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| <b>Institution:</b> University of Bolton   |  |  |
| <b>Unit of Assessment:</b><br>A3: Allied Health Professions, Dentistry, Nursing and Pharmacy   |  |  |
| <b>Title of case study:</b><br>TACKLING THE INCIDENCE OF CONCUSSIONS IN SUPER LEAGUE RUGBY   |  |  |
| <b>Period when the underpinning research was undertaken:</b> 2013 - 2018   |  |  |
| <b>Details of staff conducting the underpinning research from the submitting unit:</b>   |  |  |
| <b>Name(s):</b>  | <b>Role(s) (e.g. job title):</b>                                     | <b>Period(s) employed by submitting HEI:</b> |
| Mrs Anna Fitzpatrick   | Director of Student Life and Satisfaction                            | 2007 - present                               |
| Mr Adam Naylor   | Programme Leader, Senior Lecturer, Sports Rehabilitation             | 2008 - present                               |
| Dr Colin Robertson   | Research Coordinator, Senior Lecturer, Sport and Biological Sciences | 2011 - present                               |
| <b>Period when the claimed impact occurred:</b> 2013 - 2018  |  |  |
| <b>Is this case study continued from a case study submitted in 2014?</b> N   |  |  |
| <p><b>1. Summary of the impact</b> (indicative maximum 100 words)</p> <p>Research conducted at the University of Bolton (UoB) has improved the method of reporting of injuries within professional Rugby League. The research has informed and contributed to improved standards of player care and welfare within the professional game, specifically with regards to concussion injuries. An online electronic surveillance tool, designed and developed at the UoB, captured injury data during the period 2013 – 2018, throughout the competitive seasons. The annual findings were presented to the governing body, and each of the Super League clubs (2013 until 2018) and led directly to a change in bylaws regarding concussion data-collection and subsequent management.</p>   |  |  |
| <p><b>2. Underpinning research</b> (indicative maximum 500 words)</p> <p>Concussion is regarded as a major area of concern in contact-sports by sports medicine practitioners. Further, the long-term consequences can be problematic, with research suggesting a link between concussion and Chronic traumatic encephalopathy (CTE).</p> <p>Rugby League (RL) is an invasive contact sport played competitively across the world. Two teams of 13-players play over 80-minutes; predominantly on a grass field. The game is intermittent and involves high-intensity activities separated by low-intensity periods of active recovery. Due to the nature of the game, the amount of high-impact collisions that result in injuries are considerably high.</p> <p>Injury surveillance is essential for identifying the level of injury risk associated with participation and performance, and likewise to underpin current and future safety practices. It was reported in 2009 that should athletes follow proper guidelines for return to play after a concussion, it was possible that the frequency of sports-related CTE could be dramatically reduced or prevented (McKee, 2009).</p> |  |  |

The research produced confidential reports for both the Rugby Football League (RFL), and an anonymised version for each of the clubs, and published as part of a funded research project on behalf of the RFL, together with a peer-reviewed three-year epidemiological prospective cohort study of rugby league match injuries.

The aim of the research was to capture injury surveillance data and report on match injury trends from all teams competing in the Super League (SL) by employing a consensus-driven prospective cohort design. Data was captured during the competitive seasons 2013 - 2018 and collected via an online-reporting survey tool; underpinned by nominal group technique-agreed (NGT) definitions. The pilot of the surveillance tool was conducted during the latter months of the 2012 season, where the final surveillance electronic format was refined following user feedback which enhanced the usability of the online tool. During this period, training sessions were provided for all of the SL medical staff who were to use the surveillance system at their respective club. To optimise inter-rater reliability, injury definitions were defined and explained to each user of the electronic tool. Each SL club was given individual access to the online survey tool via unique login; aligned with data protection regulations. The authors maintained the accessibility to, and training on, the electronic system for new medical staff, enabling new user access and user coaching to ensure injury descriptors were adhered to.

The main findings are an Injury incidence of 56.9 injuries per 1000 hours, with an average of 33.8 days missed per injury. Further, 13% of all injuries were recurrent, accounting for a greater time-loss per-injury (45.2 days) than new injuries (31.8 days). Concussions (7.1 injuries per 1000 hours) were the most commonly diagnosed injuries, although the knee joint (18.3 injuries per 1000 hours) was the most frequently injured area. Prior to the change in bylaws regarding how concussion data was collected, the average number of players suffering concussions (2013 – '15) was 29, increasing to 50 once improved data-collection methods were in place and enforced.

### 3. References to the research (indicative maximum of six references)

1. Authors: Fitzpatrick, A.C., Naylor, A.S., Myler, P. and Robertson, C.  
 Title: A three-year epidemiological prospective cohort study of rugby league match injuries from the European Super League.  
 Year of Publication: 2018  
 Type of Output: Journal: title, *Journal of Science and Medicine in Sport*,  
<https://doi.org/10.1016/j.jsams.2017.08.012>

Where panels request details of key research grants or end of grant reports, the following should be provided:

- Grant awarded to: Anna Fitzpatrick
- Grant Title: Injury Surveillance Audit
- Sponsor: Rugby Football League (RFL)
- Period of the grant (with dates) • 2013-2018 value of the grant. £36,000.

