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David Mills is Adjunct Associate Professor and recently retired as Director of the Adelaide Rural Clinical School at the University of Adelaide. He has been a practicing GP on Eyre Peninsula in rural South Australia since 1988, and has been a committed undergraduate and postgraduate teacher since 1990. His MD was in rural diabetes care in Aboriginal and non-Aboriginal communities. He has worked in the Port Lincoln Aboriginal Health Service, serves on the Eyre Regional Health Board and is passionately committed to community engagement, improving health outcomes for rural communities and improving the rural medical workforce.

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Chris Milne is a sports physician in private practice at Anglesea Sports Medicine in Hamilton. He has been team doctor for the NZ Olympic and Commonwealth Games teams from 1990 to the present and was team doctor for the Chiefs Super Rugby team from 1997 to 2003. A past President of the Australasian College of Sports Physicians he has also served as National Chairman and is a Fellow and Life Member of Sports Medicine New Zealand.

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Ross Sanders' research interests include motor control and skill acquisition to maximise participation in physical activity as well as to improve performance. His current research focuses on:

- *Development of rhythm and skill in movement from human performance and rehabilitation perspectives*
- *Analysis of aquatic locomotion from the perspectives of skill learning, elite performance, and rehabilitation/exercise*
- *Anthropometry: Applications of quantifying the physical properties of body segments to address research questions relating to cardiovascular health, obesity, and sports performance*

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GUEST EDITORIAL

Too serious, too soon? A complex issue but there are some easy-to-remember messages we can give parents

SIMON WALTERS

Some time ago, my colleague Chris Whatman asked me to write a guest editorial talking about some of the research I and my colleagues have been doing in the kids' sport space. It has been on my 'to do' list for a while but I was prompted to put pen to paper after a recent visit to my local physiotherapist. As I walked into his treatment room he appeared really down. He told me he was devastated that he had for the first time just encountered an ACL injury in an 11 year old. This was probably the lowest point for him over a period of time in which he had regularly expressed his concern regarding the increasing number of sports injuries he was seeing in children and adolescents.

So if there has been an increase, and recent ACC media releases show there has been a 60% surge in general injuries in the 10-14 year old age group,[1] what are some of the factors possibly contributing to this? We are conducting a programme of youth development research at AUT, with a team of people with expertise in coaching, sports parenting, physical activity, exercise science and sport injury prevention. I think that what we have witnessed over the last couple of decades is an increasingly serious focus on young people's organised sport, and this is occurring at increasingly younger ages. Cognisant of these worrying developments, Sport New Zealand funded a youth sport 'culture change' project in 2015. The project – 'Good Sports'[2] – was designed and implemented in the Greater Auckland area by Aktive Auckland Sport and Recreation working closely with researchers from AUT and Massey University. The resources utilised in Good Sports workshops were sourced by the research team and were drawn from the latest international research and NZ based research we were conducting. To date, over 2,000 parents/coaches/teachers have attended Good Sports workshops, and over 300 people nationwide representing over 100 sports organisations (NSOs, RSOs. RSTs, Schools etc) have been trained up as Good Sports 'developers', qualified to run the programme in their own communities.

Based on the latest research, Good Sports advocates for young people's sporting experiences to be conducted in a 'Climate of Development' as opposed to a 'Climate of Performance'. A Climate of Performance is characterised as one that focuses on outcomes (winning) as opposed to development; is usually accompanied by pressure (from coaches or parents); and leads to earlier and earlier specialisation. Evidence we are uncovering here in NZ and internationally suggests that a 'climate of performance' can result in elite performance, but comes at a cost for the vast majority, these costs including burnout, dropout and overuse injuries. Conversely, a 'climate of development'

creates an environment that supports early diversification in a range of sports; lots of 'free' and 'risky' play outside of the organised sport setting; is accompanied by parental support and a lack of pressure from coaches; and if specialising in one sport, then that happens later (15 yrs plus) and only if the child wants to and is ready. Evidence we are discovering here in New Zealand shows that this developmental pathway is also a pathway to elite performance, but more importantly can also result in kids staying with sport as they transition into adulthood. It also reduces the risk of overuse injuries in the adolescent age group.

As we now know, there are some simple guidelines that we can give parents based on recent evidence.[3] These easy-to-remember guidelines basically state that children: should not participate in organised sport for more hours per week than years of age; should not exceed a 2:1 ratio of organised sport to free play; and not participate in one sport for more than 8 months of the year. Physiotherapists and other sports medicine practitioners are ideally placed to communicate these messages to parents. Most importantly, let parents know that sport should be fun and should not be overly serious too soon. The more their kids enjoy sport, the more likely they are to stay with it as they get older.

However, parents are only one stakeholder – no matter how well informed parents and coaches are, it is the competitive structures put in place by sporting organisations that can drive behaviour. Acknowledging this, Good Sports conversations are also happening at the sport organisational level. Partly in response to these conversation a number of provincial rugby unions, supported by the New Zealand Rugby Union and Sport NZ, have removed junior representative rugby competitions.[4] These changes reflect a move away from a 'climate of performance' and support a more developmental approach to children's sport. Structures can shape attitudes and drive the behaviour of not only adults but of children themselves. The Theory of Planned Behaviour (TPB) suggests that behaviours can be driven by: attitudes (beliefs related to the likely consequences of the behaviour); norms (the expectations of significant others, eg, parents, coaches); and perceived behavioural control (perceptions about external factors that will control behavioural performance).[5] A number of years ago I interviewed three injured female athletes (two netball players, one hockey player). They had similar stories about playing on through injury, but I repeat an extract from the interview with the hockey player here:

Player: "Hockey is like rugby, you need to appear tough and take a knock. I had compartment syndrome – knew what it was – but told nobody as my age group trials were coming up for national selection. I got picked but injury got worse and I ended up missing much of the next season."

SW: "If you could go back in time, would you make same decision to disguise the injury?"

Player: "Yes."

SW: "What would make you consider telling your coaches about an injury?"

Player: "Reassurance that you are not forgotten just because you are injured – but that wouldn't happen."

The issues we face are complex. We need to have informative conversations with parents and coaches, organisations need to have a deeper understanding of the implications

of their athlete development structures and processes (as evidenced by the attitude of the hockey player interviewed here). It is time in New Zealand for a 'think tank' involving representatives from key stakeholders involved with the delivery and support of sport for young people. There have been moves in the right direction, as evidenced by rugby organisations recently. But if we want to see a decline in the injury trends reported by ACC, that will require a multi-disciplinary approach. As researchers we have worked in silos for too long (sports medicine, exercise science, coaching, sport management), we have often ignored the knowledge and experiences of those at the 'coal face' (physiotherapists, coaches, teachers). We need to work together to enhance the ongoing delivery of sport for young people in our country. As a relatively small country, with a history of innovation, collaboration should be easy and we could lead the way in this area.

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BEST OF BRITISH - HIGHLIGHTS FROM THE BJSM

CHRIS MILNE

HIGHLIGHTS FROM THE BJSM

This instalment covers the second six months of BJSM in 2018.

July - Issue 13

The July issue included an infographic on treating runners with patellofemoral pain.[1] It is the most common presentation to musculoskeletal practitioners in the community. This is a worthwhile document to have up in your practice. It includes the three pillars of management, ie, education, exercises and gait retraining. Later in the same issue there was an article by Cinque and colleagues, discussing the issue of meniscal root tears.[2] These are managed non operatively if there are significant comorbidities or advanced osteoarthritis. However, active patients without such issues are potentially a candidate for surgical repair. The aim is to restore the anatomy as far as is practicable and this surgery has produced high satisfaction rates in various centres. It has the potential to decrease the progression of OA changes in the knee and potentially delay the requirement for joint replacement surgery.

July - Issue 14

The second July issue included an editorial by Jill Cook entitled '10 Treatments to Avoid in Patients with Lower Limb Tendon Pain'.[3] These included; not resting completely, not prescribing incorrect exercise or relying on passive treatments, not ignoring tendon pain, not using friction massage, and not using the imaging as a diagnostic, prognostic or outcome measure. She recommends avoiding injection therapies and not rushing the rehabilitation.

Physical activity is thought to reduce mortality but there are currently no completed randomised trials of physical activity where mortality is a pre-specified primary outcome. However, these authors, Shiroma and Lee, comment that although only some of the Hill criteria for causality have been satisfied, the relationship is more likely causal than not.[4] Therefore, they recommend continuing prescribing physical activity because of the large body of evidence currently available from observational studies. Later in the same article, Kujala, one of the leading figures in the field, has confirmed that physical activity improves fitness and physical function and confers other health related benefits, even if the positive effect on mortality has yet to be conclusively proven.

August - Issue 15

The August issue included a useful infographic on ankle sprain treatment and prevention.[5] Kasper Janssen of Amsterdam, summarises the timeline as, Day 1 – treat and load, Week 1-8 – load and protect, Two months to one year – train and tape or brace. This is a useful summary particularly for junior practitioners to be aware of.

Later in the same issue was a consensus statement by Vuurberg and colleagues on diagnosis treatment and prevention of ankle sprains.[6] They emphasise that NSAID's should be used with care and can reduce pain and swelling but their usage is not without complications. Concerning treatment, supervised exercise programmes are preferred over passive modalities as it stimulates the recovery of functional joint stability. Surgery should be reserved for cases that do not respond to thorough and comprehensive exercise based treatment.

Femoroacetabular impingement is a commonly diagnosed hip problem. An article by Reiman and colleagues, summarised the results of 35

studies including 1,634 athletes.[7] These showed that 74% of athletes were able to return to the same competitive level of sports participation following surgery but their level of performance remains unreported. These figures are useful to bear in mind when advising athletes.

August - Issue 16

Plantar heel pain is common in the community. Rasenberg and colleagues analysed the efficacy of foot orthotics for the treatment of plantar heel pain.[8] They looked at 20 studies investigating 8 different types of foot orthoses. Interestingly, they found no difference between sham orthoses and custom orthoses for pain at short term, and nor was there a difference between prefabricated orthoses and custom orthoses. This goes rather against one's intuitive judgement. We need to work collaboratively with our podiatry colleagues in managing this difficult condition.

Exertional calf pain is common in the community and popliteal artery entrapment is amongst the differential diagnosis. The diagnosis is often delayed. Hameed and colleagues provide a useful update.[9] Typically, these athletes have no vascular risk factors and their peripheral pulses are normal in most cases. Ultrasound is a useful diagnostic aid and they recommend lying the patient prone with their feet off the end of a bed pressed against a wall and looking at the popliteal artery for normal triphasic flow. They then recommend using a probe in the popliteal fossa whilst asking the patient to plantar flex. It is crucial to examine the popliteal artery proximal to the sural artery branch. The diagnostic sonographic finding is absolute obstruction of flow within the popliteal artery. These features should aid in the diagnosis of this condition.

September - Issue 17

Exercise in pregnancy has been the subject of several IOC expert group meetings. The latest recommendations summarised advice for exercise during pregnancy and following childbirth.[10] The authors note conditions such as poorly controlled hypertension, ruptured membranes and pre-eclampsia which pose a high risk to the foetus and exercise is absolutely contraindicated. Relative contraindications include a history of foetal growth restriction, premature birth, cervical enlargement and certain respiratory disorders. The authors advise avoiding high risk sport where there is a significant risk of falling or collision, eg, wrestling, boxing or rugby and also advise pregnant women to refrain from SCUBA diving. There is some evidence that the first stage of labour is shortened in exercising pregnant women and elite athletes are more likely to have a normal BMI which is associated with a decreased risk of caesarean birth. Exercise in the postpartum period can resume once the woman feels able to do so and there is a limited but growing body of evidence that physical activity may reduce the risk of postpartum depression.

September - Issue 18

Sitting time is known to be a risk factor for non-communicable diseases. Ulf Ekelund has produced an infographic stating that one hour of physical activity eliminates the detrimental effects of 8 hours of inactivity.[11] The message is clear, try and build some physical activity into your daily routine.

ACL ruptures are common in pivoting sports. Oiestad and colleagues reported on 210 participants who had undergone ACL reconstruction 15 years previously.[12] 109 of these had returned to pivoting sport and those who managed to do so had lower odds of knee OA and better self-reported ADL function. These results are as would be expected.

