

SPORT

HEALTH

VOLUME 32 ISSUE 4 2014/15

CRICKET WORLD CUP ISSUE

Head injuries
in cricket



- Biomechanics of performance and injury in cricket
- Cricket pitch preparation
- High stability surgeries that also allow for quick recovery
- Working with the NZ BLACKCAPS

Cricket Australia's
2014 Injury Report

What it's like to
work in cricket





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FROM THE CHAIRMAN

CALL TO ACTION FOR SAFER SPORT



Peter Nathan
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SMA CHAIRMAN, PETER NATHAN CALLS ON SMA MEMBERS TO BACK A CAMPAIGN TO EQUIP COMMUNITY SPORTING CLUBS TO RESPOND TO AND MANAGE MEDICAL EMERGENCIES.

It's now been almost three months since cricketer Phillip Hughes tragically died as a result of a freak injury in the field of play. Following much analysis of the situation and widespread grieving throughout the cricket community and beyond, we now have an opportunity to focus on the lessons that might be taken from an incident of this kind.

In the wake of this situation, SMA will shortly launch a campaign calling on all levels of government to address the inability of community sporting clubs to respond to and manage medical emergencies.

New SMA data has revealed the majority of community sporting clubs are drastically ill-prepared to manage a catastrophic incident. Up to 80 per cent of sporting clubs alone don't have medical emergency plans in place, while 70 per cent don't have a Safety Officer or undertake sports safety promotion.

When an unexpected, rare medical emergency occurs on a sporting field what happens in those first few minutes immediately after the incident can be the difference between life and death.

At an elite level when something such as this occurs there is usually a team of sports medicine experts on hand to provide immediate treatment and emergency care using a carefully planned set of procedures.

In the case of Phillip Hughes, having those personnel and procedures in place almost certainly ensured he reached the hospital alive and provided further hope of survival.

When they occur at a community level, rarely are clubs prepared to manage these catastrophic incidents.

We don't expect every local club to have a full team of sports medicine experts on hand for every game, but we do want to see governments and the sporting community taking action to address this critical shortfall in community sport's ability to respond to and manage a medical emergency.

Each and every sporting club should be supported to develop a medical emergency plan and provide volunteers at every game and training session who have been trained in first aid and injury management.

We also want to see mandatory placement of defibrillators in sporting clubs across the country.

We are urging SMA members and anyone with an interest in making community sporting clubs safer to get behind this campaign, and lobby all levels of government to address this critical issue.

Founding Director of Defib Your Club for Life, Andrew White, has thrown his support behind the campaign in the hope that Phillip Hughes' tragic passing will draw attention to the need for clubs to be equipped to respond to medical emergencies, including sudden cardiac arrest.

Over recent years there have been too many instances where sudden cardiac arrest has claimed lives on the sporting field. This needs to be addressed.

Sadly, not all clubs are equipped with defibrillators. We know there is very strong evidence that early defibrillation significantly increase the chance of survival following sudden cardiac arrest.

More details on this campaign will be released soon.



We are urging SMA members and anyone with an interest in making community sporting clubs safer to get behind this campaign, and lobby all levels of government to address this critical issue.

A NEW ERA FOR *SPORT HEALTH*

FROM THE
CEO

SMA CEO, NELLO MARINO WELCOMES A CHANGE TO OUR BELOVED PUBLICATION.

Welcome to the first *Sport Health* of 2015 and to a new and revised format. *Sport Health* has been a staple of the SMA membership offering since 1983. Since then it has gone through at least six changes in design and format. Over these 32 years it has become a trusted industry publication that has endeavoured to serve the very diverse make-up of the SMA membership.

Yet in the words of the Greek Philosopher Heraclitus, 'there is nothing more constant than change' and yes, *Sport Health* is again going through a significant change. SMA members were alerted recently that this issue would be the first presented in an 'electronic only' format. Yes, SMA has published electronic versions of *Sport Health* to accompany the printed version over recent years, however following a recent decision by the SMA Board, we are committing completely and solely to *Sport Health* in an electronic format.

Accompanying this commitment is a range of new and exciting possibilities that are impossible to deliver in a printed structure. Opportunities such as video articles, live links, comment and discussion sharing between readers – the list goes on. This is a real opportunity for readers to get an even greater insight into the personalities and information that make up SMA.

Being electronic will also provide an opportunity for this valuable

communication channel to extend beyond the SMA membership alone with subscription to the publication able to be made available to anyone with an interest in sports medicine and science. Based on this we anticipate the readership to instantly swell from a few thousand to tens of thousands.

Naturally this is an enormous opportunity to further inform the active community about Sports Medicine Australia members, the benefits of physical activity, participating safely and how to get the best of care when an injury may occur.

We hope you enjoy the first issue of *Sport Health* in an electronic only format and I personally welcome your feedback and suggestions on the publication.

MORE EXCITING PUBLICATION NEWS

I am also delighted to announce that SMA has recently renewed its contract to publish the *Journal of Science and Medicine in Sport (JSAMS)* with Elsevier for a further five years. Under Editor in Chief, Professor Greg Kolt JSAMS has gone from strength to strength and now sits amongst the quality journals of its kind world-wide. Following a rigorous tender process, we are very excited at the new and innovative initiatives that Elsevier have planned in partnership with SMA. More subscription and general information about JSAMS is available at jsams.org



Nello Marino

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In the words of the Greek Philosopher Heraclitus, 'there is nothing more constant than change' and yes, Sport Health is again going through a significant change.

5 MINUTES WITH DR PETER BRUKNER

5 MINUTES WITH DR PETER BRUKNER, SPECIALIST SPORTS AND EXERCISE PHYSICIAN, FOUNDING PARTNER OF OLYMPIC PARK SPORTS MEDICINE CENTRE, MELBOURNE AND ASMF FELLOW.



What is your day job?

Australian Cricket Team Doctor.

What does a typical day consist of?

It depends on whether we are training or have a game. On training days, apart from managing any injuries or illnesses, I try and help out in any way during training (drinks, picking up balls etc). We usually have a couple of players doing rehab on the ground or in the gym, so I help out our physio Alex Kountouris with this. After training Alex and I will treat the players in the team room. My main contribution for soft tissue injuries is dry needling. I also contribute behind the scenes organising social events, visits to sporting events, and regular presentations at team meetings. Currently I am doing a presentation on one of the previous World Cups at each meeting.

What is your favourite aspect of your job?

Enjoying the team's success with the players and staff.

What has been the highlight of your career?

There have been lots of highlights. Freeman night at the Sydney Olympics was pretty special. I was Team Manager of the Athletics Team and was Cathy's minder for the few hours after her win.

How did you become involved in SMA?

I first joined SMA (or ASMF as it was then) when I returned to Australia from the UK in 1983 and presented at my first of many conferences that year in Ballarat. I then joined the Victorian, and later the National Board.

Tell us how you became to be involved in cricket and with the Australian Cricket Team.

I had just finished a couple of years at Liverpool FC in 2012 and was asked to do a short cricket tour of United Arab Emirates. The cricket team had never had a permanent doctor and after that tour I was asked if I was interested. I have been with the team ever since.

Beside from sports medicine, what are you passionate about?

Sport, exercise, nutrition and especially family.

What's the best piece of advice anyone has even given you?

'Treat other people the way you would like to be treated yourself' from Alan Salter my old footy coach at Uni Blues.

Name four people, living or not, you would invite for a dinner party and why?

Right now it would be my four kids who are currently scattered all over the world so we never get them all together. But apart from them I would have a sports medicine dinner party consisting of Tim Noakes, South African exercise scientist and clinician; Andrew Pipe, eloquent Canadian and drugs in sport guru; Stan Herring, sports physiatrist from Seattle and the Seahawks team physician; and Karim Khan, my co-author. It would be a very stimulating and amusing dinner.

FAVOURITES

Travel destination: Any major sporting event.

Sport to play/watch: Love watching all sport but probably AFL, soccer, hockey and of course cricket, would be my favourites.

Cuisine: French but love all good healthy food.

Movie: Jersey Boys.

TV program: Really only watch sport on television.

Song: You'll Never Walk Alone (the Liverpool FC anthem).

Book: Nina Teicholz's *The Big Fat Surprise* – every health professional should read it.

Gadget: My iPhone – I would be lost without it.



PROTECT YOURSELF WHILST HEALING OTHERS

Sports Medicine Australia and JLT Sport are pleased to announce we have enhanced all the benefits within the Insurance package in the Sports Trainer Membership for no additional cost to the members. We pride ourselves of including the most competitive offering to our members.

Our Sports Insurance policy will provide:

SPORTS LIABILITY COVER

- Public Liability (\$20 Million)
- Products Liability (\$20 Million)
- Professional Indemnity (\$10 Million)

PERSONAL ACCIDENT

- Capital Benefits (Death and total disablement \$100,000)
- Loss of Income (\$500 a week up to 52 weeks)
- Medical Benefits (non-Medicare costs up to \$3,000)

The Policy operates while a sports trainer is working in activities involving:

- playing in club, representative, state or national matches
- training routines arranged by the club, league, association or federation
- travelling directly to or from the above activities and residence or place of employment or club premise
- staying away from home during a tour for the purpose of participating in representative matches
- an administrative capacity or organised social and fundraising activities

**PLEASE NOTE, THIS POLICY IS ONLY AVAILABLE TO SMA ACCREDITED SPORTS TRAINERS.
IF YOU REQUIRE INSURANCE TO WORK AS A PERSONAL TRAINER, FITNESS LEADER OR
SOFT TISSUE THERAPIST, PLEASE CONTACT KIRSTEN MILLS AT JLT ON TEL +61 3 9613 1493
FOR FURTHER INSURANCE OPTIONS.**

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WORKING IN CRICKET

WHAT'S DIFFERENT FOR **MEDICAL STAFF?**

DR J EXPLAINS THE ROLE OF THE SPORTS MEDICINE TEAM IN CRICKET AND WHY INJURY PREVENTION FROM THE SPORTS MEDICINE TEAM IN CRICKET IS DIFFERENT TO THE FOOTBALL CODES.

WORKING IN CRICKET

WHAT'S
DIFFERENT
FOR
**MEDICAL
STAFF?**

IF THERE IS SUCH A THING AS AUSTRALIA'S NATIONAL SPORT, THEN IT IS PROBABLY CRICKET. IN INDIVIDUAL STATES, CRICKET MAY COME IN AS NUMBER TWO (WITH RESPECT TO SPECTATOR ENGAGEMENT) BEHIND AFL (PARTICULARLY IN THE SOUTHERN STATES). THIS IS NOT LOST ON CRICKET TALENT MANAGERS WHO REALISE THAT IT IS MUCH HARDER COMPETING FOR THE MINDS AND BODIES OF THE ATHLETIC, LEAN YOUNGSTERS IN VICTORIA, SOUTH AUSTRALIA, WESTERN AUSTRALIA AND TASMANIA.

There is no doubt that rugby league and union have plenty of avid followers particularly in New South Wales and Queensland, but it is interesting that the ideal body type of rugby players differs enough from cricket so that there is less competition for the same athletes. However, a surprisingly small number of sports medicine professionals have worked for a cricket team. If SMA members were surveyed with the question: 'Which sports have you worked in professionally?' then I don't know whether cricket would actually make the top five.

At the top of the pyramid, cricket in Australia has reached the point of being as professionally managed, medically-speaking, as the top football teams. The Australian Cricket Team has a full-time travelling doctor and physiotherapist, as well as independent positions at Cricket Australia of Chief Medical Officer, Head of Sports Science and Sports Medicine, and physiotherapists in charge of rehabilitation at the state-of-the-art National Cricket Centre in Brisbane. Each of the six state organisations also have one or more doctors and full-time physiotherapists. But in general the workload of cricket medical staff is different from similar professionals working in the football codes. There is more time spent watching games, emailing management plans and teleconferencing (and travelling), even though there is still plenty of acute treatment to do. I like to make the comparison that a doctor at an average football game probably has two hours of acute management work spread out over three to four hours, whereas a doctor at an average day of cricket has the same two hours of acute

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work but spread over eight to nine hours. Efficiency involves trying to make good use of the remaining hours in other medical management tasks. In terms of injuries and illnesses presenting per hour of actual play, cricket is clearly of a lower intensity than the football codes. Cricket Australia has certainly decided that it is better to have high quality staff on hand when you need them.

At the lower levels of the game, injury rates, time and economics mean there is less requirement and therefore opportunity for sports medicine professionals to work directly with cricket teams. For starters, the injury profile in cricket is slanted towards what we traditionally call 'overuse' injuries rather than 'traumatic' injuries. The injury rates for full-time professional cricketers are higher than amateur players because of the amount of cricket played at the top levels. In this sense cricket is similar to sports like tennis and swimming, which also have very high injury rates at the elite end but are relatively low-risk sports for injury at amateur level.

But even though you might expect to see the odd finger injury on any given day if you were, say, a physiotherapist offering to work at your local cricket club, there would be a lot of waiting around between presentations. All over Australia there are physiotherapists and even doctors

working at city and country football matches who would be called upon for their services at least a few times for a two hour match and as a result generate referrals for their clinic during the week. The cricketers who are seen in a sports medicine or physiotherapy practice have usually made their own way there rather than having someone from the clinic working at the actual game. Again, in this sense cricket is similar to the individual sports like athletics, swimming and tennis than it is to the football codes.

