SPORT INJURY AND OVERUSE SURVEILLANCE IN HANDBALL-
REVIEW OF SYSTEMS AND NEW PROPOSAL

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Injuries in handball

- Overall incidence of an injury in handball is about 2/1000h.

  - 10x higher in competition

- Handball has the highest absolute numbers of injuries in women’s club sport in Germany
  \[ \text{Henke 2003} \]
Injury prevention

1. **identification of the problem (epidemiology)**
2. **identification of the risk factors contributing to injuries (etiology)**
3. introduction a preventive measures (prevention)
4. assessment of prevention and effectiveness

*van Mechelen et al., 1992, Finch C. 1999, Aman M at al. 2014*

Injury and overuse surveillance in handball
Injury prevention

1. identification of the problem (epidemiology)
2. identification of the risk factors contributing to injuries (aetiology)
3. introduction a preventive measures (prevention)
4. assessment of prevention and effectiveness


Injury and overuse surveillance in handball
Multiple sports:
- the Fysion Blesreg system 1998
- International Olympic Committee approach 2008
- FIFA injury report form
- Injury Definitions and Data Collection in Rugby Union 2007
- OSTRC Overuse Injury Questionnaire 2012

Handball:
- IHF injury and illness report from
- Injury monitoring by Olsen at al. 2006
- Standardized form by Leig & Henke 2010
- SMS approach by Moller at al. 2012
- Injury report system by Sharma at al. 2013

Basic issues
- What data?
- Where to take the data from?
- Who should to that?
- How?
- When?
### Administration Items
- Person recording case information
- Immediate source of injury record
- Date of injury
- Time of injury
- Date of injury record

### Demographics
- Age
- Gender
- Area of usual residence

### Place of Injury Occurrence
- Name of injury place - text
- Place of injury - type
- Sport and recreation places - specific Part of specific injury place

### Activity When Injured
- Activity when injured - broad areas
- Activity when injured - name of sport or activity
- Phase or aspect of involvement in activity or event

### Major Injury Factors
- Injury Factors
- Equipment used with intent to protect against injury

### Mechanism of Injury
- Mechanism of injury
- Narrative of mechanism of injury

### Body Region Injured
- Body region and body chart
- Specific structure injured

### Nature of Injury - Pathology
- Nature of injury
- Provisional diagnosis text

### Treatment Factors
- Date of presentation
- Time of presentation
- Reason for presentation

### Treatment
- Treatment
- Advice given to injured person
- Referral
- Treating person

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**Australian Sports Injury Data Dictionary**
- standardised guidelines for injury data collection

- Finch at al. 1997

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**Injury and overuse surveillance in handball**
Sports injury registration: the Fysion Blesreg system

- de Bruijn J. V. & Keizers S. 1991

- 2 forms
  - registration form (zero)
  - competition form (injury)
    - team card - sport activity
    - player card - cause, nature and treatment of the injury
- trainers, masseurs, physiotherapists and physicians
### Injury and Overuse Surveillance in Handball

**Sport Injury Surveillance Systems**

<table>
<thead>
<tr>
<th>Team</th>
<th>Event</th>
<th>Size of match</th>
<th>Type of court</th>
<th>Location of match</th>
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<th>Number of Injuries:</th>
<th>E (events)</th>
<th>J (jumper)</th>
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Aman M at al. 2014

- high-quality sports injury data from insurance data-base
- sports activity, age, gender, residence at time of injury, date of injury
- type of injury, injured body part
- type of financial compensation
- disability assessment

- only injuries, no overuse, no illness
- relies on third party and insurance system
Overuse results in
- pain
- decreased sport performance

How to measure overuse?

- 4 questions related to any anatomical area
- comparing to standard injury reporting
- 10x more
- 64% overuse injuries missed

**Oslo Sports Trauma Research Centre (OSTRC) Overuse Injury Questionnaire**
- Clarsen B. at al. 2012
### IHF- Injury & Illness Report Form (World Championship 2015)

<table>
<thead>
<tr>
<th>Player</th>
<th>Time of injury</th>
<th>Injury location</th>
<th>Type of injury</th>
<th>Cause of injury</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>Position (code)</td>
<td>Training (date)</td>
<td>Match (time)</td>
<td>Description</td>
<td>Code</td>
</tr>
<tr>
<td>Example</td>
<td>L</td>
<td>-</td>
<td>14:35</td>
<td>Ankle (lateral)</td>
<td>27</td>
</tr>
</tbody>
</table>
|         |       |       |         | Yes ☐ No ☐  | 7

