on reports of catastrophic/ fatal injuries 	Catastrophic Football Injuries Annual Report (2011)

OVERALL INJURY RATES FOR NCAA SPORTS

2012-13 NCAA®
**Sports
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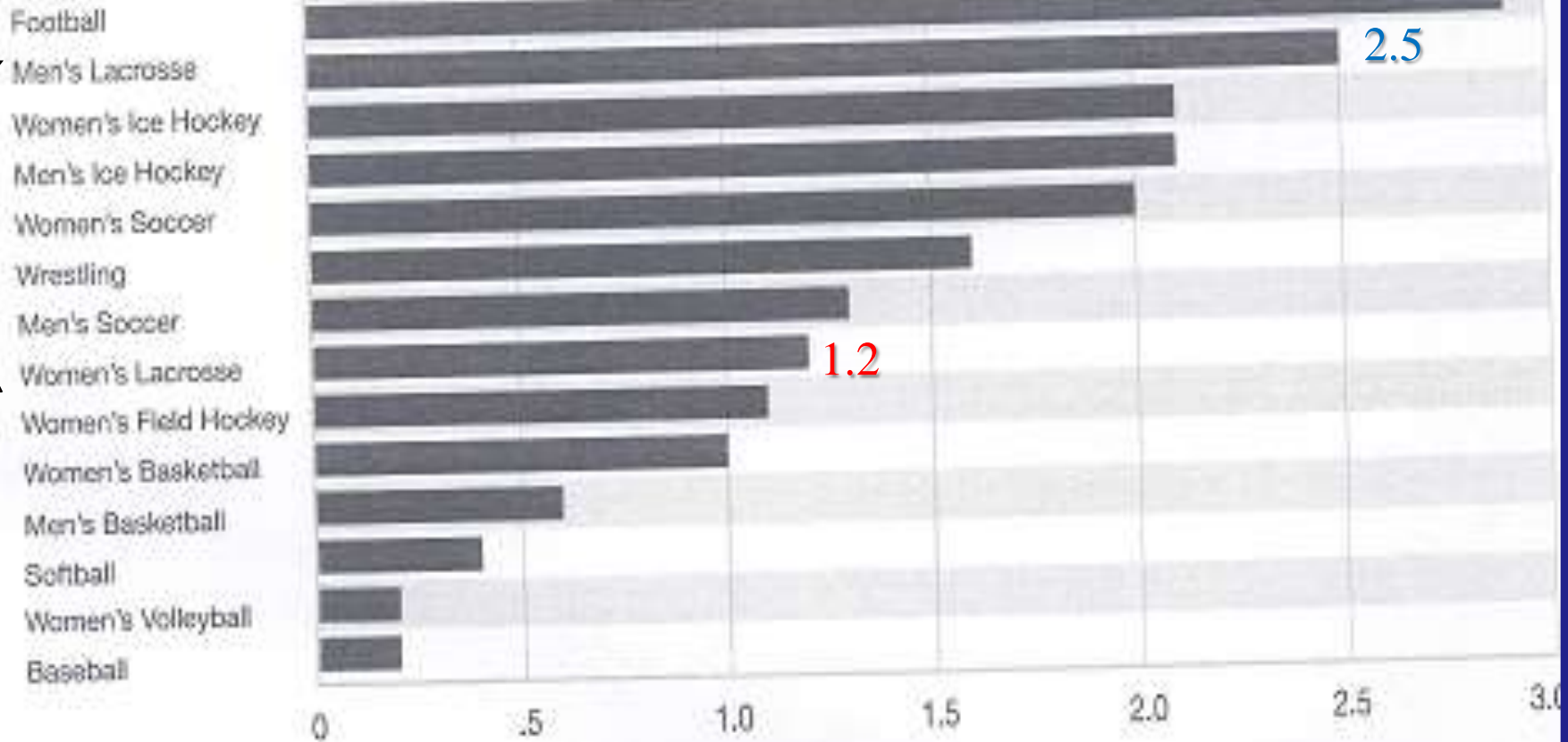


February 18, 2015



NCAA CONCUSSION RATES

Figure 1: Rate of competition concussion injury in 14 NCAA sports



Number of injuries per 1,000 athlete-exposures

Data from 2004-2009. Overall practice and game injury rates for each sport can be found in Appendix C.