Athletes frequently describe feeling short of breath with exercise. Asthma is the commonest

condition, but one should not overlook the possibility of exercise induced laryngeal obstruction.[13] This typically presents with difficulty breathing in and on examination, there may be inspiratory wheeze or stridor. Typically, there is lack of relief with standard asthma inhalers. Liaison with our ENT colleagues is useful to try and confirm the diagnosis. Management centres on providing breathing control exercises and encouraging improved diaphragmatic pattern breathing.

October - Issue 19

Do school bags cause back pain in children and adolescents? Yamato and colleagues conducted a systematic review of 69 studies including 72,000 patients and could find no convincing evidence that aspects of school bag use increased the risk of back pain in children and adolescents.[14] Nevertheless, it needs to be appreciated that there were only a small number of prospective studies and the methodological quality of many studies was low.

Medial tibial stress syndrome is a common presentation in the community. Winters et al conducted a clinical reliability study at multiple sports medicine sites in the Netherlands.[15] They concluded that the condition could be diagnosed reliably using history and physical examination. They also found that about 1/3 of the athletes with medial tibial stress syndrome had co-existing lower leg injuries.

October - Issue 20

Paediatric ACL injuries are a challenge to manage, as one needs to consider the growth plate in the management protocol. Ardern and colleagues recommend combining the history and examination findings and imaging to inform the diagnosis and treatment decision making.[16] Completing the FIFA 11+ for kids can reduce football related lower limb injuries by over 50%. Surgery is still an option even in the skeletally immature patient but needs to be carried out by an appropriately qualified and experienced individual.

The International Ankle Consortium produced a consensus statement on clinical assessment of acute lateral ankle sprains.[17] They recommend paying attention to the mechanism of injury and being aware of mechanisms characteristic of lateral ankle sprain versus syndesmosis sprain. The anterior drawer test is essential to evaluate the integrity of the anterior talofibular ligament. Previous ankle sprains are a primary risk factor for recurrent injury. They recommend using the Ottawa Ankle Rules to establish the likelihood of ankle fracture. This comprehensive article includes 65 references.

There was an article by our own Mark Fulcher and colleagues describing the development and implementation of the ACC Sport Smart Warm-Up programme.[18] This programme is based on the 11+ and a special focus was on reaching out to secondary school aged players and coaches. The authors also point out that talking about performance enhancement rather than injury prevention is likely to result in better buy in from coaches and players.

November - Issue 21

Issue 21 could well be called the 'Exercise in Pregnancy' issue. It included the 2019 Canadian guideline for physical activity throughout pregnancy by Mottola and colleagues.[19] Not surprisingly, the advice is similar to that given by the IOC expert group. There is a useful table including reasons to stop physical activity and consult a healthcare provider. These include vaginal bleeding, regular and painful uterine contractions and persistent loss of fluid indicating rupture of the membranes.

Later in the same issue was an article by Davenport and colleagues studying

the impact of prenatal exercise on neonatal and childhood outcomes.[20] The main finding was that exercise reduced the incidence of foetal macrosomia i.e. a baby weighing more than 4,000g. Also, exercise is not associated with neonatal complications or adverse childhood outcomes. Urinary incontinence is a common complication of pregnancy. Prenatal exercises including pelvic floor muscle training are recommended to reduce the risk of urinary incontinence. A further study by Davenport and colleagues concluded that appropriate pelvic floor exercise reduced the risk of urinary incontinence by 50% in pregnancy and the postpartum period.

November - Issue 22

The second November issue included useful articles on interpreting statistics in sports injury science. The first of these by Nielsen and colleagues was entitled, 'Seven Sins when Interpreting Statistics in Sports Injury Science'.[21] These including trusting coincidence, getting causation backwards and forgetting to consider the multi-factorial nature of sports injury development. In addition, the authors caution against relying on P-values rather than considering minimal relevant differences, being aware of deceptive graphs and not considering subgroup differences when discussing the training dose.

When should our patients return to running after ACL reconstruction? Rambaud and colleagues provided a scoping review of 201 studies and the average patient returned to running approximately three months' post-surgery.[22] Most frequently reported criteria for return to running were full knee range of motion plus pain less than 2 on the visual analogue scale and isometric extensive limb symmetry index of over 70%.

Lateral hip pain is very common in the community. Mellor and colleagues looked at education plus exercise versus a cortisone injection versus wait and see approach in the management of this condition.[23] At one year follow up, education plus exercise led to better global improvement than a cortisone injection but no difference in pain intensity. My clinical approach is to start people on exercises but if pain is limiting the patient's ability to participate in the exercise regime, then cortisone injection can be particularly useful in improving compliance.

December - Issue 23

It is well documented that elite athletes often have poor oral health. Needleman and colleagues recommend the following strategies:[24]

1 Avoiding supplements not benefitting training, competition or recovery. This involves discouraging the use of sugary rehydration fluids.

2 They recommend high concentration fluoride toothpastes and appropriate training in tooth brushing and use of dental floss to reduce the dental plaque biofilm.

3 All athletes should have routine periodic oral health assessments.

4 If you must use a sugary sports drink, then follow it up with water to dilute the effect of the sugary drink.

Ron Maughan, a senior nutrition scientist, has provided an excellent infographic on helping athletes make decisions on dietary supplement use.[30] Using this infographic as intended would result is significant reduction in dietary supplement use and hopefully the risk of an inadvertent adverse analytical finding for the athlete concerned.

Traumatic shoulder dislocation is a common problem. Kavaja and colleagues conducted a meta-analysis of 22 randomised controlled trials.[25] They found moderate quality evidence that labral repair reduced the risk of future shoulder dislocation. However, even with non-surgical management, 47% of first time dislocators did not experience a further

episode. It all depends on the provocative activity for the first dislocation, and the sport the person is involved with.

December - Issue 24

Participatory medicine is a new concept and Ahmed and colleagues introduced the concept of participatory sports and medicine via patient 'voices'.[26] Patient centred elements are likely to play an increasing role in the sports medicine literature.

In the same volume, Jermain Defoe, retired professional footballer, has written an interesting article entitled 'Trusting the Experience of the Experienced Athlete'.[27] He describes a culture change in his sport during his time in football. He recommends that clinicians trust the player as with experience they know their body more. He recommends that players act to ensure that everything they do is tailored and specific to what they need. With regard to injuries, he comments that players need to be patient and not rush back into competition too soon after an injury. From my perspective, a very eloquent article from the changing room.

Achilles tendinopathy is a challenging problem. Wilson and colleagues conducted a meta-analysis of 22 studies with 1,137 participants.[28] They found moderate level evidence favouring eccentric exercise over concentric exercises for reducing pain and low level evidence of no specific benefit and adding a night splint to an eccentric exercise programme. In my experience, very few patients tolerate night splints in any case.

Patella tendinopathy is another challenging condition. Sprague and colleagues conducted a systematic review and meta-analysis of the modifiable risk factors for this condition.[29] They looked at 31 articles covering 862 athletes and found a lack of strong evidence for any potential modifiable risk factor or associated factors. A high volume of jump training and greater activity volume were thought to be potentially modifiable risk factors.

That is all for this six month period. My pick for most valuable article would be the infographic by Ron Maughan, describing helping athletes make decisions regarding supplement use.[24]

Chris Milne

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BULLET POINTS - HIGHLIGHTS FROM THE SIB

CHRIS MCCULLOUGH

HIGHLIGHTS FROM THE SPORTS INJURY BULLETIN

This second instalment incorporates articles from May 2018 to December 2018.

In the May issue under the title

"Roll away blues"

Andrew Hamilton considers the recent research on the efficacy of foam rollers and the most effective techniques for its implementation. In general, results showed increased range of motion following a stretching programme but with an impairment in subsequent performance. Another downside is that some patients may find hard foam rollers too uncomfortable to use, so a compromise may be needed. Other results support the use of a foam roller in conjunction with a static stretching protocol. In summary, recent studies seem to confirm that foam rolling and roller massaging are capable of improving joint ROM across a number of joints, but more research is needed to confirm this.

The second article by Andrew in the August edition titled

"Help or hype"

highlighted both USA and Spanish research indicating a carry over the immediate effects of rolling. Thus, it may be best utilised in a therapeutic setting to increase ROM or pain management to enable greater immediate participation in exercise and functional movement.

In the July issue, Michael Lancaster discusses

differential diagnosis in cases presenting with rare thigh pain

the most common cause being hamstring strains. He overviews the relevant anatomy, examination sequence and differential diagnostics, highlighting referred pain, spinal and other articular structures, deep gluteal syndrome and vascular aspects. He reminds clinicians to take a step wise approach, with a thorough assessment excluding as many potential causes prior to definitive diagnostics. Also in this issue, Chris Mallac examines the anatomy and biomechanics of meniscal root injuries which can be considered as a catastrophic injury. He reminds us the injury may occur in the usual pivot-shift mechanism or in a full squat and knee flexion positions when under load. The difficulty of clinical examination encourages specific MRI imaging for an anchored diagnosis.

"Pain and brain: New thinking for clinicians"

is the title for Andrew Edwards article explaining why the bio-psychosocial approach to pain management is gaining traction among sports medicine clinicians. Biological factors, psychological factors and social factors are covered along with practitioner implications. While there are challenges to implement this model, he reminds us it can be helpful for achieving better outcomes for our patients. In NZ, a pilot study for the "Start Back" program is now being trialled in our Physiotherapy network to provide local data for this aspect of our low back pain patient management.

Subscapularis dysfunction

more common than we once thought, is Chris Mallac's article. This explores the anatomy, biomechanics and common presentations. He concludes this is an important rotator cuff muscle with a key role to play in gleno-humeral stability during high demand athletic function, i.e. tennis

and swimming. He notes that with arthroscopic examination as many as 50% of these incidences can now be visualised for refined diagnostics.

In the same August edition, Trevor Langford in an article titled

"More power to your elbow"

highlighted single handed back-hand in tennis as one of the common causes of lateral elbow pain. Coaching and technique, as in most sports, are encouraged along with selecting the correct equipment. He mentions three primary tests: Cozens (resisted wrist extension), Maudsley (resisted extended mid finger) and Mills (extensor over-stretch) as all useful in differentiating common extensor elbow issues.

I particularly enjoyed Alicia Filley's editorial discussing

the importance of sleep in performance and injury recovery

Long known to improve cognitive performance, sleep impacts on both physical and mental health. She reminds us that athletes, especially student athletes, are particularly vulnerable to sleep deprivation, generally getting two fewer hours sleep than their non-athlete counterparts. A study in the USA found increased training loads resulted in decreased total sleep and this may be due to increased levels of cortisol and stress hormones. Other factors included travel to competitions, time zones, caffeine consumption and blue light from devices (glow kids), baseline anxiety or depression. Interestingly, teams sleeping less than eight hours were 1.7 times more likely to suffer a sports injury. Sleep also plays a role in healing as well, with increases in pain tolerances by up to 20% after just four nights of extended sleep. In conclusion, it was suggested that clinicians survey athletes sleep habits as part of their general history taking.

Chris Mallac in an article titled

"Under pressure"

provides a concise summary of a frustrating condition called Chronic Exertional Compartment Syndrome (CECS). This occurs when the pressure within the muscle compartment is greater than the systemic blood pressure. Tissue death (ischemia) follows and causes up to one third of all leg pain in athletes including rowers and motor-cycle racers, ie, athletes who grip. Pain is mostly described as deep or burning and athletes may present with foot drop and weakness on dorsi flexion of the foot. Gold standard diagnostics are achieved with intra-compartmental pressure testing using a needle nano-meter. He suggests all cases should be referred to a physician because CECS can present as an acute medical emergency. Management is usually conservative at first, with modified activity for 6-12 weeks, NSAIDS and physiotherapy with fasciotomy a follow on option with reported successful outcomes (90%) with progressive rehab.

The second article by Chris in August was titled

"Spotting Zebras"

He looked at sural nerve injuries which result from trauma to the lateral ankle via an ankle sprain or fibula fracture, or compression (tight ski or hiking boot). This may result in altered sensory and proprioceptive function with resulting neuropathic pain. Because sural nerve injury is so uncommon it is also not often reported as of cause of exercise related leg pain.

