Photo:
Amy Alden Timacheff

Injury Pattern Differences in World Championship and Olympic Fencing Competition

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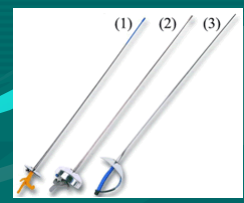
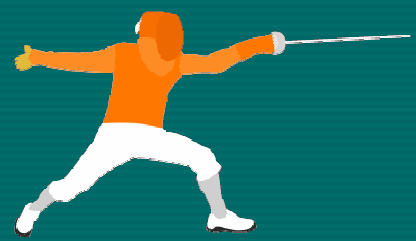
Introduction

- Olympic sport regulated by the International Olympic Committee, (IOC) and International Fencing Federation (FIE), with 134 national federations worldwide.

- Fencing: an armed combat sport with 3 weapon types and 3 different sets of rules and tactics:



- Foil: hit valid on torso and with tip of blade.
- Epée: hit valid on all body surface and with tip of blade.
- Saber: hit valid from the waist up and with blade tip, edge and counteredge (slash weapon).



Introduction

- PROTECTIVE EQUIPMENT:

  International competition equipment must abide by specific FIE safety standards: 1600 N resistant metal grid or polycarbonate transparent masks; 800 N resistant Kevlar® jacket, undersleeve, pants; breast or genital protectors, padded gloves and socks. All parts of the body are covered, except the back of the head and the unarmed hand.

- INJURY TIMEOUTS:

  determined by the Referee upon consultation to the FIE Medical Delegate, team doctors are allowed up to a total of 10 min. in timeouts for injuries during a bout, provided that they are different injuries. Laesions not solved within this period lead to disqualification due to injury.

Competition patterns

World Championship (WC)

- Qualification restricted to the best 3 fencers per country and weapon.
- Competition begins with *poules*: groups of 6-7 fencers fighting individual bouts of 4' or 5 hits, with *poule* ranking of victories and defeats, with relation of hits scored and received.
- Elimination of the last ranking fencers to set a field of 128. Hereby, the first 16 previously FIE best-seeded fencers are exempt from first day competition. The *poule* ranking sets the first against last, the second vs. second-to-last, etc., down to a field of 64 and then 32. Bouts of 3 periods of 3' or 15 hits.
- Second day competition starts with all qualified fencers at Direct Elimination (DE) of 32, then 16, Quarter finals (8), Semifinals (4) and Final matches.

Olympic Games (OG)

- Qualification strongly restricted by FIE ranking, continental quotas and at most 3 fencers per country.
- One day competition begins with Direct Elimination (DE) of a field of 32 fencers. "Sudden death" pattern: bouts of 3 periods of 3' or 15 hits. Then DE of 16, Quarter Finals (8), Semifinals (4), Bronze medal and Final matches.

D E 128
D E 64
D E 32
D E 16
QF
SF
Final

D E 32
D E 16
QF
SF → Bronze
Final

Objectives

- To confirm Fencing-specific injuries.
- To identify possible differences in injury types in World Championship (WC) and Olympic Games (OG) Fencing competitions.
- To produce improved safety guidelines for athletes in high-level Fencing.

Material and Methods

- Standard International Fencing Federation (FIE) - Competition Healthcare Register in cooperation with the local medical teams (Lisboa CM 2002, Leipzig WM 2005 and ATHOC 2004, BOCOG 2008): sequential number, date, weapon, diagnosis and hospital referral, if necessary.
- The WC study group (Lisbon 2002 and Leipzig 2005) provided by the Organizing Committees CO CM Lisboa 2002 and the Leipzig Fecht WM 2005 had an N= 2754
- The OG study group (Athens 2004 and Beijing 2008) provided by the Organizing Committees ATHOC and BOCOG 2008 had an N= 659.
- Only trauma cases in competition have been included: excluded were all medical cases and all cases during training sessions unreported by the team doctors.
- Main injury types, anatomic distribution and relative percentages were noted: Head and neck (H), Spine (SP), Upper Extremity (UE), Lower Extremity (LE).

Results I

World Championship Group (Lisbon 2002, Leipzig 2005)

N= 2754

Anatomic Distribution	Diagnosis	Grand Total
Head	Ocular foreign body	1
	Facial Contusion	**3**
	Corneal Trauma	1
	Blunt Head Trauma	1
Head Total		**6**
Spine	Cervical Blunt Trauma	6
	Lower back pain	14
	Costo-vertebral Dislocation	**1**
SP Total		**21**
Upper Extremity	Thoracic Blunt Trauma	1
	Arm Blunt Trauma	6
	Elbow sprain / Blunt Trauma	2
	Wrist sprain	5
	Hand fracture	2
	Hand blunt trauma	5
	Hand incisive/ blunt wound	6
	Thumb sprain	6
UE Total		**33**
Lower Extremity	LE Cramps	2
	LE blunt trauma	6
	Knee sprain	2
	ACL / Meniscal Injury	2
	LE Muscle Tear	9
	LE Incisive/ blunt wound	1
	Foot / Ankle blunt trauma	5
	Ankle sprain	6
	Achillean Tendinitis	2
	Plantar Fascitis	2
	Metatarsalgy	2
	Plantar Blisters	8
LE Total		**47**
Trauma Care Total		**107**