Epidemiology of Lacrosse Injuries in High School-Aged Girls and Boys

A 3-Year Prospective Study

Richard Y. Hinton,^{*†} MD, MPH, Andrew E. Lincoln,[‡] ScD, MS, Jon L. Almquist,[§] ATC, Wiemi A. Douoguih,[†] MD, and Krishn M. Sharma,[†] MD

From the [†]Department of Orthopaedic Surgery, The Union Memorial Hospital, Baltimore, Maryland, [‡]Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland, and [§]Fairfax County Public Schools, Athletic Training Program, Fairfax, Virginia

American Journal of Sports Medicine, 2005



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COMMON INJURIES

Scholastic Boys Lacrosse

Rank Order	Body Part	Nature of Injury	Number of Cases	Incidence Rate ^a	Median Days Lost	Total Days Lost
1	Ankle	Ligament sprain	82	0.39	4.0	557
2	Head/face	Concussion	61	0.29	6.0	520
3	Knee	Ligament sprain	34	0.16	29.0	1880
4	Upper leg	Muscle-tendon strain	26	0.12	7.0	357
5	Head/face	Contusion	21	0.10	1.0	52
5	Wrist/hand	Fracture	21	0.10	19.5	379
7	Wrist/hand	Ligament sprain	20	0.09	3.0	127
8	Upper leg	Contusion	18	0.08	3.0	75
8	Back	Muscle-tendon strain	18	0.08	5.0	120
8	Knee	Inflammation	18	0.08	6.5	316



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COMMON INJURIES

Girls Scholastic Lacrosse

1	Ankle	Ligament sprain	79	0.54	7.0	972
2	Knee	Inflammation	30	0.21	2.5	619 ^b
3	Head/face	Contusion	23	0.16	1.0	55
4	Knee	Ligament sprain	21	0.14	16.0	581
5	Head/face	Concussion	14	0.10	4.0	83
6	Wrist/hand	Contusion	13	0.09	2.0	38
6	Hips	Muscle-tendon strain	13	0.09	7.0	107
8	Upper leg	Muscle-tendon strain	12	0.08	2.5	72
9	Wrist/hand	Fracture	11	0.08	31.0	439
10	Back	Muscle-tendon strain	9	0.06	2.0	39



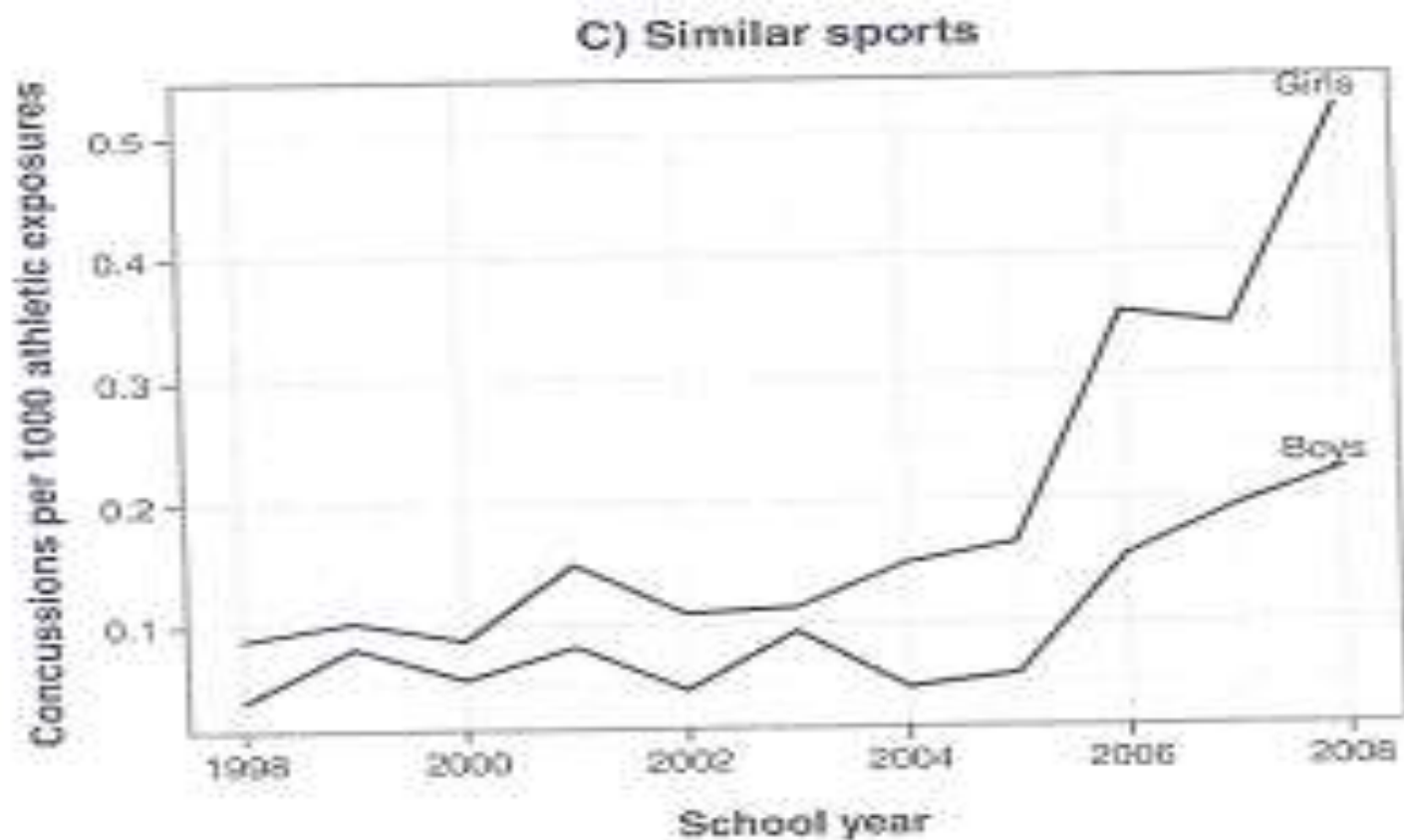
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Trends in Concussion Incidence in High School Sports