Cricket is sometimes described – even by those from within – as an individual sport dressed up as a team sport. But as it really is a team sport (and as mentioned probably our number one national team sport) there is certainly plenty of public scrutiny attached to injuries suffered by players in our national men's squad. Externally this scrutiny can be quite harsh, particularly from those sections of the media where the journalists' work consists of reporting on cricket and some of the football codes. In football, the pack mentality (amongst the public, media and even health professionals) is that you can't prevent traumatic injuries but you should be able to prevent overuse injuries. The medical team actually builds credit points looking after all of the acute traumatic injuries suffered by a football team – pulling dislocated shoulders back

into place, stitching up head lacerations and getting players back on the field, and organising players with snapped ACLs to see a top surgeon. When a football team starts getting too many hamstring or other soft tissue non-contact injuries, the medical and fitness teams may need to use up any credit points to deflect some of the blame for overuse injuries which may be heading in their direction. Although the dichotomy between non-preventable traumatic and preventable overuse injuries is a myth, it is certainly true that you can increase the risk of overuse injuries by flogging players too hard in training. It is part of the combined skill of fitness, medical and coaching teams in football to train players hard enough to have their fitness at a peak, but not so hard that the rate of overuse injuries is too great.

In cricket, the majority of injuries are overuse injuries and the burden of these fall disproportionately to fast bowlers (although hamstring injuries are increasing in all types of players as T20 cricket becomes more popular). The medical team doesn't get to do nearly as much work patching up traumatic injuries as in football and must sit back at times looking relatively helpless (in the eyes of those used to watching football) when overuse injuries mount up. This is because workload patterns of cricketers



But in general the workload of cricket medical staff is different from similar professionals working in the football codes. There is more time spent watching games, emailing management plans and teleconferencing (and travelling), even though there is still plenty of acute treatment to do.

(the greatest modifiable risk factor for overuse injuries) are far more variable and determined primarily by conditions that are out of the control of the cricket medical and fitness staff. The football fan (or journalist) might point the finger and ask – why can't the medical and fitness team in cricket prevent our fast bowlers from breaking down so often (because medical and fitness teams in the football codes often claim to be able to do such a thing)? The answer is that our influence is arguably smaller because of some of the unique circumstances of cricket.

Another way to illustrate this is to look at how you'd manage a cricket squad if your only aim was simply to reduce the injury rates. You might develop a deep bowling attack based primarily on spin rather than pace, because spinners get injured far less often than pace bowlers. The pace bowlers you'd pick would be aged mainly between 25 and 30, because this is the age least at risk for fast bowlers. Perhaps you might prefer workhorse type pace bowlers rather than out-and-out speedsters, as the express types again are slightly more prone to breaking down. You might prevent pace bowlers you

wanted to play in first class cricket from playing in shorter forms of the game (and vice versa) because rapidly changing from low workloads to higher ones and back again is the biggest risk factor for injury that we know of. If in a Test match your opposition was smashing lots of runs against you and not losing many wickets or your pace bowlers were starting to get niggling muscle injuries, you'd stop bowling your frontline bowlers to prevent them getting fully injured and start bowling part-timers, again to spread the workload around. Now it's all very well to say these things (...and I could go on), but the reality is that the selectors, coaches and captains are never managing a cricket team with the sole aim of preventing injuries. Believe it or not, their focus is almost totally on strategy that will maximise chances of winning the current or next match to be played! The role of a doctor or physiotherapist or conditioner working with an elite cricket team is certainly not to tell the selectors who to pick or to tell the captain who to bowl and everyone in cricket understands this fully. An analogy might be an economist giving advice to a treasurer in preparing for a budget – the advice from the economist

DO YOU NEED A SIDE OF CARBS WITH YOUR EXERCISE?

Most athletes know that they need to replace the electrolytes that sweat takes out, but if you are training to achieve a specific body composition or fitness goal then you may want your hydration without the additional carbs.



TO CARB OR NOT TO CARB...

Carbohydrates are important for sport because they provide a source of fuel for your muscles. During exercise, many people use a rehydration formula that contains carbohydrates and electrolytes to replace fluid and salts lost through sweat. However, there are sporting situations when these additional carbs may not be necessary and are actually working against your goals despite the hard work you're putting in.

TIMES WHEN YOU MAY NOT NEED CARBS IN YOUR REHYDRATION

- Training for less than an hour at a low to moderate intensity such as walking or jogging for shorter periods, or doing low intensity exercise such as yoga or tai chi.
- Your goal may be weight management, or perhaps you are on a training plan to support specific body composition.
- You may want the option to take electrolytes with minimal carbs if you prefer to use Sports Energy Gels or food based carbs, as your preferred carb fuelling method.

REFRESHINGLY LOW CARB REHYDRATION

Until now, quality electrolyte formulas with low carbohydrates have been hard to come by. New Endura Rehydration Low Carb Fuel provides sodium and potassium to meet your body's rehydration needs and has less than 1.3 grams of carbs per dose! With the addition of Meta Mag® Magnesium to help prevent muscular cramps and spasms and relieve aches and pain, Endura Rehydration Low Carb Fuel has your recovery fuel sorted. Now you can stay hydrated with minimal carbs and achieve your fitness goals.



Available in Lemon Lime, Coconut, Tropical Punch and Grapeberry flavours.

WORKING IN CRICKET

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FOR
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STAFF?

about what to be wary of is expert and well-thought out, but the treasurer and not the economist will be making the final decisions. With the expanding schedule in cricket and rapid transition from one form of the game to the other, trying to conserve players is now much more on the radar of selectors thanks to the input of the medical staff. However if the selectors think that bowler A could do the required job better than bowler B, most (but admittedly not all) of the time they will pick him, even if the medical staff have flagged bowler A as being at increased risk of injury due to recent workloads. What those in Cricket Operations (coaching/selectors) appreciate from their medical team is good management of injuries when they occur and good advice from the medical team about injury risk when clear judgment can be made, but then a clear demarcation that they will make (and then ultimately bear responsibility for) the final decisions. Whereas a football coach might be prone to direct a snide remark in the direction of the medical team if a couple of players have recently broken down with soft tissue injuries, internally in cricket there is much more understanding that other factors beside the medical team are the cause of overuse injuries in a sport structured the way that cricket is.

If you work in a professional cricket medical team, you just accept that part of the job will be getting criticised in public for not preventing overuse injuries (mainly by those without experience working in modern cricket). Funnily enough, criticism from the bleachers will tend to be even greater if the selectors ever announce they are resting a player for precautionary reasons because he has played too much cricket recently. The utopia that the fans and commentators want is a set of fast bowlers that never stop bowling at absolute express pace and never miss a game through either injury or injury prevention (and they also don't mind the idea of cricket being on TV every day of the season or even year)!

However, there are certainly ways in which cricket injury management has changed with the influence of more engaged medical staff. The most obvious and important example is the management of lumbar back injuries (particularly stress fractures) in fast bowlers. In the medium-term past (say 20 years ago in Australia) the mentality of fast bowling was that your back would get sore as you entered the elite fast bowling ranks but you had to keep bowling and be mentally tough enough to cope with this as part of your job. It may have been partially known then, but we

certainly can prove now (with imaging) that a huge burden of this back pain problem particularly in younger bowlers was due to lumbar stress fractures. Now the 'old school' fast bowlers are certainly correct when they say that it may be possible to keep bowling despite having a lumbar stress fracture. Some of them obviously did it and have lived to tell the tale. However, the key question is whether it is good management (from the perspective of the bowler, in the short or long term, and the team) to do so. We also live in an era where if you start dropping 5kph off your regular pace as a fast bowler everyone will immediately pick up on it. If you get picked to play, but don't take wickets and leak runs, then the media, selectors and public won't be forgiving of the fact that you were 'carrying' an injury.

The end result is that there may be cynics who think that the modern cricket medical team are trying to rule out every 19-year-old promising pace bowler with a lumbar stress fracture for a minimum of six months of bowling. Even though this scenario may seem epidemic, there are some knock on effects that are demonstrably very positive. Back in the 'old school' days there were all sorts of surgical papers and textbooks describing how to surgically fix grade 2 and 3



If you work in a professional cricket medical team, you just accept that part of the job will be getting criticised in public for not preventing overuse injuries (mainly by those without experience working in modern cricket).

spondylolistheses (slips of bilateral pars stress fractures) and despite the surgery being available the results weren't pretty. In elite cricket in Australia in the 'modern' era this sort of an injury is the equivalent of measles or chicken pox, in that you almost can't recall the last time you saw a case. Early recognition and rest of lumbar stress fractures has virtually eliminated progression to career threatening slips. The other less obvious but perhaps as important change is in the longevity of fast bowlers in the modern era. Back in the 70s and 80s (although they 'bowled through back pain') it appears as if, historically, the average fast bowler was more likely to be 'cooked' once they hit their early 30s. Even though we may be holding back fast bowlers from bowling for some of the developmental years, if it means that they can still be bowling at good pace into their mid or even late 30s (as the modern bowler seems more able to be capable of, despite the history of early career stress fractures) then the ledger is in the positive for both player and team (Australia!). It might be a bit cheeky to claim it, but I also think that the almost inevitable early career stress fractures of fast bowlers could be helping our batting totals. The 'old school' management of stress fractures involved immobilisation in a brace. Whilst we



do restrict bowling, quite often we'll encourage a young 'quick' with a low grade stress fracture to start playing second grade as a number six batsmen for a season until we can clear them to bowl. Many of our fast bowlers have chalked up a few grade 'tons' during this modified loading rehab, then later have gone on to save a Test innings that was floundering at five for not many into a respectable total.

Without much of a build-up, we have really had a summer of sport for the ages in Australia, with a great Australian Open, hosting the Asian Cup and culminating in a cricket World Cup. From a cricket viewpoint in Australia, the death of the 50-over ODI has been totally exaggerated but both the Test scene and T20 format

at domestic level are thriving. The modern schedule will continue to feature plenty of cricket because there is genuine public demand for it, which is great. The role of the sports medicine team in cricket is different to other sports, but just as in other sports the sports medicine team is there to serve the needs and circumstances of the particular sport rather than to dictate it.

ABOUT THE AUTHOR

Dr J is a sports physician located in Sydney, NSW. The opinions expressed in this article are his own personal opinions.

INJURY REPORT

2014 CRICKET AUSTRALIA

THE CRICKET AUSTRALIA 2014 INJURY REPORT ANALYSES INJURIES OCCURRING PROSPECTIVELY IN AUSTRALIAN CRICKET AT THE MEN'S STATE AND NATIONAL LEVELS OVER THE LAST NINE YEARS IN PARTICULAR, CONCLUDING IN SEASON 2013-14, WHICH IS THE RECENT FOCUS OF THE REPORT. IT ALSO COMPARES THIS NINE YEAR PERIOD ('T20 ERA') WITH THE PREVIOUS NINE YEARS (STARTING 1996-97) TO ANALYSE LONG-TERM TRENDS OF INJURY.

The following is a summary of the Report, with the full version able to be downloaded here. ►

SUMMARY OF KEY FINDINGS

- **Change in workload a key risk for fast bowling injuries:** our recently published research suggests that sudden change in workload is probably the greatest risk factor for injury in fast bowlers. Tendon injuries are most affected, and are more susceptible to injury with sudden upgrades to high bowling workloads (e.g bowling five overs in a T20 match then soon after bowling 50 overs in Test cricket). Therefore, consistent bowling workloads reduce the risk of tendon injuries. In addition, for young fast bowlers gradual upgrades in workload are recommended to reduce the risk of bone stress injuries.

Overs bowled in matches each season 2005-06 to 2013-14

	Av 98-9 to 04-5	Av 05-6 to 13-14	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
Champions League T20	0	89	0	0	0	0	210	175	154	173	97
Domestic T20	0	782	241	470	570	659	615	730	1181	1296	1272
Domestic One Day	2510	2533	2751	2877	2606	2751	2846	2546	2315	2238	1869
Domestic First Class	9821	9707	9645	9967	9713	9974	9745	9297	9511	9093	10419
International T20	3	151	58	20	171	121	152	224	158	232	223
One Day International	1204	1154	1577	1488	805	959	1657	1226	1040	721	911
Test match	1945	1917	2756	890	1136	2833	2116	1419	2128	1728	2250
Total overs	15483	16334	17027	15711	15001	17299	17341	15617	16488	15481	17041

- **Injuries in season 2013-14 at a seven year low:** season 2013-14 was a season with relatively low injury prevalence at state/overall (10.8%) and national team (10.8%) level. These are both the lowest figures recorded since season 2006-07.
- **Possible reasons for the low injury figures:**
 - At national level, the Australian national men's team was very successful, particularly in Test cricket. Winning cricket is usually associated with lower risk of injury, as there is often less need for fast bowlers to over-bowl and risk getting injured from the sudden increase in workload. This happens if the opposition is being dismissed quickly and if the team's own batsmen are spending long periods occupying the crease.

At domestic level, a major change in the schedule occurred in 2013-14 with the domestic one day competition being held as a stand-alone fixture at the start of the cricket season. This substantially reduced the number and frequency of format changes (moving back and forth from one day to Shield) for players.

