



The 24th Men's Handball World Championship Injury & Illness Surveillance Project

Introduction

The Injury & Illness Surveillance Project was conducted throughout the Male Handball World Championship (WSC) 2015 in Doha. The objective was to implement a systematic registration of injuries and illnesses among players of all participating teams and provide information about the rate and pattern of injuries and illnesses. This report presents all injuries and illnesses that occurred during matches and/or training throughout the event, from January 15 to February 1. Please, be aware that the data presented are preliminary results, which will be submitted to an international scientific journal for publication. The purpose of this internal IHF report is to provide complete data to all stakeholders within the IFH as a basis for discussions on injury prevention.

The team medical staff (physicians and/or physiotherapists) of all participating teams were asked to report all newly incurred injuries and illnesses in matches and/or training on a daily basis, using a specially designed, single-page report form (see Appendix). The report form was available in six languages (English, French, Spanish, German, Russian and Arabic). The project methodology was modeled on the IOC protocols developed for the Olympics (Junge et al. 2009; Junge et al. 2008).

A newly incurred injury is defined as any musculoskeletal complaint (including concussion) newly incurred due to match play and/or training during the tournament that received medical attention, regardless of the consequences with respect to absence from matches or training. This injury definition includes four aspects: (1) all injuries that received medical attention (not only time loss or reduced performance), (2) newly incurred (exclusion of pre-existing and not fully rehabilitated injuries), (3) injuries occurring during matches or training, and (4) injuries occurring during the period of the tournament.

A newly incurred illness is defined as any physical complaint (not related to injury) incurred due to competition and/or training during the tournament that received medical attention, regardless of the consequences with respect to absence from competition or training (e.g. fever, fatigue, cough, nausea, dizziness, etc.). Chronic pre-existing illnesses are not included, unless there is an exacerbation requiring medical attention during the event.

We trust that this report will assist all the relevant stakeholders to consider creative methods and interventions to reduce the risk of injuries & illnesses and to protect the health of athletes. We would like to sincerely thank IHF Senior Management and all team medical staff members for their outstanding cooperation and contribution to this Injury & Illness Surveillance Project throughout the entire World Championships.

Doha, February 2015

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Number of injuries and illnesses reported

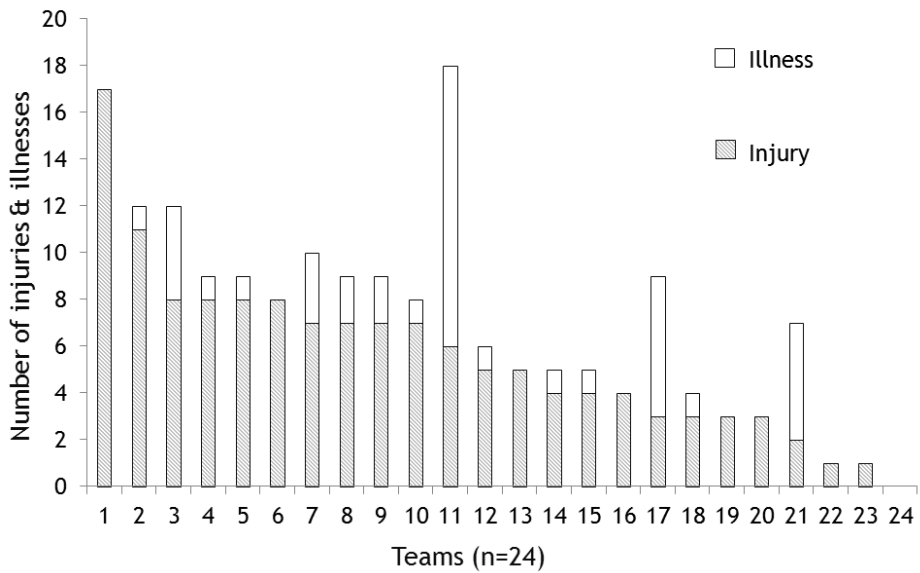


Figure 1 Number of cases of injury and illness reported (y-axis) by the 24 participating teams (x-axis).