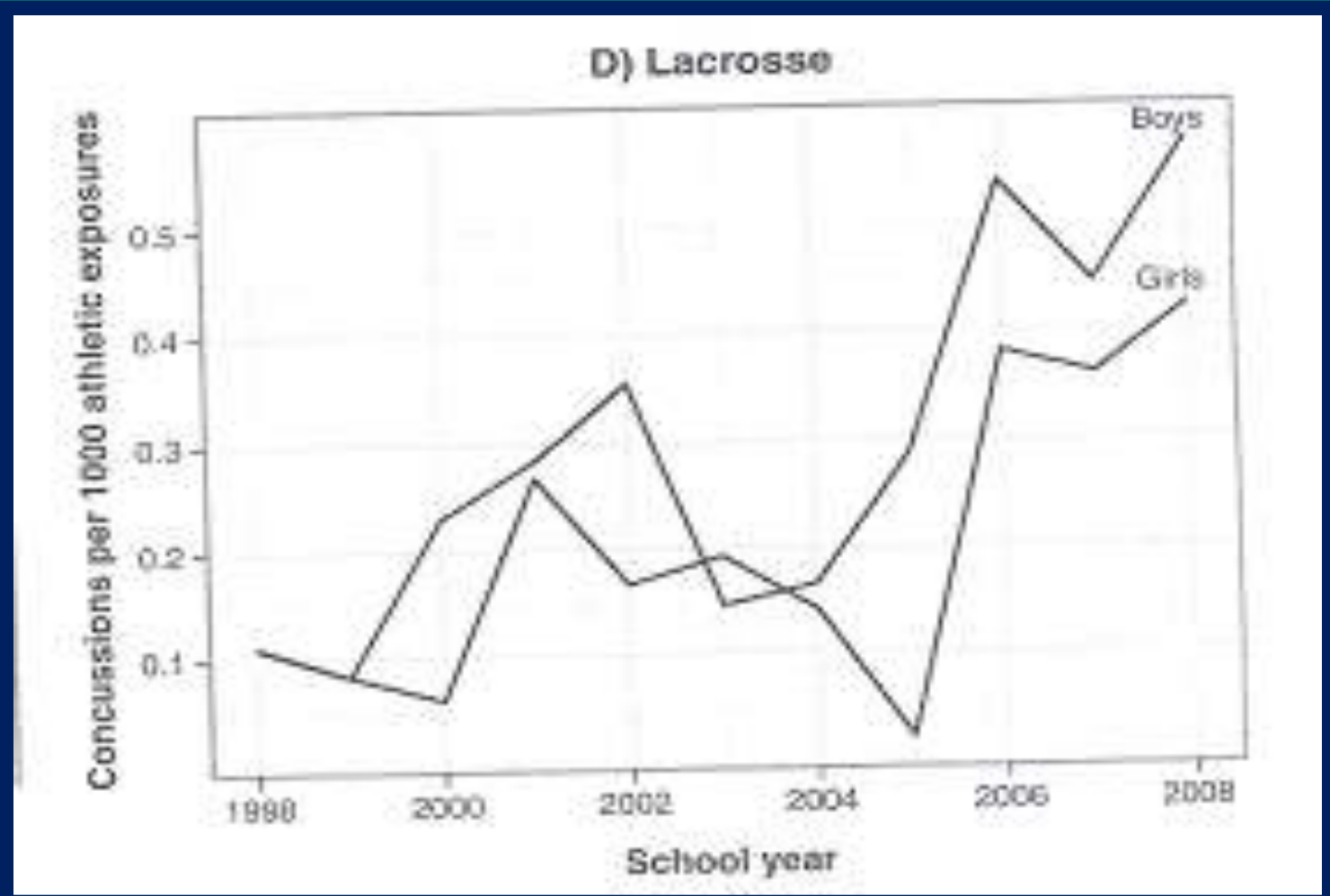
A Prospective 11-Year Study

Andrew E. Lincoln,^{*†} ScD, Shane V. Caswell,[‡] PhD, ATC, Jon L. Almquist,[§] VATL, ATC, Reginald E. Dunn,^{*} BA, Joseph B. Norris,^{||} MD, and Richard Y. Hinton,^{||} MD, MPH, PT
Investigation performed at MedStar Health Research Institute, Baltimore, Maryland



LACROSSE CONCUSSION RATES

Scholastic Boys and Girls



Video Incident Analysis of Head Injuries in High School Girls' Lacrosse

Shane V. Caswell,^{*†} PhD, VATL, ATC, Andrew E. Lincoln,[‡] ScD, Jon L. Almquist,[§] VATL, ATC, Reginald E. Dunn,[‡] BA, and Richard Y. Hinton,^{||} MD, MPH, PT
Investigation performed at Sports Medicine Assessment, Research and Testing Laboratory, George Mason University, Manassas, Virginia



Video Incident Analysis of Concussions in Boys' High School Lacrosse

Andrew E. Lincoln,^{*†} ScD, Shane V. Caswell,[‡] PhD, ATC, Jon L. Almquist,[§] VATL, ATC, Reginald E. Dunn,[‡] MS, and Richard Y. Hinton,^{||} MD, MPH, PT

Investigation performed at MedStar Sports Medicine Research Center, Baltimore, Maryland

American Journal of Sports Medicine, 2013



CONCUSSION MECHANISM

Scholastic Boys and Girls Lacrosse

Table 1.	Boys	Girls
Level of play		
