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Travelling light - sports physiotherapists administering medications in the absence of a doctor

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PUBLISHER
SPORTS MEDICINE NEW ZEALAND
PO Box 6398, Dunedin
NEW ZEALAND
Tel: +64-3-477-7887
Fax: +64-3-477-7882
Email: smnznat@xtra.co.nz
Web: www.sportsmedicine.co.nz

EDITOR
Dr Chris Milne

From the Editor

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Jim Cotter
Penelope Day
David Gerrard
Paul Kennedy
Neil Matson
Judith May
Duncan Reid
Gill Stotter
Stewart Walsh
Rosalind Wilson
Simon Brebner
Kirsty Fairbairn
John Hellemans
Michael Lamont
Peter Maulder
Simon Mayhew
Dale Speedy
Stuart Thomson
Sandra Webb

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Contents

Concussion - how should we manage it?

Head injuries are a significant problem in sports medicine. They make up about 10% of all injuries in most large series. Only a few are severe but these can be associated with lifelong sequelae. Accurate early assessment is therefore critical so those with more minor injury can safely return to sport at an early stage.

Our knowledge of head injury has expanded exponentially in the past 20 years. This is due to a variety of factors including new research, better access to more advanced imaging and the development of head injury scoring scales that enable injury severity to be more accurately assessed. Two decades ago there was a plethora of injury rating scales in use, each with their own advocates. One of the great achievements since then has been the development of international consensus guidelines drawn up by the world's leading experts.

We in New Zealand have been fortunate to have both Dr Paul McCrory and Dr Bob Cantu speak at our annual conference in days gone by. Experts such as these have debated the issues at length and produced a series of useable guidelines. Consensus conferences held in Vienna, Prague and Zurich over the years have successfully refined the guidelines. These in turn have won acceptance from international sporting federations and the International Olympic Committee.

The current iteration, Sport Concussion Assessment Tool 2 (SCAT2), was drafted following the Third International Conference on Concussion in Sport held in Zurich in November 2008. This is the one you should use.

The important issue is that not all head injuries are the same. In the past the three week stand down period following head injury was rather arbitrarily applied, regardless of the severity of it. Now it is recognised that there is a spectrum of injury. After the second conference in Prague the concept of simple and complex concussions was introduced. Most concussions are simple, i.e. resolve completely within two to three weeks. Athletes should complete the SCAT2 questions. These cover a series of 22 symptoms and each of these is graded from nil to severe. The greater the number of symptoms and the greater their severity, the more severe is the head injury. This symptom score is combined with examination findings including five word recall, digit span and balance assessment. To these are added the Glasgow Coma Scale score and a total SCAT2 out of 100 is arrived at.

In the professional environment athletes can also be assessed via computerised testing batteries, e.g. CogState or ImPACT. However, these are not widely available to the average club athlete nor are they necessary. The clinical assessment (SCAT2) plus a digit symbol substitution test (DSST) score over 90 seconds provides very good information on which the treating doctor can base clinical advice.

What should happen in practice?

1 All athletes with concussion should honestly report their injury to coaching and team medical or physiotherapy staff. I have no doubt there are a large number of concussions which go unreported each year. Athletes who fail to report their concussion are putting their own health at risk and potentially at more risk of causing injury to others.

2 Athletes should be assessed via the SCAT2 plus whatever other assessments are available to assess their speed of information processing. At this stage their injury severity can be assessed.

3 Education is vital. I usually give out a one page concussion sheet; this has been reproduced for your information and own use later in this issue of the journal. It can be modified according to your own practise.

4 Only a small minority of concussed athletes will require imaging e.g. x-ray, CT scan or MRI scans. These are for severe cases only. Always assess the athlete's neck, as neck injuries frequently accompany head injuries.

5. The athlete should have both cognitive and physical rest until their symptoms are in a late stage of resolution.

6. The athlete may then resume work and study commitments, plus embark on a progressive aerobic training regime.

7. Once they are symptom free at rest and with light exercise they should have a further check by the doctor. If this is satisfactory they can then be cleared to resume contact (collision) training.

8 Once they have got through one or more full sessions of collision training without a flare of symptoms they can safely return to competition. Obviously, any recurrent symptoms should be reported at the earliest opportunity.

There are some growing points. At our annual conference in Rotorua in 2009 there was an excellent presentation on the introduction of aerobic training at an earlier stage of recovery. This has been shown to be helpful in restoring the athlete's confidence without seemingly causing adverse events. However, this should not be taken as an excuse to resume collision training prior to adequate recovery and clearance by a doctor.

From a New Zealand perspective, we have been pretty active in the area. The ACC Injury Prevention Unit has produced a concussion scoreline advice sheet which was widely distributed. This has been publicised internationally and Simon Gianotti is to be commended for providing the impetus for ACC to get involved with this area.

Currently in the Waikato a major head injury study is being conducted under the auspices of AUT and the University of Waikato. Entitled Brain Injury Outcomes in New Zealand and the Community (BIONIC) it aims to study all head injuries in the region between March 2010 and February 2011. The data obtained will add to our knowledge of the impact of head injury in our community. The study area involves about 10% of the nation's population so data can be extrapolated to provide some national perspective.

How knowledgeable are you?

Later in this issue there is an article by Doug King et al regarding concussion knowledge of sideline staff. The questions have been reproduced in this issue and you should attempt to get an idea of your own current knowledge. Answers will be produced in the next issue. Now go to it!

Chris Milne
Editor

April

The April issue contained some excellent articles on shoulder problems.

The first of these is entitled Current Concepts: Scapular dyskinesis written by noted expert Ben Kibler and Aaron Sciascia. They note that scapular stability is important in order for proper shoulder function to occur. Altered scapular position and movement has been termed scapular dyskinesis. This is a non-specific response to a painful condition in the shoulder and can be assessed by visual inspection of the scapular position at rest and during dynamic humeral movements.

Repeated movements will highlight weakness of particular muscles, e.g. serratus anterior, with the accompanying scapular winging. They describe the scapular assistance test, where the examiner applies gentle pressure to assist scapular upward rotation and posterior tilt as the patient elevates the arm. This can relieve the painful arc of impingement and increase the arc of motion. The highest level of serratus anterior activation occurs during the cocking phase of the throwing motion. Serratus anterior is the most important muscle for stabilising the medial border and inferior angle of the scapula. Specific scapular stabilisation protocols start with short lever kinetic chain assisted exercises and then progress to long lever movements.

I would regard this article as a state of the art review of this subject.

Later in the same issue Geoffrey Abrams and Marc Safran discuss the diagnosis and management of SLAP lesions in overhead athletes. These often result from posteroinferior capsular tightness and scapular dyskinesis, which causes a peel back phenomenon at the biceps anchor and tearing of the superior labrum. Clinical evaluation consists of a history of pain plus gradual loss of function and sometimes intermittent clicking.

The authors emphasise that there are many clinical tests available and these vary considerably in their sensitivity and specificity. They identify the sick scapula syndrome, which is asymmetrical malpositioning of the scapula on the dominant side, with the dominant shoulder appearing lower with a prominent inferomedial border of the scapular. Combinations of the available tests are more helpful than a single test. With regard to imaging, the gold standard remains MR arthrography which they state is over 90% sensitive and specific.

Non-operative treatment involves stretching of the posteroinferior capsule and a strengthening programme for the rotator cuff and scapular stabilisers. Operative treatment currently favours arthroscopic surgical repair with

bioabsorbable anchors loaded with non-absorbable sutures. Return to sports after SLAP repair approaches 90% in many series.

Once again, this is a state of the art review of the topic.

Later in the same issue there is an evidence-based review of the rehabilitation of shoulder impingement syndrome and rotator cuff injuries. These authors describe findings of increased external rotation and decreased internal rotation in the dominant arm of overhead athletes. There are detailed descriptions of various stretches and exercises, and the article contains 115 references; all in all, a very comprehensive summary of this topic.

Moen and colleagues have put together a very useful article entitled Clinical tests in shoulder examination: how to perform them. These include the commonly used tests for impingement plus rotator cuff strength, e.g. the belly press test, plus tests for SLAP lesions and instability. The article is very well illustrated, with descriptions of the tests being described.

The article is best read in conjunction with another article in the same issue entitled Clinical and diagnostic tests for shoulder disorders: A critical review by McFarland and colleagues. These authors conducted a detailed literature review and provide useful guidance to the clinician as to which physical examination tests are helpful for making the diagnosis of various shoulder conditions.

There are other good articles in the same issue and if you are a clinician seeing patients with shoulder problems I would heartily recommend you read the entire issue.

May

The May issue contained an interesting article on clinical predictors of time to return to competition and of recurrence following hamstring strains. They followed elite Australian footballers and found that time to walk pain free and previous hamstring injury were the most important predictors of time to return to competition and recurrence.

Also in the same issue was an article by Quinlan and colleagues from Ireland, who studied patients with patellar dislocation and found that 50% of these patients had coexistent medial collateral ligament injuries. This was particularly common in male patients and should prompt clinicians to look for this coexistent pathology. If a high grade medial collateral ligament injury is found then this should be managed actively with a brace to prevent the MCL healing in a lengthened position. The authors also state that if a coexistent MCL injury is found then perhaps it is best to avoid aggressive rehabilitation of the patellar dislocation injury until the MCL is healed.

June

The June issue contained a good summary of the review of the management of cardiac arrest on the football field. Whilst this is a rare event, medical personnel should be well-trained to recognise cardiac arrest plus the distracters, including seizures, common myoclonic jerks and agonal respiration. Prompt initiation of CPR with early defibrillation offers the best chance of a successful outcome. A player who collapses without contact must be considered to have sustained a cardiac arrest until proven otherwise. They recommend training fellow team members to perform at least hands-only CPR.

Later in the same issue there is an evaluation of the Football for Health Programme for children in South Africa. This study involved children between the age of 11 and 15 years in a township of Cape Town. The authors found that a football based interactive education programme designed to improve the health knowledge of these children did so successfully. This is a positive development, as it is well-known that health knowledge underpins changes in health behaviour.

A neuromuscular prevention strategy was studied by Winne Meeuwisse's group in Calgary. They found a 38% reduction in injury rate in those teams where a specific neuromuscular training programme was introduced. This included dynamic stretching, eccentric strength, agitation, jumping and balance, including a home based balance training programme using a wobble board. This study involved players from 60 teams, i.e. over 700 athletes, so the findings can be regarded as relatively robust.

Injections for tennis elbow are controversial; Alfredson and colleagues conducted a two year follow up following injection therapy for patients using either Polidocanol or local anaesthetic. They evaluated these patients clinically and with ultrasound including colour Doppler. They found that the majority of patients with a good clinical results after treatment had no visible blood flow. However, of the 20 patients who had a good result, 13 still had structural changes in their tendons. It should be emphasised that injection should only be considered after the patient has been through a programme of progressive concentric then eccentric strengthening and, despite good compliance with this programme, has not achieved a favourable result.

A supplement to the June issue contained interesting articles on fasting and sports participation. Fasting is sometimes a result of cultural or religious influence, and Muslims fast during the hours of daylight during Ramadan. Whilst this can potentially cause problems in endurance sport, where possible events should be scheduled after sunset. The absence of drinks may be more significant than the absence of food intake during periods of fasting.

The IOC convened a meeting of experts in April 2009 to assess the evidence regarding fasting and performance. Ron Maughan and colleagues produced a four page summary following their literature review. They concluded that the

effects of short term fasting are far from clear, but that there may be some negative effects on prolonged exercise tasks and, in those situations where recovery between rounds of a competition may be compromised. These may be compounded by high environmental temperature and humidity. Generally the effects of fasting on exercise performance appear to be small but the authors note that small differences in performance are often critical in determining the results of sporting contests.

Later in the same issue Louise Burke summarises the important issues relating to fasting and recovery from exercise. She includes a very useful table with strategies for exercising and nutrition during Ramadan fasting. For those athletes who are Muslim, this article contains some very useful practical tips.

With the first Youth Olympic Games having just concluded, there was the timely release of an IOC Consensus Statement on age determination in high level young athletes. This was also published in the June supplement. The focus was on optimising the health and safety of the elite adolescent athlete. There have been cases of overage and underage athletes fraudulently competing in international events. This article describes clinical evaluation plus the use of x-ray and MRI of the wrist in determining age. The authors conclude that the available methods are not sufficient but that MRI studies of the wrist can help determine maturity between the ages of 14 and 17 years.

Margo Mountjoy and colleagues, including our own David Gerrard, studied sports injuries and illnesses during the 2009 FINA World Championships. Not surprisingly, the most commonly injured body part was the shoulder, followed by the head. Half of the injuries occurred during training, with the most common type being overuse injury. Amongst the illnesses, the respiratory tract was the most commonly affected organ system, as one might expect. Response rate varied amongst the five aquatics disciplines, from 22% in swimming up to 53% for water polo. Even with these limited response rates, there is still useful data to provide guidance for those involved in athlete care in future events of this type.

July

In the July issue there were a couple of useful articles regarding platelet rich plasma and its use in sports injuries. The first of these by Kimberley Harmon entitled Muscle Injuries and PRP: what does the science say? gave a general overview with regard to the phases of tissue healing. Harmon makes the following recommendations:

Firstly, PRP should not be administered in the first 24 hours after injury, and in that timeframe ice, compression and elevation are the mainstays of treatment. A product which contains a high proportion of plasma may have increased level of IGF-1 and potentially enhance healing and decrease fibrosis. A product which is leukocyte poor may mitigate the potentially adverse effects of neutrophils.

This article was complemented by a second entitled Platelet-rich Plasma: any substance to it? by Nicola Maffulli and colleagues. This paper discusses the clinical rationale for use of PRP injections. This lies in reversing the blood ratio by decreasing red cells to approximately 5% and increasing the platelet amount to 94% in an effort to stimulate recovery. The most influential stimulus for PRP therapy in the USA was a February 2009 article in the New York Times. Since then the intervention has been seized upon in the professional sports arena despite the lack of science. Maffulli and colleagues comment that Level 1 studies are lacking and encourage researchers to undertake appropriately powered Level 1 studies with adequate and relevant outcome measures and clinically appropriate follow up. In the interim, Harmon explains that it is incumbent upon physicians using this treatment to disclose its experimental status and to follow outcomes in a structured way.

The area was studied in detail at a symposium held in Qatar in 2008. Our own Bruce Hamilton was the lead author in a publication entitled Use of complex growth factor preparations in the management of muscle strain injury.

Later in the same issue was an article by de Jonge and colleagues, who studied whether the addition of a night splint to eccentric exercises is beneficial in treating midportion achilles tendinopathy. In short, the answer is no. They studied 58 patients with 70 injured tendons and in both groups the VISA score increased by about 25 points.

Finally in this issue, the A to Z of nutritional supplements series continues. Part 10 evaluated the effects of co-enzyme Q10, colostrum, copper, conjugated linoleic acid and citrulline. The authors concluded that colostrum supplementation may potentially provide ergogenic benefits. They found a small amount of evidence suggesting potential usefulness of conjugated linoleic acid to optimise body composition. Copper supplementation should only be considered where copper deficiency was documented. They recommend evaluation of copper status in athletes with chronically restricted energy intakes who report persistent fatigue, frequent infections and stress fractures.

This excellent series of articles by well respected nutritionists is recommended reading for anybody with an interest in sports nutrition. It provides a good scientific counter to the often spurious advertising claims that one reads everyday in the lay press.

Chris Milne
Sports Physician

Travelling light - sports physiotherapists administering medications in the absence of a doctor

Lynley Anderson PhD

Correspondence to
Lynley Anderson
Senior Lecturer
Bioethics Centre
University of Otago
Tel 03 474 7977
Fax 03 474 7601
Email lynley.anderson@otago.ac.nz

ABSTRACT

Physiotherapists in New Zealand have been known to carry a range of medications (provided by a willing doctor) for distribution to team members. Many would find this practice contentious because it means a physiotherapist is expected to exercise his or her professional judgement about diagnosis, and the appropriate drug therapy. Physiotherapists have not traditionally been trained in pharmacology or pharmacokinetics and so it appears that this practice has a high potential for risk, not only with regards to patient safety, but also professionally for the doctor and physiotherapist. So, are these physiotherapists and doctors acting appropriately or should this practice be banned? Actually non-prescribing health professional can administer medications that have been prescribed by a doctor and this activity is permitted by regulation set out in detail in the Medicines (Standing Orders) Regulations (2002). The regulations stipulate how standing orders must be issued and followed. This paper discusses the issue of physiotherapists working under standing orders and suggests some further parameters that could be established around this practice to safeguard patient welfare.

INTRODUCTION

The practice of sports teams opting to take only a physiotherapist on tour with them and then expecting that physiotherapist to carry a range of medications is not uncommon in New Zealand. It is usually teams that have the least funds that decide to take just one health care provider on tour, and the health provider commonly considered to offer the broadest range of health care skills applicable to meet the everyday team needs is the physiotherapist. While not taking a doctor away may well save the team money it will mean that skills held by the doctor will not be immediately available. One of those skills held by a doctor (and not a physiotherapist) surrounds the management of medications. For teams who decide to only take a physiotherapist, one solution has been for a doctor to provide the physiotherapist with a range of medications to provide to team members as required.