Number of injuries reported related to setting and player position

Table 1 Number of injuries reported (n=132) for setting and player position

Setting	Player position					Total
	Wing	Back	Line	Goalkeeper	N/A*	
Match	31	44	31	9	7	122
Training	1	4	5	0	0	10
Total	32	48	36	9	7	132

*N/A = Information not available

Number of match injuries, exposure, and injury incidence

Table 2 Number of match injuries (n=122), exposure (number of player hours), and injury incidence (injuries per 1000 player hours) for each of the four player position

Player position	Match injuries		Exposure	Injury incidence (CI)	
	All	Time-loss	Player hours	All	Time-loss
Wing	31	20	334	93.0 (60.2-125.7)	60.0 (33.7-86.3)
Back	44	22	500	88.0 (62.0-114.0)	44.0 (25.6-62.4)
Line	31	11	167	185.6 (120.3-251.0)*	65.9 (26.9-104.8)
Goalkeeper	9	3	167	53.9 (18.7-89.1)	18.0 (-2.4-38.3)
N/A	7	3	-	-	-
Total	122	59	1168	104.5 (85.9 to 123.0)	50.5 (37.6 to 63.4)

*Relative risk line vs. goalkeeper: 3.44 (1.64 to 7.24)

Exposure calculation for the player positions is based on the team formation, i.e. wing (2/7 of total), back (3/7), line (1/7) and goalkeeper (1/7).

The total injury incidence corresponds to 1.4 injuries/match for all injuries and 0.7 injuries/match for time-loss injuries (leading to absence from full participating in training and/or match play for at least one day).

Injury risk by player position during matches

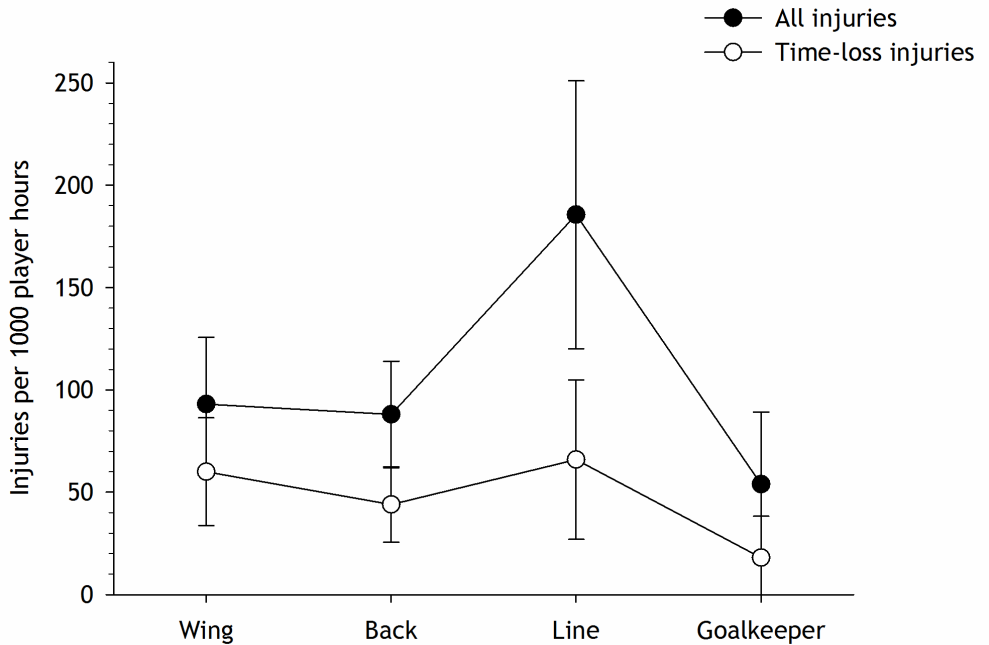


Figure 2 Incidences of match injuries; all (n=115) and time-loss (n=56), expressed as injuries/1000 player hours (CI), for each of the player position.

Note: In total, 7 of the 122 match injuries were not classified according to player position, including 3 of the 59 time-loss injuries.

Injury severity by player position

Table 3 Number of match injuries (n=122) regarding severity, expressed as estimated days of absence from full participation in training and match play, for each of the player position

Absence	Wing	Back	Line	Goalkeeper	N/A	Total (%)
No absence	9	13	18	6	3	49 (40.2)
1 day	5	6	5	1	-	17 (13.9)
2 days	10	7	1	-	-	18 (14.8)
1 week	3	4	3	1	2	13 (10.7)
2 weeks	-	2	-	-	1	3 (2.5)
3 weeks	2	1	1	1	-	5 (4.1)
4 weeks	-	-	-	-	-	0 (0)
>4 weeks	-	2	1	-	-	3 (2.5)
≥6 months	-	-	-	-	-	0 (0)
N/A	2	9	2	-	1	14 (11.5)
Total (%)	31 (25.4)	44 (36.1)	31 (25.4)	9 (7.3)	7 (5.7)	122 (100)