Varsity	22 (65%)	14 (100%)
Junior varsity	12 (35%)	0
Concussion mechanism		
Body check	32 (94%)	1 (7%)
Stick (unintentional)	0	5 (36%)
Stick (intentional)	0	3 (21%)
Collision (unintentional)	2 (6%)	3 (21%)
Ball	0	1 (7%)
Undetermined	0	1 (7%)
Penalty called		
Yes	8 (24%)	2 (14%)
No	25 (73%)	10 (71%)
Unknown	1 (3%)	2 (14%)

Effectiveness of the Women's Lacrosse Protective Eyewear Mandate in the Reduction of Eye Injuries

Andrew E. Lincoln,^{*†} ScD, Shane V. Caswell,[‡] PhD, ATC, Jon L. Almquist,[§] VATL, ATC, Reginald E. Dunn,[†] BA, Mark V. Clough,^{||} MD, Randall W. Dick,[¶] and Richard Y. Hinton,^{||} MD, MPH, PT
Investigation performed at MedStar Sports Medicine Research Center, Baltimore, Maryland

Rates of Injury Before (2000-2003) and After (2004-2009) Introduction of Protective Eyewear in Women's Lacrosse^a

Body Part	2000-2003		2004-2009		Rate Ratio (95% CI)
	Frequency	Rate (per 1000 AEs)	Frequency	Rate (per 1000 AEs)	
Eye	22	0.10	5	0.016	0.16 (0.06-0.42)
Head/face	33	0.15	21	0.07	0.44 (0.26-0.76)
Concussion	38	0.18	86	0.28	1.6 1.1-2.3
All injuries	406	1.9	543	1.8	0.93 0.82-1.1

^aTotal athlete-exposures (AEs): 212 520 in 2000-2003 and 306 130 in 2004-2009. CI, confidence interval.