### Illness

<table>
<thead>
<tr>
<th>Player</th>
<th>Time</th>
<th>Affected system</th>
<th>Main symptom(s)</th>
<th>Cause of illness</th>
<th>Diagnosis</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>Position (code)</td>
<td>Mode of onset (sudden/gradual)</td>
<td>Date (of occurrence)</td>
<td>Description</td>
<td>Code</td>
<td>Description</td>
</tr>
</tbody>
</table>
| Example | L | Sudden | 14.01.15 | Upper resp. Dist. | 1 | Fever, pain | 1, 2 | Infection | Tonsillitis, cold | 2

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Injury and overuse surveillance in handball
Sport injury surveillance systems in handball

- **Moller M. et al. 2012**
  - SMS system
  - 3 messages: injury last week?
  - If yes, then player contacted with the interview form
  - Response rate 85%-90%

  - circumstances, sports career and personal background, sociodemographic
  - coach report vs. match report
  - 73% response rate (Sharma), 70% (Olsen)

**Injury and overuse surveillance in handball**

1. Date of injury
2. Injury was acute/overuse/not handball related?
3. Injury was new/re-injury/exacerbation?
4. The location of the injury
5. Match or training?
6. Type of training
7. Injury during warm up, after warm up, after training?
8. Type of match
9. Injury during warm up/1.half/2.half?
10. Field position when occurred
11. Was related with any contact with another player or object, during side cutting, during run?
12. Severity of the injury in the first week after registration
13. Medical attention?
14. If medical attention, sought a doctor/physiotherapist/chiropractor or other
15. Consent to collect medical records
Major issues with reporting

- definitions
- all injuries, or time-loss injuries
- overuse, illness
- diet
- efficacy of reporting
  - missed injuries
  - underreporting by personnel
    - inconvenience
    - not included in the study, no incentive, not informed
  - underreporting by athlete (hiding the injury)
- errors in calculations of time of play or training
- to simple vs. to complex
Purpose

- to develop sport injury and overuse surveillance system for handball
How to develop sport injury surveillance?

- **Needs Assessment, Consultation and Literature Review**
- **Development of Prototype Form**
  - mixture of open-ended and closed questions
- **Trial during the Games**
- **Refinement of Prototype Form**
  - layout pre-coded data options
- **Further Use and Adoption of the Form**

*Finch C. et al. 1999*
Injury and overuse surveillance in handball

SIOMS sport injury & overuse monitoring system in HB

profile form

acute injury form

overuse form
### Demographic Form - Player Profile

#### Rehasport Clinic

<table>
<thead>
<tr>
<th>Field</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>First and last name</td>
<td></td>
</tr>
<tr>
<td>Date of birth</td>
<td></td>
</tr>
<tr>
<td>Position on the field</td>
<td></td>
</tr>
<tr>
<td>Has there been any injuries requiring medical treatment during entire career?</td>
<td>(causing time lost from training of more than 7 days)</td>
</tr>
<tr>
<td>Has there been any injuries requiring medical treatment during last season?</td>
<td>(causing time lost from training of more than 7 days)</td>
</tr>
<tr>
<td>Average time of playing during last season:</td>
<td>min/game</td>
</tr>
<tr>
<td>Number of hours playing in matches during last season</td>
<td></td>
</tr>
<tr>
<td>Number of hours playing in matches during this season</td>
<td></td>
</tr>
<tr>
<td>Number of hours in training during last season</td>
<td></td>
</tr>
<tr>
<td>Number of hours playing in training during this season</td>
<td></td>
</tr>
<tr>
<td>Has the player been on sport diet?</td>
<td>Yes</td>
</tr>
<tr>
<td>What kind of injury?</td>
<td></td>
</tr>
<tr>
<td>What type of treatment?</td>
<td></td>
</tr>
<tr>
<td>How does the player estimate the rate of endurance/strengthening training?</td>
<td>30/70 50/50 70/30</td>
</tr>
</tbody>
</table>

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**SIOMS sport injury & overuse monitoring system in HB**
### Injury and Overuse Surveillance in Handball

#### SIOMS Sport Injury Monitoring System in HB

<table>
<thead>
<tr>
<th>Incident Location</th>
<th>Chronology</th>
<th>Court Surface:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training</td>
<td>Acute</td>
<td>Artificial</td>
</tr>
<tr>
<td>League Game</td>
<td>Chronic</td>
<td>Natural</td>
</tr>
<tr>
<td>Tournament</td>
<td></td>
<td>Other</td>
</tr>
<tr>
<td>Home Game</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Away Game</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Incident

- Unfortunate landing after the jump
- Collision with object
- Collision with participant
- Fall from a jump
- Struck by the object or person
- Rupture or tear
- Tendinitis

#### Body Part

- Head
- Neck
- Back
- Upper Limb
- Pelvis
- Lower Limb

#### Side

- Right
- Left

#### Diagnosis Verification

- Clinical
- X-ray
- Ultrasound
- MRI
- CT

- Has the player had the same type of injury before?
  - Yes
  - No

- Is the injured body part supported?
  - Yes
  - No

- Knee pads
- Tape
- Splinting
- Brace

- Has the player reported any complaints regarding injured body part before the injury occurred?
  - Yes
  - No