Drugs that the physiotherapist might be expected to carry and administer include any number or combination of the following: non-steroidal anti-inflammatory drugs (NSAID), anti-emetics, anti-diarrhoeal, anti-histamines, sleeping tablets, respiratory medications, pain relief, antibiotics, and Tamiflu. But this activity raises a number of questions; is this practice acceptable? Are there any potential risks for the athlete? Is this a safe activity for the physiotherapist or the doctor to be engaged in?

The issue of physiotherapists taking medications to administer to team members in the absence of a doctor is somewhat contentious. Even though this practice has been going on for some years with no reported ill-effects, there are those that oppose this activity citing patient safety as the greatest concern, and arguing that physiotherapists just do not have the requisite skills to take on this role. They might also argue that other doctors should not facilitate this activity. The purpose of this paper is to discuss this activity, identify the risks, and suggest some possible parameters so that patient safety is maintained and that doctors and physiotherapists know their obligations. This paper however will not consider the issue of physiotherapists gaining prescribing rights but is solely about

physiotherapists working under the direction of a doctor-prescriber.

MEDICATIONS AND RISK

The business of prescribing medications is a risk-filled activity even for those who are qualified to perform this role. Medications that are available on prescription (and even some over the counter medications) have potential to cause a great deal of harm. That is why prescribing is limited to just a small number of people qualified to do so (generally, but not exclusively, limited to doctors and dentists). There are huge potential risks to the individual athlete in receiving drugs that are administered by someone who is not adequately qualified to do so. The drugs may be provided for the wrong condition, or contraindicated because of other medication or concomitant disease (that may or may not be diagnosed), or the athlete may have a known or unknown allergy to a medication. Then there is always the issue of unnecessary use of medications such as antibiotics. So, at first glance, because of the potential for harm that exists, we might conclude that anyone other than those trained to prescribe should not engage in administering medications. As physiotherapists are not trained or qualified to prescribe medicines this would mean that they should not be prescribing or administering medicines. While that might seem the end of the matter, it is not. There is a facility for non-prescribing health professionals who are providing care for patients to work under 'standing orders' from a practitioner who does have a prescribing role. This activity is permitted by regulation set out in detail in the Medicines (Standing Orders) Regulations, of 2002.[6]

STANDING ORDERS

The practice of someone else administering drugs or changing the dose under instruction from a doctor is described as working under 'standing orders'[1]. A standing order is outlined in the Ministry of Health document entitled 'Guidelines for the Development and Operation of Standing Orders (GDOSO)' as:

> a **written instruction** issued by a medical practitioner or dentist, in accordance with the regulations, authorising any specified class of persons engaged in the delivery of prescription medicines or controlled drugs to any specified class of persons, in circumstances specified in the instruction, without a prescription. A standing order does not enable a person who is not a medical practioner or dentist to prescribe medicines – only to supply and/or administer prescription medicines and some controlled drugs.[5]

People entitled to issue standing orders as described in the GDOSO document are limited to registered medical practitioners or dentists. The GDOSO document sets out who is able to work under standing orders as those

> …permitted to supply or administer medicines pursuant to a standing order must be engaged in the delivery of a health service. They may include, for example: Registered nurses, pharmacists, paramedics, New Zealand Defence Force Medical personnel, optometrists, and physiotherapists.[5]

This list of health care providers is clearly not exhaustive, but just a list of professions perhaps most likely to be involved in the use of standing orders. Paramedics and nurses are probably the two most obvious groups commonly engaged in this activity. We can imagine a paramedic attending a major trauma scene and administering morphine to an injured person to enable transfer by ambulance to hospital; the provision of medications is carried out under standing orders provided by a regional emergency doctor. For a standing order to be practicable for paramedics working in these kinds of circumstances it must allow for the provision of particularly powerful medications to, as yet, unnamed people. Nurses who work in the community or in regions where there is a shortage of General Practitioners may also work under standing orders.[9,8] The nurses described in Scott-Jones and Lawrenson's article were not extended scope nurse practitioners, but registered nurses. These nurses administered contraceptives, the morning-after pill, antibiotics, and anti-inflammatories.[9p14] The authors describe standing orders as being 'safe and efficacious in primary care settings'.[8p107]

Physiotherapists are specifically listed in the GDOSO document above as one example of the kind of health professional that could conceivably work under standing orders. Physiotherapists may be involved with standing orders in a range of settings, not just sports health care. These settings might include respiratory health care where physiotherapists might provide respiratory medicines via nebulisers to patients, or possibly providing pain relief in some rehabilitation settings prior to mobilisation. Physiotherapists have also been involved in research that has utilised standing orders.

The GDOSO document provides useful 'guidance for the development and operation of standing orders, to assist providers to comply with the regulations when developing a standing order, and to assist persons working under standing orders'.[5p2] There are some important points that must be adhered to. For example, the standing order must be in writing and provided to a range of people including: 'every person permitted to supply or administer a medicine under the standing order', and 'any person affected by the standing order'. The regulations also require that the standing order is provided on request to both the Director-General, and any member of the public.[5p3]

The regulations require that the standing order list:

- the medicines that may be supplied or administered under the standing order,
- the indications for which the medicines is to be administered and the recommended dose or dose range for those indications,
- the contraindications for the medicines, the validated reference charts for calculation of dose (if required),
- the method of administration, and
- the documentation required'.[5p3]

The GDOSO document also states that registration authorities (such as the

Physiotherapy Board in this case) may set competencies required for a health practitioner working under standing orders. The document also goes on to state that: If the people who will supply and administer medicines under the standing order do not have a registration authority, or the registration authority has not set any level of competency, then the standing order must specify the level of competency required in order to act under the standing order.' (5 p4) This would mean that, in the absence of competencies issued by the registration authority, it is up to the issuer of the standing order to set the competencies. 'Those competencies must be reviewed by the issuer at least once a year, commencing from the date on which the standing order was signed by the issuer.'[5p4]

CONCERNS ABOUT PHYSIOTHERAPISTS ADMINISTERING MEDICATIONS

Athletes who are given prescription medications to take while they are away on tour will generally self-manage their medications. In these situations the physiotherapist would not usually be involved. However with a standing order, the issue that many would consider contentious is when a physiotherapist (travelling with a team and with access to a range of medications) encounters a health problem or injury that means he or she is expected to exercise his or her professional judgement about the appropriate response, including instigating treatment and drug therapy. Those who oppose this activity would argue that physiotherapists are just not appropriately qualified to provide this kind of care and would doubt the quality of their judgement. Others would suggest that physiotherapists carry out diagnosis and instigate physical therapy anyway, and with the appropriate support of a doctor, then drug therapy can be safely provided, albeit in a very narrow range of circumstances.

Physiotherapy Knowledge about Medication

The first question is whether physiotherapists receive any training in medications and their use? Physiotherapists in New Zealand have not traditionally been trained in pharmacology or pharmacokinetics.[1,2] But this situation is changing. Pharmacology is now taught at an undergraduate level for students going through physiotherapy school at the University of Otago, with the first graduates emerging in 2010. This course covers basic pharmacology and pharmacokinetics in clinical areas which relate to physiotherapy. Physiotherapists can also access a post graduate paper on Pharmacology through the Auckland University of Technology. Some physiotherapists who carry medications for team members may have taken it upon themselves to learn about the kinds of medications they commonly come across in their work, or have had some informal training provided by a doctor.

Competencies

Does the regulatory body for physiotherapists stipulate any competencies for physiotherapists working under standing orders? Currently the Physiotherapy Board of New Zealand has not imposed any competencies relating to standing orders, but has instead opted for self-regulation by individual physiotherapists considered to be working in any 'defined field of interest'.[7] A physiotherapist who is working in a defined field of interest 'must have relevant training and education to include a defined interest in their practice' and must ask themselves a range of self evaluation questions in an attempt to get a perspective on how safe and competent they are to practise in their specific area.[7] The absence of competencies for working under standing orders does not mean that it is prohibited but that, if called upon for the purpose of investigating a complaint, it would be the responsibility of an individual physiotherapist to prove to the Board that they have the necessary skills to carry out this work. This approach by the Physiotherapy Board means that the responsibility for assessing a physiotherapists education and training needs, and their competencies fall to the individual physiotherapist working in that area. This can be a useful measure given that physiotherapists may work in a wide range of areas which may be difficult to regulate effectively, however there maybe an opportunity here to create competencies around a specific and definable area where risks exist and where there maybe some identifiable ways of reducing them. Establishing competencies for this specific task (or a separate position statement) would provide a benchmark for physiotherapists who plan to work under standing orders, and some reassurance for doctors who are delegating this work to the physiotherapist.

A 'Good' Track Record

The practice of physiotherapists travelling with teams and taking a collection of drugs provided by a willing doctor has gone on for a number of decades in New Zealand and apparently with no reported complaints or ill effects for athletes. One likely reason for this apparent 'good' safety record is because the team is a small identifiable group. Their allergies to medication may be known to the doctor and the physiotherapist and the medications specified are likely to be limited to only a small number. This is in direct contrast to a paramedic who uses a range of very potent drugs on a previously unknown and unspecified group of people – usually in a time pressured situation (but admittedly with a great deal more training). The physiotherapist working under standing orders is usually in a situation where there is time to consult with the prescribing doctor without immediate time pressures.

A further reason for the apparent safe track record for this activity is because the medications a physiotherapist is likely to have at hand are generally those that are considered to be relatively 'safe' and are generally well tolerated. That does not mean that these drugs are without risks and sometimes severe side effects (particularly NSAIDs in certain circumstances), but this group of drugs (if taken appropriately) are less of a concern than many other prescription medications (some drugs may also be available off-the-shelf in supermarkets).

It may also be that because administering medication is not standard practice within the repertoire of the physiotherapist, then physiotherapists are particularly cautious about taking on this role. Or more importantly, it could be that the prescribing doctor is very selective about which physiotherapists are provided with medications and which are not. A physiotherapist who is overly confident about taking on this role will not recognise

what they do not know, and it is that person who may pose the greatest risk to patients. It may be that the combination of personal selection of which physiotherapist is appropriate for the task, coupled with good communication between the two professionals is what has kept patients, physiotherapists and doctors safe from any potential harms.

Despite the apparent good track record, those opposed to this activity might suggest that is just down to sheer good luck and that it is just a matter of time before severe harm does eventuate from this activity. They might claim that this activity must be stopped before an athlete is seriously hurt, which in their view, will undoubtedly happen.

SOME SUGGESTED PARAMETERS AROUND STANDING ORDERS IN THE SPORTS MEDICINE SETTING

If physiotherapists and doctors are happy to work under this structure, there are ways of ensuring that it is done safely. Both the physiotherapist and the prescribing doctor need to be aware of their obligations, and to ensure they are acting lawfully. For this they should view the regulations, and the document 'Guidelines for the Development and Operation of Standing Orders' published by the Ministry of Health (both available online, and written in plain English).[5]

Standing orders should perhaps not be the first choice. If the team can afford it, then taking a doctor and physiotherapist is the very best option. If team management chooses to only take a physiotherapist, and the team is travelling to a place where medical care is readily available (e.g. travelling to a major city for a two week tournament) then a relationship with a local sports physician/doctor set up prior to departure would be another option. However, concern has been expressed that using another doctor can be very expensive, and confidentiality of information about the health of the team may be potentially compromised. If the team is travelling to places where appropriate medical care is not readily available or there will be major language difficulties, or there is some other reason why accessing local care is not appropriate, then standing orders are a possible alternative.

When using a standing order, the most important requirement for patient safety is a good relationship between the doctor and the physiotherapist. This relationship depends on a large degree of trust and respect between the doctor and physiotherapist. The doctor needs to trust that the physiotherapist will be diligent in their care and communicate effectively. The physiotherapist must trust that the doctor will be available at all times for consultation about the health of an athlete and not leave the physiotherapist without relevant support. The physiotherapist needs to act with great caution and know the limits of their knowledge and skill, seeking appropriate support and care when necessary or if in doubt.

If they feel uncomfortable doing so, a physiotherapist should not feel pressured by a team or a doctor to work under standing orders. Some physiotherapists will not feel happy or confident to take on this role or do not feel they have a good and effective relationship with the team doctor. Similarly a team doctor should not feel obligated to create a standing order if they do not feel comfortable doing so. This may include where they do not have an effective relationship with the physiotherapist or do not have confidence in the physiotherapist's level of competence or communication.

In order to attempt to clarify some of the comments above, guidelines for using standing orders in the sports team setting have been drafted by the author in consultation with a number of medical and physiotherapy clinicians. These proposed guidelines do not replace the regulations but should be read in conjunction with both the Guidelines for the Development and Operation of Standing Orders, and the Medicines (Standing Orders) Regulations, 2002.[5,6]

Draft Guidelines for Sports Doctors/ Physicians Writing Standing Orders for a Physiotherapist

- Know your obligations in establishing standing orders, (see the document: 'Guidelines for the Development and Operation of Standing Orders').
- Know that the responsibility for the standing order (if carried out in accordance with the written instructions) rests with the prescribing doctor.
- Ensure a good working relationship with the physiotherapist as a prerequisite for issuing a standing order.
- Ensure that the physiotherapist has achieved appropriate competencies in the area of the standing order. If there are no listed competencies, then the prescribing doctor can stipulate what competencies need to be attained.
- Where possible, provide relevant health information about team members to the physiotherapist (allergies to medications etc.).
- Be available for consultation at all times, providing the physiotherapist with a range of different mechanisms for contact.
- Recognise that the physiotherapist may need to contact a doctor when new conditions develop, assistance is required, or for a second opinion.
- Ensure that the written instruction provided to the physiotherapist meets the regulations and is clear and unambiguous.
- Review patient notes with the physiotherapist on the team's return.
- Provide written information to each athlete's General Practitioner where relevant.

Draft Guidelines for Physiotherapists Working Under Standing Orders

- Know your obligations when working under standing orders, (see the document: 'Guidelines for the Development and Operation of Standing Orders').
- Maintain a good working relationship with the prescribing doctor established on mutual trust and respect.
- Maintain appropriate competencies for working under standing orders.
- Know your limitations and be prepared to seek assistance when necessary and as required.
- Patient safety is paramount, if in doubt – seek assistance.
- Know that any deviation from the standing order is not permitted and the responsibility will be on

physiotherapist for any such deviation.
- Ensure that the prescribing doctor will be available for consultation and review (e.g. by telephone or email) at all times.
- Keep appropriate contemporaneous documentation of care and advice given.
- Refer to a doctor in the host country when complications arise, or a new condition develops and document that action.
- Inform the prescribing doctor of any referrals to other doctors or services in the host country
- Debrief with the prescribing doctor on return and provide the doctor with a complete record of action taken.

FINAL REMARKS

It appears that the practice of physiotherapists being provided with medications to use when travelling with teams has been going on under the radar for decades, with no known or apparent ill-effects. It seems pointless to suggest a ban on what may, at times, be a useful activity. However caution is required and standing orders should not be an activity of first choice if better options are available. If a standing order is to be used, then both the doctor and the physiotherapist need to make sure they are aware of their obligations and that they are acting lawfully and at all times act in the interests of patient safety.

One way of ensuring patient safety is to insist on physiotherapists receiving appropriate training for the role. In order to standardise the knowledge required the Physiotherapy Board could establish competencies or a position statement for physiotherapists who choose to work under standing orders. If a standard was established then a prescribing doctor could delegate this task with more confidence and any harm that might arise from untrained practitioners taking on a role outside their level of training could be minimised.

One of the most important elements required to ensure a safe environment for patient care is a relationship of trust and respect between the doctor and the physiotherapist. Both need to be aware of their respective roles and the limits of those roles, be effective communicators, and be able to work co-operatively for the benefit of the patient. The bottom line must be patient safety.

ACKNOWLEDGEMENTS

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NOTES

[1] Reference is also made to standing orders in the New Zealand Medical Council's two documents: 'Good Medical Practice'[3] and 'Good Prescribing Practice'.[4]

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The use of mouthguards in the reduction of orofacial injuries

Brian Whitley

Oral and Maxillofacial Surgeon
Waikato Hospital, Hamilton

Orofacial injuries are a significant problem in sport; 31% of sporting injuries result in damage to the teeth, face or head, 95% of injuries involving the teeth result in disfigurement to the most visible upper front teeth, the incisors. If you lose a tooth it will cost $20,000 in treatment expenses over life, in addition to the pain and disfigurement.

In the USA more than 5 million teeth are knocked out annually as a result of sporting injury and in Australia, with a population of 18 million where there are an estimated 1 million sporting injuries per year, the national cost of orofacial injuries is estimated at $1.4 billion.