Also by Chris Mallac in late August, was a brief summary of patella-femoral tracking issues under the title of

"Stuck in the middle"

"Stuck in the Middle". Common in runners and cyclists, PFP results from improper tracking of the patella along the trochlear groove of the femur. It is estimated that between 15 to 25% of knee injuries

presenting to the sports medicine practitioner involve the patello femoral joint. He looks at all the many and varied aspects that impact upon the biomechanics and concludes, that whatever the cause, athletes usually demonstrate VMO dysfunction as well.

In a similar vein Pat Gilham's thought provoking commentary titled

"Strengthening and stretching soleus helps PFP"

discusses how his unique approach to treatment helps a runner increase cadence which in turn decreases the ground reaction forces absorbed at the knee. He highlights the "Cyclist Squat" exercise on a decline board as particularly helpful. Although the VMO gets all the glory in this drill the soleus may well play a key role in the management of this challenging condition.

Kay Robinson concludes the August editions in her article

"Getting ahead - concussion"

With so much international research in this area, she highlights that progress has been made with increased resources in recent years with resultant knowledge on the lingering effects called post-concussion disorder. A Harvard University study covered 7,000 papers on this subject with 101 meeting their criteria of examining athlete issues, found that most will recover within approximately one month's time following the injury.

We have been fortunate here in recent years to have our sports physician colleagues initiate concussion clinics for ease of access following sports injury, so the NZ scene is evolving in line with our international colleagues and collegial guidelines.

In September, Tracey Ward discusses

Plantar fasciitis

with a battery of strengthening exercises for the intrinsic muscles of the foot. She encourages us to keep looking up the kinetic chain for deficits that may translate to added strain on the plantar fascia. In short, plantar fasciitis isn't an isolated issue but usually a symptom of training error or kinetic chain deficits. She concludes that it appears exercise is the best treatment approach.

In an informative overview Andrew Hamilton and Sean Fyfe combine to discuss the

"the physio and the disabled athlete"

as they separate fact from fiction. They remind us that everyone who walks into the gym has the potential to find joy, satisfaction and health in movement. Recent studies on exercise guidelines on adults with spinal cord injury (a systematic review) concluded that at least 20 minutes of moderate to vigorous aerobic exercise (twice a week) and three sets of strength exercises (twice a week) of each major muscle group, were a recommended dose. While there are additional physical barriers to overcome, disabled athletes (especially at elite levels) may possess mental attributes that more than make up for their disability, ie. perseverance. Transient exposure to adversity is now considered a formative experience for talent development.Known as post-traumatic growth (PTG), that is, post-injury rehabilitation often has positive repercussions later on.

Relative to able-bodied athletes, research suggests those with disabilities demonstrate stronger resilience and self-efficacy skills. Implications for clinicians conclude certain categories may be particularly susceptible to injuries, e.g. wheelchair shoulder complaints and all groups have a high percentage of soft-tissue injuries. In conclusion, the scope of disabilities experienced by our para-athletes is vast. People are limited only by their beliefs and unique problem solving may be required to help accomplish their rehab goals.

bullet points

In late September, Pat Gilliam presents

"Shin splints, cramps and thrombosis"

He notes that lower leg pain often plagues runners with 65% of all calf strains occurring in the medial head of gastrocnemius with 50% extending into the soleus as well. Pat outlines a grading system for calf injury from least traumatic:

1 myofascial - peripheral aspect

2 muscle belly – commonly at MTJ

3 intratendinous – injury extends into tendon

4 complete tear of muscle or tendon

He also reminds us that chronic injuries require the clinician to differentiate between symptoms that appear the same, ie, sural nerve neuropathy vs chronic exertional compartment syndrome, medial tibial stress syndrome or Bakers cyst.

Later in the year Chris Mallac coverd a hands-on approach to

axillary nerve injury

This often occurs in athletes via a stretch from a fall or shoulder dislocation, compression, trauma or as an unwelcome result of shoulder surgery. Injury reduces both strength around the shoulder and feeling within the movements affected including abduction and external rotation. Treatment utilising PNF patterns helps recruit the impacted muscles with hands-on techniques appearing of more benefit than other approaches.

Chris McCullough
Physiotherapist

ORIGINAL RESEARCH

Could a new method of exposure quantification be the standard for cricket injury epidemiology?

NAJEEBULLAH SOOMRO, NAUKHEZ ASIF, DAVID LYLE, DAVID MILLS AND ROSS SANDERS

ABSTRACT

Background: Epidemiological studies on time-loss and non-time-loss injury rates among junior cricketers using exposure hours in match and training are limited in scientific literature. This study bridges the gap by suggesting new methods for surveillance and reporting injuries by tracking individual exposure time.

Methods: Employing a prospective study design, male players from two schools in New South Wales, Australia (n=49) were monitored during the last eight weeks of the regular cricket season. Match and training injures along with individual player exposure times during participation were recorded by the players and verified by the team coach and the researchers by using logbooks. Injury incidence rates (IIR) per 1000 hours of participation for all injuries were calculated.

Results: Overall, there were 18 injuries and the IIR was 15.93 injuries/1000 hours. There were significantly more injuries in matches (IIR=41.84/1000 hours) compared to training injuries [IIR= 8.07/1000 hours $F(1,80) = 7.826$, $p = 0.006$]. Bowling IIR (30.1/1000 hours) was greater than batting and fielding injury rates (16.82/1000 h and 11.16/1000 h, respectively).

Conclusions: Quantifying cricket injuries by using individual hours of exposure to find IIR, in match and training conditions allows a robust quantification of injuries based on player workload. It also standardizes inter-sport injury rate comparisons.

Main messages:

- Injury surveillance in cricket is possible by accurate quantification of match and training exposure time.
- The injury rate in schoolboy cricketers is higher in matches than in training.
- When both time-loss and non-time-loss injuries are quantified in terms of exposure time, bowling injury rates are higher than batting and fielding injury rates.

Future research questions?

- Why are the injury rates in schoolboy cricketers higher than the adult counterparts?
- Could injury prevention programs curb the high injury rates?
- Will the appraisal of individual exposure time be a new standard in quantifying cricket injury epidemiology?

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INTRODUCTION

Over the past decade there has been an emphasis by cricket administrative bodies to promote cricket at the grassroots level.[3] This initiative has increased popularity and participation among junior cricketers, particularly in school age children and adolescents. Albeit, sports related injuries are a surrogate of increased participation,[7] and the increased cricket participation leads to injuries that put burden on the healthcare system.[17,29] In junior cricket, up to 30% of the players may have a time-loss injury at some point of the season and the injuries are equally distributed between batters, bowlers and fielders.[6,14,30] A recent meta-analysis on cricket related injury burden showed that the injury rates in junior cricketers, when quantified by exposure time, were higher than those of adult cricketers and players from other non-contact sports such as soccer, basketball and tennis.[29]

In 2016, an updated consensus statement for reporting cricket related injuries was published.[19] The consensus statement suggested that injuries per hour of exposure can provide an accurate estimate of injury rates, however, its application in cricket may be problematic for pragmatic reasons. These reasons include the variability in the format of cricket and difficulty in delineating the workloads of all-rounders from batters or bowlers. Nonetheless, having injury rates per hour of exposure is now considered a new-standard for reporting injuries in other sporting codes as it provides a standardised reference to compare inter and intra-sport injury rates.[2,9,10,28] This reporting method assists in developing a relationship between workload (active playing time) and injuries thereby providing better estimation of injuries in respect to exposure.

Previous work on injury epidemiology in schoolboy cricketers has not used individual exposure time to calculate injury rates, rather, player participation days or events have been used to extrapolate hours of play.[5,14,30] Some studies on adult cricketers quantify injury rates per number of participations (i.e. matches played, and training sessions attended), or number of balls bowled, batted and thrown.[5,23] However, only a few studies have reported teams' cumulative workload by using 'hours of exposure'. These studies reported injury rates ranging between 5.2 - 31.4 injuries per 1000 player hours.[5,15,22] It is important to accurately calculate the individual exposure time as it may vary from player to player, playing position, format played and on field performance. For example, a batsman may spend an entire innings on the field engaging in bouts of high intensity physical activity while batting, or may be dismissed early to spend much of the playing time in the dressing room.[8]

Some confines in the existing cricket injury literature are due to methods defined by Orchard et al (2005),[18] however the updated consensus statement by the same author published in 2016[19] addresses most of these issues. Nonetheless, three important limitations in the existing literature are: a) calculations being based on the assumption that at any point in time there are 13 players on the field or 6.5 players/team. This method calculates team exposure per hour of play as 6.5 hours [(6.5 players multiplied by 1 hour) assuming 15 overs are bowled per hour]. This calculation for a team's exposure is problematic as at any point during a match there are 11 players from the fielding side and only 2 players from the batting side on the field, rather than 6.5 each. As a consequence, results discount individual player exposure rather works on team exposure; making it difficult to segregate the injury rate per player or player type. For example, a batsman batting 30 overs in a match (2 hours of exposure) may have the same injury rate as batsman who got out on the first ball (<0.01 hours of exposure). To rectify this issue, we propose that time of play for each individual player is measured, which can be done by calculating time spent batting, fielding or bowling in both matches and at training. b) The non-inclusion of 'non-time-loss' injuries, where a non-time-loss injury is an injury that does not cause the player to miss training or matches. The updated consensus statement now calls for inclusion of non-time-loss injuries inclusion and this is consistent

with the view of sports injury epidemiologists at Oslo Sports Trauma Research Centre (OSTRC), who have advocated the inclusion of non-time loss and overuse injuries in the surveillance strategy for all sports.[4] According to OSTRC, the reliance on time-loss injury definitions can mask the true burden of overuse injuries in sports. c) Non-inclusion of training time when calculating injury rates. As training time can be a major portion of player workload, its inclusion is pivotal for establishing the relationship between training loads and injuries.

The aim of this study is to introduce a new method for quantification of cricket related injuries by accounting for individual player workloads and training times. It will be the first study on injury epidemiology in schoolboy cricketers using the updated consensus statement and this may assist in furthering cricket epidemiology research.

Methods

A pilot prospective study was conducted with two high-schools from New South Wales, Australia. An initial email invitation was sent to twelve schools, of which four accepted. All participating players were given an information sheet, and a consent form to be signed by their parents. Ethics approval was obtained from The Human Research Ethics Committee at The University of Sydney (Project no. 2014/849) before commencing the project. Of the four schools that accepted the initial invitation, only two participated in the study, resulting in a total of 49 male players, mean age 14(±2) years.

An introductory session was arranged between the research team, participating players and coaches. During this session the aims of the study were described, methodology for data collection explained and any relevant questions answered. Due to delays in ethics approval and team recruitment, the data collection occurred between February and April 2015, corresponding with the last 8 weeks of the cricket season.

The consensus definition of 'medical attention injuries' was used which included any health-related condition that requires medical (or medical staff) attention and had the potential to affect cricket participation, this included both time-loss and non-time-loss injuries.[19] Participating coaches were given player attendance sheets on which they recorded attendance for both matches and training sessions (Appendix 1). All participating players were given workload logbooks in which they recorded their bowling, batting and fielding times for training sessions (Appendix 2).

Injuries were recorded by a doctor, who visited team training sessions fortnightly and interviewed players as well as coaches to assess the incidence of injuries. The injuries were recorded on a standard injury reporting form for cricket developed by Finch et al. and used by Sports Medicine Australia.[12,13] This form includes details relevant to the injury, such as the mechanism and time of injury (Appendix 3). During the fortnightly visit, the doctor also checked the player logbooks. If a player failed to complete their logbook, they were asked to recall the approximate time in the training sessions and matches which was then cross checked with the coach with reference to the known structure of the training sessions. Batting time during training was fixed and coaches used a stop watch for monitoring. This meant that if the batsmen forgot to log their practice times, it was possible to confirm their time from the coaches. Assessment of bowling loads was based on observations of three training sessions revealing that, on average, five bowlers bowled in each net at an average rate of six balls every ten minutes.

The team's match scoresheet was used to calculate match workload. According to Australian school competition rules, teams are required to maintain a rate of 15 overs per hour. This factor was used to calculate individual player workload during matches. For bowlers, the number of overs bowled was divided by 15 (based on the 'Australian rules' required over rate). For example, if the bowler bowled 5 overs, the active bowling exposure time was calculated as 5/15= 0.33 hours or 20 minutes. This method assisted in recording bowling time. Similarly, if the batters forgot to log their match batting time, it was calculated using the number of

overs batted. The scoresheet was used to determine the fall of wicket and the over number and the details were used to calculate batting time. For example, if a batsman came to bat on the first ball of the 15th over and got out on the first ball of the 30th over, then total batting overs were calculated as 15 (from the 15th to the 30th over). Using the average over rate of 15 overs per hour, the total batting time was calculated as 15/15 = 1 hour.