Body part injured by player position

Table 4 Number of match injuries (n=122) regarding body part injured for each of the player position

Body part injured	Wing	Back	Line	Goalkeeper	N/A	Total (%)
Face	2	2	5	2	1	12 (9.8)
Head	1	2	-	-	2	5 (4.1)
Neck, cervical spine	-	-	-	-	-	0 (0)
Thoracic/upper back	-	-	-	-	-	0 (0)
Sternum/ribs	1	-	1	-	-	2 (1.6)
Lumbar/lower back	2	1	3	-	-	6 (4.9)
Abdomen	1	1	2	-	-	4 (3.3)
Pelvis/sacrum/buttock	-	-	1	-	-	1 (.8)
Shoulder/clavicle	1	5	2	1	-	9 (7.4)
Upper arm	-	1	-	-	-	1 (.8)
Elbow	1	1	-	-	-	2 (1.6)
Forearm	-	-	-	-	-	0 (0)
Wrist	-	2	-	-	-	2 (1.6)
Hand	-	-	-	1	-	1 (.8)
Finger	-	3	2	-	-	5 (4.1)
Thumb	1	1	-	-	-	2 (1.6)
Hip	1	-	-	-	-	1 (.8)
Groin	1	1	-	2	-	4 (3.3)
Thigh	5	6	4	1	2	18 (14.8)
Knee	2	6	3	1	1	13 (10.7)
Lower leg	4	3	1	-	-	8 (6.6)
Achilles tendon	-	-	-	-	-	0 (0)
Ankle	6	7	6	1	1	21 (17.2)
Foot/toe	2	2	1	-	-	5 (4.1)
Total (%)	31 (25.4)	44 (36.1)	31 (25.4)	9 (7.3)	7 (5.7)	122 (100)

Body part injured versus injury severity

Table 5 Number of match injuries (n=122) related to body part injured and injury severity

Body part injured	No absence	1 day	2 days	1 week	2 weeks	3 weeks	4 weeks	>4 weeks	≥6 months	N/A	Total (%)
Face	11	1	-	-	-	-	-	-	-	-	12 (9.8)
Head	2	1	-	1	1	-	-	-	-	-	5 (4.1)
Neck, cervical spine	-	-	-	-	-	-	-	-	-	-	0 (0)
Thoracic/upper back	-	-	-	-	-	-	-	-	-	-	0 (0)
Sternum/ribs	1	-	-	-	-	-	-	-	-	1	2 (1.6)
Lumbar/lower back	4	2	-	-	-	-	-	-	-	-	6 (4.9)
Abdomen	1	2	-	-	-	-	-	-	-	1	4 (3.3)
Pelvis/sacrum/buttock	1	-	-	-	-	-	-	-	-	-	1 (.8)
Shoulder/clavicle	2	-	2	1	-	-	-	1	-	3	9 (7.4)
Upper arm	-	-	1	-	-	-	-	-	-	-	1 (.8)
Elbow	1	-	1	-	-	-	-	-	-	-	2 (1.6)
Forearm	-	-	-	-	-	-	-	-	-	-	0 (0)
Wrist	1	-	-	1	-	-	-	-	-	-	2 (1.6)
Hand	1	-	-	-	-	-	-	-	-	-	1 (.8)
Finger	4	-	-	-	-	-	-	-	-	1	5 (4.1)
Thumb	2	-	-	-	-	-	-	-	-	-	2 (1.6)
Hip	-	-	1	-	-	-	-	-	-	-	1 (.8)
Groin	1	-	-	1	-	1	-	-	-	1	4 (3.3)
Thigh	5	3	3	1	1	3	-	-	-	2	18 (14.8)
Knee	5	1	4	3	-	-	-	-	-	3	13 (10.7)
Lower leg	1	3	1	1	-	-	-	-	-	2	8 (6.6)
Achilles tendon	-	-	-	-	-	-	-	-	-	-	0 (0)
Ankle	6	4	3	4	1	-	-	-	-	3	21 (17.2)
Foot/toe	-	-	2	-	-	1	-	2	-	-	5 (4.1)
Total (%)	49 (40.2)	17 (13.9)	18 (14.8)	13 (10.7)	3 (2.5)	5 (4.1)	0 (0)	3 (2.5)	0 (0)	14 (11.5)	122 (100)