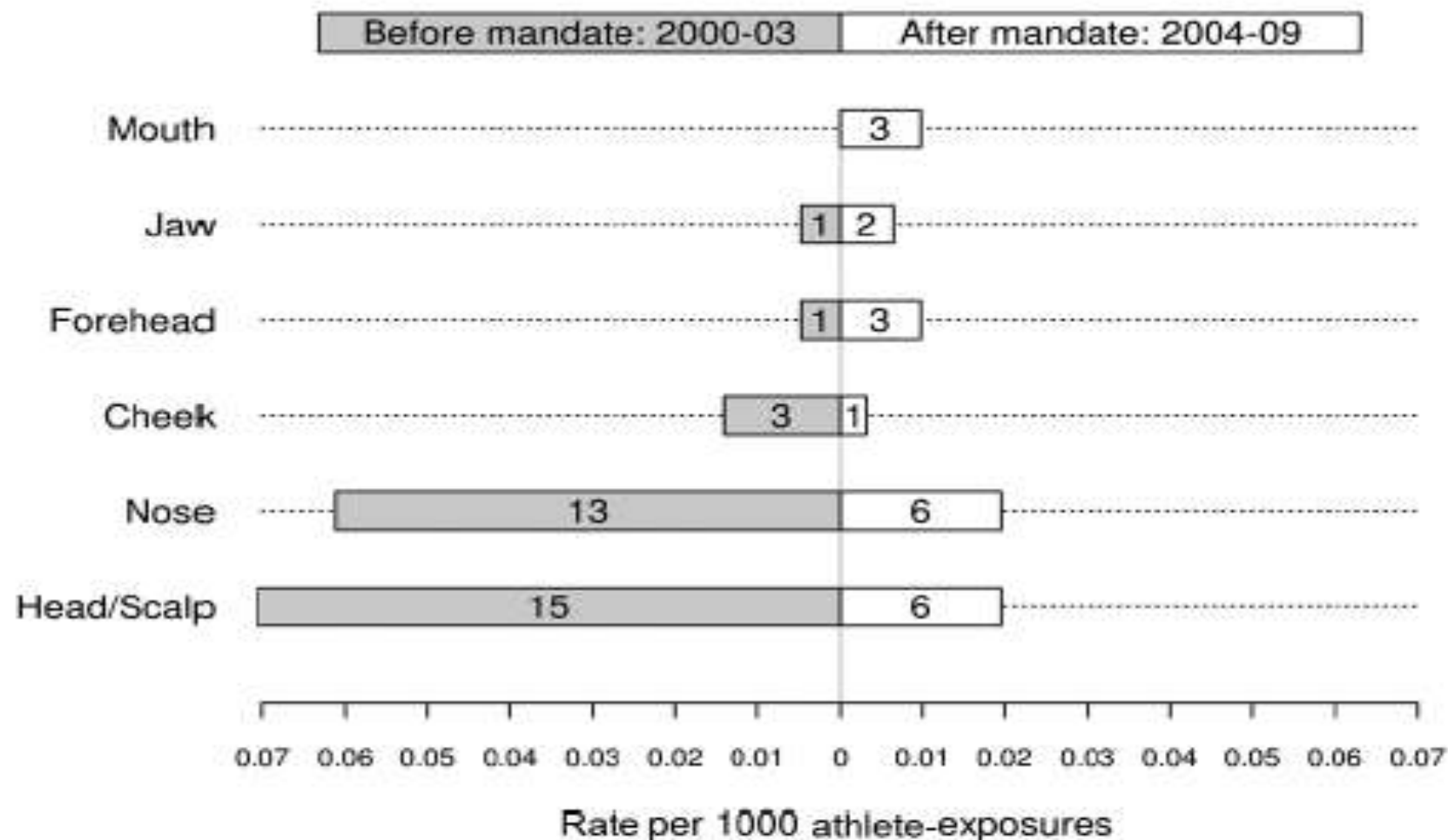


Figure 3. Head/face injuries by area of head and face, before and after introduction of mandated eyewear. Values inside the graph bars indicate number of injuries.

“Why are hard helmets and mounted face masks not required in women’s lacrosse ?”

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I Make the ...

The New York Times **Sports**


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A Case Against Helmets in Lacrosse



Larry French

Helmets, except for goalkeepers, are banned in women's lacrosse. "This to me is like, come on, you're not serious," Dr. Jack Ryan said. "This is 2011."

By ALAN SCHWARZ
Published: February 16, 2011

Hard helmets / facemasks have not been required or deemed necessary in women's lacrosse because:

- The nature of women's lacrosse is an incidental contact sport*
- The risk of head/face injury is on par with other sports*
- Administrative controls (rules) and educational programs have been created for players, coaches, and officials to teach the nature of the game and reduce exposures*
- Unique history and culture of the women's game*



ASTM STANDARDS FOR GAME SPECIFIC WOMEN'S LACROSSE HEAD PROTECTION

- ASTM – Consensus Based Standards Setting
Includes NGB, Manufacturers, Consumers,
Interested Parties...
- On ballot for 2014
 - Testing to include
 - Drop test (duplicate stick checking)
 - Cannon ball test
 - Flexibility (safety for other players) testing
- Relatively soft head protection (game specific)
 - Two piece
 - Single piece with goggles mounted