Player data were de-identified and compiled on Microsoft Excel 2010 for Windows, showing the frequency and percentage of injuries. Injury incidence rate (IIR) was calculated by dividing the total number of injuries by the total hours of exposure, and then reported as injuries per 1000 hours of exposure. All aspects of the study were reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: Guidelines for reporting observational studies31

RESULTS

A total of 18 injuries were recorded among the 49 players. Overall, bowlers and fielders had more injuries (n=7, 39%) compared to batsmen (n=4, 22%). Match injuries (n=11, 61%) were more frequent than training injuries (n=7, 39%) (see table 1). The most common site for injury was the lower back (n=4), followed by elbow joint in the throwing arm (n=2), non-dominant knee while

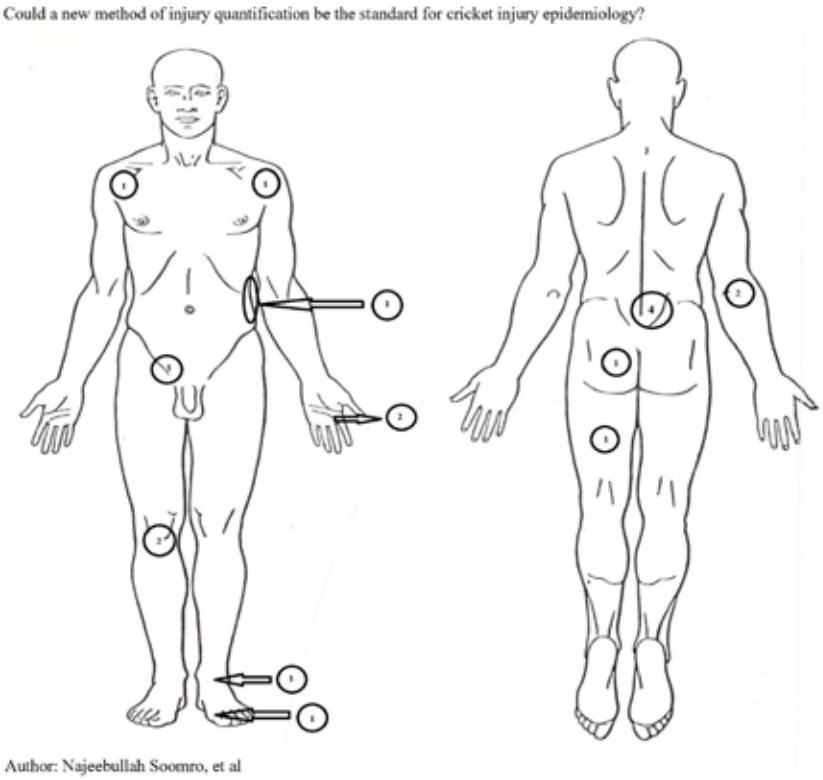

Figure 1: Number of injuries to various anatomical locations

bowling and throwing (n=2), and fingers and hand (n=2) (see figure 1).

The most common mechanism of injury reported by players was overuse or overexertion (50%), followed by falls (28%) and contact injuries with ball (11%). Provisional injury assessment showed that muscle or tendon strains (66%) were the most common form of injury. Of the two fast bowlers whose provisional diagnosis was lower back pain (11%), one was later diagnosed with lower back bony stress after x-rays and magnetic resonance imaging.

Match and training time exposure data were also obtained from each school, and cross-matched with the injury data. On fortnightly visits by researchers, player compliance on filling workload logbooks was approximately 70% and coach compliance on filling attendance sheets was around 50%. All missing data were updated during the fortnightly checks. The risk of recall bias was minimal due to short recall span (2 weeks) and cross-verification from players and coaches. The total hours of exposure were 1130 comprising of 263 match hours and 867 training hours. The overall IIR was calculated to be 15.93 injuries per 1000 hours of exposure (see table 2). The match IIR (41.83/1000 h) was significantly greater than training IIR (8.07/1000 h) [F (1,80) = 7.826, p = 0.006].

As training IIR were significantly lower than match IIR, a further analysis of the training injuries was conducted. There were two bowling injuries in 532.56 hours of bowling at training which yielded an IIR of 3.6/1000 h, this was considerably lower than match bowling IIR of 316.06/1000 h. Fielding IIR at trainings (27.77/1000 h) was higher than that at matches (15.46/1000 h). The most common cause of fielding injuries was elbow pain in the throwing arm and impact injuries to the hands and fingers.

Table 1: Characteristics of report injuries

Variable	Classification	n	% Total
Activity	Batting	4	22
	Bowling	7	39
	Fielding	7	39
	Total	**18**	**100**
	Match	11	61
	Training	7	39
	Total	**18**	**100**
Type of injury	New injury[a]	10	66
	Recurrent Injury[b]	8	44
	Total	**18**	**100**
Mechanism of injury	Overuse/Overexertion[c]	9	50
	Fall	5	28
	Struck by ball	2	11
	Throwing	2	11
	Total	**18**	**100**
Provisional Diagnosis[d]	Strain	10	66
	Sprain	2	11
	Bruise/Contusion	2	11
	Pain/Soreness	2	11
	Stress Fracture/Bony Injury	2	11
	Total	**18**	**100**
Immediate response	Immediate return to activity	5	28
	Able to return with restriction	10	56
	Unable to return	2	11
	Able to return but choose not to	1	5
	Total	**18**	**100**

[a] Reported for the first time.
[b] Reported again after a similar injury previously reported on the same anatomical location.
[c] Overuse/overexertion includes activities such as repeated running between the wickets, throwing or bowling.
[d] The provisional diagnoses were made during the doctor's visit based on participant's previous history, available medical records and a physical examination. Provisional diagnoses were subject to change based on further imaging and specialist examinations.

DISCUSSION

Quantification of individual exposure hours by inclusion of training time and breakdown of match workload into batting, bowling and fielding provides a better understanding of the relationship between workload and injury rates in different playing positions. Previously published studies on Australian school-age

Table 2: Injury rates for (n=49) players during the last eight weeks of the season.

Variable	Hours Of Exposure	Bowling Injuries	Fielding Injuries	Batting Injuries	Total Injuries	Total IIR* /1000h (95% CI^)
Total Training Time	867	2	4	1	7	8.07 (7.97-8.17)
Total Match Batting Time	53.17			3	3	56.42 (55.43, 57.42)
Total Match Bowling Time	15.82	5			5	316.06 (312.41-319.74)
Total Match Fielding Time	194		3		3	15.46 (15.19-15.74)
Total Match Time	263	5	3	3	11	41.83 (41.44-42.21)
Total Time (Match+Training)	**1130**	**7**	**7**	**4**	**18**	**15.93 (15.81-16.05)**

*IIR = Injury Incidence Rate
^CI = Confidence Interval

cricketers based the injury rates on 'participations', where a participation was defined as taking part in bowling, batting or fielding.[14] However, as the workload, technique and movement patterns for different playing positions in cricket are very different, describing injury rates in terms of 'participations' may be pragmatic but misleading. For example, a batsman may get out on the first ball or may play 50 overs, both participations obviously will have a significantly different exposure. This study pilots a new method of injury surveillance in cricket where individual player workloads are quantified in terms of exposure time. Similar methods for injury reporting have been used in other sports,[1,9-11,28] therefore its application to cricket may be useful for comparing injury rates in cricket with those of other sports.

The results for injury rates (15.93 injuries/1000 hours) in this study are comparable to previously published pooled injury rates in a similar cohort (12.97 injuries/1000 hours).[29] The overall number of injuries were similar for different playing positions, however the match bowling injury rates were the higher (316.06/1000 h) than match batting (56.42/1000 h), match fielding (15.46/1000 h) and training bowling (3.6/1000 h) injury rates. The high bowling injury rates in matches (n=15, 85%), may be attributed to the fact that bowlers are more likely to stop bowling in a match if an injury is hindering their performance. This contrasts with training injuries as training performance does not affect the outcome of a match.

Furthermore, the overall match injury rate (41.83/1000 h) was higher than that previously reported in the literature 5.2 - 31.4 injuries per 1000 h,[5,15,22] This may also be attributed to reasons such as, match intensity being higher than training, duration being longer, and sub-optimal warm-up or conditioning during the match.[20,25,26] Petersen et al[20] showed that game based simulations in elite cricketers require higher maximum sprinting speed (4.6 ± 1.0 m.s-1), higher mean peak heart rate (158 ± 10 beats.min-1), and lesser recovery time (51 ± 38 s) compared to net based training where these variables were (4.3 ± 1.6 m.s-1), (153 ± 11 beats.min-1), and (66 ± 29 s) respectively.

A recent meta-analysis on the burden of cricket injuries showed a baseline injury rate of 5.32 (95% confidence interval 5.18–5.45) per 1000 h.[26] This IIR is almost five times lower than that reported in our study. However, the heterogeneity of injury definitions, exclusion of non-time-loss injuries, and missing data on training injuries may be explanations for the lower injury rates. Nevertheless, Soomro et al (2018) computed the injury rates in junior and amateur cricket to be higher than that of other popular non-contact or quasi-contact sports such as soccer, basketball, volleyball and tennis.[26] Given the high rates of injuries in junior cricket and majority of injuries being non-time-loss (85%), overuse/overexertion (61%), musculo-ligamentous strains or sprains (77%) there may be scope for

implementation of physical conditioning and neuro-muscular training for injury prevention. Injury prevention programmes (IPP) focusing on improvement of balance, strength, and coordination, delivered in the form of warm-ups or cool-downs, are highly effective in reducing injuries in adolescent sport.[28] Pote el al (2018)[21] and Soomro et al (2017)[25] suggested the design and feasibility for cricket specific IPP to reduce overuse and soft tissue injuries in amateur cricketers. Implementation of such programmes may assist in reduction of overuse and soft tissue injuries.

The high velocity impact of a cricket ball with the hands when fielding can also cause a range of traumatic injuries. Contusion injuries to the fingers and hands were the highest fielding related injuries in this study. This finding is consistent with those of previous studies of junior and amateur cricketers where hand injuries account for 12-15% of the total injuries.[14,27] The burden of these impact injuries can be modified by using protective equipment such as gloves or protective taping of the fingers. Sports and playing positions involving high velocity ball catching such as baseball, National Football League (NFL) and soccer goal-keeping or cricket wicket-keeping, allow the use of gloves. More recently, cricket specific fielding gloves have become available commercially and if worn during training may assist in the reduction of a small but meaningful proportion of impact injuries. Meanwhile, the incidence of throwing related injuries of the shoulder can be reduced by using warm-up exercises to strengthen shoulder muscles and eccentric training of the rotator cuff and serratus anterior.[25]

Given most injuries (84%) resulted in either immediate return to activity or return with modified activity, triage of these injuries by medically trained staff during matches can assist in curtailing the process of overuse injuries turning into bony stress or fractures. This can be of particular importance to fast bowlers as lower back pain may be a harbinger of career threatening lower back stress fractures.[16,27] A pragmatic approach to this problem can be the use of tele-health or mHealth to provide medical coverage in community cricket.[24] Nonetheless, cricket administrative bodies need to prioritise investment in providing medical coverage of community cricket.

STRENGTHS AND LIMITATIONS

In cricket, quantification of workload in terms of exposure time is dependent on the player specialty and position. For instance, a fast bowling all-rounder who bats in the top order may have a workload that differs markedly from that of a middle order batter. Therefore, expressing injury rates per hours of exposure in different playing positions is a robust method of understanding the relationship between workload and injury than expressing workload in terms of matches played, participations or match days. Similarly, the inclusion of 'non-time-loss' or 'medical attention' injuries is in accordance with the updated consensus definition.[19] This modification caters for injuries that either allow players to return with modified activity or in the interest of the team.