Injury type by player position

Table 6 Number of match injuries (n=122) regarding injury type for each of the player position

Injury type	Wing	Back	Line	Goalkeeper	N/A	Total (%)
Concussion	-	1	-	-	1	2 (1.6)
Fracture (traumatic)	-	-	-	-	-	0 (0)
Stress fracture (overuse)	-	-	-	-	-	0 (0)
Other bone injuries	-	-	-	-	-	0 (0)
Dislocation, subluxation	1	3	1	-	-	5 (4.1)
Tendon rupture	-	3	-	-	-	3 (2.5)
Ligamentous rupture	-	-	1	-	1	2 (1.6)
Sprain (injury of joint and/or lig)	7	13	8	1	-	29 (23.4)
Lesion of meniscus or cartilage	1	1	-	-	1	3 (2.5)
Strain/ muscle rupture/ tear	5	4	3	3	1	16 (13.1)
Contusion/ hematoma/ bruise	11	15	15	4	2	47 (38.5)
Tendinosis/ tendinopathy	1	-	-	-	-	1 (.8)
Arthritis/ synovitis/ bursitis	1	1	-	1	-	3 (2.5)
Fasciitis/ aponeurosis injury	-	-	1	-	-	1 (.8)
Impingement	-	-	-	-	-	0 (0)
Laceration/ abrasion/ skin lesion	1	1	2	-	1	5 (4.1)
Dental injury/ broken tooth	-	-	-	-	-	0 (0)
Nerve injury/ spinal cord injury	-	-	-	-	-	0 (0)
Muscle cramps or spasm	2	1	-	-	-	3 (2.5)
Other	1	1	-	-	-	2 (1.6)
Total (%)	31 (25.4)	44 (36.1)	31 (25.4)	9 (7.3)	7 (5.7)	122 (100)

Injury cause by player position

Table 7 Number of match injuries (n=122) regarding injury cause for each of the player position

Injury cause	Wing	Back	Line	Goalkeeper	N/A	Total (%)
Overuse (gradual onset)	2	3	2	1	1	9 (7.4)
Overuse (sudden onset)	3	1	-	2	-	6 (4.9)
Non-contact trauma	7	5	4	-	1	17 (13.9)
Recur. of previous injury	-	1	1	-	-	2 (1.6)
Contact: another player	15	32	22	2	5	76 (62.3)
Contact: moving object	1	-	1	4	-	6 (4.9)
Contact: stagnant object	2	-	1	-	-	3 (2.5)
Violation of rules	1	-	-	-	-	1 (.8)
Field of play conditions	-	-	-	-	-	0 (0)
Environmental conditions	-	-	-	-	-	0 (0)
Equipment failure	-	-	-	-	-	0 (0)
Other	-	1	-	-	-	1 (.8)
N/A	-	1	-	-	-	1 (.8)
Total (%)	31 (25.4)	44 (36.1)	31 (25.4)	9 (7.3)	7 (5.7)	122 (100)

Match time of injury by player position

Table 8 Number of injuries reported (n=122) related to match time and player position

Match time (min)	Player position					Total
	Wing	Back	Line	Goalkeeper	N/A	
First half (0-15)	3	10	4	1	1	19 (15.6)
First half (15-30)	17	19	12	4	3	55 (45.1)
Second half (30-45)	2	6	2	2	0	11 (9.0)
Second half (45-60)	8	6	7	3	2	26 (21.3)
N/A	1	3	6	0	1	11 (9.0)
Total (%)	31 (25.4)	44 (36.1)	31 (25.4)	9 (7.3)	7 (5.7)	122 (100)

Match result by player position

Table 9 Number of injuries reported (n=122) related to match result and player position

Result	Player position					Total
	Wing	Back	Line	Goalkeeper	N/A	
Win	17	13	19	1	4	54 (44.3)
Loss	11	30	11	7	3	62 (50.8)
Tie	3	1	1	1	-	6 (4.9)
Total (%)	31 (25.4)	44 (36.1)	31 (25.4)	9 (7.3)	7 (5.7)	122 (100)

Number of cases of illness related to onset and player position

Table 10 Number of cases of illness (n=42) by onset and player position

Onset	Player position					Total
	Wing	Back	Line	Goalkeeper	N/A	
Sudden	6	11	5	5	2	29 (69.0)
Gradual	4	4	3	2	0	13 (31.0)
Total	10 (23.8)	15 (35.7)	8 (19.0)	7 (16.7)	2 (4.8)	42 (100)