TRALIA



INJURY REPORT 2014

As changes in workload are a key risk factor for fast bowling injuries, the format change for the domestic one day competition should assist in reducing injuries. In practice, 2013-14 showed lower injury rates than in previous years and we hope that this trend will continue if the new format remains in place.

THE T20 ERA COMPARED WITH THE PRE-T20 ERA

- **Increase in matches played:** The number of Test, first class, ODI and List A matches was essentially unchanged from the pre-T20 era to the T20 era, but there was a 35% increase in the number of overall matches played, with the increase entirely being T20 matches. The challenge for bowlers was the rapid changes in weekly workloads rather than an increase in annual workloads.
- **Increased risk of injury in the T20 era:** The T20 era was generally associated with increased risk of injury.
 - *Injuries during matches:* For match injury incidence (number of injuries during a match per squad per season) overall, there was an 18% higher chance of injury in the T20 era compared to the pre-T20 era. For match bowling injuries overall, there was a 28% higher risk in the T20 era.
 - *Injuries during the whole season:* In the T20 era there was also a 13% increase in seasonal injuries for all teams combined. However, the only individual categories of injuries that increased in the T20 era were thigh and hamstring strains and other shoulder (not tendon) injuries.



Injury seasonal incidence by body area and injury type

Injury type	Av 96-7 to 04-5	Av 05-6 to 13-14	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
Fractured facial bones	0.1	0.2	0.2	0.1	0.1	0.3	0.1	0.2	0.3	0.1	0.0
Other head and facial injuries	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.2
Neck injuries	0.1	0.1	0.2	0.4	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Shoulder tendon injuries	0.6	0.5	0.9	0.6	0.5	0.2	0.3	0.3	0.7	0.1	0.2
Other shoulder injuries	0.4	0.7	0.8	0.5	1.5	0.3	0.4	0.3	0.8	0.7	1.1
Arm/forearm fractures	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other elbow/arm injuries	0.3	0.4	0.6	0.3	0.9	0.3	0.4	0.8	0.3	0.1	0.0
Wrist and hand fractures	1.1	1.2	0.8	0.5	1.3	1.0	1.2	2.7	1.0	1.5	1.0
Other wrist/hand injuries	0.6	0.8	0.4	0.5	0.4	0.9	0.6	1.3	0.8	1.6	0.5
Side and abdominal strains	1.3	1.6	0.6	1.6	1.7	1.4	1.4	1.2	2.0	2.4	2.0
Other trunk injuries	0.2	0.4	0.6	0.6	0.1	0.1	0.3	0.3	0.6	0.4	0.2
Lumbar stress fractures	0.6	0.9	0.4	0.9	0.3	0.6	0.8	1.2	1.4	1.1	1.3
Other lumbar injuries	1.3	1.3	1.7	1.0	1.6	1.3	0.9	1.7	2.0	0.8	0.7
Groin and hip injuries	1.2	1.3	1.2	1.4	1.1	1.0	0.5	1.7	1.8	2.1	1.1
Thigh and hamstring strains	2.6	3.7	1.3	1.9	4.4	5.0	2.9	2.8	4.9	5.8	4.6
Buttock and other thigh injuries	0.2	0.4	0.0	0.8	0.5	0.3	0.3	0.5	0.5	0.8	0.4
Knee cartilage injuries	0.9	0.9	1.7	0.9	0.5	0.5	1.4	0.9	0.2	0.5	1.1
Other knee injuries	0.7	0.5	0.6	0.4	0.3	0.3	0.4	0.2	1.0	0.9	0.4
Shin and foot stress fractures	0.4	0.6	0.1	0.5	0.5	0.9	0.1	0.6	0.9	1.2	0.8
Ankle and foot sprains	1.0	0.8	0.5	0.9	1.2	1.2	0.4	1.2	0.9	0.8	0.2
Other shin, foot and ankle injuries	1.4	1.6	0.7	1.6	1.3	1.3	1.0	2.3	2.7	2.0	1.8
Heat-related illness	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Medical illness	1.0	0.8	1.5	1.0	1.3	0.3	0.2	0.7	1.0	0.4	0.5

- *Overall injury prevalence:* Overall injury prevalence increased in the T20 era as injured players missed more games – the major reason for this is that the games were scheduled more closely to fit the T20 games into the calendar.
- *Injuries by position:* Injury prevalence for each position also increased significantly in the T20 era. The largest absolute increase was a 4.7% increase for fast bowlers. Batsmen, spin bowlers and wicketkeepers all had absolute increases of injury

prevalence of approximately 3% in the T2O era, but coming off a low base in the T2O era their relative injury prevalence compared to pre-T2O era was much higher. For example, spin bowlers increased from 4.1% to 7.2% average injury prevalence in the T2O era whereas fast bowlers increased from 15.2% to 19.9%.

Injury prevalence by player position 2005-06 to 2013-14

	Av 96-7 to 04-5	Av 05-6 to 13-14	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
Batsman	4.4%	7.2%	6.4%	5.4%	7.0%	6.7%	7.3%	9.1%	9.2%	5.6%	7.8%
Keeper	2.0%	5.1%	3.0%	0.5%	1.7%	3.0%	9.0%	8.0%	13.6%	1.2%	3.2%
Pace Bowler	15.2%	19.9%	14.4%	18.8%	18.8%	19.7%	21.0%	24.2%	25.0%	19.8%	16.9%
Spinner	4.1%	7.2%	8.5%	4.0%	9.9%	3.8%	3.5%	10.8%	10.4%	10.8%	4.7%

Relative injury prevalence by player position comparison between eras

	Relative risk T2O:preT2O injury prevalence	95% CIs
Batsman	1.64	1.53-1.75
Keeper	2.57	2.10-3.14
Pace Bowler	1.31	1.27-1.36
Spinner	1.77	1.60-1.97

- *Types of injuries:* Injuries that caused players to miss more playing time in the T2O era were shoulder injuries (non-tendon), wrist and hand fractures, side and abdominal strains, low-back stress fractures, thigh and hamstring strains and shin and foot stress fractures. Injuries that caused players to miss less playing time in the T2O era were medical illness and arm/forearm fractures.

Comparison of injury prevalence by body area

Body region	Av 96-7 to 04-5	Av 05-6 to 13-14	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
Fractured facial bones	0.1%	0.1%	0.0%	0.0%	0.1%	0.2%	0.1%	0.0%	0.1%	0.0%	0.0%
Other head and facial injuries	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Neck injuries	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Shoulder tendon injuries	0.5%	0.5%	0.8%	0.7%	0.4%	0.5%	0.5%	0.0%	1.2%	0.7%	0.0%
Other shoulder injuries	0.4%	0.6%	1.0%	0.5%	1.1%	0.2%	0.3%	0.5%	0.5%	1.0%	0.3%
Arm/forearm fractures	0.1%	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other elbow/arm injuries	0.2%	0.3%	0.2%	0.0%	0.4%	0.6%	0.7%	0.6%	0.5%	0.0%	0.0%
Wrist and hand fractures	0.5%	0.7%	0.6%	0.2%	0.5%	0.3%	0.8%	1.4%	1.4%	0.6%	0.8%
Other wrist/hand injuries	0.2%	0.3%	0.1%	0.1%	0.6%	0.1%	0.3%	0.5%	0.4%	0.4%	0.1%
Side and abdominal strains	0.6%	0.9%	0.3%	0.6%	0.8%	0.8%	0.9%	1.3%	1.1%	0.9%	1.1%
Other trunk injuries	0.1%	0.2%	0.3%	0.1%	0.0%	0.0%	0.5%	0.1%	0.1%	0.2%	0.2%
Lumbar stress fractures	1.0%	1.7%	0.9%	1.6%	0.8%	0.8%	2.1%	2.7%	1.7%	1.5%	2.6%
Other lumbar injuries	0.7%	0.8%	1.1%	0.6%	0.5%	1.3%	1.0%	1.2%	1.0%	0.2%	0.3%
Groin and hip injuries	0.6%	0.7%	0.6%	1.0%	0.7%	0.4%	0.3%	1.2%	0.6%	0.6%	0.7%
Thigh and hamstring strains	0.8%	1.6%	0.3%	1.1%	1.6%	2.3%	1.5%	1.1%	2.3%	2.0%	2.3%
Buttock and other thigh injuries	0.0%	0.2%	0.0%	0.8%	0.1%	0.4%	0.1%	0.1%	0.1%	0.6%	0.1%
Knee cartilage injuries	0.7%	0.9%	1.7%	1.0%	0.6%	0.3%	1.3%	1.5%	0.4%	0.4%	0.5%
Other knee injuries	0.4%	0.6%	0.6%	0.3%	0.4%	0.5%	1.5%	0.4%	0.6%	0.4%	0.4%
Shin and foot stress fractures	0.3%	0.6%	0.2%	0.4%	0.4%	1.0%	0.2%	1.0%	1.1%	0.7%	0.5%
Ankle and foot sprains	0.5%	0.6%	0.5%	0.6%	1.6%	0.5%	0.3%	0.7%	0.6%	0.2%	0.1%
Other shin, calf, foot and ankle injuries	0.6%	0.8%	0.2%	0.4%	0.5%	0.8%	0.3%	1.3%	2.1%	0.8%	0.5%
Heat-related illness	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Medical illness	0.4%	0.2%	0.3%	0.2%	0.3%	0.1%	0.2%	0.3%	0.4%	0.1%	0.1%



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Injury prevalence categories significant changes between eras

Body region	Significant change in prevalence	Relative risk T20: preT20 era injury prevalence	95% CI low	95% CI high
Fractured facial bones	No	1.24	0.87	1.79
Other head and facial injuries	No	1.50	0.75	3.00
Neck injuries	Down	0.39	0.19	0.79
Shoulder tendon injuries	No	1.09	0.96	1.23
Other shoulder injuries	Up	1.55	1.35	1.78
Arm/forearm fractures	Down	0.38	0.24	0.62
Other elbow/arm injuries	Up	2.16	1.77	2.63
Wrist and hand fractures	Up	1.35	1.21	1.52
Other wrist/hand injuries	Up	1.27	1.05	1.52
Side and abdominal strains	Up	1.48	1.33	1.65
Other trunk injuries	Up	2.34	1.78	3.08
Lumbar stress fractures	Up	1.69	1.56	1.84
Other lumbar injuries	No	1.09	0.99	1.21
Groin and hip injuries	Up	1.16	1.03	1.30
Thigh and hamstring strains	Up	2.08	1.90	2.27
Other thigh/buttock injuries	Up	6.25	4.33	9.03
Knee cartilage injuries	Up	1.20	1.09	1.33
Other knee injuries	Up	1.46	1.28	1.67
Shin and foot stress fractures	Up	1.75	1.52	2.00
Ankle and foot sprains	Up	1.15	1.01	1.30
Other shin, calf, foot and ankle injuries	Up	1.25	1.13	1.40
Heat-related illness	No	0.00		
Medical illness	Down	0.55	0.47	0.66

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HELMET HITS

ON NOVEMBER 25, 2014 AUSTRALIAN CRICKETER PHILLIP HUGHES WAS TRAGICALLY STRUCK IN THE NECK BY A BOUNCER WHILE BATTING DURING A SHEFFIELD SHIELD MATCH BETWEEN SOUTH AUSTRALIA AND NEW SOUTH WALES.

Hughes was wearing a helmet, but the ball struck an unprotected area just below his left ear. Hughes' injury was a rare but described type of sport-related blunt cerebrovascular injury called a vertebral artery dissection which led to subarachnoid haemorrhage. On the morning of 27 November 2014, Hughes died from his injuries, three days before his 26th birthday.

Following his death questions of player safety were raised, mostly directed towards cricket helmets. The following two articles written by Andy Harland, Senior Lecturer at Loughbrough University and Dr Andrew McIntosh, Adjunct Professor at the Australian Centre for Research into Injury in Sport and its Prevention (ACRISP) at FedUni Australia present the authors' views on current protective equipment within cricket.

HEAD INJURIES IN CRICKET A SHARED

ANDY HARLAND, SENIOR LECTURER IN SPORTS TECHNOLOGY AT LOUGHBROUGH UNIVERSITY LOOKS AT WHY A PLAYER MAY NOT CHOOSE TO WEAR THE BEST PROTECTION AVAILABLE IN RESPONSE TO PHILLIP HUGHES' RECENT DEATH.

On November 27, 2014 the world of cricket suffered one of the darkest days in its recent history. Following a blow to the neck sustained from a ball bowled during a Sheffield Shield match two days earlier, Australian batsman Phillip Hughes died.

Hughes was batting well, having completed a half century, and whilst the bowling was combative, there would have been little to concern an experienced international batsman. He was playing at a standard and on a wicket he was entirely familiar with and was wearing a helmet. Perhaps not the very latest model available, but one that had served professional cricketers well enough over the several seasons it had been on the market. Sean Abbott, the unfortunate bowler, delivered a perfectly legitimate short pitched ball and could not be blamed for his part, but in a flash, Hughes was felled, never to recover. His death was truly out of the ordinary and could not have been anticipated.