What about New Zealand? Data from the New Zealand Rugby Football Union shows that non-users of mouthguards are 4.6 times more likely to require ACC support for dental injuries than mouthguard wearers. Since mouthguard wearing was made compulsory at all levels of rugby in 1998 there has been a 43% decrease in rugby related claims. A 2003 survey indicated that players used mouthguards in 93% of games compared with 67% in an earlier study in 1997. Whilst this is encouraging, it is not yet ideal and all players and officials need to take this problem seriously.

What are the important properties of a mouthguard? Firstly, it must be able to absorb great forces over the teeth and other skeletal orofacial structures. Secondly, it should provide high levels of protection, comfort, durability and value. To do this requires an impeccable fit.

There are two main types of mouthguards. The first of these are the cheap, over the counter type. These can either be preformed or stock mouthguards. The other over the counter option is a mouth-formed "boil and bite" type mouthguard. However, these suffer from serious deficiencies in that the fit is less than ideal and they interfere with speech and breathing. In particular, the use of a stock mouthguard is not advocated as there are only limited stock sizes available. The "boil and bite" mouthguards are slightly better but not much. Their deficiencies include insufficient impact dispersion plus they do not encompass all of the posterior teeth. Their durability is limited.

By far the better option is a custom-made mouthguard. This is fabricated in conjunction with your dentist. There are three types:

a Injection moulded, which provide a satisfactory fit but cannot be reinforced and cannot have names or telephone numbers included on them.
b A single layer thermo-formed mouthguard may provide satisfactory fit and durability but it cannot be reinforced, and the area over the incisors, which are the teeth at greatest risk, is always thinner.
c The most effective mouthguard is a custom laminated type. These provide excellent fit and durability and offer the best combination of power absorption and dispersion. They offer superior protection for players in all sporting codes.

What should the ideal mouthguard do? It should protect the teeth, soft tissue, bone and temporomandibular joints. It should provide high shock absorption and distribution through the entire mouthguard and offer a close fit to the upper jaw with a high degree of comfort. The lower jaw should fit comfortably in its impression on the mouthguard. A properly fitted and worn mouthguard will reduce the incidence of orofacial injury significantly. The mouthguard should allow freedom to speak easily whilst not limiting breathing and be durable, resilient, tear resistant, odourless and tasteless.

Research has shown that with custom laminating using the same amount of material one can achieve 22.5% more impact absorption and 43.6% more total cushioning.

What about children? Younger players offer a significant challenge because their teeth change rapidly, and with limited household finances there is a significant financial hurdle to overcome. In addition, some children purposely lose or hide their mouthguards. Children frequently require orthodontic treatment and this provides an additional complicating feature in this age group.

What can be done to overcome these issues? Firstly, it has been shown that children are more willing to wear mouthguards if they are produced in fun colours or the colours of their team with their name and telephone number sealed in it - there is a good chance that a lost mouthguard will then be returned. Secondly, if children wear properly fitted mouthguards when they are young, they will probably continue do so for the rest of their lives. In other words, instilling good habits early brings later rewards.

In summary, a laminated custom-fitted mouthguard offers the best protection to the teeth, jaws, oral soft tissues and brain. Dentists or dental technicians are able to provide properly constructed mouthguards for children and adults alike. Labelled mouthguards in team colours are a fun idea and readily available. One option to improve accessibility would be to consider team sponsorship for mouthguards.

CASE STUDY

Nipple pain caused by seam sores

Yee Leng Teoh MBBS and **Tsun Tsien Liu** MBBS
Changi General Hospital
Singapore

Correspondence to
Yee Leng Teoh
Changi General Hospital
2 Simei Street 3
SINGAPORE 4632202
Tel +65 9870 1428
Email yeeleng.teoh@mohh.com.sg

INTRODUCTION

Sports injuries are not uncommon among female athletes. The diagnosis of nipple pain from repetitive trauma from the seam linings of the bra are often missed by clinicians leading to poor symptom relief.

CASE REPORT

A 56-year-old lady presented to the breast clinic with a 3-month history of intermittent itchiness and pain affecting the left nipple. She had no nipple discharge or rash. On examination, no lumps or any clinical features of breast malignancy were elicited. She had no significant medical history except for fibrocystic changes of the left breast diagnosed on histology following a wide local excision of a breast lump done in March 2001. She was therefore followed-up with annual mammograms for 5 years following the lumpectomy and was on routine breast screening when she presented.

In view of her history of a benign breast disease, the Breast Team organised a bilateral mammogram and ultrasound scan of her breasts. Mammogram showed no suspicious opacities, clustered microcalcifications or stromal distortion. There was normal breast echotexture and no suspicious lymph nodes on ultrasound. Most importantly, the skin and nipple were normal in both modalities.

Patient was referred to our Dermatology department for assessment of nipple pain. On clinical examination, her breasts were slightly asymmetrical with the left breast lower than the right breast. She had prominent bra strap marks on her left clavicular region due to an ill-fitting bra. There was a faint indentation from the bra strap over the right breast. There was a deep horizontal tender fissure across the left nipple with slight bleeding and a superficial tender vertical fissure on the lateral aspect of her left areola (Figure 1). The position of the fissures corresponded with the position of her bra lining seams which had a rough edge.

A diagnosis of tender left nipple fissures secondary to repeated trauma from bra seam friction was made. The patient was reassured and advised to change to a well-fitting seamless bra. As she was an avid jogger and high jumper, she was advised to wear a sports bra to avoid subsequent trauma. She was prescribed hydrocortisone 1% and tetracycline HCl 3% ointment.[1] At her two-week follow-up appointment, her left nipple had completely healed and there was no nipple tenderness.

DISCUSSION

Her breast asymmetry, repeated trauma from unsuitable bra and her regular sports caused the painful fissures.

To prevent breast abrasion, women who are actively involved in sports are advised to wear seamless bra or apply petroleum jelly or adhesive bandages.[2] Trial of tacrolimus ointment for refractory cases has also been shown to be effective.[3]

Experimental studies show that the there is significant vertical motion during running and sports. Although fitting seamless bras reduce the risk of nipple fissures, the use of sports bra which is stiffer than everyday bra can further minimise nipple friction by damping of motion of the breasts during sports.[4,5]

This case illustrates the rarely reported case of unilateral nipple pain due to chronic abrasion from the seams of her bra. The importance of picking up subtle signs including pressure marks on the skin can provide clues to the diagnosis. It is important not only to examine the breast but also the bra or the underlying clothing in the clinical assessment of a patient presenting with thelagia to avoid unnecessary investigations and anxiety to patients.

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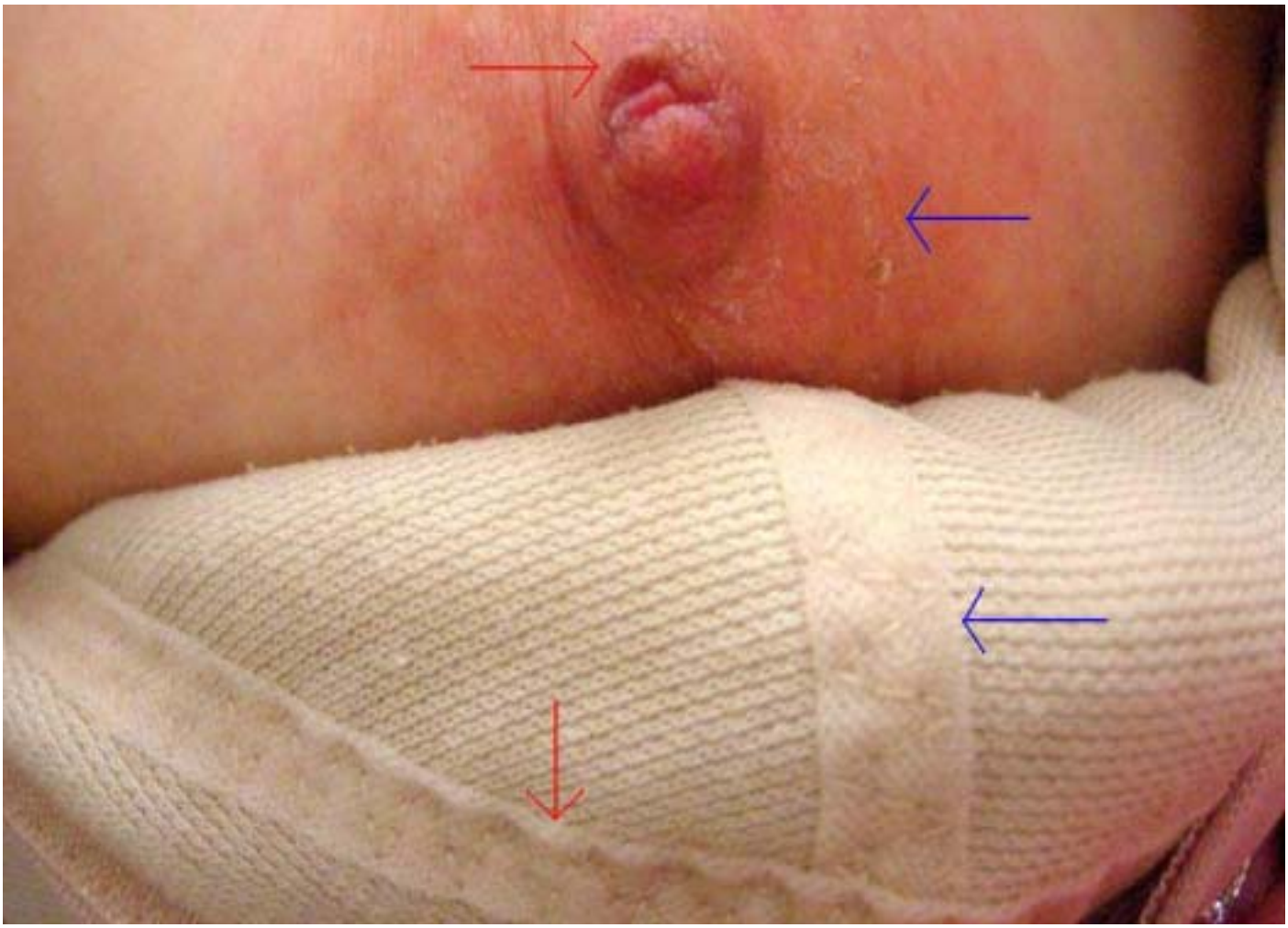

FIGURE 1: The horizontal nipple fissure (upper red arrow) caused by the horizontal bra seams (lower red arrow). The vertical fissure (upper blue arrow) caused by the vertical bra seams (lower blue arrow).

CASE STUDY

Trochanteric pain in a 43 year old female

Karrin J Aitken-Meehan Dip Phys MNZSP, MNZSOPA[1]
Hamish R Osborne MBChB, MMedSci, FACSP [2]

1 Division of Health Sciences, University of Otago
2 Department of Medicine, Dunedin School of Medicine, University of Otago

Correspondence to:
Dr Hamish Osborne
Department of Medicine
PO Box 913
Dunedin
Tel +64 3 474 7007 ext 8556
Fax +64 3 474 7461
hamish.osborne@otago.ac.nz

INTRODUCTION

"Greater trochanteric pain syndrome (GTPS) is a term used to describe chronic pain overlying the lateral aspect of the hip."[8] The syndrome includes but is not limited to tendinopathy, muscle tears, trigger points, Iliotibial band disorders, and general or localised pathology in surrounding tissues.[8] Previously, this condition was commonly referred to as trochanteric bursitis, until it was discovered that swelling of the trochanteric bursa was remarkably uncommon.[7] In those patients with actual trochanteric bursitis, many often developed secondary pathology in adjacent tissues.[2] It is more prevalent in females[8] between the 4th and 6th decade of life, with a lifetime prevalence exceeding 20%.[2] GTPS also appears to be associated with other conditions such as low back pain, osteoarthritis, and obesity amongst others[8]. "Specific etiologies of GTPS include repetitive activity, acute trauma, crystal deposition and infection, especially tuberculosis."[8] Corticosteroid injections can provide significant short-term relief; however, exercise therapy has a greater likelihood of longer term recovery.[7]

A slim, otherwise well 43 year old health worker, who regularly undertook exercise in the form of cycling 20-40 km, swimming 45-60 minutes, and running 5-10 km hill/flat runs, each on two days per week, presented with a six week history of insidious onset, intermittent, lateral hip pain in the region of the greater trochanter, without radiation. Using the Numeric Pain Rating Scale her worst pain in the previous 24 hrs had reached 9/10 when attempting to run, but could rest at 0/10. Her sleep was disturbed in side lying. She reported no paraesthesia, weakness, or current low back pain, but did have a history of previous low back pain episodes. Her provocative movements were stair climbing, getting out of the car, up from a low sofa, off her bike, and running about 10 steps. Over-the-counter diclofenac 25 mg tds did ease the pain intensity.

On examination, she had a Trendelenberg positive gait but no antalgic component. The right leg was longer than the left, but it is noted that leg length discrepancy has been confirmed to be not associated with GTPS.[7] Single-leg stance was painful. No abnormality could be found on examination of the lumbar, thoraco-lumbar, and sacro-iliac joints. Passive hip range of movement was symptom-free including combined flexion, adduction, and internal rotation which is commonly positive in hip pathology.[1] The provocative hip movement tests were resisted external rotation in 45 and 90 degrees of flexion in side lying and FABER test. In addition, she presented with a pain free 10° quadriceps lag on descent of an active straight leg raise. She did not have power loss of knee extension in sitting, which ruled out neurological weakness of L3. On palpation in side lying there was point tenderness of the posterior aspect of the greater trochanter.

Base on history and examination GTPS was diagnosed with the differential diagnosis in this age group being referred pain from the lumbar spine, particularly from L2, L3[5]; sacroiliac joint;[1] thoracolumbar junction via the lateral branch of the posterior primary rami of T12;[4] osteoarthritis hip;[8] femoral neck stress fracture[5]; rarely avascular necrosis of femoral head[5], and infection.[5]

Her general practitioner referred her for an ultrasound of the greater trochanter with the request of corticosteroid injection into the bursa if trochanteric bursitis could be confirmed during the scan. Fluid was found in the bursa deep to the gluteus medius musculotendinous junction so the guided corticosteroid injection was performed. She slept that night with 0/10 pain felt in left side lying. She returned to biking and swimming within 24 hours, after the timeframe for potential 'post-injection flare' had passed.[1]

Follow-up to physiotherapy was three days post-injection. Three to seven days reduced activity has been a recommendation post-injection but this is being questioned.[1] A home programme was given based on the Rompe et al[7] study. The modified programme was as follows: Active straight leg raise 10 times 3; Pelvic Drop, off the edge of a step[3] 10 times 3; Hip Stability Exercise emphasising hip abduction with external rotation[1], Single Leg Bridge[6] 10 times 3. Exercise frequency was 2 x day for a duration of 12 weeks[7], as per Rompe et al[7] study. Gradual return to running was suggested to recommence at six weeks.[7]

DISCUSSION

Trochanteric bursitis was strongly implicated with the clinical tests then confirmed on ultrasound as being part of the patients GTPS. An ultrasound guided corticosteroid injection was conducted at the same radiology visit. However, one study demonstrated that fluoroscopically guided trochanteric bursitis injections were not associated with superior outcomes to non guided cortisone injections[2] but they did state that further research is required to determine who would benefit from each approach. Research by Rompe et al[7] showed that cortisone without guidance was 75% effective at one month from baseline, but the beneficial effect diminished over time with only 51% of patients improved at 4 months, and 48% at 15 months. However, home exercises improved 7% of patients at one month, 41% at 4 months and 80% at 15 months.[7] Because it takes time to strengthen, the home exercises initially had little effect, but as time went by, success rates increased. So, as expected, the cortisone treatment in this case study was effective initially. However, the outcome for her GTPS will be far superior if the short-term treatment is combined with a 12 week exercise programme[7] as based on the Rompe et al study. Corticosteroid injections are a 'bridge' treatment providing immediate symptomatic relief,[1] thus enabling comfortable therapeutic programmes to begin.

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Player perspectives on return to play after a match or training injury in amateur rugby league

Doug King,[1, 2] Patria Hume,[2] Trevor Clark,[3]

1 Emergency Department, Hutt Valley District Health Board, Lower Hutt
2 Sports Performance Research Institute New Zealand, School of Sport and Recreation, Faculty of Health and Environmental Science, AUT University, Auckland
3 Institute of Food, Nutrition and Human Health, College of Science, Massey University Wellington

Correspondence to:
Doug King
Emergency Department, Hutt Valley District Health Board
Private Bag 31-907
Lower Hutt
New Zealand
Tel: +64 4 569 7835
Email: douglas.king@huttvalleydhb.org.nz

ABSTRACT

Objective: To explore and document perspectives on the return to play of players that have missed a training and/or rugby league match as a direct result of an injury occurring from participation in rugby league activities.

Method: A prospective experimental study to identify, document and report player perspectives on reasons they returned to participation in rugby league following a missed match or missed training injury from rugby league activities.