- Pain
- Instability
- Other
- Hypertension
- Swelling

#### Severity

- Time lost for training from the injury to complete recovery:
  - Injured: [Days]
  - Moderate: [1-7 days]
  - Severe: [8-28 days]
  - [More than 28 days]

#### Treatment Applied

- NSAID
- Anticoagulants
- PEP
- Rehabilitation
- Crutches
- Braces
- Other supporting equipment

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**ORTHOPAEDICS - DIAGNOSTICS - REHABILITATION - SPORT**
# Injury and overuse surveillance in handball

## SIOMS sport injury & overuse monitoring system

### Chronic/overuse injury

#### Protocol B

<table>
<thead>
<tr>
<th>Incident Location A</th>
<th>Incident Location B</th>
<th>Chronology</th>
<th>Court surface</th>
</tr>
</thead>
<tbody>
<tr>
<td>training</td>
<td>league game</td>
<td>acute</td>
<td>artificial</td>
</tr>
<tr>
<td>tournament</td>
<td>international game</td>
<td>chronic</td>
<td>parquet</td>
</tr>
<tr>
<td>home game</td>
<td>away game</td>
<td>other</td>
<td></td>
</tr>
</tbody>
</table>

### Overuse injury

**First and last name**: [Name]

**Date of Birth**: [DOB]

**Playing position**: [Position]

**Date of injury/ time of the game**: [Date/Time]

**Describe the pain you feel when the needle is advanced while blood collecting procedure. VAS scale (0 No pain, 10- worst possible pain)**

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
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</table>

**Describe pain intensity related to the current injury. VAS scale.**

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#### Body part

- Head
- Neck
- Back
- Upper limb
- Pelvis
- Lower limb

#### Anatomical Structure

- Bones
- Joints
- Muscles
- Nervous system
- Skin

#### Diagnosis

<table>
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<tr>
<th>Diagnosis</th>
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</table>

### Diagnosis verification

- Clinical
- X-ray
- Ultrasound
- MRI
- CT

- Has the player had same type of injury before?
  - Yes
  - No

- Has the player reported any complaints regarding the injured part before the injury occurred?
  - Yes
  - No

#### If yes, what kind of complaints?

- Pain
- Swelling
- Diffusion
- Hypertension
- Edema
- Skin warmth
- Dressing

#### If yes, when was the onset of the symptoms?

- [Date]

#### Has the player had any difficulties in the training related to the injury?

- Normal training
- Normal training with pain
- Limited training
- Training impossible

#### What were the training limitations?

- No limitations
- Mild limitations
- Major limitations
- Training impossible

#### How the injury influenced the quality of the player’s game?

- No influence
- Mild influence
- Major influence
- Game impossible

#### Describe the pain the player has had while playing during last week. VAS scale.

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#### Has been equipment used for supporting injured part of the body?

- Yes
- No

#### If yes

- Knee pads
- Elbow pads
- Ankle pad
- Brace

#### Has the player taken any of following to decrease discomfort or symptoms?

- NSAIDs
- Injections
- PRP
diclofenac
- Nothing

#### Evaluation of injury severity

- Insignificant
- Slight 1-3 days
- Minor 4-7 days
- Moderate 5-8 days
- Severe 9-12 days

#### Treatment received

- NSAIDs
- Antibiotics
- PRP
- Physical therapy
- Crutches
- Surgical treatment
- Physiotherapy
SIOMS sport injury & overuse monitoring system in HB

REST Webservice

SIOMS Database

windows based app
Tablet, PC

Injury and overuse surveillance in handball
SIOMS sport injury & overuse monitoring system in HB

Injury and overuse surveillance in handball
Injury and overuse surveillance in handball

SIOMS sport injury & overuse monitoring system in HB

App

player’s profile
team

Injury and overuse surveillance in handball
Injury and overuse surveillance in handball

SIOMS sport injury & overuse monitoring system in HB

App

Reporting injury
- Acute
- Overuse

Injury and overuse surveillance in handball
### Preliminary results

#### 2 friendly matches international tournament
- **7 acute injuries**
- **3 overuse injuries**
- **3 hospitalizations**
- **3 training limitations**
- **7 match absences**

#### Injury and overuse surveillance in handball
Conclusions

Surveillance of sport injuries in handball is critical for sports injury prevention

SIOMS allows for
- collecting the acute and overuse injury data
- constant monitoring of players’ injury profile
- event, training, season
- web/mobile application
- database and data analysis

Further development necessary

Part of “athlete’s passport” project in Rehasport Clinic
Thank you!

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