When a player dies from a head injury sustained whilst wearing a helmet, it is tempting to conclude that the helmet must not have fulfilled its function, or that safety standards must have been inadequate. In my opinion, this is a simplification that misunderstands the role of the helmet in cricket and misunderstands risk in sport. Protective equipment in cricket is not mandatory – there is nothing to prevent a player walking out to the middle without even the most obvious protection, such as gloves or leg guards. These might be reckless extremes, but many examples exist of players batting at the highest level without a helmet, and uptake of arm and chest protection is by no means universal. Players are free to choose their level of protection and, presumably, accept the consequences of their decisions. So why would a player choose not to wear the best protection available?

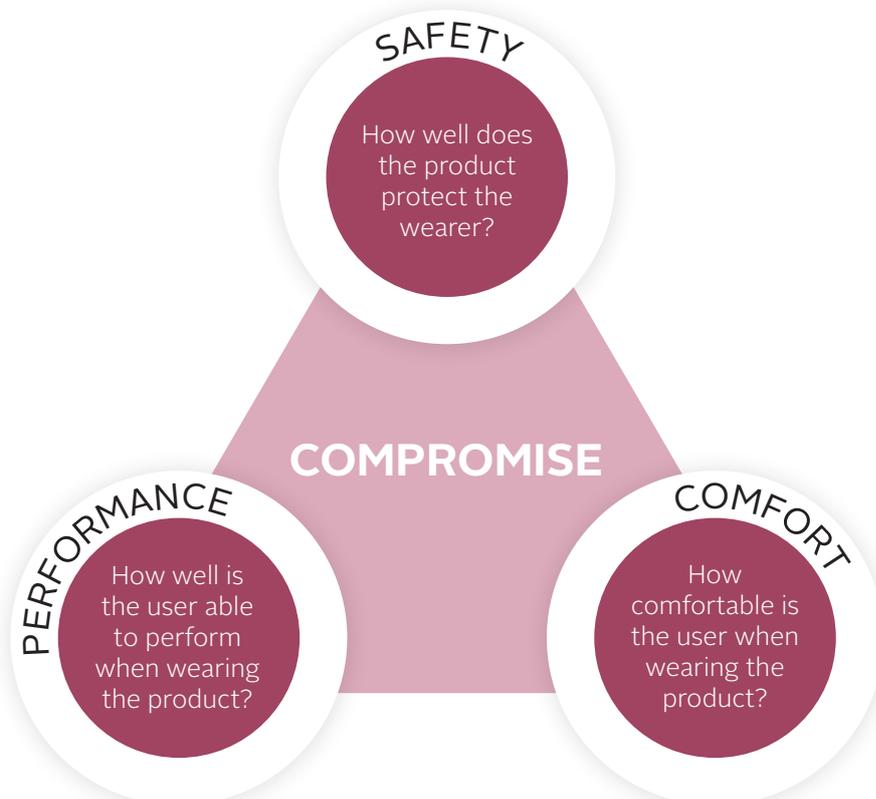
Any player taking the field at any level of the game seeks to perform to the best of their abilities. Protective clothing adds weight and bulk which may restrict mobility or vision or affect the body's thermoregulatory balance. Some will absorb sweat or cause discomfort over the course of an innings. Players must balance their preferences in terms of performance, comfort and safety with any singular bias one or other likely to compromise the remainder.

Understanding this relationship goes a long way to understanding safety in sport.

The most obvious means of escaping injury is to avoid a collision in the first place. It is therefore plausible that a

product capable of enhancing performance might allow a player to respond faster or with greater agility. Or that a comfortable product might facilitate improved judgement and decision making. The safety of a helmet should therefore be considered the last line of defence rather than the first. If product safety enhancements were to come at the cost of performance and comfort, it would not necessarily follow that improved protection would lead to safer players.

Neither the guardians of the laws, the Marylebone Cricket Club (MCC), nor the International Cricket Council (ICC) currently legislate for the provision of



The 3-way relationship between performance, comfort and safety in sports protection products.

RESPONSIBILITY

any safety equipment. Instead it is left to agencies such as Standards Australia and the British Standards Institute, to define standards by which products can be certified.

It is impossible for standards agencies to predict the context in which a piece of protective gear will be used. Neither will be able to account for the tactics or personal circumstances of the wearer. Instead, the focus of their requirements is almost always the ability of the item to dissipate force or attenuate acceleration based on a simplified representation of a likely collision. Any physical testing must be carried out at a reasonable cost, since this is typically passed onto the consumer, meaning energy equivalent collisions where a fast moving ball is replaced by a heavier and slower moving rigid mass are commonplace, since such arrangements are more economical to operate and are less reliant on expensive apparatus. It is, however, increasingly being recognised that such tests are unable to replicate many in-play collisions.

Following the lead of baseball and ice hockey, British Standard BS7928:2013, has recently been updated to require a full speed ball collision for helmets used in cricket. Updated in response to a series of high profile facial injuries, the standard now requires helmets to prevent either the ball or the face grille contacting the face when struck by a ball travelling at a match representative speed and only those helmets that have passed this test may display the BSI Kitemark.

The British Standards panel consisted of representatives of cricket authorities, medics, engineers, helmet manufacturers and players, with the standard representing a consensus view.

Fundamentally, it was agreed that if a helmet includes a face guard, the wearer should reasonably expect their face to be protected. Other than defining a facial region for this purpose, agreement was not reached in prescribing the total area of coverage that should be afforded by a helmet. Instead it remains a matter for the helmet providers to determine and consumers to discern.

In selecting appropriate head protection a player should evaluate the risk – simply described as the product of the likelihood of an event and its severity.

Risk management cannot therefore be considered the sole responsibility of cricket or any other statutory authorities. The skill of a player and their approach to batting clearly affects the likelihood of an impact to the head and the manner in which they wear, secure or maintain their helmet are all likely to influence the severity of any resultant injury.

Many will have recognised the likelihood of a blow to the neck but few will have appreciated its potential severity. Now the severity is undeniably clear, it is important that careful attention is given to the likelihood. Whether the vertebral artery was dissected as a direct consequence of the impact or as a result of a chipped bone fragment may never be known, and as such it is not possible to determine the precise location of impact or ball speed required to cause such an injury. History suggests the likelihood is extremely small, however, with only around 100 cases reported throughout medicine and only one previous case within cricket.

In mitigating risk, health and safety legislation typically requires solutions to be 'suitable' and 'sufficient'. Whilst the word 'sufficient' describes a minimal acceptable level, the word 'suitable' represents a more precise balance. It recognises that requirements must be appropriate to the level of risk and not inhibit or prevent the user from undertaking their task. This is especially true in cricket, where protection is optional. Unsuitable protection is unlikely to be worn, yet no standard requires consideration of any ergonomic factors.

None of these considerations are clear cut of course. The opinion and the attitude of the wearer, or their responsible guardian in the case of a juvenile, is centrally important. What is important is that players at all levels are provided with clear and well balanced information on which to base their decisions. Evidence that doesn't hide the dangers, but puts them into context and allows players to understand how their choices can increase or decrease their exposure to risk.

Among the many heartfelt tributes paid to Hughes, it was frequently observed that he loved the game. There is an all-encompassing breadth to those words.



The helmet should therefore be considered the last line of defence rather than the first.

He didn't just love elements of the game, he loved the game as a whole. The balance between bat and ball. The contrasts between guile and aggression. He appreciated the risks, took precautions where he felt they were needed, but strived to perform to the best of his abilities.

At this time it is entirely appropriate that cricket authorities consider whether laws or standards should be changed as a consequence of his passing. It is for those who knew him best to speculate as to whether he would have wanted the game to change. Would Hughes have preferred a game where short pitched bowling was illegal? I doubt it. If a helmet offering extended coverage behind the ears had been available would Hughes have been wearing it if it restricted his mobility? We will never know.

Phillip Hughes's death was an accident. A combination of circumstances that turned an unlikely but severe impact into a tragic reality. Everyone involved should now be more aware of the risks, but should not confuse this with believing the risk to be higher than it is.

Helmet manufacturers should continue to strive to improve their products. Cricket authorities and standards bodies should continue to ensure that products perform in line with expectations. But if we all are able to put risk in perspective we can continue to enjoy the game in the way Phillip Hughes did. This may well prove to be the legacy he would be most proud of.

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IS FATE A 'MATTER OF MILLIMETRES'?

DR ANDREW MCINTOSH, ADJUNCT PROFESSOR AT THE AUSTRALIAN CENTRE FOR RESEARCH INTO INJURY IN SPORT AND ITS PREVENTION (ACRISP) AT FEDUNI AUSTRALIA LOOKS AT THE RECENT TRAGIC EVENT INVOLVING CRICKETER PHILLIP HUGHES AND ASKS IF IT COULD HAVE BEEN AVOIDED.

Incidents over the last year that have resulted in a number of sports stars suffering severe head injuries highlight what has been achieved over decades in the area of helmets and what still needs to be done. The incidents, as far as we can gauge from publicly available information, have given rise to questions regarding helmet performance: why did Michael Schumacher suffer head injuries when he was wearing a helmet while skiing; did Phillip Hughes' helmet offer enough protection; could Jules Bianchi's helmet have done more? Although F1 drivers have been wearing helmets for a long time and seem to survive the most horrendous crashes, helmets have only recently become part of the cricket kit and alpine sports. There is no doubt that these steps have been valuable in protecting professional and recreational cricketers and skiers. These are important but initial steps. The focus now needs to shift to ensuring that the best and most suitable helmets are available. In my experience of almost 25 years of helmet research and related activity, I've come to the conclusion that good policy, helmet standards, committed suppliers, and consumer information are central to ensuring that the public get the best equipment possible. Policy, from the main sports body or the government, creates the environment for the development and supply of effective equipment. Standards define what the policy really means in terms of helmet performance; will the helmet protect an international cricketer facing an express bowler or a 15 year old? There is often confusion about performance standards or technical specifications. These documents describe in detail test methods and the performance criteria for those tests.





Most consumers are in the dark about the safety performance of sports equipment.

They rarely constrain manufacturers around materials or construction. In terms of cricket helmets, the new 2013 British Standard (BS 7928:2013) addresses issues with faceguard performance by firing a solid synthetic cricket training ball at the faceguard at a speed of 28 m/s (101 km/h) for adult helmets. If the ball makes contact with a defined area of the anterior face, the helmet fails. The test method is superior to previous cricket faceguard tests and is based on the NOCSAE baseball helmet test method. In 2003, Dr David Janda and I wrote:

“The test method in the NOCSAE baseball helmet standard simulates more realistically projectile impacts than methods in the Australian and British standards for cricket helmets, both to helmets and faceguards. The development of a common standard for cricket helmets using similar test methods should be considered”. [McIntosh and Janda, BJSM, 2003] Consideration now needs to be given to whether modifications to this method in BS 7928:2013 would lead to protection of other vulnerable areas of the head, face and neck.

We need equipment suppliers. The policies and standards assist suppliers in considering the business case and can encourage investment in new products. Typically the major investments are in R&D and tooling up to produce the helmets. If that investment is aligned with good policy, i.e. evident through relevant performance standards, the public benefits. If the investment is in largely aesthetic changes, opportunities to improve safety are missed.

Consumer information is important because of the often bewildering range of products and claims; do I buy the \$100 or the \$800 helmet? Suppliers of padded

headgear for football have claimed that the product helps footballers play and train harder without injury. Such statements are simply not true, but it would take a concerned parent considerable effort to understand this when they are trying to do the best for their child.

In Australia, some sports have developed and implemented policies to improve helmets and to change their culture. The Australian Racing Board is on the verge of realising its goal of seeing the world's best helmets used in horse racing. This has been achieved through a focus on jockey safety, a realisation that jockeys are exposed to impacts that are more severe than those assessed in general equestrian helmet standards, rewriting the helmet regulation (standard), five years of racing supported R&D, and encouraging suppliers to meet that standard. Suppliers, through design, have stretched helmet performance in response. Through policy, there is a commercial incentive for suppliers to produce helmets that meet the helmet regulation. Once the new helmets are available, it will be mandatory for jockeys to wear a helmet compliant with the helmet regulation.

Cricket took a major step decades ago and since then few would face a fast bowler without a helmet. However, it has taken a long time for cricket to take the next step, which is to examine whether the helmets have satisfied their needs, to rectify some of the limitations in the standards, and to require better performance. The Australian Standard for cricket helmets has always at best only differentiated between helmets that offer a very basic level of protection and those that offer little protection. Cricket Australia states helmets “*shall be of a colour, type, design and brand approved and advised by Cricket Australia*”. Rather than ‘design’ the focus should be on performance; at a minimum it should be mandatory and explicit that the helmet meets a standard, e.g. BS 7928:2013. A standard defines performance, i.e. whether the helmet will protect the wearer if struck by a ball at 100 km/h or only 30 km/h. F1 helmets and helmets used in International Ski Federation controlled downhill, super-G and giant slalom events have more stringent performance requirements than, respectively, a common motorcycle or ski helmet. Those performance requirements

reflect the high speed collisions in those sports. According to Masuri, the manufacturer of the helmet worn by Phillip Hughes, he was not wearing their latest helmet that meets BS 7928:2013. The question needs to be asked, why are our best athletes not wearing the best performing equipment?