Results: A total of 63 people were enrolled in the study having recorded a missed training and/or match injury from 178 training sessions and 85 matches. There were 20 training injuries (4 per 1,000 training hours) and 73 match injuries (80 per 1,000 match hours) that were recorded as resulting in missed training and/or match activities. The majority of injured players returning to play were in paid employment (73%) with 26% either unemployed or enrolled as a student and 1% self employed. Only 79.6% of injured players saw a health professional as part of their rehabilitation process. The team coach was reported to have asked the player to return to rugby league activities in 28% of training return and 29% of match participation. More than three quarters of injured players felt that the recommended time off from training (75%) and match (80%) activities by health professionals were too long.

Conclusions: The most powerful factor according to a third of all players was that being told they could return had the most significant influence on their decision. Of concern is that nearly a third also reported that the injury sustained was not as bad as first diagnosed. Therefore, it is crucial that players receive the best and perhaps more importantly the most qualified advice at this early stage of assessment to ensure correct treatment and ongoing management of their injuries.

INTRODUCTION

Played internationally,[1] rugby league is participated at junior,[2] amateur,[3] semi-professional[4] and professional[5] levels of participation. As rugby league is an intermittent collision sport there is a risk of musculoskeletal injury occurring from both the match and training environments due to the number of physical collisions and tackles that occur.[6] Injury may result in hospitalisation, inability to participate in training and match activities and the inability to participate in work related activities. As a result of an injury occurring there may be loss of income to the injured player, financial costs for medical related care and job limitations owing to the severity and type of the injuries that have occurred.[6] Players incurring any injury may find that they undergo physical and psychological challenges.[7, 8] These challenges can range from feelings of alienation and isolation from team mates, emotions arising because of physical incapacitations, anxieties related to fear of re-injury and concerns about performance while returning to pre-injury levels.[7, 8] Other challenges that the injured player may

undergo are changes to self identity, self worth and contending with physical limitations while undergoing the demands of rehabilitation.[7, 8] As a result of these challenges, injuries that occur from participation in sporting activities not only limit players' physical performances but may also place a stress on their psychological health and well being.

Alongside of these challenges, the return to participation places yet another set of demands on the injured player. Demands such as selection back into the team, the capability to perform with their team mates and to retain a sense of affiliation with the coach, team and club may be motivating factors for deciding to either return to play or may be a source of self-doubt, worry and apprehension.[7, 8] Such demands may also influence the injured player to return before they are medically fit enough to fully participate risking further injury to the already injured area or an exacerbation of the injury necessitating longer rehabilitation or premature retirement from the sport.

No published study reporting on rugby league injuries to date has undertaken to report on the player perspectives of returning to play or training in rugby league activities following a missed match or training injury. Therefore the aim of this study was to explore and document: (1) Injuries that result in missed training and match participation as a consequence of participation in rugby league activities; and (2) Decisions for the return to participation of players that had missed a training and/or match rugby league activity as a direct result of an injury occurring from participation in rugby league activities.

METHODS

Data Extraction

The present study was a prospective experimental study design to identify, document and report player perspectives on reasons they returned to participation in rugby league as a result of incurring an injury from rugby league activities that resulted in missing a match training session. A single recorder assessed all injuries using the injury definition[9] employed used in other rugby league injury studies.

Participants

The incidence, site, nature, and cause of playing injuries was prospectively studied in 128 amateur rugby league registered players enrolled in the study over two consecutive seasons (2008 and 2009). The total number of registered players for each year was 93 and 73 respectively with 38 players competing in both seasons. The mean ±SD age (yrs), height (m) and body mass (kgs) of the players was 27.0 ±12.3 yrs; 1.79 ±0.05 m and 94.7 ±12.1 kgs. An amateur rugby league team was studied from December through to August of two consecutive years with competition games from March to August. The team participated in the premier division of a domestic competition comprising of eight teams. An amateur rugby league representative team was also studied from August through to October of two consecutive years. The representative team competed in the division 1 national representative competition comprising of six teams. All players were registered with the Wellington Rugby League and competed in the Premier division of the Wellington Rugby League competition. All registered players were considered amateur as they derived their main source of income from other means and did not receive match payments. Over the duration of the study, all injury data was recorded from all training and match activities. This included the pre-season and competitive season period. Not all players attended every training session for various reasons. Training sessions were held three times a week in the pre-season period and then twice a week through the competitive phase of the domestic season. Training sessions were held twice a week through the competitive phase of the representative season. The AUT Ethics Committee approved all experimental procedures for this study (AUTEC 08/44).

All injuries sustained were recorded over the 2 competitive seasons. Injury data were collected from 178 training sessions and 85 matches, which included all trial, fixture, and finals matches. All matches were 80 minutes in duration while trainings varied from 90 mins to 120 minutes with mean ±SD duration of 98 ±17 minutes per training session.

Definition of Injury

For the purpose of this study, an injury was defined as *"any injury that causes a player to be unable to participate in a rugby league training activity or to be selected in a competitive match"*.[9] Injuries were assessed during the match or training session, immediately after the injury event. Multiple injuries that resulted from the same activity were counted as one injury event. The head trainer, a registered comprehensive nurse with tertiary sports medicine qualifications and accredited in injury prevention, assessment and management, recorded all injuries sustained during training and match activities using an injury reporting form.[10] Injuries were categorised according to the site, nature and cause of injury as previously described.[11, 12] The injuries were classified anatomically according to the site: head, eyes, nose, mouth, teeth, neck, shoulder arm, elbow, hand, finger, chest/trunk, back, groin, thigh, knee, lower leg, ankle and toe. Injuries were also described according to the nature of the injury.[11, 12] These included sprains, strains, bruises and contusions, haematomas, dislocations, lacerations, fractures, overuse, concussion and unspecified medical conditions.[11, 12]

The injuries were also classified according to the causative mechanism: tackling player, ball carrier, collision with player, collision with object, fall/stumble, slipped/tripped, scrum collapse, twisted, overexertion, temperature-related and other.[11, 12] All injuries resulting in a missed match or training activity were recorded. Injuries were classified as either minor (1 missed training week), moderate (2—4 missed training weeks) or major (5 or more missed training weeks).[13]

Questionnaire

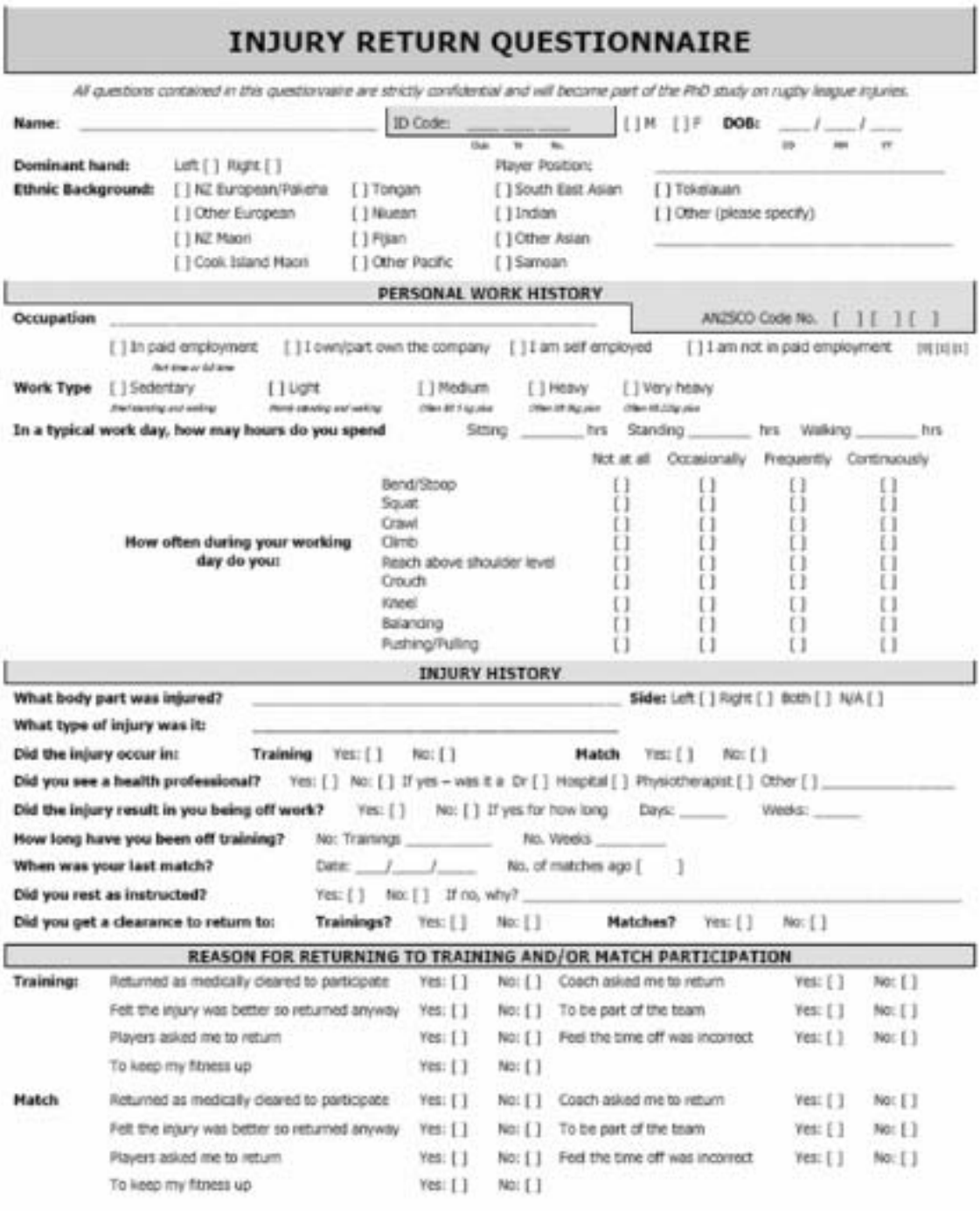
A questionnaire was specifically developed for this study. Demographic data (age, player position, activity frequency and occupational activity) were included in the data. Injury history and medical clearance questions were included as well. Several previously injured players were asked to provide possible questions for the identification of decisions influencing players return to sport. Personal data (age, ethnicity, occupation, work history, injury history)

was obtained (see Figure 1). The return to play influences were explored using yes or no questions and a Likert scale ranging from No influence (0) to Total influence (6) in their decision to return to participate in rugby league activities. A total of 14 questions were established for the Likert questionnaire.

Procedure

Following any injury occurring in the match or training activity, players were assessed by the head trainer. Players requiring further medical input were referred to the appropriate health care facility for this. Those players injuries identified as incurring a missed match or training activity were enrolled in the study. Consent was sought and obtained for all enrolled players. When players elected to return to rugby league activities they were asked to complete the questionnaire before commencing any activity. Players with injuries that may have resulted in life long consequences were required to obtain a written medical clearance before they could return to rugby league activities. Players with a recorded concussion were only allowed to return to rugby league activities after the required stand down period, were symptom free, had a medical clearance and on a graduated return to play (RTP) program[14, 15] as outlined in the New Zealand Rugby League concussion policy (http://www.nzrl.co.nz/files/nzrl_policies/nzrl_policy_concussion_april2008.pdf).

FIGURE 1 - Return to play demographic and injury questionnaire.



INJURY RETURN QUESTIONNAIRE

All questions contained in this questionnaire are strictly confidential and will become part of the PhD study on rugby league injuries.

Name: _____ ID Code: ___ ___ ___ [ ] M [ ] F **DOB:** ___/___/___

Dominant hand: Left [ ] Right [ ] Player Position: _____

Ethnic Background:

[ ] NZ European/Pakeha	[ ] Tongan	[ ] South East Asian	[ ] Tokelauan
[ ] Other European	[ ] Niuean	[ ] Indian	[ ] Other (please specify)
[ ] NZ Maori	[ ] Fijian	[ ] Other Asian	_____
[ ] Cook Island Maori	[ ] Other Pacific	[ ] Samoan	

PERSONAL WORK HISTORY

Occupation _____ ANZSCO Code No. [ ][ ][ ][ ]

[ ] In paid employment [ ] I own/part own the company [ ] I am self employed [ ] I am not in paid employment

Work Type [ ] Sedentary [ ] Light [ ] Medium [ ] Heavy [ ] Very heavy

In a typical work day, how many hours do you spend Sitting _____ hrs Standing _____ hrs Walking _____ hrs

How often during your working day do you:	Not at all	Occasionally	Frequently	Continuously
Bend/Stoop	[ ]	[ ]	[ ]	[ ]
Squat	[ ]	[ ]	[ ]	[ ]
Crawl	[ ]	[ ]	[ ]	[ ]
Climb	[ ]	[ ]	[ ]	[ ]
Reach above shoulder level	[ ]	[ ]	[ ]	[ ]
Crouch	[ ]	[ ]	[ ]	[ ]
Kneel	[ ]	[ ]	[ ]	[ ]
Balancing	[ ]	[ ]	[ ]	[ ]
Pushing/Pulling	[ ]	[ ]	[ ]	[ ]

INJURY HISTORY

What body part was injured? _____ **Side:** Left [ ] Right [ ] Both [ ] N/A [ ]

What type of injury was it: _____

Did the injury occur in: **Training** Yes: [ ] No: [ ] **Match** Yes: [ ] No: [ ]

Did you see a health professional? Yes: [ ] No: [ ] If yes – was it a Dr [ ] Hospital [ ] Physiotherapist [ ] Other [ ] _____

Did the injury result in you being off work? Yes: [ ] No: [ ] If yes for how long Days: _____ Weeks: _____

How long have you been off training? No: Trainings _____ No. Weeks _____

When was your last match? Date: ___/___/___ No. of matches ago [ ]

Did you rest as instructed? Yes: [ ] No: [ ] If no, why? _____

Did you get a clearance to return to: **Trainings?** Yes: [ ] No: [ ] **Matches?** Yes: [ ] No: [ ]

REASON FOR RETURNING TO TRAINING AND/OR MATCH PARTICIPATION

Training:	Returned as medically cleared to participate	Yes: [ ]	No: [ ]	Coach asked me to return	Yes: [ ]	No: [ ]
	Felt the injury was better so returned anyway	Yes: [ ]	No: [ ]	To be part of the team	Yes: [ ]	No: [ ]
	Players asked me to return	Yes: [ ]	No: [ ]	Feel the time off was incorrect	Yes: [ ]	No: [ ]
	To keep my fitness up	Yes: [ ]	No: [ ]			
Match	Returned as medically cleared to participate	Yes: [ ]	No: [ ]	Coach asked me to return	Yes: [ ]	No: [ ]
	Felt the injury was better so returned anyway	Yes: [ ]	No: [ ]	To be part of the team	Yes: [ ]	No: [ ]
	Players asked me to return	Yes: [ ]	No: [ ]	Feel the time off was incorrect	Yes: [ ]	No: [ ]
	To keep my fitness up	Yes: [ ]	No: [ ]			

Statistical Analyses

All data collected were entered into a Microsoft Excel spreadsheet and analysed using SPSS v.16.0 (SPSS Inc, Chicago, Illinois, USA). Injury rates were calculated as the number of injuries per 1000 training or match hours.[13, 16, 17] Data are reported as either means with 95% confidence intervals (CI) or standard deviations (± SD).[18, 19] A *t*-test was used to identify differences between categories in the questionnaire responses. The reliability or internal consistency of the questionnaire was assessed by estimating Cronbach's alpha () coefficient.[18, 20] An alpha coefficient for an internally consistent scale should be al least 0.70.[21] Significant *p* values reported in the text are less than 0.001 if they are not specifically stated. The level of significance was set at $p<0.05$.

RESULTS

A total of 178 training sessions were conducted over the study period with a training exposure of 10162 training hours. There were 85 matches completed with a match exposure of 916 hours. A total of 63 people recorded a missed training or match activity injury over the 24 months of the study. Nearly a quarter of the people enrolled (22%) recorded more than one missed training or match injury with 4% recording two or more missed match injuries (see Table 1).

A total of 618 training hours (391 training days) and 267 match hours (201 matches) were recorded missed as a result of an injury from rugby league activities. The mean ± standard deviation of training and match activities session loss over the study was 6.6 ± 6.2 training hours (4.2 ± 3.9 training days) and 2.9 ± 2.6 match hours (2.2 ± 2.0 matches) per player.

Injured Player Employment Activities

The majority of injured players returning to play were in paid employment (73%) with 26% either unemployed or enrolled as a student and 1% self employed (see Table 2). Nearly a third of all players (32%) recorded their employment as often lifting 5 kgs plus (medium) while sedentary (28%), heavy (20%), light (15%) and very heavy (4%) were recorded less often. Players recorded an average 3.2 ± 1.4 hrs standing, 2.5 ± 1.6 hrs sitting and 2.3 ± 1.3 hrs walking per day as part of their employment. As shown in Figure 2, 50% reported that they reach frequently during the day, 54% occasionally crouch and 4% bend or squat continuously.