Severity of illness by player position

Table 11 Number of cases of illness (n=42) regarding severity, expressed as estimated days of absence from full participation in training and match play, for each of the player position

Absence	Wing	Back	Line	Goalkeeper	N/A	Total (%)
No absence	3	3	5	3	0	14 (33.3)
1 day	1	2	1	1	0	5 (11.9)
2 days	6	8	2	3	2	21 (50.0)
1 week	-	-	-	-	-	0 (0)
2 weeks	-	-	-	-	-	0 (0)
3 weeks	-	-	-	-	-	0 (0)
4 weeks	-	-	-	-	-	0 (0)
>4 weeks	-	1	-	-	-	1 (2.4)
≥6 months	-	-	-	-	-	0 (0)
N/A	-	1	-	-	-	1 (2.4)
Total	10 (23.8)	15 (35.7)	8 (19.0)	7 (16.7)	2 (4.8)	42 (100)

Affected system by player position

Table 12 Number of cases of illness (n=42) regarding affected system for each of the player position

Affected system	Wing	Back	Line	Goalkeeper	N/A	Total (%)
Upper respiratory tract	8	10	4	4	2	28 (66.7)
Lower respiratory tract	1	-	2	-	-	3 (7.1)
Gastrointestinal	-	2	-	1	-	3 (7.1)
Cardiovascular	-	-	-	-	-	0 (0)
Urogenital, gynecological	-	-	-	-	-	0 (0)
Endocrine or metabolic	-	-	-	-	-	0 (0)
Hematologic, metabolic	1	2	-	-	-	3 (7.1)
Neurologic, CNS	-	-	-	-	-	0 (0)
Dermatologic/ skin	-	1	1	1	-	3 (7.1)
Musculoskeletal	-	-	1	-	-	1 (2.4)
Dental	-	-	-	-	-	0 (0)
Ophthalmological/ontological	-	-	-	-	-	0 (0)
Psychiatric/ psychological	-	-	-	-	-	0 (0)
Other	-	-	-	1	-	1 (2.4)
Total	10 (23.8)	15 (35.7)	8 (19.0)	7 (16.7)	2 (4.8)	42 (100)

Main symptom(s) of illness by player position

Table 13 Number of cases of illness (n=42) regarding main symptom(s) for each of the player position

Main symptom(s)	Wing	Back	Line	Goalkeeper	N/A	Total (%)
Pain, ache, soreness	8	8	5	2	2	25 (59.5)
Fever, excess sweating or chills	1	2	1	2	-	6 (14.3)
Nausea, vomiting or diarrhea	-	3	-	1	-	4 (9.5)
Weight loss or dehydration	-	-	-	-	-	0 (0)
Fatigue, lack of energy, lethargy or arterial hypotension	-	-	-	-	-	0 (0)
Irregular heartbeat, palpitation, syncope, collapse or chest pain	-	-	-	-	-	0 (0)
Congestion, hypersecretion, rhinorrhea or discharge	1	1	-	1	-	3 (7.1)
Cough, wheezing, dyspnea or shortness in breath	-	-	1	-	-	1 (8.3)
Dizziness or vertigo	-	-	-	-	-	0 (0)
Rash, itch or eczema	-	1	1	1	-	3 (7.1)
Numbness, weakness or tingling	-	-	-	-	-	0 (0)
Mood/ sleep disturbance, anxious or depressed	-	-	-	-	-	0 (0)
Other	-	-	-	-	-	0 (0)
Total	10 (23.8)	15 (35.7)	8 (19.0)	7 (16.7)	2 (4.8)	42 (100)

Cause of illness by player position

Table 14 Number of cases of illness (n=42) regarding causes for each of the player position

Cause of illness	Wing	Back	Line	Goalkeeper	N/A	Total (%)
Pre-existing disease	-	-	1	1	-	2 (4.8)
Infectious (viral, bacterial, etc.)	9	11	5	5	2	32 (76.2)
Environmental (heat, altitude)	-	-	1	1	-	2 (4.8)
Nutritional, endocrine, metabolic	1	2	-	-	-	3 (7.1)
Drug related or toxic reaction	-	-	-	-	-	0 (0)
Exercise related	-	-	1	-	-	1 (2.4)
Psychiatric	-	-	-	-	-	0 (0)
Other/ idiopathic	-	1	-	-	-	1 (2.4)
N/A	-	1	-	-	-	1 (2.4)
Total	10 (23.8)	15 (35.7)	8 (19.0)	7 (16.7)	2 (4.8)	42 (100)