HELMET SENSOR DATA IN MEN'S LACROSSE

- Kindshi et al: MedStar Sports Medicine and Towson University Sports Medicine: Head impact exposure in men's collegiate lacrosse players
Unpublished
- G Force Tracker
- Linear Acceleration and Rotational Velocity
- 9 games, 39 practices
- 17 Div I Male Lacrosse Players
- Total Impacts, Threshold Impacts
- Video Pairing

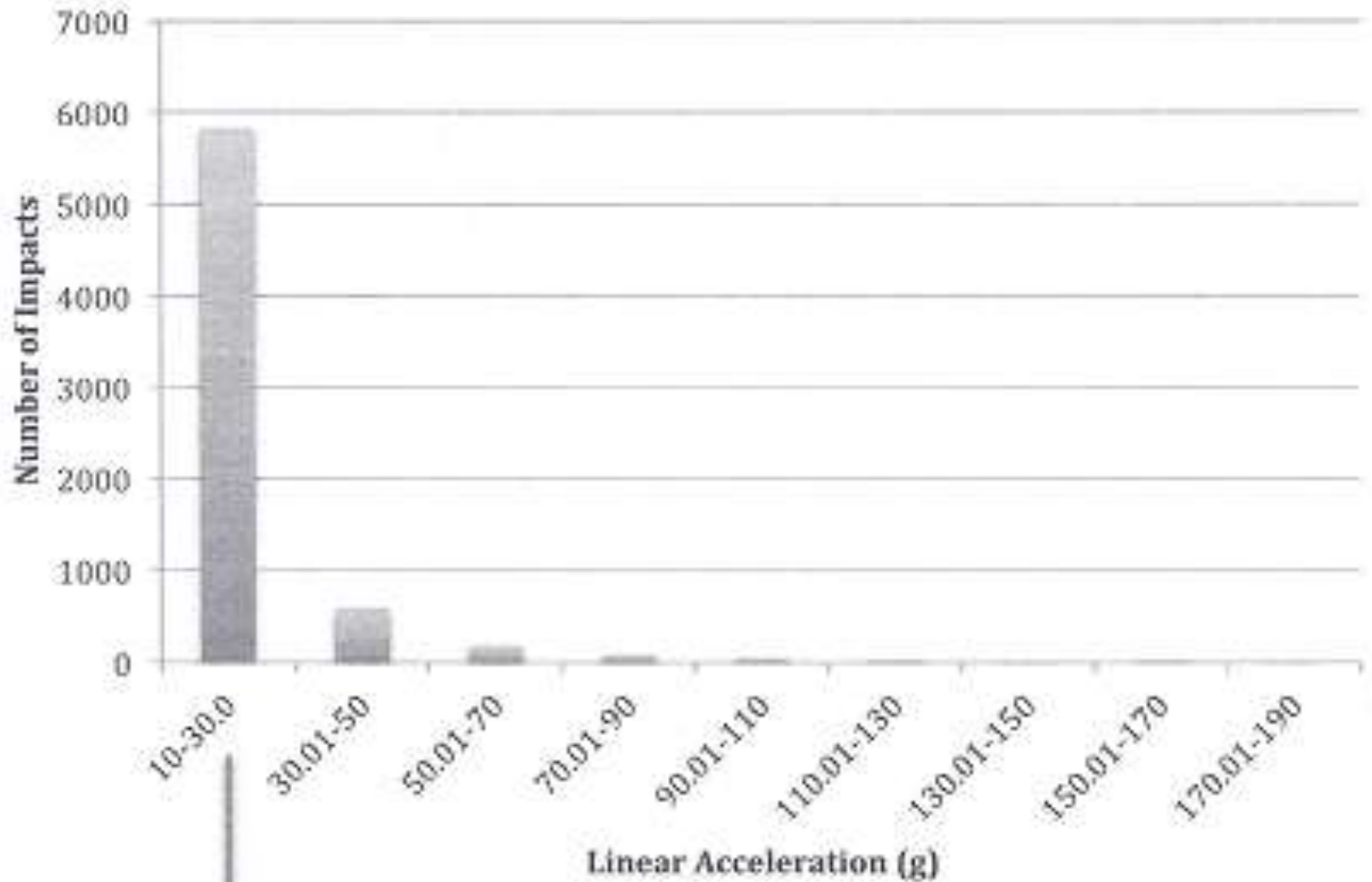


HELMET SENSOR DATA

- Avg. # Impacts
 - 23 games
 - 8.7 per practice
- Vast majority low impact 10 – 30 g
- 3% >70 g
- ~ 80 % related to body to body contact
- > 70 g impacts are in loose ball situations
- > left side hits for right handed players
- Position specific