Injured Players Health Services Utilisation

Although 80% of injured players saw a health professional as part of their rehabilitation process (t=1.7, df=1, p=0.340), compared with those that did not there was no significant difference observed (see Table 2). Nearly half (44%) of all injured players saw a physiotherapist 34% of all injured players attended a hospital for their treatment and 10% saw their own medical practitioner. Only a third of all injured players (38%) reported they had rested as part of their rehabilitation from the injury they had incurred.

TABLE 1: Missed training and match injuries by injury site, type, cause, severity and position per 1000 training player hours with 95% confidence intervals and percentage injuries.

	2008						2009					
	Missed Match Injuries			Missed Training Injuries			Missed Match Injuries			Missed Training Injuries		
	No	Rate[1] *(95% CI)*	%	No	Rate[2] *(95% CI)*	%	No	Rate[1] *(95% CI)*	%	No	Rate[2] *(95% CI)*	%
Total	47	104.6 *(78.6 to 139.2)*	100.0	23	4.2 *(2.8 to 6.3)*	100.0	44	94.3 *(70.1 to 126.7)*	100.0	20	4.3 *(2.8 to 6.7)*	100.0
Injury Site												
Head/Neck	14[d]	31.1 *(18.4 to 52.6)*	29.8	1[bc]	0.2 *(0.0 to 1.3)*	4.3	8[b]	17.1 *(8.6 to 34.3)*	18.2	1[c]	0.2 *(0.0 to 1.5)*	5.0
Upper Limb	17[d]	37.8 *(23.5 to 60.8)*	36.2	9[a]	1.6 *(0.8 to 3.1)*	39.1	19[ad]	40.7 *(26.0 to 63.8)*	43.2	1[c]	0.2 *(0.0 to 1.5)*	5.0
Lower Limb	13[d]	28.9 *(16.8 to 49.8)*	27.7	10[a]	1.8 *(1.0 to 3.4)*	43.5	11	23.6 *(13.0 to 42.5)*	25.0	18[abd]	3.9 *(2.4 to 6.2)*	90.0
Chest/Back	3[abc]	6.7 *(2.2 to 20.7)*	6.4	3	0.5 *(0.2 to 1.7)*	13.0	6[b]	12.9 *(5.8 to 28.6)*	13.6	0[c]	0.0 -	0.0
Injury Type												
Sprain	4[hi]	8.9 *(3.3 to 23.7)*	8.5	3	0.5 *(0.2 to 1.7)*	13.0	4[fh]	8.6 *(3.2 to 22.8)*	9.1	1[f]	0.2 *(0.0 to 1.5)*	5.0
Strain	7	15.6 *(7.4 to 32.7)*	14.9	10[g]	1.8 *(1.0 to 3.4)*	43.5	16[eghi]	34.3 *(21.0 to 55.9)*	36.4	16[eghi]	3.5 *(2.1 to 5.6)*	80.0
Concussion	8	17.8 *(8.9 to 35.6)*	17.0	0[fh]	0.0 -	0.0	5[fh]	10.7 *(4.5 to 25.7)*	11.4	1[f]	0.2 *(0.0 to 1.5)*	5.0
Fract/Disloc	14[e]	31.1 *(18.4 to 52.6)*	29.8	7[g]	1.3 *(0.6 to 2.7)*	30.4	19[ei]	40.7 *(26.0 to 63.8)*	43.2	2[f]	0.4 *(0.1 to 1.7)*	10.0
Other	14[e]	31.1 *(18.4 to 52.6)*	29.8	3	0.5 *(0.2 to 1.7)*	13.0	6[fgh]	12.9 *(5.8 to 28.6)*	13.6	0[f]	0.0 -	0.0
Injury Cause												
Tackled	28[lm]	62.3 *(43.0 to 63.6)*	38.3	5	0.9 *(0.4 to 2.2)*	21.7	21[lm]	45.0 *(29.3 to 69.0)*	47.7	1[m]	0.2 *(0.0 to 1.5)*	5.0
Tackling	18[lm]	62.3 *(25.2 to 90.2)*	59.6	5	0.9 *(0.4 to 2.2)*	21.7	17[lm]	36.4 *(22.6 to 58.6)*	38.6	1[m]	0.2 *(0.0 to 1.5)*	5.0
Collision	0[jk]	0.0 -	0.0	2[m]	0.4 *(0.1 to 1.4)*	8.7	1[jk]	2.1 *(0.3 to 15.2)*	2.3	1[m]	0.2 *(0.0 to 1.5)*	5.0
Other	1[jk]	2.2 *(0.3 to 15.8)*	2.1	11[l]	2.0 *(1.1 to 3.6)*	47.8	5[jk]	10.7 *(4.5 to 25.7)*	11.4	17[jkl]	3.7 *(2.3 to 5.9)*	85.0
Injury Severity												
Mild	23[o]	51.2 *(34.0 to 77.0)*	48.9	14[op]	2.5 *(1.5 to 4.3)*	60.9	22	47.1 *(31.0 to 71.6)*	50.0	16[op]	3.5 *(2.1 to 5.6)*	80.0
Moderate	8[n]	17.8 *(8.9 to 35.6)*	17.0	4[n]	0.7 *(0.3 to 1.9)*	17.4	11	23.6 *(13.0 to 42.5)*	25.0	2[n]	0.4 *(0.1 to 1.7)*	10.0
Major	16	35.6 *(21.8 to 58.1)*	34.0	5[n]	0.9 *(0.4 to 2.2)*	21.7	11	23.6 *(13.0 to 42.5)*	25.0	2[n]	0.4 *(0.1 to 1.7)*	10.0
Injury by Position												
Forwards	26	125.3 *(85.3 to 184.0)*	55.3	13	2.4 *(1.4 to 4.1)*	56.5	24	111.4 *(74.7 to 166.2)*	54.5	10	2.2 *(1.2 to 4.0)*	50.0
Backs	21	86.8 *(56.6 to 133.1)*	44.7	10	1.8 *(1.0 to 3.4)*	43.5	20	79.6 *(51.3 to 123.3)*	45.5	10	2.2 *(1.2 to 4.0)*	50.0

Rate expressed per (**1**) 1,000 player hours; (**2**) 1,000 training hours. Significant difference ($p<0.05$) than (**a**)=Head/Neck; (**b**)=Upper Limb; (**c**)=Lower Limb; (**d**)=Chest/Back; (**e**)=Sprain; (**f**)=Strain; (**g**)=Concussion; (**h**)=Fracture / Dislocation; (**i**)=Other; (**j**)=Tackled; (**k**)=Tackling; (**l**)=Collision; (**m**)=Other; (**n**)=Mild; (**o**)=Moderate; (**p**)=Major

TABLE 2: Percentage (number) of participant's employment status, work type and utilisation of health professionals for players with a missed training/match injury.

	%(n=)
Employment Status	
Paid Employed	73.1 *(68)*
Self Employed	1.1 *(1)*
Not Employed	25.8 *(24)*
Work Type	
Sedentary (Brief standing or walking)	28.0 *(26)*
Light (Mainly standing or walking)	15.1 *(14)*
Medium (often 5 kgs plus)	32.3 *(30)*
Heavy (often lift 9kgs plus)	20.4 *(19)*
Very Heavy (often lift 22 kgs plus)	4.3 *(4)*
Utilisation of Health Professionals	
Seen health professional	79.6 *(74)*
Seen own Dr.	9.7 *(9)*
Seen at hospital	34.4 *(32)*
Seen Physiotherapist	44.1 *(41)*
Seen other Health Professional	0.0 *(0)*
Rest as Part of Rehabilitation	
Rested while rehabilitating	37.6 *(35)*

Percentage of total participants.

TABLE 3: Percentage (number) of "No" responses for reasons why players returned to rugby league match and training activities.

	Match Activities % (n=)	Training Activities % (n=)
Returned as medically cleared to participate	69.9 (65)[a]	80.6 (75)[a]
Coach asked me to return	72.0 (67)[a]	71.0 (66)[a]
Felt the injury was better so returned anyway	2.2 (2)[a]	3.2 (3)[a]
To be part of the team	2.2 (2)[a]	2.2 (2)[a]
Players asked me to return	63.4 (59)[a]	63.4 (59)[a]
Feel the time off was incorrect	24.7 (23)[a]	20.4 (19)[a]
To keep my fitness up	15.1 (14)[a]	18.3 (17)[a]

Rate in percentage of responses. Significant difference ($p<0.05$) for (a) = compared with yes responses.

FIGURE 2: Reported percentages of activity undertaken during course of employment of players returning from injury from rugby league activities.

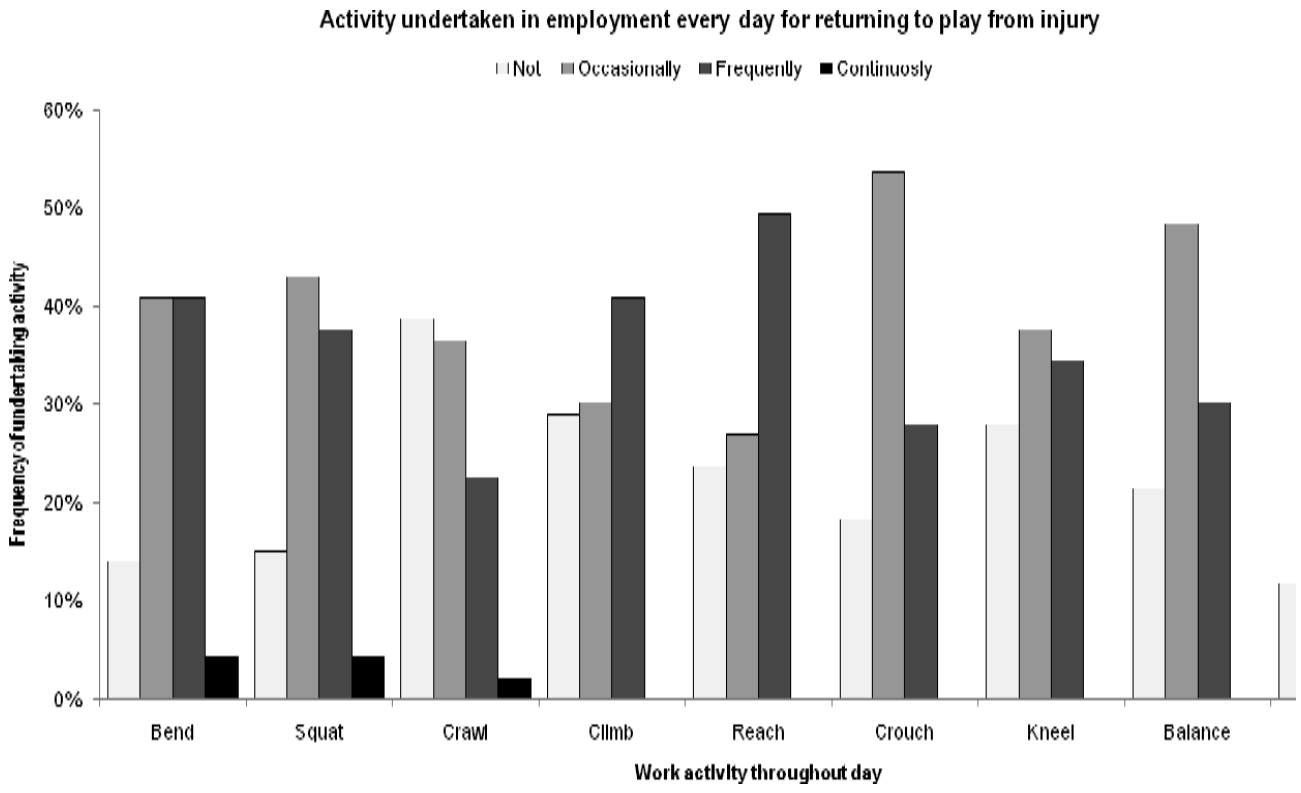


TABLE 4: Results of questionnaire for players with a missed match and/or training injury by percentages (number of responses) for return to training/match activities influences.

		Response							
	Question	Not at all[d]	Slight[cde]	Mild[bg]	Moderate[abefg]	Strong[bdg]	Very Strong[d]	Totally[cdef]	Mean ±*SD*
		% (n=)	% (n=)	% (n=)	% (n=)	% (n=)	% (n=)	% (n=)	
1	I felt I was needed by the team	0.0 (0)	4.3 (4)	17.2 (16)	**54.8 (51)**	19.4 (18)	2.2 (2)	2.2 (2)3.	0 ±0.9
2	I felt that the injury was not as bad as I was told it was	5.4 (5)	7.5 (7)	23.7 (22)	9.7 (9)	**26.9 (25)**	24.7 (23)	2.2 (2)	3.3 ±1.6
3	I felt that there was not an injury to worry about	9.7 (9)	6.5 (6)	**28.0 (26)**	19.4 (18)	12.9 (12)	21.5 (20)	2.2 (2)	2.9 ±1.6
4	The Coach/Manager/Trainer asked me to return	**49.5 (46)**	23.7 (22)	21.5 (20)	5.4 (5)	0.0 (0)	0.0 (0)	0.0 (0)	0.8 ±1.0
5	I feel my contribution to the team is valuable	2.2 (2)	2.2 (2)	40.9 (38)	**43.0 (40)**	5.4 (5)	2.2 (2)	4.3 (4)	2.7 ±1.1
6	I feel that my contribution to the team is valued by the coach	2.2 (2)	4.3 (4)	**61.3 (57)**	19.4 (18)	9.7 (9)	3.2 (3)	0.0 (0)	2.4 ±0.9
7	I feel that my contribution to the team is valued by the players	0.0 (0)	10.8 (10)	9.7 (9)	**49.5 (46)**	28.0 (26)	2.2 (2)	0.0 (0)	3.0 ±0.9
8	The upcoming game is important for the club/team and I want to be part of it	2.2 (2)	4.3 (4)	10.8 (10)	**32.3 (30)**	11.8 (11)	29.0 (27)	9.7 (9)	3.7 ±1.5
9	I don't like watching the game and would rather be playing	0.0 (0)	0.0 (0)	5.4 (5)	12.9 (12)	**28.0 (26)**	26.9 (25)	26.9 (25)	4.6 ±1.2
10	know my body and it is alright to come back and play	0.0 (0)	7.5 (7)	12.9 (12)	19.4 (18)	14.0 (13)	**32.3 (30)**	14.0 (13)	3.9 ±1.5
11	I can play and see the physiotherapist if I get injured again	10.8 (10)	1.1 (1)	12.9 (12)	**45.2 (42)**	20.4 (19)	4.3 (4)	5.4 (5)	3.0 ±1.4
12	I want my spot back on the team and will do anything to make sure I play	3.2 (3)	5.4 (5)	28.0 (26)	**29.0 (27)**	17.2 (16)	15.1 (14)	2.2 (2)	3.1 ±1.3
13	I was told that I can play as the injury won't get any worse	**66.7 (62)**	20.4 (19)	4.3 (4)	4.3 (4)	0.0 (0)	2.2 (2)	2.2 (2)	0.7 ±1.3
14	I can play as long as I am strapped on my injured area	26.9 (25)	3.2 (3)	4.3 (4)	**29.0 (27)**	22.6 (21)	11.8 (11)	2.2 (2)	2.6 ±1.8

Percentage are of total responses. Significant difference ($p<0.05$) than (a)=Not at all; (b)=Slight; (c)=Mild; (d)=Moderate; (e)=Strong; (f)=Very Strong; (g)=Totally

Return to Sport

Only 31% (37% training; 26% match) of injured players obtained a medical clearance to return to match and training activities (see Table 3). Nearly a third of injured players (29%) identified the team coach had asked them to return to rugby league activities. This was similar for injured players returning to training (28%) and match (29%) related activities. Most, but not all injured participants felt that the injury was better for either the next training (98%) or match (97%) participation. Three quarters of injured players felt that the recommended times off from training (75%) or match (80%) activities were too long.

Return to Play Questionnaire

The Cronbach's for the questionnaire was 0.78. This means that the questionnaire has an acceptable to good internal reliability.[22] There were significantly more "moderate" influences than "not at all" (t=-1.71, df=26, p=0.049), "slight" (t=-4.06, df=26), "strong" (t=2.12, df=26, p=0.019) "very strong" (t=2.57, df=26, p=0.008) and "total" (t=4.43, df=26) influences reported over the duration of the study (see Table 4). A third of all participants (33.3%) reported that being told they could "return to participation" had some influence on their decision to recommence team activities. Half of the participants (56%) reported that being asked to return to team activities by a member of the team management had some influence on their decision to return with 25% identifying that this was a mild influence. Nearly a third of participants (30%) reported that they felt strongly that the injury was not as bad as they were told it was with slightly less (25%) reporting this was a strong influence in their decision to return to team activities.