Results II

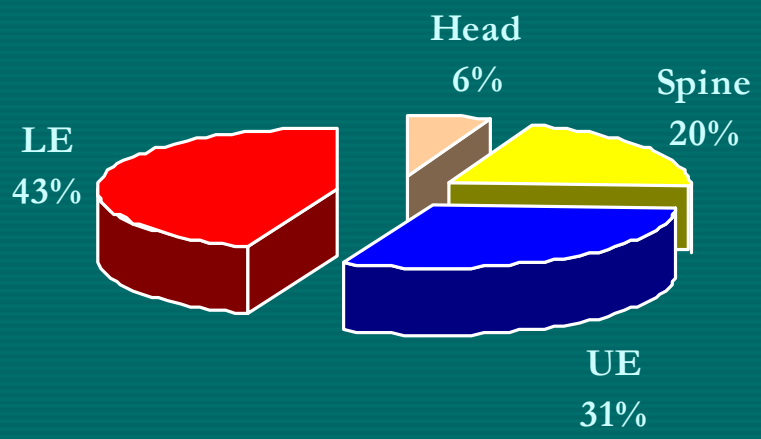
Olympic Games Group (Athens 2004, Beijing 2008)

N= 659

Anatomic Distribution	Diagnosis	Grand Total
Head	Ocular foreign body	1
Head Total		**1**
Spine	Neck pain	1
	Lower back pain	4
SP Total		**5**
Upper Extremity	Shoulder Dislocation	1
	Shoulder Tendinitis	2
	Elbow sprain / Blunt Trauma	3
	Wrist sprain	2
	Wrist fracture	1
	Hand blunt trauma	8
	Hand incisive/ blunt wound	6
	Thumb sprain	1
UE Total		**24**
Lower Extremity	LE Cramps	1
	LE blunt trauma	5
	Knee sprain	4
	Meniscal Injury	2
	LE Muscle Tear	1
	LE Incisive/ blunt wound	2
	Foot / Ankle blunt trauma	2
	Ankle sprain	11
	Achillean Tendinitis	1
LE Total		**29**
Trauma Care Total		**59**

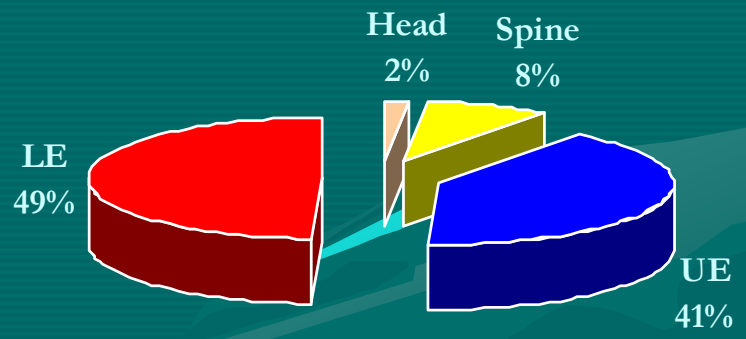
Results III

World Championship Group (Lisbon 2002, Leipzig 2005)



- ✓ N= 2754 ; recorded injuries 107.
- ✓ Fencer/injury ratio: 25,74 (3,88% injured)
- ✓ Most frequent injuries: lower back pain (14), muscle tears (9), plantar blisters (8).
- ✓ European host cities; top healthcare and hospital support organization.
- ✓ FIE supervised.

Olympic Games Group (Athens 2004, Beijing 2008)

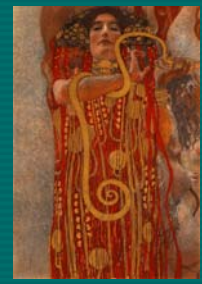


- ✓ N= 659 ; recorded injuries 59.
- ✓ Fencer/injury ratio: 11,17 (8,95% injured)
- ✓ Most frequent injuries: ankle sprains (11), hand blunt trauma (8), hand wounds (6).
- ✓ European and Asian host cities; top health-care and hospital support organization.
- ✓ FIE and IOC supervised.

Discussion

- No life-threatening laesions, such as penetrating injuries to head, neck, thorax or bowel, were recorded at any of the 4 observed top-level Fencing competitions (2 World Championships and 2 Olympic Games).
- Both groups presented grossly similar injuries, as Fencing competition has proven injury statistics, as established in earlier studies: most frequent injuries went in both to the Lower Extremity, followed by the Upper Extremity, then Spine and Head, least injured anatomical region.
- In the WC study group, the longer-lasting competition, with preliminary bouts and a certain margin for defeat, but also a test for concentration and endurance, the prevailing injuries were of the wear-and-tear type, due to continued exertion, dehydration and fatigue. Its injury rate was 3,88%.
- In the OG study group, the shorter, but more intense competition of the "sudden death" (Direct Elimination) type, injuries were predominantly due to the violence and speed of the competition circumstances, with a clear bias to the unprotected hand. Its injury rate was 8,95%.
- The few injuries leading to abandon of competition (shoulder dislocation, hamstring tear, meniscus/ ACL laesion) were due to relapsing previous injury. Most injured athletes were able to continue competing.

Conclusions



- Despite being an armed combat sport, high-competition Fencing is a safe activity, provided that the protective gear is worn and safety measures are kept at all times.
- The single most frequent injury type is the Ankle sprain (push-off foot): we believe in specific ankle strengthening and flexibility exercises, as well as posterior shoe support.
- The continued lumbar spine flexo-extension leads to frequent lower back pain (specially in Épée): we strongly recommend specific abdominal and lumbar strengthening to curb this injury type.
- The sharp rise of avoidable injury in the unprotected hand (specially in Sabre) draws our attention after the observed statistics: the time for an added glove to the protective equipment list might have come.
- Direct Elimination competition leads to added pressure and an increased, if still small, injury risk.
- For longer type competition, plantar blisters might be reduced by using the use-softened competition sport shoes.
- Statistical surveillance of competition leads to identifying expected injury types.
- Thorough planning and coordination with the local medical teams helps ensure a safe competition and minimize injury impact therein.

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