Consumer information is vital. As a result of good policy, society is very well served in some safety areas. In addition to rigorous and research informed standards, Australia provides consumer information about motor vehicle safety, child restraints and motorcycle helmets. This means that a consumer can choose to buy the safest car, child restraint or helmet. Most consumers are in the dark about the safety performance of sports equipment. The Australian Sports Commission and Sports Medicine Australia are vague in the information they provide the public about equipment, such as helmets. In fact there has been inadequate oversight in terms of the performance quality of helmets offered to cricketers at any level and no point of reference for the consumer. This is an area that I’ll be focusing on at ACRISP with the aim to provide high quality consumer information on sports equipment safety performance.

From a physician's perspective, Phillip Hughes' brain injury might be a matter of millimetres. From a safety perspective, there is no valid reason why a vulnerable region cannot be protected by a helmet. From a policy perspective, injury prevention might be a matter of millimetres, i.e. the width of a character in an enabling word.

ABOUT THE AUTHOR

Dr Andrew McIntosh is an Adjunct Professor at the Australian Centre for Research into Injury in Sport and its Prevention (ACRISP) at FedUni Australia. ACRISP is an IOC Research Centre for Prevention of Injury and Protection of Athlete Health.

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SMA MEMBER NEWS



SMA POLICIES AND POSITION STATEMENTS UPDATE

Policies and position statements on the following topics: drugs and supplements in sport, concussion in sport, pregnancy and exercise, and infectious diseases, will be released in the first half of 2015.

NEW INJURY RECORDING SOFTWARE

New software that is able to record and collate data about injuries will be launched by SMA-ACT in March, just in time for the winter sports pre-season. The InjuryEdata Project provides a user friendly tool that will record and improve data collection of injuries across all levels of sport.

Read more at <http://sma.org.au/state-branches/act/>



NEW WOMEN IN SPORT FACT SHEETS

Be sure to check out the new SMA women in sport resources – pregnancy, young women, older women, nutrition and bone health – we have you covered!

Visit <http://sma.org.au/resources-advice/>

AUSTRALIA DAY 2015 HONOURS LIST

SMA congratulates Dr Robert Reid AM who was a recipient in the Australia Day 2015 Honours List, receiving the Member (AM) in the General Division of the Order of Australia award. SMA is truly grateful for Rob's tireless and unwavering support.

JOURNAL OF SCIENCE AND MEDICINE IN SPORT (VOL 18 ISSUE 1 JANUARY 2015) HIGHLIGHTS

- ▶ Tracking postural stability of young concussion patients using dual-task interference
Jason C. Dorman, Verle D. Valentine, Thayne A. Munce, B. Joel Tjarks, Paul A. Thompson, Michael F. Bergeron
- ▶ Oral contraception does not alter typical post-exercise interleukin-6 and hepcidin levels in females
Marc Sim, Brian Dawson, Grant Landers, Dorine W. Swinkels, Harold Tjalsma, Bu B. Yeap, Debbie Trinder, Peter Peeling
- ▶ Understanding sleep disturbance in athletes prior to important competitions
Laura E. Juliff, Shona L. Halson, Jeremiah J. Peiffer



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THE PINNACLE OF WORLD

RESEARCH THAT SUPPORTS THE GAME

THE FOLLOWING IS A REPUBLISHED EDITORIAL WHICH FEATURES IN **THE JOURNAL OF SCIENCE AND MEDICINE IN SPORT** (VOLUME 18, NUMBER 1, JANUARY 2015) WRITTEN BY EDITOR-IN-CHIEF, GREGORY S. KOLT, PHD.

For those of our readers who follow and understand the game of cricket, you will no doubt agree that the ICC Cricket World Cup to be held in Australia and New Zealand in early 2015 is the pinnacle of world cricket. As was pointed out in an earlier editorial¹, those who do not come from the small number of countries who follow cricket, will not understand what all the fuss is about. This World Cup that I am referring to is the one-day version of the game where players from one team awkwardly throw a hard leather ball at the opposition players (don't worry, only one ball and one player at a time). The player with a wooden bat then attempts to hit the ball as long as they can in order to run a

certain distance before the ball is recovered by the fielding team. Any clearer yet? Perhaps for those of you who I have now confused even further should watch out for the major media coverage that will follow the Cricket World Cup and see for yourself what all the fuss is about.

Given the interest in this sport in some of the countries who closely follow our journal I thought it was appropriate to focus this editorial on the research that supports cricket. I have selected two papers that focus on cricket to include in this issue. In the first of these papers Orchard and colleagues from Australia examined the risk of injury in cricket fast bowlers within the context of the match workloads over the period prior to injury



CRICKET

taking place. They found that there were no increases in subsequent injury risk for high workloads for periods of 12-26 days, although exceeding 100 overs (i.e. 600 match balls bowled) in 17 days or less was associated with higher injury rates. Given that Australia and South Africa are fierce rivals in cricket it would be remiss of me not to include a paper coming out of South Africa. Olivier and colleagues (from South Africa) examined the difference in lumbo-pelvic movement control, and static and dynamic balance, at the start and end of a cricket season to identify any differences between fast bowlers who sustained an injury versus those who did not. They identified that lumbo-pelvic movement control could not discriminate between injured and non-injured participants, but that single leg balance at the start of the season was better in players who did not sustain an injury during the season.

Given the theme of this editorial and the Cricket World Cup, I highlight a range of other cricket research we have published in the last few years for your interest. This research has covered broad areas including biomechanics, psychology, injury risk, muscle asymmetry, anatomy, and motor skill acquisition. For example, Stuelcken and Sinclair² examined ground reaction forces in cricket fast bowlers, Twomey et al³ investigated injury risk in relation to ground hardness, White et al⁴ looked at the perceptions of injury risk in junior players, Finch et al⁵ carried out a prospective cohort study of injuries, Weissensteiner et al⁶ investigated the psychological characteristics of expert cricket batsmen, and Phillips et al⁷ looked at performance accuracy and variability in

cricket fast bowlers. In other studies that the *Journal of Science and Medicine in Sport* has published Ball and Hrysomallis⁸ examined ball bounce characteristics on synthetic grass cricket pitches, Kountouris et al⁹ looked at quadratus lumborum asymmetry and lumbar spine injury in cricket fast bowlers, Green et al¹⁰ researched altered scapula position in elite young cricketers with shoulder problems, and Phillips et al¹¹ studied acquisition of expertise in cricket fast bowling.

Enjoy the Cricket World Cup, and as you watch the event think just for a moment about the amount of research that goes into supporting this sport at the elite and professional level.

ABOUT THE AUTHOR

Gregory S. Kolt is the Editor-in-Chief of *The Journal of Science and Medicine in Sport*.

They found that there were no increases in subsequent injury risk for high workloads for periods of 12-26 days, although exceeding 100 overs (i.e. 600 match balls bowled) in 17 days or less was associated with higher injury rates.

The *Journal of Science and Medicine in Sport*, published by Sports Medicine Australia (SMA), is the major refereed research publication on sports science and medicine in Australia. The Journal provides high quality, original research papers to keep members and subscribers informed of developments in sports science and medicine. Produced for SMA six times a year by Elsevier Australia, it reflects SMA's commitment to encouraging world-class research within the industry, and its commitment to the continuing education of its members. Journal articles can be found at jsams.org



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HOWZAT SHOE!



The brand new GEL-ODI

SPORT HEALTH INTERVIEWS
MARK DOHERTY, GENERAL
MANGER PRODUCT, ASICS
OCEANIA PTY LTD ON THE
ASICS RANGE OF CRICKET
SHOES AND THE LAUNCH
OF THEIR NEW PRODUCT
TO COINCIDE WITH THE ICC
2015 CRICKET WORLD CUP.

Can you outline the range of cricket shoes ASICS offers?

Naturally in cricket you have bowlers, batsman, fielders, and wicket-keepers so there is variation in the types of products that you need. ASICS offers the following range of cricket shoes:

For the fast bowlers: We have developed a boot that is available in a low cut (GEL-Speed Menace Lo) and a high cut (GEL-Speed Menace Hi). It's a shoe that works with the foot and we feel can help reduce the loads that possibly contribute to stress fractures and other foot ailments fast bowlers sometimes suffer from (research pending of course!). It is the only shoe in our whole range that we sell in singles because often a fast bowler wears out one shoe more than the

other. It allows people to buy just the half pair and not outlay money for a complete pair when they know that they run out of one three times faster than the other.

For the batsman/all-rounder:

We offer three models (GEL-Advance 6, GEL-210 Not Out, GEL-Gully 4) that can be adapted for batting and bowling.

For Twenty20 cricket: We offer the GEL-Strike Rate 4 which has a running shoe feel to it complete with track and field pins to make it much more flexible.

For hard wicket cricket: For our Australian concrete pitches which have a matting or synthetic grass covering, we offer the GEL-Hardwicket 5 and GEL-Peake 3 which do not feature screw-in studs.

HOWZAT SHOE!

You recently launched a shoe for the ICC 2015 Cricket World Cup. Can you give us an insight into this new development?

Our brand new GEL-ODI shoe, white base with navy stripe and neon orange outsole ensuring it is highly visible, has been developed primarily as a batting shoe which is also great for all-rounders. It comes with either traditional plate studs or track inspired stud options that can be utilised depending on match requirements. However, its most unique feature is that ASICS have taken 80 grams off the weight of our lightest ever cricket shoe. Cricket shoes tend to be heavy due to their studs however the weight of this new shoe is quite amazing. We have already had excellent feedback from the Australian Cricket Team (Brad Haddin wear tested them) with many players keen to give them a try. It looks great, it feels light, it is perfectly built for cricket. We are extremely proud of this product.

What are some of the unique features of ASICS cricket shoes?

With our fast bowling boot there was a need to stabilise the boot, to make the midsoles a little bit firmer than our other shoes so we utilised a PU plate in the forefoot giving fast bowlers more stability and control and allowing them to avoid ankle trauma when hitting and planting. With our GEL-Advance 6 shoe we took the technologies that we have used in our football boot to try and make an outsole that was super lightweight. This has become a very popular boot among batsmen due to its lightweight properties. Another unique property of our shoes is within the GEL-Strike Rate 4. Most studs are developed on a traditional golf system where you have a PU locking piece on the stud which locks onto the outsole but the idea with this shoe was to introduce a track and field pin setup which locks onto the insert itself (eliminating the need for a base) which makes the boot much lighter.

Can you give us an insight into ASICS cricket shoe development?

We weren't doing anything in cricket but I wanted to get into this area from a personal point of view, being a cricket tragic myself. In 1999 I wrote the first

concept for a cricket shoe which was quite foreign to my Japanese colleagues but luckily they agreed as I had had previous successes with other products. The numbers we do in cricket are not that big. Where other companies rehash toolings from other sports, or put inserts into cross trainers to try and make them like cricket shoes we wanted to build our shoes from the ground up. As you can't adapt cricket shoes for other sports successfully, i.e. you can only use a cricket shoe for cricket, it limits how many pairs we can do. Luckily our company policy is that 'we will build shoes if people want them'.

Cricket shoe development is similar to our other shoes – concept, design reviews, proto-typing (testing by professionals like Brad Haddin or Shane Watson, and parkland testing) and launch. However, with cricket we have to do more extensive testing because the sport is so hard on shoes and therefore a lot of time is spent on proto-testing. The whole process can take anywhere from 12 months to 18-24 months (for a completely new development).

Can you provide us with some information on the ASICS partnership with Cricket Australia?

The ASICS/Cricket Australia partnership started in 2011 with a few of the top players wearing our shoes as their shoes of choice which resulted in working relationships. It's that same story with people having seen or tested or used our shoes within the team and the next thing we know more and more people are getting into our shoes. That's how our licence team took off. We didn't even have a licence team at ASICS but due to our Cricket Australia contract one was started which now also looks after the Wallabies. Our current ASICS/Cricket Australia players include: Michael Clarke, Shane Watson, Mitchell Johnson, Dave Warner, Brad Haddin, Ryan Harris, and Josh Hayward.



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BIOMECHA

DR RENÉ E.D. FERDINANDS OF THE UNIVERSITY OF SYDNEY EXPLAINS THAT MANY OF THE ESTABLISHED STANDARDS OF CRICKET TECHNIQUE DO NOT STAND UP TO BIOMECHANICAL SCRUTINY PUTTING CRICKETERS AT RISK OF INJURY.

The professional demands on cricketers are on the rise. The selectors assess batsmen not only by the number of runs scored, but on the rate of scoring; and bowlers not only by the number of wickets taken, but by the economy rate. The demand is not lighter on the fielders, the team requiring them to take catches, throw accurately, and save runs in the field. Furthermore, all this is to be done without the player incurring injury. But players cannot improve their performance outcomes by the mere application of willpower, simply channeling their efforts into more hours of training. Training hard is necessary, but not sufficient to achieve success. Because cricket is one of the most technically complex sports, the elite cricketers are generally the more skilled players. Hence, the proficient coach will focus on training methods that lead to technical mastery. Biomechanics is the science that can be applied to explore the mechanisms of technique in cricket. The recent advances in technology make biomechanical testing more accessible to coaches and players. If cricket coaches can include biomechanical feedback to improve player performance, then the effect on the way the sport is taught would be revolutionary.