DISCUSSION

The incidence of injury in rugby league has been well documented. There are numerous occasions where, as the result of injury sustained whilst playing and training for rugby league activity, players have had to miss crucial games in their careers. This is the first study to identify, document and report player perspectives on reasons why they returned to match and training activities following a missed match/training injury. The reported injury rate for matches (402 per 1000 player hours) was higher than some,[3] but not all[23] studies for amateur participation. This was similar for the training injury rate (9 per 1,000 training hours) reported with the current rate less than other studies[24] for amateur participation.

A third of all the injured players rested as part of their rehabilitation process. This low number of resting players may be reflective of the participation status of the players. Amateur players receive no financial compensation for participating in rugby league and therefore must derive their income from other employment. With a quarter of players reporting their employment requiring lifting heavy or very heavy objects the opportunity to rest is reduced. Additionally the mean standing and walking per day recorded was in excess of five hours which may further compromise any lower limb rehabilitation requirements. Not recorded in this study is whether those players with a reoccurring injury actually rested with this injury when compared with the initial injury or whether they were required to continue to work in their employment in either a standing or walking situation. These data would be beneficial in future studies researching amateur player return to play decisions and influences.

Although nearly half of the participants reported seeing a physiotherapist as part of their rehabilitation, this may change in the current political environment of New Zealand. Throughout the duration of the study the Accident Compensation Corporation (ACC) provided fully subsided medical care through services such as a physiotherapist. Since completing the study there has been a change in government, resulting in legislative changes to the Injury Prevention, Rehabilitation, and Compensation Act (2001). A result of this change has seen the reintroduction of surcharges for visits to physiotherapists. The implications of these changes may see a downward trend in attendance to physiotherapists or other health care providers as the majority of participants

are 'blue collar' class of occupations in the employment sector.[25] Financial restrictions may influence the use of the physiotherapist for rehabilitation from the injury that has occurred. This could result in an upward trend in the incidence of missed match injuries or reoccurrence of the same injury as a result of incomplete rehabilitation. Further studies are warranted to identify if the legislative changes result in an increase in the incidence of injuries due to decreased use of rehabilitation services.

Medical clearance for return to sports participation was reported to have occurred in less than a third of injured players for match situations and less than a quarter of injured players for training situations. As well, more than three quarters of players returning from injury identified that they felt the time off for the injury rehabilitation was too long. For example, players who had recorded a concussion from match or training activities reported they felt alright to return to full training and/or match activities before the New Zealand rugby league stipulated guideline of three weeks. Regardless of this, all players with an assessment of concussion were required to undergo a return to play protocol, be symptom free, have three weeks stand down and be medically cleared before they could return to full contact training or match activities. Players who have incurred an injury resulting in a missed match or training activity should, ideally, be managed in their rehabilitation process with the assistance of other health professionals. Clearance to return to rugby league activities should, ideally, be with the cooperation of the team management and the health professional ensuring that the returning player is best managed to ensure that no exacerbation of the injury occurs.

Communication between the team management and the health service involved in the injured players rehabilitation is another reported influence for players returning to sport.[26] As the team trainer involved in this research was a registered nurse with tertiary qualifications in sports medicine, there was communication established with some rehabilitation services' enabling the coach to receive direct feedback in regards to individual player injury rehabilitation on some of the players seen at the rehabilitation services. This may be seen as a bias in this study as not all teams have qualified team trainers with this level of professional qualifications and established networks. Also, coaches of the teams involved in this study were retired professional players and had been exposed to a high level of medical services as part of their professional career. Local coaches with a family member supporting them in the role of the trainer or team manager may not be aware of the influences they may impart on players returning from an injury. Further research is warranted on amateur coaches in these areas and this information could be incorporated into injury prevention modules for coach education.

As reported in this study, nearly a third of players reported they were asked by the coach to return to match and/or training activities. The coaches' decision to ask a player to return to play may have been influenced by several interlinked coaching philosophies. These are (1) The player's status in the team (i.e. reserve player, starting player), match situation (i.e. a close game, win/loss situation) and the importance of the competition,[26] (2) Some coaches may want nothing to do with athletes with injuries, or around the team environment as this may have a potential "contaminating effect" on other team members,[26] (3) The role the coach undertakes (i.e. parental figure assisting with athletes or primary role to ensure physical readiness to perform),[26] and (4) Awareness of potential psychological stressors involved in returning to sport after injury and whether the coach feels comfortable dealing with these.[26]

Injured players returning to match and training activities indicated that team involvement was important to them. In particular areas of motivation reported in this study were the desire to retain their spot in the team, they did not like watching from the sideline, the game was important to them and they felt they were needed by the team. Team affiliation and sense of belonging have been reported to be key motivators for players wanting to return from injury.[7] The findings of this study are similar to another study[27] where team sports participants reported that they wanted to regain a spot in the team and to "have an impact" on teams performance. As well they reported a love of the sport, wanting to keep fitness up, bonding and socialising with team mates and to retain their athletic identity as key motivators to return to sport.[27] There were all similar to the current study where players reported the influences for returning to sport were more team related than being told they could return to sport.

Not reported in this study, but an important consideration for future studies is whether there was any re-injury anxiety for players returning to match and training participation. Players returning to competition activities have been reported to undergo re-injury anxiety and whether they are going to be able to perform to their own pre-injury level of participation.[7, 28, 29] Not reported in other studies on return from injury to sports is what impact being an amateur participant has on these returning anxiety states. As previously identified, amateur participants rely on other employment to secure a financial income and becoming injured again may risk their employment, impact on their financial status or place further financial burden on their income. These areas are of concern for the amateur participant and warrant further exploration.

CONCLUSION

This study has reported on player perspectives of why they returned to rugby league match and training activities. Of concern is that nearly a third also reported that the injury sustained was not as bad as first diagnosed. Therefore, it is crucial that players receive the best and perhaps more importantly the most qualified advice at this early stage of assessment to ensure correct treatment and ongoing management of their injuries. The finding that only 31% of injured players reported having a medical clearance and a third of injured players reported they were asked by team management to return to training and match activities before they were medically cleared highlights a possible knowledge deficit in areas such as first aid knowledge and concussion management. Further research in these areas is warranted.

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First-aid concussion knowledge of rugby league team management, administrators and officials in New Zealand

Doug King,[1, 2] Patria Hume,[2] Trevor Clark,[3]

1 Emergency Department, Hutt Valley District Health Board, Lower Hutt
2 Sports Performance Research Institute New Zealand, School of Sport and Recreation, Faculty of Health and Environmental Science, AUT University, Auckland
3 Institute of Food, Nutrition and Human Health, College of Science, Massey University Wellington

Correspondence to:
Doug King
Emergency Department, Hutt Valley District Health Board
Private Bag 31-907
Lower Hutt
New Zealand
Tel: +64 4 569 7835
Email: douglas.king@huttvalleydhb.org.nz

ABSTRACT

Objective: To assess rugby league team management, administrators and officials' knowledge of first-aid, concussion recognition and management and injury prevention.

Methods: A descriptive study was conducted using a first-aid and concussion knowledge questionnaire consisting of two parts: (1) Thirty six multi-choice questions on first-aid assessment and knowledge incorporating five constructs (injury prevention, identification and management, cardiopulmonary resuscitation, and wound care) and, (2) Thirty eight closed- and open-ended questions on concussion recognition, management and prevention knowledge.

Results: Ninety five people from the Wellington district rugby league community completed the questionnaire. Fifty two (55%) of respondents had a current up-to-date first-aid certificate which included cardiopulmonary resuscitation. Only two (2%) participants achieved the 80% passing score in the first-aid and concussion knowledge questionnaire. The mean ±SD percentages for the first-aid knowledge questions was 56 ±13% and for the 16 symptom recognition of concussion questions was 33 ±14%. Overall sports-related concussion knowledge was low (42 ±20%). Loss of consciousness was reported to be incorrectly required for a concussion to have occurred by 39% of respondents. Nearly half the respondents identified that all concussions recover at the same rate. All referees had a refereeing qualification while only 24% of coaches, 7% of managers and 2% of trainer/medics had a rugby league specific qualification.

Conclusion: The first-aid and concussion knowledge results highlighted a lower understanding of sports-related first-aid and concussion than previously reported. Injury prevention and care programs in rugby league at the amateur level in New Zealand should stress first-aid and concussion injury knowledge management to enable knowledge empowerment.

INTRODUCTION

Originating in the north of England in the 1890's, rugby league is a full contact collision sport participated in countries throughout the world. The game is played over two halves of 30 to 40 minutes duration depending on whether the level is junior, amateur, sub-elite or elite. Players compete in a physically challenging contest that typically involves bouts of high-intensity activities (e.g. sprinting, running, passing, and tackling) separated by short bouts of low-intensity activities (standing, walking, jogging).[1] As a result of these activities musculoskeletal injuries occur frequently.[2]

The Accident Compensation Corporation rugby league mean cost per moderate to severe injury entitlement claim (MSC) was NZD$7,100, and the most common injury entitlement claim was for soft tissue injuries (47.4%) accounting for nearly half of the costs (40.5%).[3] Concussions accounted for 1.8% of all MSC's and 6.3% of MSC total costs, but alarmingly were the highest single injury type cost per claim at $25,347 per concussion MSC.[3] The number and costs of injuries in rugby league[3] highlights the need for first-aid training in specific areas such as soft tissue injuries and concussion.[4] Due to this situation it has been recommended that all coaches should be trained in first-aid.[5]

Sports injuries are the single-most commonly reported reason why people withdraw from sporting activity and participation.[6] This usually occurs where a player gets injured at the amateur level and untrained personnel treat the injured player at the sideline.[7] Often treatment and advice is via the team coach and this may be beyond their level of knowledge or training.[7]

Studies assessing coaches' first-aid knowledge have shown low knowledge levels (27%[8] to 38%[7]) despite the majority of coaches (89%[8] to 93%[7]) having a current first-aid certificate. Unfortunately 16%[9] to 51%[10] of coaches were unable to correctly identify factors relating to concussion recognition, management and prevention techniques. Of concern was that 42% of coaches thought that a player had to have loss of consciousness for a concussion to occur and 26% would return a player to participation while showing symptoms of a concussion.[10] These studies were conducted in the United States of America where there are state legislated requirements for team management to have a current in-date first-aid qualification as part of their coaching role. To date there are no studies on team management first-aid knowledge outside of the United States of America. Therefore, our study assessed the knowledge of first-aid, concussion recognition and management and injury prevention of local rugby league club administrators, coaches and other team management. first-aid.

METHODS

A descriptive questionnaire study was conducted during the rugby league off season (November 2009 to February 2010) to assess rugby league team management, administrators and officials' knowledge of first-aid, concussion recognition and management and injury prevention.

Participant Recruitment

Participants were recruited from a New Zealand Rugby League zonal region. Participation was anonymous and voluntary. All procedures were approved by the Health and Disability Central Regional Ethics Committee (CEN/09/56/EXP).

Questionnaire

The first-aid and concussion knowledge questionnaire (see Appendix) consisted of three parts: Part I consisted of general information about the participants in terms of their role in rugby league and their qualifications and experience in first-aid; Part II "first-aid knowledge" consisted of 36 multi-choice questions on first-aid assessment and knowledge incorporating five constructs (injury prevention, identification and management, CPR, and wound care); and Part III "concussion recognition, management and prevention knowledge" consisted of 38 closed- and open-ended questions on concussion recognition, management and prevention knowledge.

The part II questions were based on the New Zealand St John's first-aid, Sports Medicine New Zealand Sports Medic and New Zealand Resuscitation Council CPR exams.[7, 8] Based on a first-aid knowledge questionnaire initially developed in 1986[11], the part I first-aid and assessment and knowledge questions were updated to reflect changes in the American Red Cross first-aid exam and the American Red Cross Cardiopulmonary Resuscitation exams through several studies.[7, 8, 12]

The part III questions were based on previously published concussion assessment questionnaires relating to concussion recognition, management and assessment and incorporating the latest concussion consensus statement.[9, 13, 14] The concussion recognition, management and prevention knowledge questions were presented in two sections: (A) Concussion understanding; and (B) Concussion recognition, management and prevention. The concussion understanding questions were from a previously published[14] 22-item questionnaire designed to source information on the participants' knowledge about the signs and symptoms of a concussion, knowledge of return-to-play strategies and protocols, and their beliefs regarding medical follow-up and sport participation after a concussion. The concussion recognition, management and prevention questionnaire was originally developed and validated for use with youth coaches.[10] The recognition questions included a list of 16 signs/symptoms, and the participants were asked to pick those they thought were actual sequelae of concussion. Lastly all participants were asked to respond to four true/false questions regarding concussion management. A check box was included that allowed participants to indicate that they did not know whether the statement was true or false to discourage them from guessing.

The current first-aid and concussion knowledge questionnaire was reviewed and updated by two experienced first-aid instructors to ensure the answers were in alignment with current practice. The pass mark of 80% used by first-aid training organisations was kept to enable comparisons with other studies on first-aid and concussion knowledge.

Cronbach's alpha () coefficients[1] determined the reliability/internal consistency of part II first-aid (= 0.79; acceptable to good internal reliability) and

TABLE 1: Rugby league management role, qualifications, first-aid certificate, pass percentages, mean ±SD first-aid knowledge score for total, current first-aid certificate and no current first-aid certificate.

Role	Qualification %	First-aid Certificate%	First-aid Knowledge Pass%	First-aid Knowledge Score%	First-aid Knowledge Score (First-Aid Cert)	First-aid Knowledge Score (No First-Aid Cert)
Coach (n=50)	28	48	0.0	57 ±14	63 ±12	52 ±13
Manager (n=13)	7	62	0.0	56 ±14	49 ±15	66 ±3
Trainer/Medic (n=15)	2	80*	13	57 ±15	57 ±16	60 ±11
Club committee (n=14)	3	43	0.0	51 ±12	54 ±12	49 ±12
Referee (n=3)	100	67	0.0	57 ±2	57 ±2	55 ±0
Average ±SD				**56 ±13**	**58 ±14**	**53 ±13**
All respondents (n=95)	**50**	**55**	**2**			

*Percentages are of total and individual management or offficial role. *=Significant difference ($p<0.05$) when compared with no current in-date first-aid certificate.*

part III concussion recognition, management and prevention (= 0.86; good to excellent internal reliability) of the questionnaire.[15]

Analysis

The results of the first-aid and concussion questionnaire were entered into an Excel spreadsheet and analysed with SPSS v.16.0 (SPSS Inc, Chicago, Illinois, USA) and the VRP Injury Statistics Software (http://www.iprc.unc.edu/sportsinjurystatistics.shtml). Data are reported as means with standard deviations ±SD.[16] Chi-squared (^{2}) analyses were performed to test for significant relationships between responses (correct or incorrect) for each construct. Significant p values reported in the text are less than 0.001 if they are not specifically stated.

RESULTS

A total of 95 people (50 coaches, 13 managers, 15 trainer/medics, 14 club committee personnel and 3 referees) from the district rugby league community completed the questionnaire. Males (83%) participated more than females (17%) and the mean age was 38 yrs ±10 yrs. Fifty two respondents (55%) had a current in-date first-aid certificate which included being certified in cardiopulmonary resuscitation. Only 54% of coaches had a rugby league coaching qualification, 54% of managers had a rugby league manager's qualification, 13% of trainers had a rugby league trainer's qualification and 100% of referees had a rugby league referee qualification.

First-aid Knowledge

The mean score for first-aid knowledge was 56 ±13% (range 24% to 84%). Only 2% of participants met the 80% pass mark (see Table 1). Significantly more trainer/medics had a current first-aid certificate (^{2}=5, df=1, p=0.020) but they recorded a lower mean first-aid knowledge score (57% vs. 60%) when compared with trainer/medics that did not have a current first-aid certificate.

The majority of participants were involved in senior rugby league (343%). No managers or trainer/medics were involved in mini-mod or women's rugby league activities (see Table 2).

When comparing responses of all participants there were significant differences in the percentage of correct responses for the five construct areas of the first-aid questionnaire (injury prevention ^{2}=155, df=4; injury knowledge ^{2}=14, df=4; injury management ^{2}=9, df=4, p=0.004; cardiopulmonary resuscitation ^{2}=9, df=4, p=0.003; wound care ^{2}=70, df=4) (see Table 3).

Team management with a current first-aid certificate recorded a higher percentage of correct answers in most, but not all, of the five constructs of the first-aid knowledge section of the questionnaire (see Table 4).

TABLE 2: Distribution of participation group in rugby league by role percentages.

	Mini-Mod	Age Grade	Senior	Women's	Premier	National
Coach (n=50)	24	12	30	5	26	3
Manager (n=13)	0	19	50	0	25	6
Trainer/Medic (n=15)	0	7	43	0	36	14
Club committee (n=14)	0	0	36	24	29	0
Referee (n=3)	13	13	13	13	13	36
All respondents (n=95)	**14**	**11**	**34**	**8**	**26**	**7**

Percentage of total and individual management or official role.