### 4. Details of the impact (indicative maximum 750 words)

The impact accounted for in this case study is three-fold, the initial phase of the research developed capacity within the field of injury surveillance in rugby league and set a new precedent regarding how research in this area is defined and structured. Following this, as the research findings were disseminated so too was a better understanding of how injuries should be captured and documented during both game and training to provide a complete insight into all factors of influence. Since the research has been influential in the development of new regulations published by the sport's governing body, with regards to the reporting of concussions, the impact of this work now extends into areas of player welfare and corporate responsibility.

The legal duty of care of employers and governing bodies in sport is to assess the risks associated with participation and reduce such risks where possible. The Injury Surveillance project was implemented to inform and guide this requirement, and extend the body of knowledge concerning injury risk, severity, and trends in Rugby League. This work has informed all of those currently practising in a medical, strength and conditioning, or skill capacity within the game.

The research was carried out by members of the Sport and Biological Sciences team at the University of Bolton, and so far produced one peer-reviewed publication titled 'A three-year epidemiological prospective cohort study of rugby league match injuries from the European Super League' (Journal of Science and Medicine in Sport), and was the first research paper to include data from every athlete from every team across a complete elite-level of sporting competition. It has since attracted the attention of other domestic and global governing bodies; principally the Rugby Football Union (England, UK), and the National Rugby League (Australia). Since its inception, the research has produced annual executive reports for the head of medicine and the head of player welfare at the RFL.

The findings have also been presented at three RFL performance conferences; 2016 (Leeds), 2017 (Huddersfield, and Chester). An executive presentation was also made at the head office of the RFL in February 2017, engaging the senior executives of the RFL in a forum which provided the opportunity for questions; exploring how the key data and findings might inform policy and practice. Following this presentation to senior executives at the RFL it was acknowledged that immediate changes were required, and the bylaws regarding the reporting of concussions within the game was updated; based primarily on the Injury surveillance data.

These changes to bylaws have led to greater attention and consideration of concussion injuries within the sport, and consequently more accurate reporting of injuries which significantly increases a clubs' ability to ensure adequate guidelines for return to play after a concussion. The advancements in injury surveillance have the potential to improve the quality of life (both during and after a players' career) and will contribute towards reducing the risk of sports related CTE in rugby league.

The increased awareness and changes to bylaws within the game then attracted international interest as within the rugby league community as In April 2017, the principal investigators (Fitzpatrick, Naylor, and Robertson) were invited to the National Rugby League (NRL) Head offices (Sydney, Australia) to share initial findings and discuss the main observations of the Injury Surveillance. The development of the injury surveillance tool has evolved considerably and now provides deeper insights into the factors that relate to all aspects of the game of Rugby League. Most notably, it has significantly improved practice within the reporting and tracking of injuries through enabling the medical staff at clubs to analyse live data capture and feedback. As a result, the staff at the clubs are now in a position where they can make immediate changes to practice based on the most current information. This change in practice is a large step towards significantly enhancing player welfare within the sport of rugby league around the world.

Since January 2019, a partnership between the University of Bolton, The RFL, and Leeds Beckett University has been established, the first publication from which (Rugby league ball carrier injuries: The relative importance of tackle characteristics during the European Super League) has recently been accepted for publication (Sept 2020). The new partnership provides a unique resource for further studies, and as such the enhanced dissemination of knowledge, The Injury Surveillance tool continues to serve PhD studies, and has already established a new set of standardized terms and definitions by which injury within the sport can be categorized and investigated.

##### **5. Sources to corroborate the impact** (indicative maximum of 10 references)

1. Authors: Haines, M.R., Fish, M., and O'Sullivan, D.  
Title: Seasonal changes in glenohumeral joint isokinetic strength in professional rugby league players.

Year of Publication: 2019 Type of Publication: Journal. Title, *Physical Therapy in Sport*, <https://doi.org/10.1016/j.ptsp.2019.06.005>

2. Authors: Cropper, E., Thorpe, C.M., Roberts, S., and Twist, C.  
Title: Injury Surveillance during a European Touch Rugby Championship.  
Year of Publication: 2019  
Type of Publication: Journal. Title, *Sports*, <https://doi.org/10.3390/sports7030071>
3. Authors: Massidda, M., Calò, C.M., Cieszczyk, P., Kikuchi, N., Ahmetov, I.I., and Williams, A.G.  
Title: Chapter Five – Genetics of team sports.  
Year of Publication: 2019  
Type of Publication: Academic Book, title, *Sports, Exercise, and Nutritional Genomics*, <https://doi.org/10.1016/B978-0-12-816193-7.00005-1>
4. Authors: Tee, J., Till, K. & Jones, B.  
title: Incidence and characteristics of injury in under-19 academy level rugby league match play: A single season prospective cohort study  
year of publication: 2018  
Type of output: Journal: title, *Journal of Sports Sciences*, DOI: 07 Nov 2018, <https://doi.org/10.1080/02640414.2018.1547100> Vol: 36.
5. Author(s): Buckwalter V, J., Duchman, K. & Amendola, N.  
Title: Proximal Hamstring Injuries: Review of Operative and Nonoperative Management  
Year of Publication: 2018  
Type of Output: Journal: title, *Journal of Hip Surgery*, DOI: 10.1055/s-0038-1676285

***Included as separate items:***

Supporting letter form the RFL

RFL Executive Reports – 2013 - 2018