In conventional cricket coaching, the assessment of player performance is based on an accepted model of optimal technique, not generally derived from any scientific process, but from the testimony of previous successful cricketers, or coaching authorities. Some useful coaching norms have been established this way, but intuition only goes so far. To address this problem, about 30 years ago coaches began incorporating a simple form of qualitative biomechanics analysis, a tool that was often used with two-dimensional video footage. They proposed models of technique in terms of simple physics principles, such as force summation, conservation of momentum, and stability. This was initially seen as a positive development, but the result tended towards oversimplification, yielding techniques that were often rigid and inflexible, constraining performance to single planes of motion and straight lines. Unfortunately, superficial understanding of biomechanics was the cause of this. The complexity of human body movements in cricket was underestimated. No-one seemed to understand that the most direct route in skill execution is not always the optimal solution.

ANICS

OF PERFORMANCE AND INJURY IN CRICKET

BIOMECHANICS

OF PERFORMANCE AND INJURY IN CRICKET

Complex systems do not reveal their mechanisms readily. Scientists seek empirical evidence when probing the inner workings of such systems. Similarly, the analysis of cricket using the methods of quantitative biomechanics signals the first serious attempt to understand the mechanics of technique. The process is rigorous. Initially, there is a data collection phase, in which fast motion red-light cameras, generally in excess of 10, operating at a frame rate between 200-500 Hz, are used to track the motions of markers placed on either the batsmen, bowlers or fielders performing their skills, while ground reaction forces are measured by force platforms.¹ The light from the cameras bounce off the markers, and re-enter the cameras, from where their tracings are processed by motion analysis software. Hence, these markers are strategically placed on all the major body segments to create a joint coordinate system for each segment, leading to full body representation of human movement in three-dimensional space. In this testing environment, cricketers can receive an assessment of technique and performance in terms of kinematics, which is the branch of mechanics that quantifies motion as displacements, velocities, and accelerations – both linear and angular. Following the data collection procedure, the biomechanist applies a model to generate higher order kinematics and kinetics data. In cricket, the human body has been modelled as a system of 15 rigid body segments, each of them assigned a set of anthropometric and inertial parameters, and connected to each other via geometrical joint constraints.¹ There are a number of options for generating the kinetics equations of motion, but a successful method used in cricket has linked the segments together using Newtonian constraint equations, solving them iteratively using the Newton–Raphson method utilised by the Mechanical Systems Pack in Mathematica (Wolfram Research Inc.)² The objective is to calculate the joint forces and torques that govern the execution of skill in cricket. Now the hidden realm of cause and effect can be explored. Merely than



If cricket coaches can include biomechanical feedback to improve player performance, then the effect on the way the sport is taught would be revolutionary.

just describe the sequences of motion that underlie cricket technique, movements can be teased apart, so that the motion actuator (the cause) is differentiated from motion effect. Taken further, segment interaction and joint power analyses can be performed – which are even higher orders of kinetics calculations. By applying such methods, it can be inferred which major groups of muscles are active or controlled in fast bowling. A well-informed coach, armed with this type of knowledge, can critique the commonly accepted techniques of the day.

It may come as a surprise to many that various fundamental notions of cricket technique do not stand up to rigorous biomechanical scrutiny. In fast bowling, for example, correct technical form generally constrains the bowler to adhere the following instructions: high bowling arm ('scraping the ear' so to speak), braced front leg (the knee fully extended), bending the back, active rear drive (thrust the knee forwards), and short delivery stride. However, from observations of bowlers in the biomechanical laboratory, this entire set of techniques is questionable: either applying only to a small select sample of bowlers; or, in the worst case, simply incorrect. Examples of the latter are the short delivery stride and the thrusting forwards of the rear knee –

techniques that if imposed upon a bowler will tend to diminish performance. Published biomechanics research has shown that the delivery stride can be up to 85 per cent of a bowler's height. And, a recent paper has shown that the rear leg drive in bowling is a complex process, undergoing cycles of active and controlled power, with the rear knee rarely going beyond the vertical by the time of ball release – a finding that directly opposes the simple notion of driving the knee forwards.³ Other conventional coaching fundamentals in bowling, such as the perfectly vertical bowling arm and the vertical head during release have also been dispelled by biomechanics analysis. Most bowlers who attempt to do this will not bowl efficiently – diverging from the most effective planar relationship between the bowling arm and shoulders. Any technical error that is adopted by the bowler could have far-reaching effects. When an error propagates throughout what is called the kinetic kink chain, it potentially reduces performance while also increasing the risk of injury, most seriously when this error ends up placing the lumbar region under more load.² Lumbar stress fractures are among the most prevalent injuries in fast bowlers, and potentially career-threatening.⁴ Incorrect technique in bowling can have serious consequences.

In spin bowling, the coaching literature has addressed only some of the more basic techniques of delivery. In reality, there is an almost endless variety of spinning deliveries, which can be produced from a number of possible action types. Again, the coach tends to over-simplify the process, prescribing an almost recipe-like set of instructions, substantially pruning the set of acceptable bowling techniques. For example, spinners are typically taught to bowl with very short strides, high arm actions, while thrusting the rear knee forwards, and standing tall with the eyes kept perfectly horizontal. In addition, their run-ups have to be short, only a few paces in length, forced to be straight, with any degree of curvature extending beyond the side-crease rarely permitted.



This recommended routine has been specified by coaches without any proper biomechanical validation. Consequently, these technical elements tend to over-constrain the actions of spin bowlers. Spin bowlers adhering to this procedure will generally compromise their performance. Worst affected are the leg-spinners, since they need to implement the very opposite to the recommended instructions. Without a sound biomechanical basis to their actions, spin bowlers tend to bowl inaccurately, too slowly, and with reduced spin rate, rendering them relatively ineffective.

In contrast, spin bowlers who do learn the proper biomechanics of applying spin to the ball are in a much better position to excel. By learning the proper mechanics of the forearm, wrist and fingers, they can apply not only a higher spin torque to the ball, but produce a large variety of variations, combining spin direction and spin axis orientations to cause the ball to deviate both in flight and off the pitch, creating a higher degree of difficulty for the batsman. That elusive art of swerving the ball prior to its spinning off the pitch, generally considered the domain of the exclusive few, the great Sydney Barnes and Shane Warne being two of the more

prominent examples, now becomes accessible to any skillful spin bowler.⁵ Biomechanics research has revealed the physical principles and techniques that underlie this hitherto unknown art.

Similarly, the art of batting – although arguably more technically complex and diverse than any other skill that involves striking a ball – has received little attention from biomechanics researchers. This is particularly problematic because biomechanists have already found that a fundamental notion of batting technique, that of the straight back lift, is rarely adopted by elite batsmen, who generally lift the bat in a looped signature.⁶ However, any misconceptions of batting technique become more serious when they affect physical safety. Batsmen face the possibility of serious injury each time they play fast bowling. Short-pitched balls bounce sharply, travelling in the region of the head. Reflexes alone are not sufficient. All batsmen – whatever their playing level – should learn the correct technique for playing this type of bowling. The range of appropriate responses fall into two categories: horizontal bat shots (hook, pull and cut), and evasive action (ducking and weaving). Footwork, trunk, neck and head kinematics – all determine the batsman's ability to reduce the

threat of the fast bowler's short ball. A quantitative analysis of batsmen playing the short ball can be performed in the biomechanics laboratory. The process of training batsmen with biomechanics feedback will become all the more important, if the fast bowlers in the future become faster and more accurate than in previous eras – which is in keeping with the expected trend.

More and more will be demanded of cricket coaches and players in the future. Seeking the technical edge over the opponent has been the major focus for advancement in all competitive fields. In the military, this is known as the arms race, each side seeking the latest technology to create weapons of more destructive power, and finding ways to launch them with more speed and agility than the delivery mechanisms of before. A late entry into this arms race can be fatal: bows and arrows cannot compete with nuclear missiles. The rate of scientific progress penalises heavily those that lag behind. The cricketers of the future will foreseeably participate in a biomechanical arms race, in which each side will seek to equip its players with the latest range of technical weapons to war against the opposition. All it would take is a trigger – just one team to start the process. For instance, a nation with an elite force of fast bowlers trained with biomechanical feedback, each one bowling in the region of 145 to 155 km/h, and possessing the skills of swing, swerve and cut, will produce a cataclysmic effect on the opposition. Something like this was seen before in the 20-year dominance of the great West Indian fast bowlers of the 80's and 90's, incapacitating batsmen throughout the world, to the extent that Test matches commonly finished before their allotted five-day period. However, by acting with foresight, and arming batsmen with a biomechanically-validated range of defensive and offensive strategies, a future era of such bowling dominance could be minimised. But, the question remains – which nation of cricketers will equip their players with biomechanically honed skills to usher in the next evolutionary epoch of the game.

ABOUT THE AUTHOR

Dr René E.D. Ferdinands is a cricket biomechanics researcher at the University of Sydney.



BEST OF BOTH WORLDS

ARE THERE SOME HIGH STABILITY SURGERIES THAT ALSO ALLOW QUICK RECOVERY?

ORTHOPAEDIC SURGEONS
GREG HOY AND DAVID YOUNG
LOOK AT THE THEORY THAT
SMALLER PROCEDURES,
WHEN COMPARED TO
LARGER ONES, DO NOT
ALWAYS ALLOW FOR A
QUICKER RETURN TO SPORT.

It is assumed that in many orthopaedic surgical cases in sportsmen and women that the more invasive the treatment, the longer the recovery. Thus the sports medical teams weigh up the risk/benefit ratio of bigger and potentially higher risk operative procedures that may require longer rehabilitation with the lower morbidity of in-season procedures with potentially quicker rehabilitation using this quasi-logical basis.

However, this basic assumption does not always hold true. The morbidity of larger procedures is sometimes, but not always, more significant and sometimes paradoxically (and fortunately) quicker for return to sport.

The difficulties of this management enigma have been bared for all to see with the (partially) ill-fated dalliance into LARS ligament ACL reconstruction for elite footballers in all codes. The massive failure rates demonstrated (up to 50 per cent)¹ make us realise that long term goals are as important as short term returns despite the romantic notion of in-season return from knee reconstructions, always

considered season wiping until the LARS option was promoted in the last few years. Of course, if it works out, as the odd celebrated case in AFL circles has, then the player would consider himself ahead, but when each episode of surgery and rehabilitation means time off the park in a short term career, other potential recipients may have questions.

Orchard wrote eloquently in this publication four years ago² about the balance of time off sport, the morbidity, and the risk/benefit ratio at different times of the season with respect to anterior shoulder instability, usually in rugby league (NRL) and Australian Rules football (AFL) depending on allegiances.

However, I would like to put forward that a bigger (bony) operation is sometimes FASTER rehabilitating, and has been returning some patients to professional contact sport QUICKER than the smaller and more anatomical (arthroscopic) reconstructions, raising some challenging ethical questions for those managing elite contact sportsmen and women.

BEST OF BOTH WORLDS

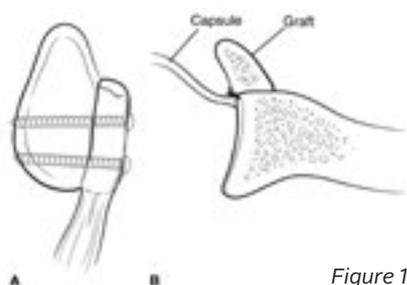


Figure 1

According to Orchard, the in season management of shoulder instability falls into conservative vs reconstructive groups (I disagree, as the concept of arthroscopic lavage for achievement of career goals is valid and in practice now, but I digress...), and the time of the season dictates different decision making to facilitate maximum involvement in sport albeit with some risk taking (See Table 1). The premise of this table, and indeed the majority of the article, is that risk taking in doing LESS reconstructive work may allow more participation but at higher risk. I would like to demonstrate that this does not always follow. The 'final solution' in Orchard's shoulder table is the Latarjet

procedure (Figure 1), in which the coracoid process with its appended conjoint tendons is 'bolted' to the anterior glenoid to restore bony deficiency that occurs in recurrent instability after previous reconstructions, but also with severe first time dislocations, and in some recurrent dislocators without surgery. The recurrence rates of instability from this procedure hover around the 2 to 4 percent mark compared with 20 to 30 per cent from arthroscopic (soft-tissue) stabilisation operations^{3,4}, but there are permanent loss of external rotation issues (this procedure should not be done in baseball pitchers) as well as some (old) reviews suggesting osteoarthritis rates may be higher with bone blocks. These reports are with older style bone block procedures, and the current techniques are hopefully less wearing. There has been a slowly growing group of surgeons performing the Latarjet almost completely arthroscopically⁶, but due to the early cases taking up to nine hours to do, and the fact that the capsule-ligamentous tissue is discarded, this is not my preference for now.



Table 1: Orchard's staging and algorithm for shoulder instability

Stage of season	? Preferred management	Recovery time	Matches missed	Recurrence rate
Pre-season at least 6 weeks prior to start of season	Acute arthroscopic repair	4 months	<=8 matches	?15-20%
Pre-season within 6 weeks of start of season	Conservative treatment in external rotation brace	6-8 weeks	<= 4 matches	?30%
Week 1 to Week 18	Standard conservative with rapid mobilisation	<=4 weeks	<=4 matches	?40-60%
Week 18 to Week 26 (team not likely to play finals)	Open shoulder reconstruction	6-8 months	Few and of little consequence	?10%
Week 18 to Week 26 (team likely to play finals)	Standard conservative treatment with rapid return to play	2-3 weeks	2 matches	?50% because of fewer matches
Post-finals having negotiated through season with ongoing symptoms	Arthroscopic shoulder reconstruction	4-6 months	None	?15%
Post-dislocation after previous failed surgery	Latarjet procedure	7-9 months	Many but career-threatening injury	?10-15%

“

The difficulties of this management enigma have been bared for all to see with the (partially) ill-fated dalliance into LARS ligament ACL reconstruction for elite footballers in all codes.