[1] Cronbach's alpha (α) coefficient is used to estimate the proportion of variance that is systematic or consistent in a set of test scores. It can range from 0.0 (if no variance is consistent) to 1.0 (if all variance is consistent) with all values between 0.0 and 1.0 being possible. For example, if the Cronbach's α for a set of scores turns out to be 0.90, you can interpret this as meaning that the test is 90% reliable, and by extension that it is 10% unreliable (100% - 90% = 10%).

TABLE 3: Percentage of correct responses by first-aid knowledge construct for total participants, team management and officials.

	All Respondents (n=95)	Coach (n=50)	Manager (n=13)	Trainer/Medic (n=15)	Committee (n=14)	Referee (n=3)
Construct						
Injury Prevention	**71***	69*	74*	79*	72*	67
Injury Knowledge	**44***	48	49	39*	33*	52
Injury Management	**45***	46	49	46	39*	37
Cardiopulmonary resuscitation	**42***	47	46	32*	36*	33
Wound Care	**69***	75*	65*	76	73*	93*

*Percentage of total and individual management or official role. *=Significant difference ($p<0.05$) when compared with incorrect responses.*

TABLE 4: Percentages of first-aid knowledge five constructs responses by participants' role and first-aid certificate.

	Injury Prevention		Injury Knowledge		Injury Management		CPR		Wound Care	
First-aid certificate	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
Coach (n=50)	69	68	60	50	52	40	63	33	76	58
Manager (n=13)	78	67	46	56	42	60	28	75	38	83
Trainer/Medic (n=15)	81	70	48	57	46	44	31	33	57	89
Club committee (n=14)	69	75	52	39	44	35	38	34	64	56
Referee (n=3)	67	56	60	50	33	44	25	50	100	67
All respondents (n=95)	**73**	**67**	**53**	**50**	**44**	**44.7**	**37**	**45**	**67**	**71**

Percentage of total and individual management or official role.

Concussion Recognition, Management and Prevention Knowledge

All respondents reported they knew what the term concussion meant and that concussions were more serious than other typical sports injuries, but only 98% responded that sports-related concussion could influence players' social and work activities. Of all respondents, 75% knew how to recognise a concussion in players but only 58% had discussed the consequences of a concussion with players. The majority (85%) identified that playing while recovering from a concussion could lead to long term complications.

The majority of respondents (70%) identified they would insist a concussed player should see a doctor before returning to play or train while 26% of non-coaches would check with the coach before they could return a player to play or training. More than half (54%) of the participants knew of a concussion policy in rugby league but only 8% could identify the three week stand-down requirement. The majority (78%) reported a seven day stand-down as the requirement for recovery from a concussion. More than half (55%) of participants who had had a player with concussion (n=52) had not sought a medical clearance for a concussed player before returning them to match or training activities. Trainer/medics reported more sequale symptoms of a concussion occurring (43 ±20%) than other team management. For all participants there were only 33 ±14% correct responses (see Table 5).

TABLE 5: Percentages of participants' responses to symptoms they thought were the sequale of a concussion occurring (concussion symptoms are indicated in bold).

	All Respondents (n=95)	Coach (n=50)	Manager (n=13)	Trainer/Medic (n=15)	Committee (n=14)	Referee (n=3)
Symptom	**%**	**%**	**%**	**%**	**%**	**%**
Abnormal sense of smell	58	50	62	67	71	67
Abnormal sense of taste	33	30	46	33	29	33
Amnesia (loss of memory)	**37**	**30**	**46**	**53**	**36**	**33**
Blurred vision	**44**	**52**	**23**	**73**	**7**	**33**
Black eye	19	20	8	27	21	0
Chest pain	26	26	15	53	14	0
Confusion	**46**	**54**	**54**	**40**	**7**	**100**
Dizziness	**45**	**54**	**23**	**67**	**14**	**33**
Headache	**48**	**54**	**23**	**67**	**36**	**33**
Loss of consciousness	**39**	**54**	**15**	**33**	**14**	**33**
Nausea	**40**	**36**	**54**	**47**	**29**	**67**
Nosebleed	17	16	15	27	7	33
Numbness/Tingling upper extremity	18	20	8	7	21	67
Sharp burning pain in neck	19	18	31	20	7	33
Sleep disturbances	**26**	**26**	**46**	**27**	**7**	**33**
Weakness of neck range of motion	13	12	8	20	14	0

Percentage of total and individual management or official role.

Wearing of headgear was reported to aide in preventing concussion by more than half of all respondents (53%). More trainers (80%) supported this statement than coaches (62%) and managers (54%). Loss of consciousness was reported to be required for a concussion to have occurred by 39% of responses (see Table 6).

Overall sports-related concussion knowledge was low at 42 ±20% (see Table 7). Trainers/medics recorded the highest overall sports-related concussion knowledge (51±26%).

the only team management at matches should first-aid decisions be required.

First-aid knowledge of team management, administrators and officials was lower than previously reported for high school coaches (27%[8] to 38%[7]) in the United States of America. Only 55% of respondents had a current, in date, first-aid certificate which was less than in some (89%[12] to 93%[7]) but not all (12.4%[8]) previously published studies. Given that only half the participants had formal first-aid training it was expected that with a first-aid certificate. Not recorded in this study were the participant's experiences with first-aid situations or whether they had been exposed to environments where first-aid or similar activities occur frequently. In a similar study[8] participants undertaking the first-aid knowledge questionnaire were observed to be nervous. A possible consequence of this nervousness is transference resulting in a lowered first-aid knowledge score.[8] Although this is a possible situation for the resulting low scores in our study it does not account for

TABLE 6: Responses of team management to the true false questions on concussion by percentage.

	A concussion only occurs when the athlete loses consciousness (blacks out). **(False)** %			A concussion requires immediate removal from the game or practice. **(True)** %			A player who reports having a headache after a concussion will likely demonstrate other signs. **(True)** %			A player who displays any sign or symptom of concussion should not be allowed to return to play. **(True)** %		
	True	**False**	**DK**	**True**	**False**	**DK**	**True**	**False**	**DK**	**True**	**False**	**DK**
All respondents (n=95)	39	54	7	62	26	12	54	32	15	68	21	11
Coaches (n=50)	42	50	8	62	26	12	58	32	10	62	22	10
Managers (n=13)	15	77	8	39	39	23	23	54	23	69	23	8
Trainer/Medics (n=15)	53	47	0	93	7	0	73	13	13	93	7	0
Committee (n=14)	36	50	14	50	43	7	43	36	21	36	36	29
Referee (n=3)	33	67	0	67	0	33	43	36	21	100	0	0

Percentages round and may not equal 100. DK = don't know.

TABLE 7: Percentage ±SD of concussion knowledge overall, concussion recognition, management and prevention questions reported correctly by all respondents, team management, administration and officials.

	Overall %	**Recognition %**	**Management %**	**Prevention %**
Coach (n=50)	46 ±20	59 ±21	40 ±16	38 ±17
Manager (n=13)	33 ±23	41 ±31	28 ±18	29 ±18
Trainer/Medic (n=15)	51 ±26	71 ±25	49 ±21	34 ±20
Club committee (n=14)	26.±21	42 ±40	27 ±29	10 ±12
Referee (n=3)	47 ±37	71 ±41	50 ±31	20 ±17
All respondents (n=95)	**42 ±20**	**56 ±23**	**38 ±14**	**32 ±15**

Percentage of total and individual management or official role.

DISCUSSION

The purpose of this study was to assess rugby league team management, administrators and officials' knowledge of first-aid, concussion recognition and management and injury prevention. No coaches were able to achieve the pass score in first-aid knowledge which could have serious consequences for safety of players if a medical situation should occur. Nearly a quarter of coaches (24%) were involved in the mini-modified rugby league level of participation. The knowledge of these coaches would ideally be higher than identified as they are often knowledge on the various constructs in the first-aid knowledge questionnaire would be 55% at best, and this was indeed the case for most constructs. Previous experience, participant occupation or exposure to first-aid type environments may have influenced the results reported and these data should be included in any subsequent studies on first-aid knowledge.

Having first-aid certification did not mean that there was greater knowledge of first-aid. In many areas participants without a first-aid certificate had a higher percentage of correct responses than those 98% of participants not achieving the 80% pass mark.

The findings of our study highlight some of the misconceptions that are common in the population generally regarding concussion. needed given Of all participants, 53% reported that head-gear aids in the prevention of concussion, 22%reported that mouth-guards prevented concussion, 39% reported that concussion only occurred when a player loses consciousness, 26% reported that removal from the field with a concussion was not required, 20% would let a symptomatic player return to play, 40% reported a 21

day stand down period while 45% reported all players recover at the same rate from a concussion. A similar study[10] reported 42% of coaches thought that loss of consciousness was required for a concussion to occur, 32% would not remove a concussed player from the field of play and 26% would let a symptomatic player return to play. It is generally acknowledged in the concussion literature that loss of consciousness is not required for a concussion to occur and this symptom has a limited value in assessing concussion severity.[13,17] Additionally it is recommended that any player with a concussion be removed from play and evaluated further.[13, 17] Signs such as headache, dizziness, nausea, brief amnesia, drowsiness feelings of being in a fog and visual disturbances are symptoms of a possible concussion and should be looked for in a suspected concussed player.[10] It is consensus amongst concussion recommendations that players should never return to play while still symptomatic.[13] Our findings highlight a lower understanding of sports-related concussion than previously reported (42% vs. 62%[10] vs. 84%[9]) and highlight the need for concussion education to occur for all people involved in rugby league at the management level of participation, and for sport in general.

Of concern is the finding that nearly half of the participants identified that concussions recover at the same rate as other injuries. Recent literature has identified that the criteria for adults returning from a concussion should be different from children and adolescents.[13,18,19] In the Zurich concussion consensus statement,[13] it was identified that adolescents (less than 18 yrs old) and children down to the age of 10 yrs old should be managed more conservatively than adults. This includes the use of the return to play guidelines which may require a longer period of rest and non contact activities than adults with a concussion.[13] Children under the age of 10 yrs old should be assessed and managed medically as they require more age-appropriate assessments and should not commence any return to play until clinically symptom free from a concussion.[13] Females have a more prolonged post-concussion reaction time and greater symptom severity than males[18,20,21] and are at a greater risk for a concussion to occur.[22, 23] Evidence is limited but suggestive that gender variations in the management of concussion is important.[18] There is also evidence in the paediatric population that concussed girls report a significantly higher mean symptom score than boys on initial presentation.[24] These findings support the recommendation that a "one-size fits all" policy for the management of concussion should not be undertaken and the need for an individualised approach is important.[25]

Although this study was conducted at the amateur level of rugby league participation where it is totally reliant on volunteers, there is still a requirement for people in this role to undertake and complete knowledge empowerment courses in regards to sports-related concussion programmes. Volunteers involved in any level of sports in any role have a responsibility to ensure that the decisions they make in regards to injuries and concussion enable the most appropriate care to be provided. In the case of sports-related concussion it is better to stand the player down than to risk them further by allowing them to participate in activities where they could be further harmed. A sideline concussion card tool developed for assisting people involved in sports where concussions may occur has been produced by the Accident Compensation Corporation. The sideline concussion card is designed to provide temporary interim management guidelines for a suspected concussion, encouraging players to seek medical treatment.[26] The sideline concussion card is based on a similar card utilised by the University of Pittsburgh that incorporates 'Maddocks questions',[27] as well as 'anterograde' and 'retrograde' questions shown as another way of assessing concussion.[28] Aspects of the sideline concussion card have been incorporated into the recently produced Sports Concussion Assessment Tool, developed for trained medical personnel.[17] It is recommended that injury prevention programs, incorporating concussion recognition, management and prevention, should be provided to all team management, administrators and officials on a regular basis with a requirement for them to update regularly as part of their role in the sport.

CONCLUSION

The first-aid and concussion knowledge results highlighted a lower understanding of sports-related first-aid and concussion than previously reported. Injury prevention and care programs in rugby league at the amateur level in New Zealand should stress first-aid and concussion injury knowledge management to enable knowledge empowerment.

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APPENDIX

The 74 questions in the first-aid and concussion knowledge questionnaire consisted of two parts: (1) Thirty six multi-choice questions on first-aid assessment and knowledge incorporating five constructs (injury prevention, identification and management, cardiopulmonary resuscitation, and wound care) and, (2) Thirty eight closed- and open-ended questions on concussion recognition, management and prevention knowledge. The questions were:

1. Water should be:
   - a. Withheld during practices, available during games
   - b. Withheld during games, available during practices
   - c. Available only on hot days
   - d. Available at all times
2. The behaviour of the first aid provider:
   - a. Should be calm and reassuring
   - b. Should be hurried and tense
   - c. Does not matter because it has no effect on the injured player
   - d. Both a and b
3. Ice should always be used _____ after an injury occurs unless otherwise directed by a doctor or senior medic:
   - a. After the first 48 hours
   - b. During the first 48 hours
   - c. During the first 24 hours only
   - d. During the first 12 hours only
4. A player who is knocked unconscious may return to play if they:
   - a. Regains consciousness within 2 minutes
   - b. Presents no signs and symptoms of a head injury
   - c. Is cleared by a Doctor
   - d. Feels capable of returning to play
5. Twisting or stretching a joint beyond its normal range of motion is the most common cause of:
   - a. Sprains
   - b. Fractures
   - c. Strains
   - d. Contusions
6. Heat stroke can result from:
   - a. Too little salt
   - b. Too high carbohydrates
   - c. Dehydration
   - d. Hyper hydration

7. A musculotendinous tissue injury is a:
   a. Fracture
   b. Sprain
   c. Strain
   d. Contusion
8. Contusions occur most frequently to the:
   a. Chest
   b. Quadriceps
   c. Abdomen
   d. Shin
9. The greatest danger for a player who has mononucleosis (glandular fever) is:
   a. Seizures
   b. A punctured liver
   c. A ruptured spleen
   d. Shock
10. Proper treatment for chronic problems, such as shin splints is:
   a. Ice before activity, ice after activity
   b. Heat before activity, heat after activity
   c. Ice before activity, heat after activity
   d. Heat before activity, ice after activity
11. Standard first aid for a sprained ankle does not included
   a. Ice
   b. Compression
   c. Percussion
   d. Elevation
12. Pre-game meals should contain foods:
   a. High in carbohydrates
   b. High in protein
   c. Low in carbohydrates
   d. Balanced in protein and carbohydrates
13. Mouthguards help to protect the player against:
   a. Tooth fractures and tongue lacerations
   b. Jaw fractures
   c. Concussions
   d. Both a and c
14. Characteristics of heat exhaustion include:
   a. Slow pulse
   b. Pale, cool, clammy skin
   c. Red, hot, sweaty skin
   d. Bounding pulse
15. Heat stroke is:
   a. Preventable
   b. Unpreventable
   c. Not life threatening
   d. Seldom seen in players
16. Heat stroke is best prevented by:
   a. Limited salt intake
   b. Limited water breaks
   c. Unlimited water breaks
   d. No way to prevent it
17. Dressings and bandages are used to:
   a. Reduce pain
   b. Reduce internal bleeding
   c. Help control bleeding and prevent infection
   d. Make it easier to move the injured player
18. How can you reduce the risk of disease transmission when caring for open bleeding wounds?
   a. Wash your hands immediately after giving first aid
   b. Avoid direct contact with blood and other body fluids
   c. Use protective barriers such as gloves or plastic wrap
   d. All of the above
19. Which is the first step in caring for bleeding wounds?
   a. Apply direct pressure on the wound with a clean or sterile dressing
   b. Apply pressure at the pressure point
   c. Apply bulk bandages to reinforce blood soaked bandages
   d. Elevate the wound above the level of the heart
20. What should you do if you think a player has internal bleeding?
   a. Apply heat to the injured area
   b. Call the local emergency phone number for assistance
   c. Place the player in a sitting position
   d. Give fluids to drink to replace the blood loss
21. What should be part of your care for a severely bleeding open wound?
   a. Allow the wound to bleed in order to cleanse it and minimise infection
   b. Apply direct pressure and elevate the injured area, if no broken bones
   c. Use a tourniquet to stop all blood flow

d. Both b and c

22. After being tackled, a player does not get up. The conscious player is face down and appears badly hurt. First you send someone for help then you:
    a. Roll the player onto his side into the recovery position, in case he starts to vomit
    b. Roll the player onto his back and elevate the head and neck
    c. Position the player so he is comfortable
    d. Have the player remain still
23. What should you do when caring for someone who is having a seizure?
    a. Remove nearby objects that might cause injury
    b. Place small object, such as a rolled up piece of cloth between the players teeth
    c. Try to hold the player still
    d. All of the above
24. Generally a splint should be:
    a. Loose, so that the injured player can still move the injured limb
    b. Snug, but not so tight that it slows circulation
    c. Tied with fasteners directly over the injured area
    d. None of the above
25. A player who is a diabetic is drowsy and appears confused. He is not sure if he took his insulin today. Should you:
    a. Suggest they rest for an hour or so
    b. Tell them to go and take their insulin
    c. Give them some sugar
    d. Both a and b
26. Two players collide on the field. Although there is no visible bleeding, the upper leg of one player is very red and swelling fast. They probably have what type of injury?
    a. Abrasion
    b. Contusion / Bruise
    c. Strain
    d. Sprain
27. When caring for a player with hypothermia, you should:
    a. Re-warm the body gently
    b. Remove wet clothes
    c. Give warm fluids if fully conscious
    d. All of the above
28. What should you do for a player who is experiencing heat exhaustion?
    a. Force the player to drink lots of cool water
    b. Get the player into a cooler environment
    c. Have the player rest until the feeling passes
    d. All of the above
29. A player has a severe muscle cramp in the calf. Proper care would be to:
    a. Bend the knee and point the toes and foot
    b. Bend the knee and flex the toes and foot
    c. Straighten the knee and point the toes and foot
    d. Straighten the knee and flex the toes and foot
30. A player's front tooth is knocked out during a practice session. The tooth should be:
    a. Washed in water and replaced in the players tooth socket
    b. Stored in saline until a dentist can replace it
    c. Stored in milk until a dentist can replace it
    d. Any of the above is acceptable
31. A player comes to you after being stepped on by an opponents boot sprigs. The type of injury you suspect is a(n):
    a. Abrasion
    b. Puncture
    c. Avulsion
    d. Laceration
32. Before attempting to resuscitate a player using CPR, which of the following conditions must exist?
    a. Dilated pupils
    b. Absence of breathing
    c. Unconsciousness
    d. Irregular respirations
33. At what rate should chest compressions be performed during CPR efforts on an adolescent?
    a. 50-70 compressions per minute
    b. 80-100 compressions per minute
    c. 100-120 compressions per minute
    d. 60-80 compressions per minute
34. What is the breath (ventilation) to compression ratio when performing CPR on an adolescent
    a. 12 compressions to 2 ventilations
    b. 5 compressions to 1 ventilations
    c. 15 compressions to 2 ventilations
    d. 30 compressions to 2 ventilations
35. The first action that should be taken when approaching a collapsed, injured player is to:
    a. Move the player off the playing surface
    b. determine responsiveness
    c. Check for breathing
    d. Check for pulse
36. Complications which may occur as a result of external chest compressions when performed properly include:
    a. Rib and sternum fractures
    b. Punctured lungs and liver lacerations
    c. Both a and b

