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A multidisciplinary approach in injury risk management in professional rugby union
Injury vs. performance relationship

Injury Audit

Comparison of injury rate of a single professional rugby union team with population norms

League points tally vs. injury burden [days/1000 player h]
## Targeting interventions

### 2012

<table>
<thead>
<tr>
<th>Injury burden (total days lost)</th>
<th>2165 days</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Injury circumstance</strong></td>
<td></td>
</tr>
<tr>
<td>• Match</td>
<td>60 %</td>
</tr>
<tr>
<td>• Training</td>
<td>40 %</td>
</tr>
<tr>
<td><strong>Injury mechanism</strong></td>
<td></td>
</tr>
<tr>
<td>• Contact</td>
<td>55 %</td>
</tr>
<tr>
<td>• Non-contact</td>
<td>45 %</td>
</tr>
</tbody>
</table>

Perhaps the training prescription isn’t right?

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Twitter: @JasonCTee  Email: j.c.tee@leedsbeckett.ac.uk
Optimizing training

Tee, unpublished observations
So how did we do?

<table>
<thead>
<tr>
<th></th>
<th>2012</th>
<th>2013</th>
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</thead>
<tbody>
<tr>
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<td>2165 days</td>
<td>2334 days</td>
</tr>
<tr>
<td>Injury circumstance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Match</td>
<td>60 %</td>
<td>80 %</td>
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<td>Injury mechanism</td>
<td></td>
<td></td>
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<tr>
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<td>55 %</td>
<td>76 %</td>
</tr>
<tr>
<td>• Non-contact</td>
<td>45 %</td>
<td>24 %</td>
</tr>
</tbody>
</table>

Twitter: @JasonCTee  Email: j.c.tee@leedsbeckett.ac.uk
Less training injury = more of this
Contact injury (Emergent pattern)

Recursive loop

Recursive loop

Regularities
(Rugby – Contact Risk Profile)

Injuries are complex and multi-factorial

Changing ONE thing is unlikely to change the WHOLE system

Changing the system may have UNEXPECTED results

Injury model for rugby

Based on Bettencourt et al., BJSM 2016

Injuries are complex and multi-factorial

Changing ONE thing is unlikely to change the WHOLE system

Changing the system may have UNEXPECTED results

Contact event

Environment conditions

Training load

Strength

Fatigue

Body mass

Level of anxiety

History of injury

Movement ability

Neuromuscular capability

Age

Player speed

Playing surface
How to approach a complex problem???

- Use every tool in the box!!!
Using the multi-disciplinary team

**S&C coach/Biokineticist**
Prescription of training to improve performance and prevent injury.
- Aerobic / Anaerobic conditioning

**Physiotherapist**
Treating injuries through “hands on” modalities
- Strength / power training
- Return to play

**Sport Scientist**
Optimising performance through interpretation of physical performance data
- Physiological monitoring
- Training load monitoring

**Doctor**
Diagnosing injuries and developing injury management plans
- Diagnosis
- Treatment/therapy

**Technical / Tactical coaches**
Directing technical and tactical training activities
- Tactical training
  - Skills
  - Game plan
- Technical coaching
  - Periodisation
  - Planning training activities

**Physiological monitoring**
- Screening
- Rehabilitation
Day to day flow of information

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2017/11/29
Assessing outcomes in a complex system

Step 1. Establish the extent of the injury problem (Injury Audit)

Step 2. Establish aetiology and mechanism of injuries

Step 3. Introduce preventive measures

Step 4. Assess program effectiveness (Repeat injury audit)

Multi-disciplinary injury risk mitigation strategies

- Strength training
- Therapeutic interventions
- Technical coaching
- Psychophysiological monitoring
- Screening
- Training load monitoring
- Fitness training
- Rehabilitation strategies
- Return to play
Successes - Screening

Preseason Functional Movement Screen Component Tests Predict Severe Contact Injuries in Professional Rugby Union Players

Jason C. Tee, Jannie F.G. Klingbiel, Robert Collins, Mike I. Lambert, and Yoga Coopoo
Fig. 1. Standard Kaplan–Meier survival curves for completing matches free of contact injury for 66 professional rugby league players. Four significant (or almost significant) risk factors are shown: (a) high body mass, (b) fast speed (40m sprint), (c) poor upper-body strength (chin-up), and (d) poor prolonged high-intensity running ability. All curves are adjusted for players’ age, playing experience and usual playing position.
Coaching contact technique frequently
Successes – Reduced tackle injuries

Interventions

- Targeted strength program
- Increased exposure to contact skills training
Successes - Monitoring

Resting heart rate

Sleep hours
Effectiveness of the multi-disciplinary approach

Injury reduction only apparent after 3 cycles of the injury prevention cycle.
Not a short-term process

It takes time to fine tune the injury prevention program to attain the desired result

Multi-disciplinary injury risk mitigation strategies:
- Strength training
- Therapeutic interventions
- Technical coaching
- Psychophysiological monitoring
- Screening
- Training load monitoring
- Fitness training
- Rehabilitation strategies
- Return to play

Job never done as the system is constantly changing!!!