The small sample size and short follow up time during the last eight weeks of the cricket season were the main limitations of this pilot study. Consequently, the results of this study may not reflect the overall seasonal injury rate as players may be more susceptible to injuries at the end of a cricket season due to fatigue and chronic loading than at the beginning of the season. The small sample size may also mean that the results were not representative of all schoolboy cricketers. Nonetheless, the main aim of the study was to provide a novel insight into the use of a comprehensive approach for injury rate quantification. This pilot study has been effective in demonstrating how the revised approach can be applied.

Self-reporting of workloads by the players was another limitation as its reliability is questionable. However, as most training sessions were time bound and match scores officially recorded,

investigators were able to cross check any outliers in the data. Unfortunately, the analysis did not factor engagement in other sports or playing cricket outside the school team. Factoring all physical activity may vary the injury rates due to the change in exposure data. Equally important is the reliability of self-reporting non-time-loss injuries by the players. Some players may perceive reporting injuries may jeopardise their selection for subsequent matches, this is where player education is important. Similarly, ground, weather conditions and physical fitness data were not collected, as factors may influence injuries future studies need to include them in the analysis.

CONCLUSIONS

This study has demonstrated that expressing injury rates in terms of individual exposure time in training and matches is possible in community cricket. The results indicate that adolescent cricketers have a higher injury rate when both time-loss and non-time-loss injuries are factored in, with the most common mechanism of injury being overuse. Though exposure time provides an estimate for workload, it is by no means exhaustive and future studies should consider the use of micro-sensor technology such as global positioning system (GPS) and accelerometers for in-depth quantification of workloads.

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CONTRIBUTORS

All authors have contributed towards either the design, development or editing of the manuscript. NS (lead author) designed, conceptualised and edited the manuscript.

COMPETING INTERESTS

None declared.

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APPENDICES

Appendix 1: Player attendance sheet

PLAYER NAME	ROLE	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7
John Smith	Fast Bowler	Match + 2 Training sessions	Match + 2 Training sessions	Absent				
Steve Smith	All rounder (Spin)	Match + 1 Training sessions	Absent	Match				
X								
Y								
Z								

Appendix 2: Individual bowling/batting/fielding records

Individual Bowling Record

Start Date / /

Name

Contact No:

Email:

DoB / /

Player Type

*(Enter the number of balls bowled per session; for **practice enter time in mins**)*

Week	Practice 1	Practice 2	Practice 3	Match 1	Match 2	Casual	Total Balls/wk	Date
1	30	55 mins	AB	60 IN	DB	12	30	25-Nov
1								
2								
3								

AB= Absent DB= Didn't bowl IN= Injury

(Av. Balls per 15 mins =) Please record the number of balls you ball in 15 min net session twice.

Incase of injury contact Dr. Naj Soomro at naj.soomro@sydney.edu.au or call 0452 199 441

Once complete please email this sheet to naj.soomro@sydney.edu.au

Individual Batting Record

Start Date / /

Name

Contact No:

Email:

Team Name

Player Type

(Enter the number of balls played per session; or practice enter time in mins e.g 15 mins)

Week	Practice 1	Practice 2	Practice 3	Match 1	Match 2	Casual/Extra	Total Balls/wk	Date
1	30	AB	10min	DB	77 IN	120		25-Nov
1								
2								
3								

AB= Absent DB= Didn't bat IN=Injury

Average Balls batted per 10 mins in nets = (Use 2 sessions)

Incase of injury contact Dr. Naj Soomro at naj.soomro@sydney.edu.au or call 0452 199 441

Once complete please email this sheet to naj.soomro@sydney.edu.au

Individual Fielding Record

Start Date / /

Name

Contact No:

Email:

Team Name

Player Type

(Enter the number of over arm throws and time spent while fielding per session)

Week	Practice 1 time/throws	Practice 2	Practice 3	Match 1	Match 2	Casual/Extra	Mins/wk	Date
1	10m/ 0	AB	DF	150m/18	120m/24	60m/30		25-Nov
1								
2								
3								

IN= Injury AB= Absent DF= Didn't Field

Incase of injury contact Dr. Naj Soomro at naj.soomro@sydney.edu.au or call 0452 199 441

Once complete please email this sheet to naj.soomro@sydney.edu.au

CRICKET INJURY REPORTING FORM

Name: _____ Initials: _____ Position: _____ **Circle** Player/Umpire/Coach/Spectator

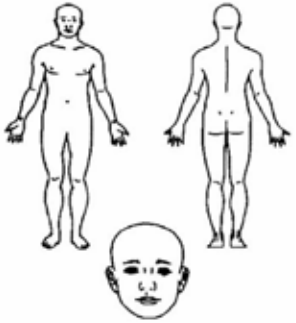
Team : _____ Grade: _____ DOB: __/__/__ Gender: M ☐ F ☐ Venue/area at which injury occurred: _____

Date of Injury __/__/__

Type of activity at time of injury
- ☐ training/practice
- ☐ competition
- ☐ other _____

Reason for Presentation
- ☐ new injury
- ☐ exacerbated/aggravated injury
- ☐ recurrent injury
- ☐ illness
- ☐ other _____

Body Region Injured
Tick or circle body part/s injured & name



Body part/s

_____

_____

Nature of Injury/Illness
- ☐ abrasion/graze
- ☐ sprain eg ligament tear
- ☐ strain eg muscle tear
- ☐ open wound/laceration/cut
- ☐ bruise/contusion
- ☐ inflammation/swelling
- ☐ fracture (including suspected)
- ☐ dislocation/subluxation
- ☐ overuse injury to muscle or tendon
- ☐ blisters
- ☐ concussion
- ☐ cardiac problem
- ☐ respiratory problem
- ☐ loss of consciousness
- ☐ unspecified medical condition
- ☐ other _____

Provisional diagnosis/es _____

_____

_____

CAUSE OF INJURY

Mechanism of Injury
- ☐ struck by ball or object
- ☐ collision with other player/referee
- ☐ collision with fixed object
- ☐ fall/stumble on same level
- ☐ jumping to field ball
- ☐ awkward landing
- ☐ overexertion (eg muscle tear)
- ☐ overuse
- ☐ slip/trip
- ☐ temperature related eg heat stress
- ☐ other _____

Explain exactly how the incident occurred

_____

_____

_____

_____

_____

_____

_____

_____

_____

Were there any contributing factors to the incident, unsuitable footwear, playing surface, equipment, foul play?

_____

_____

_____

Protective Equipment
Was protective equipment worn on the injured body part? ☐ yes ☐ no

If yes, what type eg mouthguard, ankle brace, taping.

_____

Initial Treatment
- ☐ none given (not required)
- ☐ RICER ☐ dressing
- ☐ sling, splint ☐ crutches
- ☐ massage ☐ manual therapy
- ☐ CPR ☐ stretch/exercises
- ☐ strapping/taping only
- ☐ none given - referred elsewhere
- ☐ other _____

Advice Given
- ☐ immediate return unrestricted activity
- ☐ able to return with restriction
- ☐ unable to return at present time

Referral
- ☐ no referral
- ☐ medical practitioner
- ☐ physiotherapist
- ☐ chiropractor or other professional
- ☐ ambulance transport
- ☐ hospital
- ☐ other _____

Provisional severity assessment
- ☐ mild (1-7 days modified activity)
- ☐ moderate (8-21 days modified activity)
- ☐ severe (>21 days modified or lost)

Treating person
- ☐ medical practitioner
- ☐ physiotherapist
- ☐ nurse
- ☐ sports trainer
- ☐ other _____

Signature of treating person

_____

_____

Today's Date: __/__/__

ORIGINAL RESEARCH

Sport and Exercise Medicine (SEM) professionals supporting New Zealand rugby teams: A visible public face?

EMMA J FORBES, CLAIRE L SWARBRICK, CONNER HW VAN TURNHOUT, S JOHN SULLIVAN

ABSTRACT

Aim: The primary purpose of this study was to document if sport and exercise medicine (SEM) professionals supporting semi-professional (semi-pro) and professional (pro) New Zealand (NZ) men's rugby union (rugby) teams, are identified on their team's websites. The secondary purpose was to determine how readily accessible this information is to users of the World Wide Web (www).

Method: A descriptive cross-sectional content analysis of team websites was completed for specific NZ men's rugby competitions (International, Investec Super Rugby, Mitre 10 Cup and Mitre 10 Heartland Championship). The primary analysis was centred on identifying and documenting available SEM professionals listed on each team's website. The search strategy was divided into two phases, systematic searching and data extraction, which were conducted by two independent researchers following a customised template. Results were summed, relevant statistics were generated, and data was presented graphically.

Results: SEM professionals were presented on 22 of the 32 examined team websites. Physiotherapist was the most commonly listed profession (n=20), followed by strength and conditioning coach/trainer (n=18), doctor (n=10), nutritionist (n=7), massage therapist (n=3) and mental skills coach(n=2). A trend of decreasing acknowledgement of SEM professionals in relation to the decreasing level of the competition was noted.

Conclusion: This research provides an initial insight into the recognition of SEM professionals on rugby team websites. The implications of this study highlight the differences in recognition of SEM professionals between rugby competitions. This study suggests there is a need for advocacy in the promotion of SEM professionals on rugby team websites.

Keywords; marketing, professional recognition, rugby union, sport and exercise medicine, website design

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INTRODUCTION

Rugby union (rugby) is a game played in over 100 countries and is considered the national sport of New Zealand (NZ). To many New Zealanders the game is associated with national pride and identity.[18] In NZ over 150,000 men and women of all ages play the game on any given week during the winter season.[25] NZ's national team, the All Blacks, has been the most dominant team in international rugby in the past decade.[15,23] It could be argued that an element of success in all levels of NZ rugby is associated with the contributions of the teams' sports and exercise medicine (SEM) professionals (sometimes known as the medical support team).[6,12]

Prior to B J McKenzie's appointment as the first All Blacks physiotherapist in 1978, and P Cunningham as team doctor in 1985 (email from S Berg, (stephen@rugbymuseum.co.nz) in May 2019), medical support was present but less structured. These appointments opened the door for further health professionals to be systematically included in the wider support team. Fast forward to the present and the SEM team has expanded to involve multiple professionals, including but not limited to; chiropractors, doctors, massage therapists, nutritionists, orthopaedic surgeons, osteopaths, physiotherapists, podiatrists, sports psychologists, and strength and conditioning coaches (S&C coaches).[6] Players work with these professionals to become fitter, faster and stronger.[7,20,21] However, with the development of the game and the increase in athletic performance, players have a greater risk of injury and health related issues.[5,8,9,22] Collectively this creates a greater opportunity for a range of SEM professionals to contribute to player health and performance.

Historically team photos have included coaches and managers, however, more recently SEM professionals and other support staff are being included as an acknowledgment for their role in the team. Since the development of the World Wide Web (www) more information is commonly presented and readily accessed online. Team websites allow information to be presented to the public in a timely, efficient and possibly more interactive manner.[14,19] It can be argued that the appointment of SEM professionals should be acknowledged on these websites to the same extent as the players that they support.

The primary purpose of this study was to document if SEM professionals supporting semi-professional (semi-pro) and professional (pro) NZ men's rugby teams, are identified on their team's website. The secondary purpose was to determine how readily accessible this information is to users of the www. This information will be important for assessing how SEM professionals are recognised in rugby team environments, and whether they are appropriately acknowledged on team websites, and promoted as integral members of NZ rugby teams.

METHODS

Study Design

A descriptive cross-sectional content analysis of NZ men's rugby team websites. This study design was modelled on that implemented by Ahmed et al to explore and analyse concussion related websites.[1] Currently there are no checklists or guidelines for the reporting of study quality specific to this study design or methodology. Thus the Standards for Reporting Qualitative Research (SRQR), originally designed for transparent reporting of qualitative research, was used as a guide for the reporting of this study.[17]

Ethics

The information collected in this study is freely accessible within the public space, therefore ethical approval was not required or sought.

Target Information Sources

The target information sought was limited to teams from four well established pro and semi-pro rugby competitions, during the 2018/19 NZ rugby seasons. The All Blacks are NZ's national team and compete at the highest level of professional rugby globally.[15] The next professional competition below includes five NZ Investec Super Rugby

franchises who compete with other franchises from Australia, South Africa, Argentina and Japan. The lower tier competitions (semi-pro players) of NZ rugby include the Mitre 10 Cup and the Mitre 10 Heartland Championship (Heartland Championship). The Mitre 10 Cup is NZ's premier domestic competition featuring the top fourteen provincial rugby unions, while the Heartland Championship is the second tier domestic competition comprising twelve provincial (rural) unions.[16]

Selection Criteria

There was no established format or guidance for the information to be collected, therefore the researchers created a customised strategy and template. Specifically, the following information was sought; whether SEM professionals (or profession) were listed, and whether this was accompanied by a name, photo, contact information or qualifications, and the navigation pathway for determining this information.