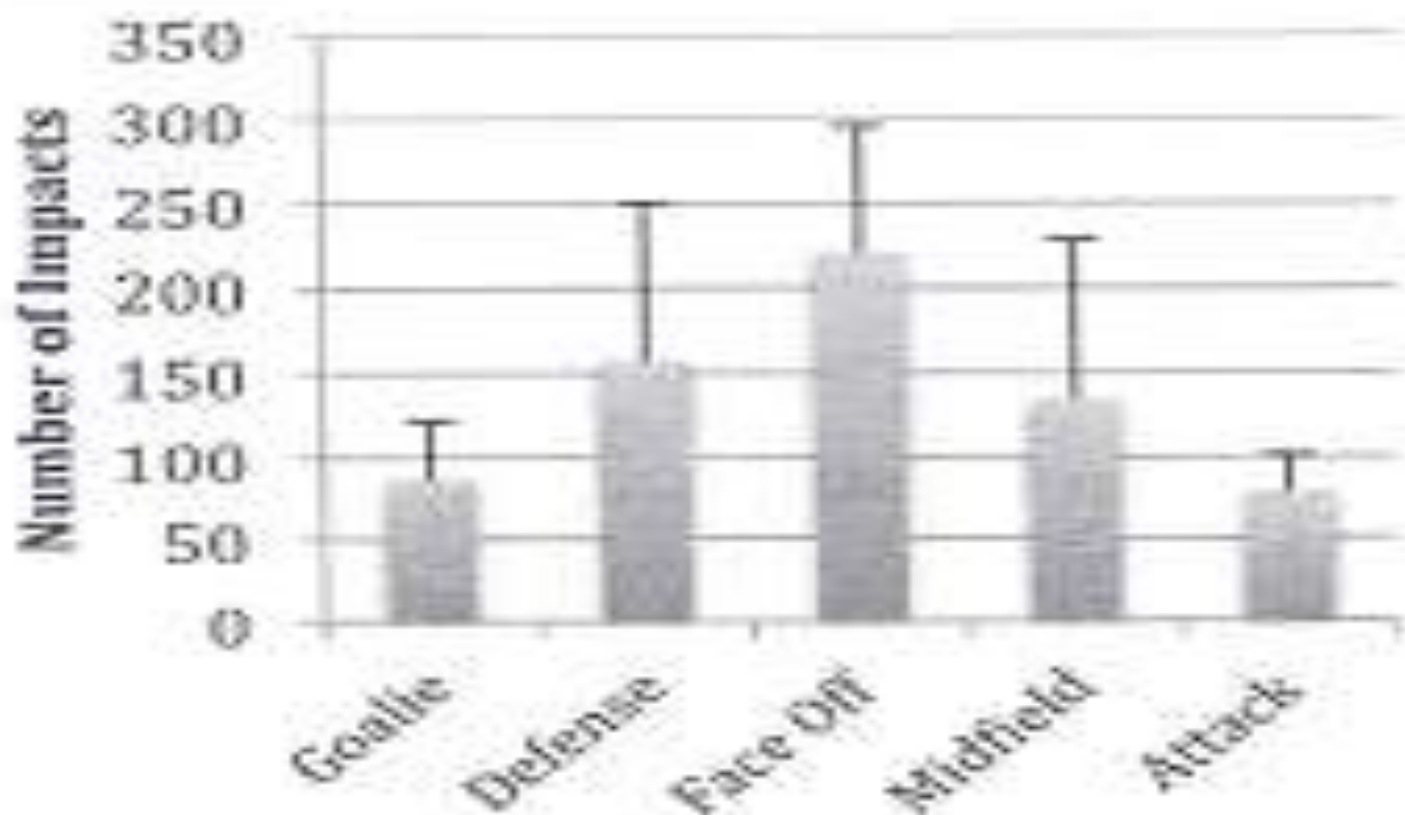


HEAD IMPACTS IN MEN'S LACROSSE



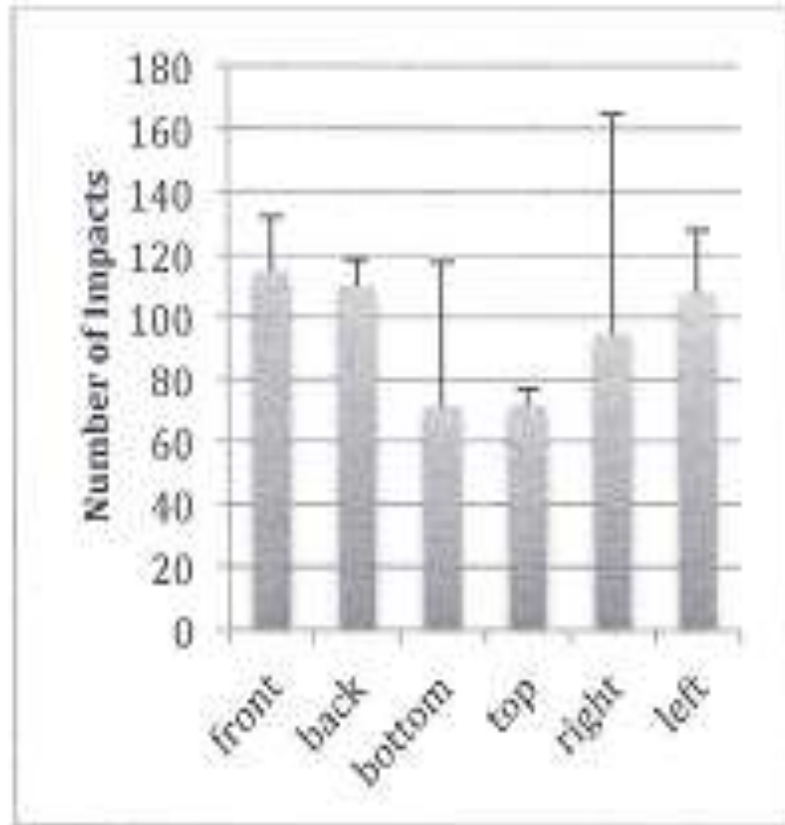
HEAD IMPACTS IN MEN'S LACROSSE

Competition

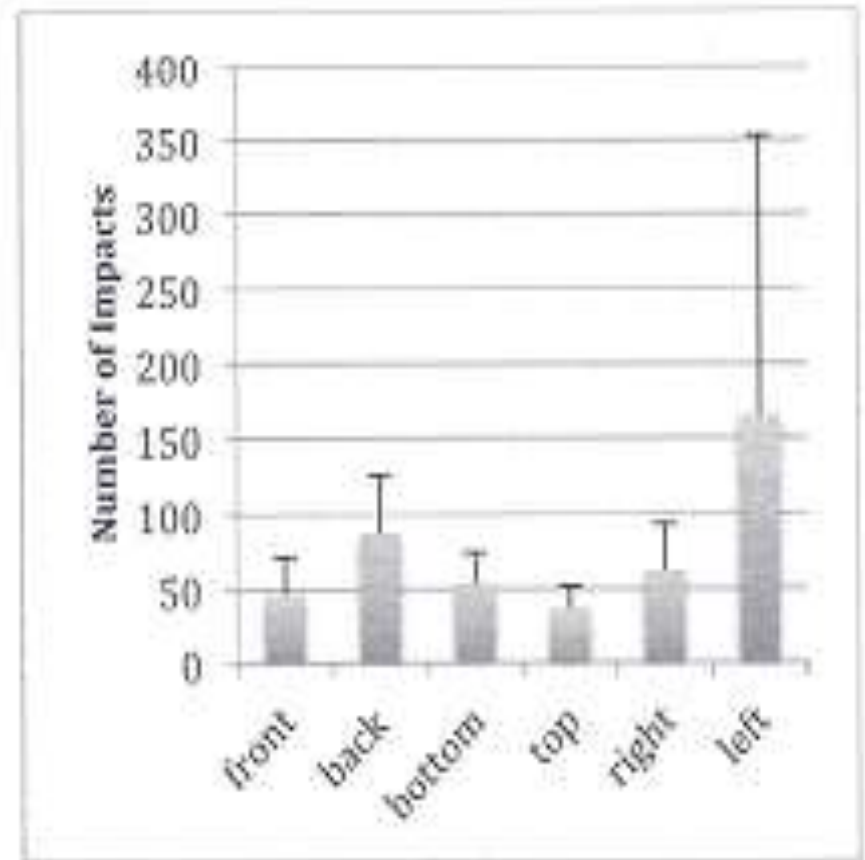


HEAD IMPACTS IN MEN'S LACROSSE

Face Off Specialists



Attack



SUMMARY

- *Concussion, head, face, and eye injuries are priority issues for men's, women's, and youth lacrosse*
- *Injury mechanisms, types, and rates are age and gender specific*
- *Injury prevention strategies, including head protective devices must be game specific to be effective*
- *Women's and men's lacrosse are two different sports and have unique health and safety issues*
- *US Lacrosse has been exceptionally proactive in lacrosse health and safety*

THANK YOU

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