The use of 3D computed tomography (CT) scans has revolutionised the assessment of these patients, making CT more effective in instability assessment than MRI for most problems (except the glaring HAGL lesion which Des Bokor has published on extensively⁵). Thus the image (left, permission supplied) of a 16 year old boy with no full dislocations and no surgery already has bone loss requiring bony reconstitution. A Latarjet procedure is a perfect fit for this case, but the rehabilitation is now much more aggressive than Orchard suggested.

Of the 27 AFL senior listed players undergoing Latarjet procedures in our own practice in the last five years (compared with 61 undergoing arthroscopic reconstructions), the last

eight players have been on an accelerated protocol that has seen them starting contact sport (including playing if in season) at 12 weeks post surgery. This compares to Orchard's 7-9 months quoted in 2010.

So why the change? Firstly, because there are two screws holding the bone rigidly, we allow active movement from just two weeks after surgery, with strengthening from six weeks. Secondly, we are now able to assess bony union easily with modern CT that can show bone in the graft site at 6 to 8 weeks. This means full strengthening can occur from then, and thus the 'in-season' treatment for the first half of the season includes full reconstruction with play in the last few games and finals if required.

BEST OF BOTH WORLDS



A bigger (bony) operation is sometimes FASTER rehabilitating, and has been returning some patients to professional contact sport QUICKER than the smaller and more anatomical (arthroscopic) reconstructions

Remembering that the average AFL career is only three years, the opportunities to play in finals may be 'career defining' and therefore worth the perceived risk. As well, the very low recurrence rates lean most players towards a primary Latarjet procedure after having a revision reconstruction with Latarjet on the other shoulder. Thus players are self selecting on the basis of not interfering with their career. At the other end of the body, the same thing is happening with management of the 'Jones fracture' or 5th metatarsal proximal shaft fracture. This fracture 'enjoys' a terrible reputation in athletes for prolonged healing and recurrences⁷. The use of an innovative pin that fills the medulla to achieve rigid bony fixation that allows full activity and the athlete

continues his or her career whilst healing occurs is in use in our practice. The fact that this is a greater intervention might lead one to assume longer follow up, but times as dramatic as three weeks until running are now close to the norm for this fixation technique. Thus, a higher level of invasiveness than other 5th MT fracture treatments but paradoxically (and pleasingly) return to sport seems to be quicker as it is so stable that you seem to be able to push load earlier. Of course, the spectre of playing without game loss versus the long term possibility of osteoarthritis and other complications is a vexed one, not dissimilar to the current conundrum of multiple concussions in both AFL and NRL players and how it affects them post career. The very fact we return players to their

chosen sport (not necessarily with a body constructed for that sport) means recurrent injuries will happen, and it is possible this may lead to significant further morbidity in the future. For the present, it means the bigger operation is leading to smaller rehabilitation times and more time on the field of play.

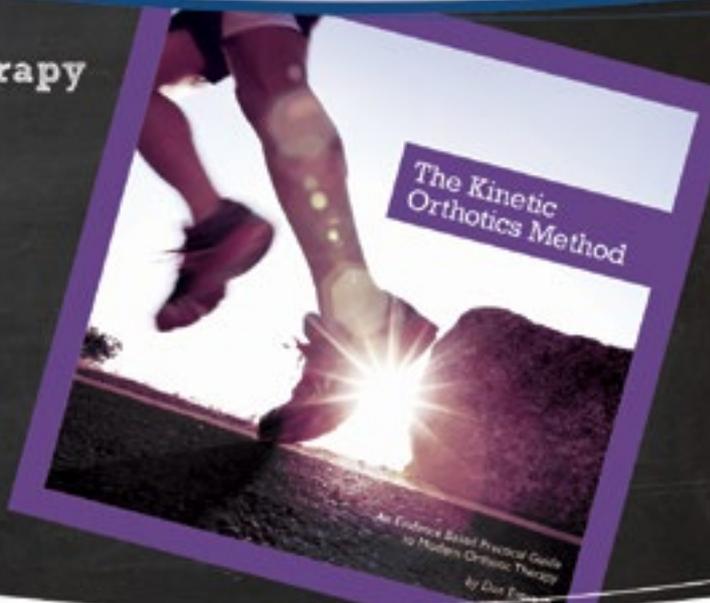
ABOUT THE AUTHORS

Greg Hoy and David Young are orthopaedic surgeons for the Melbourne Orthopaedic Group and the Monash University Department of Surgery.



Online Professional Course in Biomechanics and Orthotic Therapy

- What's included?**
 You will receive a full colour textbook, access to online interactive modules and an augmented reality application that bridges the gap between print and digital.
- How long does the course take?**
 The course is delivered over a six week period of self directed learning with a minimum of 10 hours of study time. This qualifies for the equivalent of 10 hours of GPD activity under either further education or self-directed learning.
- Who developed the course?**
 This course was developed over 5 years by Dantecq and the Queensland University of Technology. The course is up to date with the latest research and application design methodologies.





THE PREPARATION OF CRICKET PITCHES FOR A TOURNAMENT

INTERNATIONAL CRICKET COUNCIL (ICC)
PITCH CONSULTANT, ANDY ATKINSON
TALKS US THROUGH WHAT IS INVOLVED
IN PREPARING A PITCH WORTHY OF
A CRICKET TOURNAMENT.

When a tournament such as the Cricket World Cup (CWC), Champions Trophy or T20 is staged in any country it means that a number of venues are required to host several matches over a specified period of time. In the case of the CWC 2007 it was necessary that five venues would host six matches in 12 days and the three venues that were to hold the semi-finals and final would host seven matches in 14 days. The CWC 2015 is to be staged in Australia at seven venues and in New Zealand also at seven venues. The fixture list is a little less severe during this tournament (as compared to the CWC 2007) as the matches are spread around both countries, although some venues, such as the MCG, will have five matches during the tournament (February 14–March 28).

This is a difficult challenge in any circumstance, but if pre-planning of the rotation of pitches for each fixture and an exact plan of how the pitches are to be prepared is put in place well in advance this challenge can be taken on successfully. All of the venues will be experienced in preparing pitches for Test or One Day Internationals (ODI), with full knowledge of all the associated worries and problems that go with these games. Preparing the square for a tournament with a large amount of games in a short period of time though is a completely different proposition than a one off Test or ODI and has to be tackled in a different way than if you are producing just one pitch for a specific match.

In the past ICC Tournaments have been held with much higher pressure fixture lists than the CWC 2007 – for example,

THE PREPARATION OF CRICKET PITCHES FOR A TOURNAMENT



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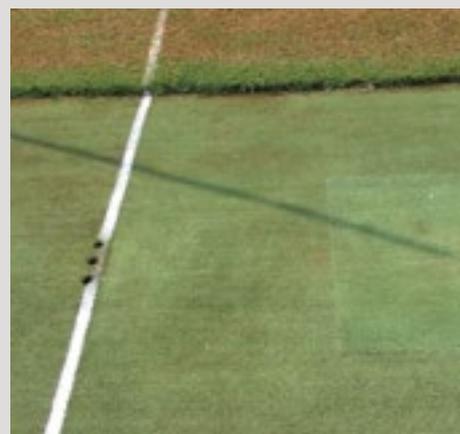
in Nairobi in 2000 for the ICC Knockout, 10 full One Day International matches were played at one ground (Nairobi Gymkhana) on five pitches in fifteen days without a hitch. For the U/19 World Cup in Bangladesh 15 matches were played in 22 days on five pitches.

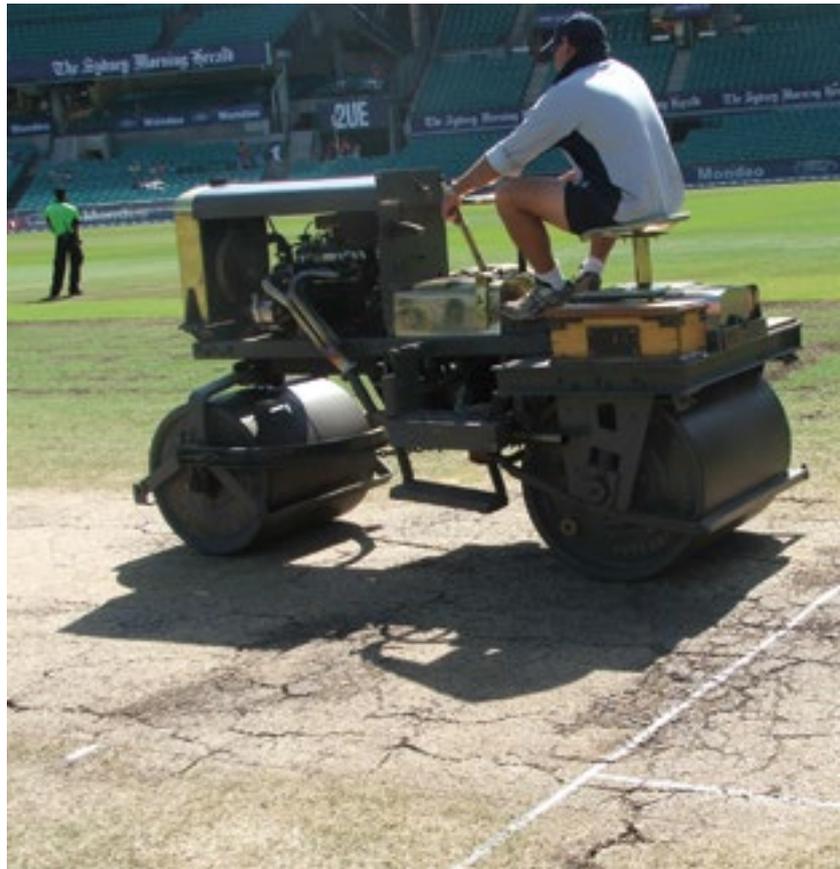
It is possible with good planning to overcome any difficulties that might arise. Due to the tight program of fixtures and short periods of time between matches all of the pitches to be used for a tournament need to be prepared in advance. When there is a very closely spaced fixture list it is not viable to individually prepare each pitch in the short space of time between games. It is preferable if each match is played on a freshly prepared previously unused pitch, which is not always possible. If it isn't possible a pitch will be selected that has been used earlier in the season.

When the tournament starts it is generally the case that some pitches have to be re-used because the matches need to be played on the middle section of the ground for obvious logistical reasons. A pitch is not re-used or played on consecutively for two matches in a row in close proximity, the rotation will allow for it to be used at least twice during the tournament over a period of time which allows the surface to go through a period of re-preparation to allow the Curator to

produce a pitch of good quality for a second time which is the aim and it is not advisable to play on one pitch for successive matches if it can be avoided.

Also scheduled into the contract between the host nation and the ICC is a period of at least 21 days (14 days for warm up match venues) prior to the first match of the tournament, which states that no cricket or any other events can be staged at any of the stadiums. This is done so that the playing surface and all other work within the stadium connected with the ICC tournament can be completed without delay or interference. This is the ideal period when the complete area of pitches to be used for the tournament can be prepared simultaneously.





GUIDELINES FOR PREPARING THE SQUARE FOR A TOURNAMENT

The initial step is to identify the amount of pitches that are to be used for the matches.

Normally the central area of the pitch square will be used because it will line up with the entire sight screen, TV gantries and other requirements of media.

It will be important that an accurate record is kept of all operations that are carried out on the tournament pitches not only for your own information but for the future when planning for other events.

Once this area is designated it should be treated in the same manner as the rest of the square and regularly mowed, watered, fertilized and monitored for infiltration of insects, weeds or fungus infections.

If the conditions are correct, for instance after rain, it will be beneficial to roll the specified area with a range of rollers to firm up the soil and start the compaction process.

It is essential to ensure that the conditions are right to roll before beginning the operation.

CLICK ON THE BELOW LINKS TO VIEW EACH PROCESS OF PITCH PREPARATION IN DETAIL

- ▶ Mowing and thinning out grass
- ▶ Watering
- ▶ What weight of roller should we be using? A guideline
- ▶ Adding water to the pitch
- ▶ When to begin rolling
- ▶ Initial rolling
- ▶ Thinning out the surface grass
- ▶ Working up the pitch
- ▶ Sealing the surface
- ▶ Initial sealing roll of the pitch surface after completion of the working up process
- ▶ Preparing the pitches for the tournament
- ▶ Width and height of roller barrels in context to the downward force achieved

ABOUT THE AUTHOR

Andy Atkinson works as the International Cricket Council (ICC) Pitch Consultant

SPORTS
TRAINER
GUIDE

Matthew Pearce

HEAT MANAGE

MATTHEW PEARCE, HEAD TRAINER/MYOTHERAPIST AT THE AFL RICHMOND FOOTBALL CLUB AND THE AFL TRAINERS ASSOCIATION PRESIDENT PROVIDES SPORTS TRAINERS WITH ADVICE ON HOW TO MANAGE ATHLETES IN HOT WEATHER CONDITIONS.