To be included in this study, teams were required to be competing in NZ pro or semi-pro men's rugby competitions and have their own individual website. Based on a review of international literature and sports websites,[6,7,21] the following professionals (or their designated positions) were specifically sought: chiropractor, dietician/nutritionist, doctor, massage therapist, orthopaedic surgeon, osteopath, physiotherapist, podiatrist, psychologist, and strength and conditioning coach/trainer. Not all of these professionals are regulated under the New Zealand Health Practitioners Competence Assurance Act 2003.[13] However, they still play a role in player welfare, and thus were included in the information sought. In addition, any SEM professionals not included above were also recorded. Other professionals such as; coaches, performance (ie, analyst, equipment manager etc), media or logistics related personnel were not included, as they did not relate specifically to the health or fitness of the players.

Pilot Testing

The purpose of a preliminary investigation was to inform the search terminology, identify common SEM professionals and locate the relevant information on websites. This preliminary investigation was conducted independently by two members of the research team (CS, EF) on six randomly selected team websites which were explored in detail.

Procedures

Search Strategy: The study proceeded in two phases; systematic search and data extraction.

Phase 1: Systematic search for team websites

The systematic search strategy was designed to identify the official team websites that would be used for data collection. NZ's governing body of rugby, New Zealand Rugby (NZR) was entered into the search engine google.co.nz, which yielded www.nzrugby.co.nz/. Once on the NZR homepage researchers identified "Rugby Fans" as being the most relevant menu and used hyperlinks to identify international and domestic competitions and the associated teams involved. On respective competition homepages, hyperlinks to each individual team website were followed. The outcome of this phase is presented in Table 1.

Phase 2: Data extraction

Each rugby team website was independently reviewed by two members of the research team (EF, CS) on 24th April 2019, and monitored for changes until 10th May 2019. A systematic search of menu options from the homepage of each team website was conducted. Results from the pilot study informed the researchers of the following key terms where the target information may be located: About Us, Competition Name, Contacts, Handbook, Key Personnel, People, Staff/Staff List, Squad, Team Management and Team Name. When the relevant target information (professionals) could not be sourced directly from these menus, researchers used the embedded search bar (if available), to search for these professionals (eg, doctors, physiotherapists, S&C coaches).

Once the necessary information was located, the same two members of the research team

Table 1: Identification of the teams playing in each competition and their URL's.

Rugby Competitions			
World Rugby	**Investec Super Rugby**	**Mitre 10 Cup**	**Mitre 10 Heartland Championship**
All Blacks (http://www.allblacks.com)	Blues (https://theblues.co.nz) Chiefs (https://www.chiefs.co.nz) Crusaders (https://crusaders.co.nz) Highlanders (https://thehighlanders.co.nz) Hurricanes (https://www.hurricanes.co.nz/memberships/home/)	Auckland (http://www.aucklandrugby.co.nz) Bay of Plenty (http://www.boprugby.co.nz) Canterbury (https://www.crfu.co.nz) Counties Manukau (https://www.steelers.co.nz) Hawke's Bay (http://www.hbmagpies.co.nz) Manawatu (https://www.manawaturugby.co.nz) Northland (http://www.taniwha.co.nz) North Harbour (http://www.harbourrugby.co.nz) Otago (http://www.orfu.co.nz) Southland (http://www.rugbysouthland.co.nz) Taranaki (https://www.trfu.co.nz) Tasman (http://www.mako.nz) Waikato (http://www.mooloo.co.nz) Wellington (https://www.wellingtonlions.co.nz)	Buller (http://bullerrugby.co.nz/wp2/) East Coast (http://npec.co.nz/wp/) Horowhenua-Kapiti (https://www.hkrfu.co.nz) King Country (https://www.sporty.co.nz/kcrfu) Mid Canterbury (http://www.midcanterburyrugby.co.nz) North Otago (http://northotagorugby.co.nz) Poverty Bay (https://povertybayrugby.co.nz) South Canterbury (http://www.scrfu.co.nz) Thames Valley (http://thamesvalleyswampfoxes.co.nz/tvrfu/) Wairarapa Bush (http://waibush.co.nz/wp/) Wanganui (http://wanganuirugby.co.nz/wp/) West Coast (http://westcoastrfu.com/wp/)

independently recorded the most direct navigational path to this information from the team's homepage. This included the number of clicks associated with each search. At the final destination, the uniform resource locator (URL) was recorded and any additional comments were made.

At the end of this phase, data from the two researchers were compared and any discrepancies were settled by consultation with a third member (CvT) of the research team. Information sourced from the team webpages were recorded and coded on a Microsoft Excel spreadsheet.

Data Analysis

The primary analysis was centred on the identification of which SEM professionals were listed on team websites, and whether there was a personal profile. Additionally, the navigation path and clicks required to find the SEM profiles were recorded to analyse accessibility. In examining the data, single professional groups with a small number of registered health professionals listed were reclassified into a single category eg, muscular therapists classified as massage therapists. Teams which listed both the SEM professional and the assistant-SEM professional, were recorded solely under the single professional. Where multiple members of the same profession were listed, a single point was recorded to recognise the presence of the profession, rather than the quantity of professionals. A data point was included when the profession was listed without the professional's name being specified, and noted. The search bar function occasionally located archived articles referring to specific SEM members. If the articles themselves did not meet the inclusion criteria, the information was not considered. Data was presented in tabular and graphical format, with

Table 2: Identification and location of target website information.

Competition	Teams	Navigation	Number of Clicks	Search Bar	URL of final destination
National	All Blacks	N/A	N/A	✓	N/A
Investec Super	Blues	Homepage → People	1	✓	https://theblues.co.nz/people/
Rugby	Chiefs	N/A	N/A		N/A
	Crusaders	Homepage → About Us → Staff List	2	✓	https://crusaders.co.nz/about-us/staff-list
	Highlanders	Homepage → About Us → Staff List	1	✓	https://thehighlanders.co.nz/about-us/staff-list
	Hurricanes	Homepage → Menu → About Us → Staff	3		https://www.hurricanes.co.nz/about-us/staff/
Mitre 10 Cup	Auckland	Homepage → Mitre 10 Cup → Team Management	1		http://www.aucklandrugby.co.nz/Mitre-10-Cup/Team-Management
	Bay of Plenty	Homepage → High Performance → Steamers → Steamers Team*	2	✓	http://www.boprugby.co.nz/high-performance/steamers/steamers-team/*
	Canterbury	Homepage → About Us → Staff List	1		https://www.crfu.co.nz/About-Us-1/Staff-List-1
	Counties Manukau	Homepage → About Us → Staff	2		https://www.steelers.co.nz/steelers-heat/about/staff/
	Hawke's Bay	Homepage → Magpies Rugby → About Us → About Us	2		https://www.sporty.co.nz/magpies/About-Us/About-Us
	Manawatu	N/A	N/A	✓	N/A
	Northland	Homepage → About Us → Contacts-NRU	1		http://www.taniwha.co.nz/About-Us/Contacts-NRU
	North Harbour	Homepage → NHRU → Our People	1	✓	http://www.harbourrugby.co.nz/webpages/contact-us/
	Otago	Homepage → Home → Staff	1		http://www.orfu.co.nz/Home-1/Staff-2
	Southland	Homepage → Mitre 10 Cup → Players and Management	1		http://www.rugbysouthland.co.nz/Mitre-10-Cup/Players-Management
	Taranaki	Homepage → Taranaki Bulls → Team	1		https://www.trfu.co.nz/TARANAKI-BULLS/TEAM
	Tasman	Homepage → TRU → About TRU	2	✓	http://www.tasmanrugby.co.nz/about-tru
	Waikato	Homepage → Mitre 10 Cup → Team Management	1		http://www.mooloo.co.nz/Mitre-10-Cup/Team-Management
	Wellington	Homepage → Squad	1		https://www.wellingtonlions.co.nz/squad/2018/
Mitre 10	Buller	N/A	N/A		N/A
Heartland	East Coast	N/A	N/A		N/A
Championship	Horowhenua-Kapiti	Homepage → About Us → Handbook + Documents → Download '2018 Annual Report'	2	✓	https://www.hkrfu.co.nz/wp-content/uploads/2018/12/2018-Annual-Report.pdf
	King Country	Homepage → Ssangyong King Country Rams → Key Personnel 2019	1		https://www.sporty.co.nz/kcrfu/Ssangyong-King-Country-Rams/Key-Personnel-2019
	Mid Canterbury	N/A	N/A		N/A
	North Otago	N/A	N/A		N/A
	Poverty Bay	N/A	N/A	✓	N/A
	South Canterbury	Homepage → About → 2018 Rugby Information Handbook	1		http://www.scrfu.co.nz/About/Staff-1
	Thames Valley	N/A	N/A	✓	N/A
	Wairarapa Bush	Homepage → Search → Physio → Select first link, September 5th 2018	4	✓	http://waibush.co.nz/wp/farriers-wairarapa-bush-starting-team-for-this-weekend-vs-east-coast/
	Wanganui	Homepage → Contact → Download '2019 Directory of Contacts'	2	✓	http://wanganuirugby.co.nz/wp/wp-content/uploads/2019/04/NEW_CONTACT_BOOK_ 2019090419.pdf
	West Coast	N/A	N/A	✓	N/A

percentages and frequencies generated for the overall sample and the different competitions.

RESULTS

A total of 1,888 data points were recorded during the course of the study. Of these, 13 (0.7%) required moderation, which was largely due to technicalities relating to articles dated prior to the 2018/19 seasons. Table 2 shows the navigation path, number of clicks to access information, presence of a search bar and the URL of the final webpage presenting the target information. The most direct navigational path to locate the SEM professionals ranged from one to four clicks with both the mode and median being one click. Of the 32 teams, four displayed the same navigational pathway (Homepage → About Us → Staff/Staff List). One team listed no SEM professionals through obvious drop-down menus, and required the use of the search bar to find a 2018 article on the team and management line-up for the upcoming game. Three teams required documents to be downloaded in order to access the target information. The following SEM professionals were not evident in the search; chiropractor, orthopaedic surgeon, osteopath, podiatrist and psychologist.

The results of the systematic search are presented in Table 3. Of the 32 websites examined, 22 listed

Table 3: SEM professionals documented on team websites.

		Sports and Exercise Medicine Professionals											
		Doctor		Nutritionist		Physiotherapist		Massage Therapist		Strength and Conditioning Coach/Trainer		Other SEM Professionals	
Competition	Teams	Named	Photo	Named	Photo	Named	Photo	Named	Photo	Named	Photo	Named	Photo
National	All Blacks												
Investec Super Rugby	Blues	✓		✓		✓		✓		✓		✓ MS	
	Chiefs												
	Crusaders	✓				✓				✓			
	Highlanders	✓		✓		✓				✓			
	Hurricanes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ MS	
Mitre 10 Cup	Auckland	✓	✓			✓	✓	✓	✓	✓	✓		
	Bay of Plenty			✓	✓	✓				✓			
	Canterbury					✓				✓			
	Counties Manukau									✓	✓		
	Hawke's Bay	✓				✓				✓			
	Manawatu												
	Northland									✓			
	North Harbour					✓	✓			✓	✓		
	Otago	✓*		✓		✓				✓	✓		
	Southland	✓		✓		✓				✓	✓		
	Taranaki	✓	✓	✓	✓	✓	✓			✓	✓		
	Tasman					✓				✓			
	Waikato	✓	✓			✓	✓			✓	✓		
	Wellington					✓	✓			✓	✓		
Mitre 10 Heartland Championship	Buller												
	East Coast												
	Horowhenua-Kapiti						✓						
	King Country					✓							
	Mid Canterbury												
	North Otago												
	Poverty Bay												
	South Canterbury					✓							
	Thames Valley												
	Wairarapa Bush					✓				✓			
	Wanganui					✓							
	West Coast												

✓ SEM Professional present * Profession listed only, no professional named MS Mental Skills Coach

SEM professionals. At the time the study was conducted, no SEM professionals were identified on the All Blacks website. Physiotherapists were the most frequently listed professionals (20/32 teams), followed by S&C coaches/trainers (19/32 teams), and doctors (10/32 teams). Collectively the 32 websites had a total of 60 SEM professionals listed, of which there were no academic and/or professional qualifications reported. Furthermore, 37% (22/60 professionals) displayed a photo and 17% (10/60 professionals) had an email or phone number listed. Neither the All Blacks nor the Investec Super Rugby team websites provided contact details for any of the SEM professionals.

