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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

- School (UK)
- Academy (UK)
- Level 2 Club
- Level 1 Club
- International
- Investigation Team

League points tally vs. Injury burden [days/1000 player h]

- $r = -0.56$
- 90% CI: -0.80 to -0.16
- Likely negative

@JasonCTee 2017/11/29
Targeting interventions

<table>
<thead>
<tr>
<th>Injuries</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injury burden (total days lost)</td>
<td>2165 days</td>
</tr>
<tr>
<td>Injury circumstance</td>
<td></td>
</tr>
<tr>
<td>- Match</td>
<td>60 %</td>
</tr>
<tr>
<td>- Training</td>
<td>40 %</td>
</tr>
<tr>
<td>Injury mechanism</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?
Optimizing training

Tee, unpublished observations
So how did we do?

<table>
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<th>2012</th>
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</tr>
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<tr>
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<td></td>
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<tr>
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<td>60 %</td>
<td>80 %</td>
</tr>
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<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
GO BACK AND START AGAIN
Contact 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

Recursive loop

Contact injury
(Emergent pattern)

Regularities
(Rugby – Contact Risk Profile)

Contact event
Tackle technique
History of injury
Movement ability
Environmental conditions
Training load
Strength
Neuromuscular capability
Fatigue
Body mass
Age
Playing surface
Player speed
Level of anxiety

Contact injury model for rugby

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(Rugby – Contact Risk Profile)
How to approach a complex problem???
Use every tool in the box!!!
Using the multi-disciplinary team

**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
  - Psychological monitoring
  - Training load monitoring

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

**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

**Using the multi-disciplinary team**
Day to day flow of information

- Coaches
  - Technical/tactical
  - Skills
  - Strength and Conditioning

- Instagram reporting
- Feedback

- Performance
- Training
  - Prescription
    - Mode
    - Load

- Injury management/rehabilitation
- Game model

- Medical
  - Doctor
  - Physiotherapist

- Sport Science
  - Sport nutrition
  - Sport psychology
  - Performance analysis
  - Biomechanics

Information sharing regarding player coping

Twitter: @JasonCTee Email: j.c.tee@leedsbeckett.ac.uk
Assessing outcomes in a complex system

Multi-disciplinary injury risk mitigation strategies

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

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 (Repeats Injury Audit)

2017/11/29
Twitter: @JasonCTee Email: j.c.tee@leedsbeckett.ac.uk
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

@JasonCTee
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 (40 m 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

![Bar chart showing injury burden from 2012 to 2016 with decreases noted in 2014, 2015, and 2016 compared to 2013.]
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

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

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

Total injuries -9% since 2012, likely beneficial
Contact injuries -21% since 2013, most likely beneficial
Non-contact injuries -39% since 2012, most likely beneficial