With summer well and truly here and summer sports underway it's a great time to talk about managing athletes in hot conditions.

There is some research that suggests heat training can be beneficial for elite athletes, but this may not necessarily be the case for amateurs and weekend warriors.

Too many times over the journey I have seen cases of people playing and training in conditions that are too hot/humid and inevitably end up suffering from some form of heat related illness as a consequence of this.

As a sports trainer it's highly important that we know how to:

- a) recognise the signs and symptoms of heat related illness, and
- b) are in a position to manage our athletes so this scenario is negated at every possible point.

So, the question we have to ask ourselves is how do we do this?

There are many facets to managing athletes in these conditions but there are a few fundamental ones that we can all implement no matter what our resource levels are.

1. **Hydration** – It's not good enough just to drink plenty the night before a game/training session in the hope to be well hydrated. Good hydration is a lifestyle choice. Essentially you need to educate your athletes that they need to consume water regularly throughout the day/night every day of the week – not just when they have a session the next day and/or it's going to be hot.

2. **Training times** – If your team has a scheduled session and the forecast is for it to be hot/humid at that time it may be worthwhile considering a change in start time or venue.

Alternatively, ensure there is adequate shade for breaks and provide ice vests or cold wet towels that athletes can use to help cool their body temperature.

3. **Education** – As with all aspects of what we do as sports trainers, education really is the key around this issue.

We need to educate our athletes on the importance of good hydration and types of fluids that can/should be consumed both before, during and after exercise.

We need to educate coaches and parents about how to recognise the signs and symptoms of heat related illness and what to do if these situations arise.

We need to continually educate ourselves and other sports trainers on all aspects relating to heat related illness and hydration.

The last point that needs to be remembered when playing/training in the heat is that as sports trainers you also need to look after yourself. Stay well hydrated, wear appropriate clothing and sunscreen.

Sports Medicine Australia have some great resources available for sports trainers around hydration and heat related illness – be sure to check these out and get some for your club.

MENT FOR ATHLETES

HEAT RESOURCES



Beat the heat

Outlines what heat illness is, its symptoms, risk factors, prevention and discusses ambient temperature vs wet bulb globe temperature.

Hot weather guidelines

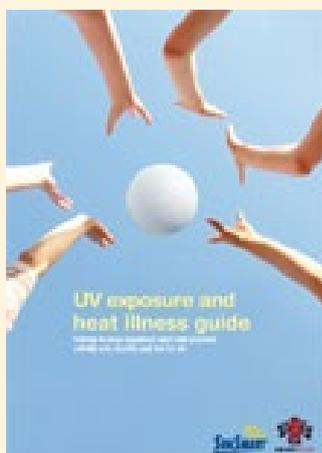
For sporting clubs and association who have ever asked the questions:

- should our sporting event be modified or cancelled?
- should our training be modified or cancelled?
- when is it safe to play sport or be physically active in the heat?



UV exposure and heat illness guide

A joint venture between Sports Medicine Australia's Smartplay and the Cancer Council's Sunsmart programs which provides information on UV exposure and heat illness, tips for creating, reviewing and implementing local guidelines, a modifiable UV exposure and heat illness checklist and real-life examples.



SunSmart UV app

Provides daily sun protection times for your location each day and lets you know when you do and don't need sun protection, making it easier to be smart about your sun exposure all year.



How to choose sun protective clothing video from SunSmart

How to choose sun protective sunglasses video from SunSmart



A LOOK AT CRICKET PHYSIOTHERAPY



Paul Close

PAUL CLOSE, PHYSIOTHERAPIST OF THE NZ BLACKCAPS CRICKET TEAM GIVES US AN INSIGHT INTO HIS WORK INTO INJURY PREVENTION.

One of the reasons I really enjoy working in cricket is that I believe the team physiotherapist can have a major impact in the area of injury prevention. Prevention of load induced injury is a major focus in our day to day management of players and also indirectly relates to optimising performance.

LOAD MONITORING

I. Bowling loads – every ball a bowler delivers in training or a match is recorded. We have various spreadsheets that this data is entered into and tells us how a bowler is tracking with his predicted loads versus actual loads. This allows us to plan a bowler's loads for weeks in advance and adjust accordingly when unexpected changes are encountered such as weather or changing match loads. There are now a number of published studies which have identified some injury risk parameters in regards to bowling workloads (Dennis, Finch & Farhart, 2005; Orchard, James,

& Portus, 2006; Dennis, Farhart, Clements & Ledwidge, 2004). One of the main findings in the past few years is that bowling load induced injury most commonly presents three to four weeks post a high load episode (Orchard, James, Portus, Kountouris & Dennis, 2009). This helps us in managing a player's loads and understanding times when an individual may be at a high injury risk.

II. Throwing loads – We track throwing loads less intently than bowling loads but this is still an area to monitor as throwing too much or too little is likely

to contribute to an increased injury risk particularly for the shoulder. The following article is a useful resource for cricket throwing loads (Saw, Dennis, Bentley & Farhart, 2011).

III. Wellness questionnaire – this is a quick daily questionnaire that enquires about sleep quality and quantity, muscle soreness, general wellbeing, appetite, session RPE (rating of perceived exertion) and stress level. This data is entered into an iPad app. Once again we can better manage a player's training and match load with this information.

SCREENING AND TESTING

- I. Medical screening – this is a simple one page document which identifies potential medical risks that we may need to look into further or be prepared to manage.
- II. Musculoskeletal screening – we screen our contracted players every twelve months and problematic areas are re-screened periodically to help address any changes we might be trying to affect. As with other sporting codes, our strongest predictor of injury is still previous injury so probably the

most important part of our screening is obtaining detail on injury history. This is usually pretty straightforward as we have electronic records of player injury history by the time a player reaches the BLACKCAPS. The tests in this screen are focused around the most common injuries we encounter and those that we think we can effect change on. The following articles have some interesting points around screening in cricket (Dennis, Finch, Elliott & Farhart, 2008; Dennis, Finch, McIntosh & Elliott, 2008).

III. Fitness testing completed by the Strength and Conditioning team happens periodically throughout the year whenever there is a suitable time. Often there will be things picked up in functional movement screening that have direct relationships with musculoskeletal screening findings so whenever possible we try and address these deficits.

RECOVERY

- I. Recovery is a massive focus for us due to the nature of the demands of international cricket. We use a 10 point recovery plan which includes specifics around sleep, hydration, food, active recovery, pool sessions, Normatec recovery system, alcohol, compression

clothing, ice baths, stretching and recovery massage.

- II. Travel protocols – We have a number of protocols that we use around travel days, particularly around long haul travel. These are all fairly standard,

some of the more interesting parts include use of in-flight humidifying masks, use of melatonin, exposure to sunlight and use of probiotics for traveller's diarrhoea prevention.

PREHAB/REHAB PROGRAMS

The majority of the injury prehab programs I provide are integrated into general conditioning programs with a few completed separately. We've found this has increased compliance and proved to be more effective over the long term. Most weeks will have two separate prehab/rehab sessions depending if we are in competition phase or not. I use these sessions to correct techniques, commence new programs and upgrade. Then the athletes can work semi-supervised and build their rehab/prehab into general conditioning e.g. rotator cuff exercises in rest breaks while doing squats. Our most common programs are focused on shoulder, adductor, ankle, hamstring, calf and elbow. There are

some programs that are specific to a player's role in the team e.g. fast bowlers have additional focus areas such as QL (quadratus lumborum) and obliques. Flexibility is also a key focus for our athletes so we have dedicated sessions with rollers, assisted stretching and massage for improved muscle length. Our athletes have access to a wide range of professionals while on tour including; physiotherapist, trainer and massage therapist along with coaches and a performance analyst. We have a doctor for away tours to developing countries and have access to a consultant nutritionist and mental skills expert. In recent years I've realised just how much of an impact nutrition can have on the day

to day wellbeing of an athlete, obviously around areas such as body composition and performance aspects, but I'm now more aware of muscle recovery related to nutrition as well e.g. player may present to me with irregular muscle soreness which could be diet related rather than a physical issue. This is especially important for us as our regular diet is often compromised when we are overseas.

ABOUT THE AUTHOR

Paul Close is the Physiotherapist for the NZ BLACKCAPS cricket team.

COUNCIL OF DISCIPLINE NEWS AND EVENTS

Australasian Academy of Podiatric Sports Medicine (AAPSM) Research Grant: Call for applications (deadline May 8, 2015)

The AAPSM research grant is an initiative to promote and assist sports podiatry research in Australia. The purpose of the research grant is to provide financial support for sports podiatry research, as well as to encourage the dissemination and promotion of research findings within the sports medicine community. Funds can only be allocated to an approved Australian research or public institution. To obtain a copy of the guidelines and application form, visit www.aapsm.org.au, visit Facebook <http://www.facebook.com/AAPSM1>, Twitter (@_AAPSM_) or email admin@aapsm.org.au

Sports Dietitians Australia (SDA)

Our Accredited Sports Dietitians members optimise health and performance of athletes through nutrition. Their strength is their detailed knowledge of nutritional science and the practical aspects of food and nutrition. They are experts in translating cutting edge science into practical messages that can be easily understood and implemented by athletes, tailored to their level of knowledge, skills and personal circumstances. Find your local SDA member via our website – www.sportsdietitians.com.au

Sports Physiotherapy Australia (SPA)

SPA has a new National Chairperson with Holly Brasher from NSW filling the role for the next two years. Holly would like to thank Aidan Rich for all his hard work and efforts during his term. For more information and to access to the extensive SPA CPD calendar visit www.physiotherapy.asn.au



2015

MARCH

- 7** Active Nutrition Course (formerly known as Nutrition for Exercise & Sport), Perth
- 12** SMA/SPA Monthly Lecture, New South Wales
- 28** Active Nutrition Course (formerly known as Nutrition for Exercise & Sport), Brisbane

JUNE

23/24 SDA Conference, Melbourne

OCTOBER

3-6 APA Conference, Gold Coast



VALE JOHN STANLEY

HERALDED AS A TRAILBLAZER OF THE PHYSIOTHERAPY PROFESSION, IT IS WITH SADNESS THAT WE LEARN ABOUT DR JOHN STANLEY'S RECENT PASSING.



A longstanding champion of the physiotherapy profession John holds the honour of being the first physiotherapist to tour with the Australian Winter Olympics Team where he oversaw our Olympic teams from 1976 to 1988. He was also the first to be associated with an Australian Rules Football club – the Richmond Football Club which resulted in a 25 year association and culminated in life membership.

He also worked as the physiotherapist to the Australian team at the World Bobsled Championships in Europe, was the physiotherapist for the America's Cup Challenger 'Challenge 12' in 1983 and was a member of the Victorian Olympic Council for many years. John's work as a volunteer (for most of his aforementioned efforts were unpaid) was underwritten by a very successful private physiotherapy practice in Kew, where his patients, ranging from the uncoordinated to the unconquerable all received the same level of expert attention.

John's contribution to SMA was significant. He served on the Victorian Board for over 15 years where he was State (VIC) President (first physiotherapist to hold office) from 1989-91 and the first physiotherapy Vice-President on the ASMF National Board. Over those years he served on virtually every state sub-committee; ethics, education, social, course and conference planning. He was Director of Physiotherapy Services when SMA-VIC set up a Sports Medicine Centre at the City Baths. In 1993 he received the Victorian President's Award for outstanding service from Paul McCrory and was made an ASMF Fellow in 1994. As well as committee work, John lectured and convened courses on ski safety and injury management to doctors, physiotherapists and the wider sports medicine community. He worked tirelessly to promote a good working relationship between the physiotherapist and SMA.

John has been described by his peers as "a generous man. A man of culture and wit." He had a love of ballet, opera, theatre and art which continued when he moved from Victoria to Noosa on retirement.

In a past interview John was quoted as saying, "My big aim in life was to try and do something for physiotherapy. When I started physio wasn't totally accepted in sport. So whether it was in football or the Winter Olympics, it was something we had to pioneer and I felt that that was one of my achievements." Vale, John Stanley – a true trailblazer of the profession.

Sports Medicine Australia extends our deepest sympathy to all who knew and loved John.



SMA Member Ian Gillam recounts a memory he has of John Stanley:

"John was lecturing a group of 100 students in a large lecture theatre on knee injuries. He was discussing the anatomy of the knee but had no model of the knee joint to use to highlight aspects of the anatomy that were important. He then proceeded to prop up his leg on a chair in front of all the students, pulled up his trousers to above the knee and started to show the students the key anatomical features of the knee he was discussing, by pointing to various parts of his now exposed knee joint! Classic John!"

Sources: Peter Dornan, Peter Duras, Ian Gillam

TRAIN. RACE. PARTY. REPEAT.

THE NEW GEL-NOOSA TRI 10

The GEL-Noosa Tri 10 continues to mix performance with flair. Grip tabs on the heel and tongue reduces T2 transition time and a new lacing system on the colourful upper will deliver an outstanding fit. A new toddler's model has been added to the Noosa Tri family that already carries pre-school, grade school and adult sizes.



Men's model



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