Figure 1 compares the number of SEM professionals observed within each NZ rugby competition. Teams involved in the Investec Super Rugby competition tended to recognise SEM professions more consistently than Mitre 10 Cup and Heartland Championship teams. The Mitre 10 Cup and Heartland Championship had a larger number of teams involved in their respective competitions, however, they listed a less extensive line-up of SEM professionals.

DISCUSSION

This is the first study of its kind to provide a snapshot of how SEM professionals are currently acknowledged within pro and semi-pro NZ rugby team websites. Approximately two thirds of the 32 teams listed at least one SEM professional. Of these professionals, physiotherapists and S&C coaches/trainers were the most well represented. Doctors, nutritionists, massage therapists and mental skills coaches were the less often listed professionals. There was a clear trend of decreasing acknowledgement of SEM professionals with the decreasing level of the

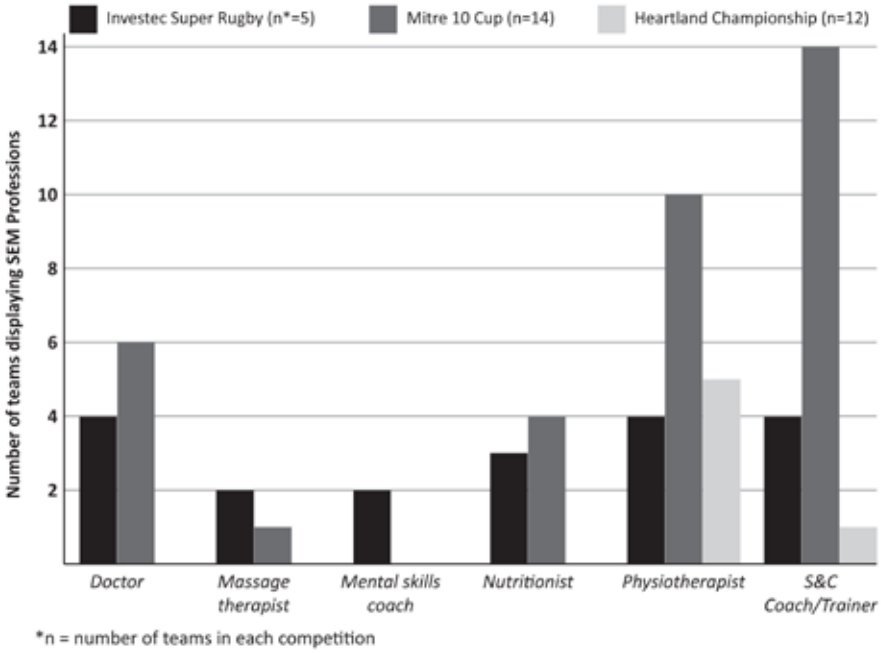

Figure 1: Number of reported SEM professionals on NZ rugby team websites per competition

competition amongst the Investec Super Rugby, Mitre 10 Cup and Heartland Championship. It was observed that the majority of the named professionals had male-affiliated names. Additionally, it was noted that there was only a limited number of SEM professionals associated with each Mitre 10 Cup and Heartland Championship team. Unexpectedly, despite being in the highest level of competition, the All Blacks team website failed to list any of their SEM professionals. Although not listed, their SEM professionals are well known to the general public through various media and can be located via simple Google search strategies.

With the growing concern for the high rates of injury (including concussions) in rugby players and their workloads, it is questionable why these professions aren't actively publicised. By increasing the awareness of what support is required to sustain pro and semi-pro rugby player performance and health, aspiring players and potential recruits will become more aware of the concern that rugby administration has for their health and wellbeing. Similarly, by presenting SEM professionals as integral members of the team, this signals a career pathway for young or aspiring SEM professionals. By presenting the names and qualifications of these professionals, it indicates to players and the public alike that team management is providing the optimal and best qualified individuals to care for players. Such actions help reinforce the professional nature and image of the game.

There are several possible explanations for the differential reporting of SEM professionals between the competitions. World Rugby, the governing body of rugby worldwide, identify key risks associated with rugby and produce guidelines promoting best medical practice which state that it is up to the member union to implement these guidelines appropriately within each country as pertains to their "legal, economic, social and medical expertise" availability.[24] However, they do not appear to provide any clear guidelines or recommendations in regard to the specific appointment or recognition of SEM professionals linked with teams or unions. Furthermore, this policy does not specify which professionals make up the "medical expertise"; this is left to the discretion of the national (NZR) or provincial unions. Thus, there appears to be a disjoint between high level policy and the actuality of what takes place in NZ rugby, or at least in the data reported here. It can also be speculated that lower tier competitions (Mitre 10 Cup and Heartland Championship) have less resources and funding, both for employing SEM staff and for website development and maintenance compared to the higher tier competitions.

As this study looked solely into four NZ rugby competitions, questions remain as to how SEM professionals are profiled in different rugby competitions worldwide and in other team sports. Team websites from comparable rugby competitions including; Investec Super Rugby franchises (www.superxv.com/), the Top 14 (www.lnr.fr/rugby-top-14), the Gallagher Premiership (premiershiprugby.com/gallagherprem/) and the Guinness PRO14 (www.pro14rugby.org/) competitions, were browsed. It was evident that the Northern Hemisphere team websites presented their SEM professionals to a greater depth than the typical NZ, Australian or South African rugby websites. Generally, Northern Hemisphere rugby websites included a biography of each professional which included their nationality, qualifications, previous employment and social media account; as illustrated by the Leinster rugby club (Guinness PRO14).[11] One team acknowledged their SEM professionals on their website with the quote; "this is the team that builds the team".[3] Including this information increases the profile of the SEM professionals, exemplifying a higher standard of recognition and demonstration that the club has recruited highly qualified individuals. This is in contrast to our data where no qualifications

or biographic data were reported for the NZ SEM professionals. Looking beyond rugby, an exploratory search was performed of websites from popular North American professional sports teams competing in Major League Baseball (MLB), National Football League (NFL), National Basketball Association (NBA) and the National Hockey League (NHL). These North American websites provided comprehensive and precise listings of all SEM professionals involved, including several professions not listed on any NZ rugby team website, for example; athletic trainers, dentists, chiropractors and ophthalmologists. It is suggested that North American and Northern Hemisphere sports teams have a higher budget to employ a dedicated or media savvy team to address the expectation of their larger audience as well as to support a larger and wider range of SEM support staff. Alternatively, the SEM professionals are more conscious of their online profiles and promoting themselves and indirectly their professions.[2] The reasons for this void is worthy of future investigation.

In today's digital age, sports fans have all the information they crave sitting within a thumbs reach. Those responsible for developing a team website have a role in ensuring information is accessible, regularly updated, and the website is user friendly for all audiences. Best practice in webpage design includes date stamping of the webpages so that the user is aware of the recency of the information. The majority of websites within this study did not appear to include a date stamp. This created uncertainty to when staff information was last updated, leaving the possibility that staff from previous year's teams were erroneously included in the data. Date stamping is a key principle embedded in website quality checklists, such as seen in the Health on the Net (HON) code.[10] There is contradicting evidence in regards to accessibility and whether there is an optimal number of clicks, or whether the number of clicks is not as important if the link is clear.[4] In this study, the median number of clicks was 1, suggesting easy accessibility of information. However, the navigation paths recorded, give a more detailed view on information flow. The most common pathway was through the "About Us" menu, however other common pathways used the competition name, or team name to access information. Although most information could be located with one click, in many cases the user was required to utilise the drop-down menus and scroll through the webpage to find the appropriate information. The combination of several common menu options and scrolling for information makes it confusing for website users trying to efficiently access information. A large number of NHL, NFL and MLB team websites offered informative menu headings (eg, Front office, News, Players, Roster etc.) which were standardised across each competition. This led to easier access of information, with most SEM professionals located under the heading "Front Office". NZ rugby teams may benefit from standardising website layouts and utilising usability criteria to give the SEM professionals an allocated and easily identified location.

This innovative, well-designed study which implemented multiple independent coders for data location and extraction, and followed a transparent methodology to enhance its quality, is not without limitations. Firstly, only four NZ men's rugby competitions were included in the search strategy, therefore, findings cannot be generalised to women's rugby, rugby grades below the semi-pro level, non-NZ rugby teams or other sports. Secondly, as only team websites were explored, SEM professional information could have been presented on other team related media platforms such as Facebook, Instagram and Twitter. A further limitation was that at the time of data collection, only the Investec Super Rugby competition was active, with the All Black's season and NZ domestic competitions not beginning until the end of July and August respectively. Due to all four competitions running at varying times throughout the year, it is feasible to assume there may be some

delay between teams changing their websites to include updated player and staff lists. To address this potentially confounding variable, websites were further monitored until the May 10th to note any changes, and one was noted. Lastly, there was a lack of dates associated with the data, which may have led to an underreporting due to pending appointments.

Moving forward, there is a need for both rugby administrators and SEM professionals to be more proactive in profiling "the team that builds the team". This will lead to a stronger presentation and increased reassurance of the quality of persons involved with player performance, health and wellbeing. This initial study provides a foundation for benchmarking these future website listings. As social media evolves, there may be other platforms better suited to promoting the SEM team and their associated professions.

CONCLUSION

This research provides insight into the recognition of SEM professionals supporting NZ men's rugby teams as evidenced by information on their websites. The implications of this study highlight that recognition of SEM professionals is non-standardised between different competition tiers. As a vital part of the rugby team it is to be expected that SEM professionals should advocate for increased recognition of their profile. With the lack of reporting, both professionals and their team management should be more proactive in creating a visible public face for these key personnel.

ACKNOWLEDGEMENTS

The authors acknowledge the contribution of Thelma Fisher, Physiotherapy subject librarian at the University of Otago, for her assistance in literature searching and referencing. The authors also acknowledge the contribution of Stephen Berg (Director of the New Zealand Rugby Museum) and Dr Kenneth Quarrie (NZR) for their assistance in obtaining historical information relating to NZ rugby SEM professionals.

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Emma J Forbes, Claire L Swarbrick, Conner HW van Turnhout were final year School of Physiotherapy students at the University of Otago at the time this study was conducted.

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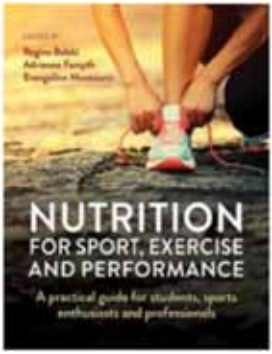
Nutrition for Sport, Exercise and Performance;

A practical guide for students, sports enthusiasts and professionals. 2019



Publisher's link: https://www.allenandunwin.com/browse/books/academic-professional/health/Nutrition-for-Sport-Exercise-and-Performance-Edited-by-Regina-Belski-Adrienne-Forsyth-and-Evangeline-Mantzioris-9781760297497

Cost AU$85.00

Sports nutrition is a continuously evolving evidence-based science where students are often faced with complex texts requiring an extensive background in the area. Nutrition for Sport, Exercise and Performance addresses the fundamentals of sport and exercise nutrition in well-presented bite size chapter with practically applied context. The clear learning outcomes and key messages guides students and readers to the important material for each chapter. Understanding physiology and the application to nutrition in a sporting context is succinctly delivered in the first section. Defining exercise, types of sport, exercise and physiology terminology along with energy needs and metabolic pathways is expertly handled without overwhelming the reader. The regular chapters on digestion and macro and micronutrients are concise and include current topics including trans fats, probiotics, alcohol and antioxidants. Three very useful chapters; Translating nutrition: from nutrient to food, Introduction to diet planning and Working with athletes should be compulsory reading for any practitioner wishing to work with athletes in the area of sports nutrition. Part two addresses nutrition periodisation and provides a timely reminder that as athletes do not train the same each day, they should not eat the same and covers training and competition nutrition with range of approaches available (eg, Train Low) and hydration. The chapter on sports supplements could have included information from the recent IOC series. The chapter on body composition provides a concise summary of the different options available and could have preceded the Introduction to diet planning. The remaining section on applied sports nutrition is presented by authors who are specialist in their fields in sports nutrition and give valuable insight into each chapter with practical examples and tables. The sectioning into sporting codes such as endurance, strength, team sports, weight classes and master's athletes further reinforces the individualisation of sports nutrition practices. Information on sports nutrition for para-athletes provides a solid introduction with a clear explanation of the categories, training age and nutrition issues with a spinal cord focus. The remaining chapters address topics of travel, climatic and environmental challenges, injury and gastrointestinal disturbances and are all well-presented addressing current knowledge and providing practical recommendations. Targeted specifically for the Pacific rim this text is a welcomed teaching resource for the undergraduate level and a valuable reference for athletes and emerging sports nutrition professionals.