CODES & DEFINITIONS

PLAYER POSITION

B: Back **L:** Line
W: Wing **G:** Goalkeeper

SEVERITY – EXPECTED ABSENCE FROM TRAINING AND/OR MATCH (IN DAYS)

0: 0 days **2:** 2 days **14:** 2 weeks **28:** 4 weeks **>180:** 6 months or more
1: 1 day **7:** 1 week **21:** 3 weeks **>30:** More than 4 weeks

FOR INJURIES

LOCATION OF INJURY

HEAD & TRUNK

1. Face (incl. eye, ear, nose)
2. Head
3. Neck/ cervical spine
4. Thoracic spine/ upper back
5. Sternum/ ribs
6. Lumbar spine/lower back
7. Abdomen
8. Pelvic/ sacrum/ buttock

LOWER EXTRIMITY

21. Hip
22. Groin
23. Thigh (anterior/posterior)
24. Knee (medial/lateral)

UPPER EXTRIMITY

11. Shoulder/ clavicle
12. Upper arm
13. Elbow
14. Forearm
15. Wrist
16. Hand
17. Finger
18. Thumb
25. Lower leg (anterior/posterior)
26. Achilles tendon
27. Ankle (medial/lateral)
28. Foot/ toe

TYPE OF INJURY

1. Concussion (regardless of loss of consciousness)
2. Fracture (traumatic)
3. Stress fracture (overuse)
4. Other bone injuries
5. Dislocation, subluxation
6. Tendon rupture
7. Ligamentous rupture
8. Sprain (injury of joint and/or ligaments)
9. Lesion of meniscus or cartilage
10. Strain/ muscle rupture/ tear
11. Contusion/ hematoma/ bruise
12. Tendinosis/ tendinopathy
13. Arthritis/ synovitis/ bursitis
14. Fasciitis/ aponeurosis injury
15. Impingement
16. Laceration/ abrasion/ skin lesion
17. Dental injury/ broken tooth
18. Nerve injury/ spinal cord injury
19. Muscle cramps or spasm
20. Other

CAUSE OF INJURY

1. Overuse (gradual onset)
2. Overuse (sudden onset)
3. Non-contact trauma
4. Recurrence of previous injury
5. Contact with another player
6. Contact: moving object (e.g. ball)
7. Contact: stagnant object (e.g.net)
8. Violation of rules (obstruction/pushing)
9. Field of play conditions
10. Environmental conditions (e.g. hall)
11. Equipment failure
12. Other

FOR ILLNESSES

AFFECTED SYSTEM

1. Upper respiratory tract (e.g. nose, sinuses)
2. Lower respiratory tract (trachea, bronchi, lungs)
3. Gastrointestinal
4. Cardiovascular
5. Urogenital, gynecological or reproductive
6. Endocrine or metabolic
7. Hematologic or immunologic
8. Neurologic, CNS
9. Dermatologic/ skin
10. Musculoskeletal
11. Dental
12. Ophthalmological/ ontological
13. Psychiatric/ psychological
14. Other

MAIN SYMPTOM(S)

1. Pain, ache or soreness
2. Fever, excess sweating or chills
3. Nausea, vomiting or diarrhea
4. Weight loss or dehydration
5. Fatigue, lack of energy, lethargy or arterial hypotension
6. Irregular heartbeat, palpitation, syncope, collapse or chest pain
7. Congestion, hypersecretion, rhinorrhea or discharge
8. Cough, wheezing, dyspnea or shortness in breath
9. Dizziness or vertigo
10. Rash, itch or eczema
11. Numbness, weakness or tingling
12. Mood/ sleep disturbance, anxious or depressed
13. Other

CAUSE OF ILLNESS

1. Pre-existing disease (e.g. allergy, asthma, diabetes, degenerative, systemic inflammatory disorders, congenital, autoimmune or malignancy related)
2. Infectious (viral, bacterial, fungal, etc.)
3. Environmental (e.g. heat, cold, altitude)
4. Nutritional, endocrine or metabolic disturbance
5. Drug related or toxic reaction
6. Exercise related (dehydration, exhaustion)
7. Psychiatric
8. Other/ idiopathic



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We would like to sincerely thank IHF Senior Management and all team medical staff members for their outstanding cooperation and contribution to this Injury & Illness Surveillance Project throughout the entire World Championships.