CONCUSSION

From time to time injuries do occur in matches and at training sessions. Some of these are serious and require medical attention; others are not serious and require only minimal treatment. The following questions are in regards to one such injury that may occur and this is concussion

2.1 Have you ever heard of the term concussion?

Yes ☐ **No** ☐

If you have not heard the term concussion have you heard of a head knock?

Yes ☐ **No** ☐

2.2 Do you know how to recognise a concussion in any of the players you look after?

Yes ☐ **No** ☐

3.1 In your opinion, is a concussion more serious than other typical sports injuries (e.g. bruises)

Yes ☐ **No** ☐

3.2 Do you think that a concussion can influence the person's school, work, study or sporting activities?

Yes ☐ **No** ☐

If Yes, for how long? _____ weeks or _____ days

3.3 Have you ever discussed the consequences of a concussion with your players?

Yes ☐ **No** ☐

3.4 Do you think that continuing to play while recovering from a concussion can lead to any serious health consequences?

Yes ☐ **No** ☐

3.5 Would it bother you if the player continues to play / train while they are recovering from a concussion?

Yes ☐ **No** ☐

3.6 If the player reported headaches and/or feeling a bit dizzy sometime after they were concussed, would you let them play and/or train?

Yes ☐ **No** ☐

3.7 Does wearing headgear help prevent a concussion?

Yes ☐ **No** ☐

Please only give **ONE** response to this question:

4.1: If you were aware or suspected that a player had been concussed – would you allow them to:

a. Continue to play / train ☐
b. Forbid them to play / practice until they felt better ☐
c. Check with their coach before allowing them to return to play ☐
d. Insist they see a Doctor before returning to play / train ☐
a. Other (please specify ☐

_____

_____

4.2 Do you know of any rules or guidelines that suggest when a player with a concussion should return to play?

Yes ☐ **No** ☐

If **Yes,** please can you specify the rule or guideline:

_____

and/or indicate what you understand about these:

_____

_____

5.1 If you were aware or suspected that a player had been concussed, from whom or where would you seek advice? (Tick all that apply)

a. I would not seek advice ☐
b. Family Doctor ☐
c. Hospital emergency department or after hours clinic ☐
d. Coach ☐
e. Ambulance Officer ☐
f. Family friends ☐
g. The World Wide Web(specify: _____) ☐
h. Other (specify: _____) ☐

5.2 Have you ever sought information on concussion to help you understand more about this injury?

Yes ☐ **No** ☐

If **Yes** – where did you seek the information from?

_____

5.3 Have any of your players been concussed during the current season

Yes ☐ **No** ☐

If **Yes**, did they visit a medical doctor to see if they were OK or needed more attention following their injury

Yes ☐ **No** ☐

5.4 Do you, or any one in the team management get written clearance for any of your players that have been concussed?

Yes ☐ **No** ☐

If **Yes** – where do the written clearances go, and what is done with them?

_____

_____

6.1 Which of the following symptoms are results of a playing having suffered a concussion?

	Symptom	**Yes**	**No**	**Don't Know**
a.	Abnormal sense of smell	☐	☐	☐
b.	Abnormal sense of taste	☐	☐	☐
c.	Amnesia (loss of memory)	☐	☐	☐
d.	Blurred vision	☐	☐	☐
e.	Black eye	☐	☐	☐
f.	Chest pain	☐	☐	☐
g.	Confusion	☐	☐	☐
h.	Dizziness	☐	☐	☐
i.	Headache	☐	☐	☐
j.	Loss of consciousness	☐	☐	☐
k.	Nausea	☐	☐	☐
l.	Nosebleed	☐	☐	☐
m.	Numbness/Tingling upper extremity	☐	☐	☐
n.	Sharp burning pain in neck	☐	☐	☐
o.	Sleep disturbances	☐	☐	☐
p.	Weakness of neck range of motion	☐	☐	☐

6.2 Which of the following statements are true in regards to concussion and concussion management?

		True	**False**	**Don't Know**
1	A concussion only occurs when a player loses consciousness (blacks out).	☐	☐	☐
2	A simple concussion requires immediate removal from the game or training.	☐	☐	☐
3	A player who reports having a headache after a concussion will likely demonstrate other signs.	☐	☐	☐
4	A player who displays any signs or symptoms of concussion should not be allowed to play.	☐	☐	☐

7. RECOGNITION

7.1. What is the minimum time a player has to be knocked out to have a sport-related concussion?

a. Players do not have to be knocked out
b. Less than 30 seconds
c. 1 to 2 minutes
d. 5 minutes

7.2. Which sign would a player with a concussion present with (excluding other injuries)?

a. Bleeding from the nose or mouth
b. Excessive sweating
c. Inability to move head in one or more directions
d. Slow to answer questions

7.3. Which of the following situations is most likely to result in a sport-related concussion?

a. Body checking in men's lacrosse
b. Heading a ball in soccer
c. Setting a pick in basketball
d. Contact with the head in a tackle

7.4 How important is the proper recognition of a sport-related concussion?

a. It's not very important. They just need time to walk it off.
b. It's a minor injury. They should put ice on their head after training or matches.
c. It's a normal injury. They should go see the trainer after the practice or game.
d. It's a serious injury. They need immediate attention.

7.5. What sports can a player get a concussion playing?

a. Sports where a ball is being thrown or hit
b. Sports where collisions are common
c. Sports where protective equipment is required
d. All sports

7.6. You might suspect a player has a concussion if they complain of which of the following symptoms?

a. Excitement or happiness
b. Feeling "in the zone"
c. Headache or dizziness
d. Hunger or thirst

7.7. What sign may indicate that a player's concussion is getting worse?
- a. Acting extremely hyper
- b. Developing a rash around the head and neck
- c. Fading in and out of consciousness
- d. Clammy skin

7.8. Which of the following is true of a player in the hours or days following an initial sport-related concussion?
- a. They can begin to sweat excessively
- b. They can develop extreme hunger or thirst
- c. They can experience new or different symptoms of a concussion
- d. They can get a rash around the head and neck

8. MANAGEMENT

8.1. When a player has sustained a concussion, what should your immediate action be?
- a. Activate the club's emergency action plan
- b. Send to a doctor or hospital
- c. Give the player medicine and let him rest
- d. Let the athlete walk it off

8.2. Coaches and other appropriate staff should be trained in a concussion action plan that includes which of the following components?
- a. Phone numbers of the club administrators and other coaches
- b. Signed progress reports and permission to treat forms
- c. Step-by-step directions for assessing a concussion
- d. Ways to recognize a concussion and emergency contact numbers

8.3. Before returning to play following a concussion and being cleared by qualified medical personnel, a player should meet which of the following criteria?
- a. Able to pass a written test
- b. Free of symptoms during rest and activity
- c. Given time to walk it off
- d. Prescribed medication

8.4. Should every level of player be allowed to return to competition at the same rate of return?
- a. Yes, all player's recover at the same rate.
- b. No, junior player's take longer to return than other player's.
- c. No, premier player's take longer to return than other player's.
- d. No, professional player's take longer to return than other player's.

8.5. What is the least amount of time a player should stay out of sports after having a sport-related concussion?
- a. 12 hours
- b. 1 day
- c. 7 days
- d. 21 days

8.6. When should a player's parents or next-of-kin be contacted after a sport-related concussion?
- a. If you think the player needs to see a doctor or go to hospital
- b. The player can tell their parents or next-of-kin when they get home
- c. After the player has been cleared to return by medical personnel
- d. When you suspect a player has a concussion

8.7. What activities should a player NOT participate in if they are still symptomatic (showing sport-related concussion symptoms)?
- a. Any level of sport activity
- b. Games
- c. Practice
- d. Warm-up

8.8. What is the most effective kind of treatment for a player with a concussion?
- a. Exercise without contact to the head
- b. Medicine from a doctor
- c. Time to rest
- d. Radiographs and imaging performed by doctors

9. PREVENTION

9.1. Who should be in the targeted group of individuals that need to participate in an education program concerning concussion awareness?
- a. Athletes, parents, and coaches
- b. Hospital staff and emergency services personnel
- c. Referees, league directors, and sports administrators
- d. Sports equipment makers and retailers

9.2. Which of the following should an education program designed to increase awareness about sport-related concussion include?
- a. Medical definition and terminology
- b. Preseason testing and physical
- c. Symptoms and care instructions
- d. Team policies and procedures

9.3. What components should preseason testing for concussion include?
- a. Baseline testing (balance and mental tests) and medical history
- b. Magnetic resonance imaging and radiographs
- c. Nothing. It is already included in the physical examination.
- d. Pulse and blood pressure

9.4. What technique is most effective in helping prevent concussions while a player is out playing on the field?
- a. Avoiding plays were head contact may occur
- b. Playing on artificial turf
- c. Reminding athletes to play fair
- d. Wearing properly fitting mouthguard

9.5. When should a plan for concussion management (ie, screening, education) be in effect?
- a. During preseason
- b. After the season starts
- c. In the off-season
- d. Year-round

9.6. What is one major concern about returning a player to play before completely recovering from an initial concussion?
- a. Blind spots in vision
- b. Inability to hear coaching instructions
- c. Lack of concentration in game or practice
- d. Second impact syndrome

9.7. Which of the following puts a player more at risk to experience another concussion?
- a. Having a poor sense of balance
- b. Having had a previous sport-related concussion
- c. Having poor neck muscle strength
- d. Participating in preseason conditioning

9.8. What action is most effective in reducing the risk of repeated sport-related concussions and the associated cumulative effects?
- a. Being educated about concussion
- b. Developing strong neck muscles in athletes
- c. Having injured athletes attend workshops about concussion
- d. Proper stretching before and after exercise

Note to readers; answers to be reproduced in the next issue of the NZJSM due for release in February 2011.

CONCUSSION

1 What is it?

It is a disturbance of brain function following head injury.

2 What causes it?

It is caused by one or more blows to the head or transmitted shock from another part of the body.

3 Symptoms - what you notice

a ***Loss of consciousness;*** **you don't need to be knocked out to suffer concussion, but the longer you lose consciousness the more severe the head injury.**

b ***In the first day after injury you may notice:***

- **Headache**
- **Blurred Vision**
- **Irritability**
- **Memory Loss**
- **Gait Disturbance - unable to walk a straight line.**

c ***Over the next few days or weeks you may notice:***

- **Dizziness**
- **Slow decision-making (impaired cognition).**
- **Fatigue**
- **Decreased concentration span.**

These are all symptoms of the post-concussion syndrome.

4 Signs - what the doctor finds.

a **Decreased level of consciousness.**
b **Signs of local brain irritation (localising signs), eg, weakness of one arm or leg.**
c **Poor short term memory.**
d **Decreased concentration span (eg, digit span).**
e **Unsteady gait.**

5 Investigations

Unless there is evidence of a possible skull fracture, x-rays are not needed. If there is evidence of severe head injury, a CT or MRI scan may be necessary. The most useful test is the digit symbol substitution test (or DSST). This is a paper based assessment of speed of informatioon processing. Ideally, there should be a pre-season baseline test with which to compare the post-concussion results. In recent years, computerised tests have been developed and are the most appropriate for professional athletes.

6 Treatment

a **Rest from all exercise until all symptoms resolve.**
b **Once you are free of symptoms you can progressively return to full training, starting with gentle aerobic exercise.**
c **If you can manage aerobic training without getting a headache or other symptoms, you can restart team training.**
d **If you can manage team training without symptoms, it is safe to restart playing.**

7 Recovery Time

Average recovery time is about three weeks, which is the mandatory stand-down period in rugby. However, not all head injuries are the same, so you need to wait until symptoms have resolved.

8 Recovery Sequence

Step 1 **- Resolution of all symptoms at rest.**
Step 2 **- Resolution of all symptoms with exercise.**
Step 3 **- Safe to return to play provided:**

- **a Symptom free**
- **b Return of DSST/computerised tests to baseline (if available).**
- **c Clearance by doctor.**

Dr Chris Milne
Sports Physician

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PATIENT ADVICE SHEET

AMITRIPTYLINE AND RELATED DRUGS FOR MUSCULOSKELETAL PAIN

1 What is it?

Amitriptyline is a medicine that was originally used for depression in doses of 50-200 mg daily.

In the past 20 years, it has been used extensively for treatment of musculoskeletal pain, in much lower doses, usually 5-20 mg daily.

NB Many drugs are used for several purposes. Aspirin was originally developed for use in arthritis at a dose of 12 tablets (3600 mg) per day. Now it is mostly used to thin the blood and prevent strokes at a much lower dose of 75-150 mg per day (ie, quarter to half a tablet).

2 How does it help in musculoskeletal pain?

In lots of people with musculoskeletal pain, the muscles fire off constantly, and so they never get a chance to relax. As a consequence, you may feel pain and stiffness in muscles and nearby joints. You may have poor sleep or wake feeling unrefreshed.

Low dose Amitriptyline allows the muscles to relax and reduces the pain. Your sleep pattern should also improve.

3 Are there side effects?

Yes, there are common side effects:

a **Drowsiness; for some reason people with musculoskelettal pain are very sensitive to Amitriptyline. Therefore, I suggest they start on a low dose of 5 mg at night (half a 10 mg tablet). If they need an increased dose to control their muscle pain, this dose can be increased after a week or two. A few people find even a 5 mg dose leaves them feeling zonked out in the morning. These people should try and take their tablet after dinner rather than waiting until just before they go to bed. People with drowsiness should avoid driving or hazardous work (eg, up a ladder).**

b **Dry mouth; this is usually only a problem in the first week or so of treatment. If it is a problem, sip a little water or suck on an ice cube.**

c **Dizzy/fainting; a few people find that Amitriptyline makes them feel slightly faint when they get up from a bed or chair. This feeling usually lasts only a few seconds, but if it is a problem mention it to the doctor.**

4 Constipation

In the low doses used for muscle pain this is rarely a problem. If the bowels become sluggish, then eat kiwifruit and high fibre food (eg, bran and high fibre cereals) and drink plenty of water.

5 Is it addictive?

No. Amitriptyline is from a totally different chemical group than drugs like diazepam (Valium) or other benzodiazepines. It is not addictive.

6 How is it best taken?

It is best taken once daily just before bedtime. If it has not helped after a month, your doctor may recommend stopping it and trying another medicine.

Dr Chris Milne
Sports Physician

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Change of address advice and business correspondence to:

Sports Medicine New Zealand Inc
PO Box 6398, Dunedin, New Zealand
Phone +64-3-477-7887 • Fax +64-3-477-7882 • Email smnznat@xtra.co.nz
Website www.sportsmedicine.co.nz