Nutrition for Sport, Exercise and Performance- A practical guide for students, sports enthusiasts and professionals, is a text edited by three

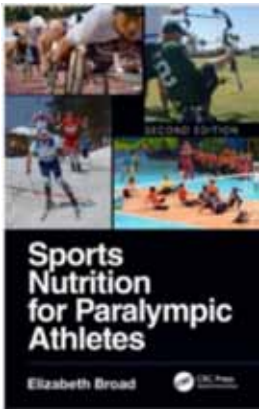
experienced Australian dietitians; Regina Belski, Adrienne Forsyth and Evangeline Mantzioris. Belski is an Advanced Sports Dietitian and is Associate Professor of Dietetics and Course Director at Swinburne University of Technology. Forsyth is an Advanced Sports Dietitian and Accredited Exercise Physiologist and is the Course Coordinator for the Bachelor of Human Nutrition at La Trobe University. Mantzioris is an Accredited Sports Dietitian and is the Programme Director for the Bachelor of Nutrition and Food Sciences at the University of South Australia. This is a new comprehensive resource for sports nutrition and exercise science students, particularly undergraduate level and those new to the field. The book is sectioned into three parts and the chapters include: Energy for sport and exercise; Digestion and absorption of macronutrients in sport and exercise; Macronutrients; Translating nutrition: from nutrients to foods; Macronutrient periodisation; and Sports supplements.

Jeni Pearce
Performance Nutritionist,
High Performance Sport New Zealand,

Sports Nutrition for Paralympic Athletes

Broad, E.(Editor)

Sports Nutrition for Paralympic Athletes, Second Edition, Taylor & Francis Group Publisher, USA. www.tandf.co.uk



Today is an exciting time to be involved in paralympic sports and the enjoyment of events, such as the Paralympic Games, highlights how the skill set needed to work with these extraordinary athletes have progressed. Sports nutrition, sports medicine and sports science has moved forward, and specialist knowledge is growing rapidly in delivering to these athletes. Today, these athletes are more competitive with training loads that are similar to able bodied athletes in many disciplines. This is evident in the dramatically improved times, heights, distances covered and scores for almost all events at the elite level with multiple world records continuously being broken.

It has been argued sports nutrition for the para-athlete is no different than for the able bodied. This book highlights the common ground and more importantly the unique characteristic of the many different disciplines and where sports nutrition must adapt to assist athlete performance. Knowledge from this new edition will go a long way to assist sports nutrition practitioners in providing bespoke delivery and the text contains a wealth of practical tips to impact performance. There is a new chapter on the critical areas of energy availability (chapter four) and of importance for 2020 and the Tokyo Olympics chapter 5 on Cooling and Hydration in para athletes. A highlight is the rea life experiences

incorporated throughout the chapters.

The often-overlooked area of the use of supplements in this population is expertly covered in chapter 14 commencing with a discussion on a decision framework for taking supplements. This chapter has been revised and contains a useful table reviewing studies on supplements in athletes with spinal cord injuries and the performance outcomes.

Although initially written for students working in para sports, athletes seeking knowledge in sports nutrition, and sports scientist and medical support will find value throughout these pages. Researchers will find new and diverse topics for further investigation as the text identifies the lack of scientific studies in this population. This is a resource which should be available for any sports nutrition professional working with para athletes of any levels and not limited to the elite.

For those less familiar or new to working with para-athletes and their classifications chapter two and the appendix provide information that is essential reading while the table in chapter one clearly demonstrates the challenges in nutrition and dietary practices for these athletes and lays the framework for the further chapters. Evidence based current dietary practices are covered in chapter three with para-athlete examples. Those working with able bodied athletes will find this chapter a condensed view of the current principles in nutrition manipulation for para-athletes and there is an excellent section dedicated to weight categories. Information throughout the text is presented in very readable sections and comprehensive tables.

Under the expert editorship of Liz Broad (who has worked at the coalface with athletes in Paralympics in USA, Australia and Scotland and supported athletes in both Summer and Winter Olympic and Paralympic Games), specialist authors and contributors have been brought together from around the world (Brazil, USA, Australia, England, Germany) along with additional commentary from athletes and coaches. Dr Broad is the Senior Sport Dietitian, US Paralympics, at the US Olympic Committee and has authored several book chapters in both public and scientific publications.

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American College of Sports Medicine Annual Meeting, Orlando 2019

DANE BAKER

I attended the 66th annual American College of Sports Medicine Conference, held in Orlando, Florida. My attendance was through my role at HPSNZ and I attended with my colleague Jeni Pearce. With that in mind our focus was on attending sessions with a sports nutrition / performance and health angle so we could bring back this information to our colleagues at HPSNZ.

The conference drew more than 6,000 sports medicine professionals from around the world, with sessions covering all aspects of sports medicine, exercise science and the benefits of physical activity. The programme is immense with numerous symposiums often running side by side across the week, and it can be hard to be across all the sessions without thorough planning, hence the team approach with us both attending!

The conference theme was Circadian Rhythm with the world congress named: The Basic Science of Exercise, Circadian Rhythms and Sleep. Our first session was part of the Gatorade Sports Science Institute pre-conference, held the day before the full schedule started. Here Dr Amy Bender from the University of Calgary gave an insightful talk about the practical work she does with athletes and applying her research regarding sleep. Her past research has involved clinically validating the athlete sleep screening questionnaire,[1] which her team at the University of Calgary has developed into an online tool for athletes where they can fill out the form online and get instant feedback and tips for improving sleep quality (https://centreforsleep.com/athlete-sleep-screening-questionnaire/). An interesting area she discussed was our sleep chronotypes and how these change over time. Apparently we are born with the early bird chronotype, by age 20 we peak as a night owl then over time we shift back towards being morning types.

Dr Robert Chapman, director of sports science medicine for USA track and field gave an enlightening talk on recent findings on iron supplementation and absorption issues, as well as outlining the frustrations the US team face in iron screening their athletes. Dr Chapman showed unpublished data currently in review (Int J Sport Physiol Perf). He emphasised that for the first time they now have data demonstrating that elite distance runners completing 21-28 days of altitude training (2150 m – 2,500 m) had significant increases in haemoglobin mass with ferritin levels of >50 ng/ml upon entering the camp. He discussed the need for updated guidelines for iron status of athletes and the frustration the US team has, where they estimate 50% of their athletes still attend altitude camps without prior iron screening. He then discussed the oral iron supplementation strategies and the bioavailability issues across different dosing strategies, highlighting the significant work of Moretti[2] and Zurich[3]. This work shows that the timing of oral iron supplementation significantly effects iron bioavailability. Chapman demonstrated that when a 60 mg dose of iron is taken at 8 am, 13.6 mg will be absorbed if there is no preceding dose, 8.8 mg absorbed after a single dose at 8 am the preceding day and only 5.6 mg absorbed after twice daily 60 mg doses the preceding day. The main cause of this reduction in absorption is the elevated hepcidin response which stays elevated for approximately 48 hours after intake.

This substantially reduces the bioavailability of subsequent doses within that timeframe. As a result he recommends alternative day iron supplementation for the greatest bioavailability, however this strategy also comes with the highest reported GI distress.

Dr Neil Walsh (Bangor University) gave a great overview on "Maladaptation and athlete immune health". Dr Walsh is a leading figure in research regarding immunity in athletes with a great recent publication on "Recommendations for athletes to maintain immune health".[4] He emphasised the lack of actual studies on the over-training syndrome and used Fry et al[5] classic continuum model of over training symptoms to show that only 8 studies had been published at the end of the continuum (over training syndrome) compared to 722 studies at the beginning of the continuum (acute fatigue). He is not convinced from current evidence that low energy availability is significantly impairing athlete's immunity. He referred to evidence from patients with anorexia nervosa where immunity is maintained and only impaired when BMI is below 15. Similarly, he rationalised that immunity is maintained in children undergoing famine and protein energy malnutrition. He believes athletes with slightly lowered BMI's, for example 19, with adequate protein intake should have appropriate energy to optimise immunity. He emphasised the work of Cohen in the early 90's[6] where subjects where given a dose of the common cold and those with high levels of stress and poor sleep were 5-6x more likely to contract the cold. His take home message for athletes with persistent fatigue, impaired performance and increased infections was a comprehensive clinical investigation focused on unresolved viral infections, aspects of mental health and examining sleep patterns.

A great part of ACSM is the tutorial lectures, where researchers have the opportunity to showcase a body of research for an hour with opportunity for good discussion. One of these lectures was "Advancing the female athlete triad" by Mary Jane De Souza and Nancy Williams from Penn State University. They summarised their amazing piece of work in which they have recently completed the first RCT on the recovery of exercising females with the triad. The paper is named "The refuel study"[7] in which they assessed the effects of an increased energy intake on metabolic, menstrual and bone outcomes in Oligo / Amenorrhoeic Exercising woman. The study was 8 years in the making and for those interested in the area is a must read. In summary the intervention focused on increasing energy intake by 20-30% above estimated baseline energy expenditure, an average increase of 220-420 calories per day in participants. Participants were supported by a clinical psychologist and nutritionist fortnightly for the first 3 months and monthly after that for the remainder of the year with significant clinical investigations occurring across the intervention. The key findings were that a 20% increase in energy intake, whilst sufficient to restore menses was insufficient to cause an increase in BMD. The presenters emphasised that the onset of menses is not the picture for full recovery and often more sophisticated analyses of hormonal recovery is needed. A minimal goal for menstrual recovery should be 3 menses in a row of 26-34 days and that recovery of adequate oestrogen exposure and ovulation will likely require more time. They summarised that patients need to commit to increasing energy intake for at least one full year and that a return to previous body weight (when weight loss has occurred) is associated with regular menses. However, they also emphasised not to assume that the onset of menses is equivalent to ovulatory cycles and adequate oestrogen exposure. One of their concluding statements was that sports dietitians are also key team members for recovery when eating disorders are involved, in combination with nutrition educators.

In preparation for the Tokyo Olympics the symposium "Preparing for competition in the heat: Considerations for Tokyo 2020" was

held. Dr Lee Taylor (formerly of Aspetar now Loughborough university) presented an overview of his recent work in preparing 7s rugby teams for competition in the heat.[8] His work has mainly involved the US and Australian teams. Of interest he discussed his recently accepted (ahead of print) paper which investigated "limiting the rise in core temperature during a rugby-sevens warm-up with an ice vest".[9] Here 12 elite male sevens players underwent an identical valid match day warm-up in a randomised cross over design (WBGT:23-27°C). Subjects wore phase change cooling vests for 70 mins prior to the warm-up and during the 30 min warm-up. The study found athletes who wore the vest had a reduced change in core temperature from pre to post warm-up (1.3°C vs 2.0°C) and had a lower peak core temperature (37.8°C vs 38.5°C). Also, in other measures they found those wearing the ice vest reported a lower RPE post warm-up (-1.01 ± 0.46) compared to control, however changes in CMJ and GPS indices were trivial between conditions. From personal communications with Dr Taylor it appears that a significant amount of work is being done to customise ice vests to be worn during warmups to optimise comfort, practicalities and minimise injury risk during a rugby warm up. He also eluded to the fact that wearing the ice vest prior to the warm-up may not be necessary as its main effect is to withhold increases in core temperature rather than eliciting pre cooling effects.

I would like to thank HPSNZ and the Prime Ministers Scholarship fund for supporting my attendance at this conference.

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