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Contents

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Physical Activity and Health

Has the Paradigm Changed?

Gary Moorhead

Analysing, establishing and explaining the importance of physical activity for health is an important research focus for many of SMA's scientific members. More recently, SMA members in clinical practice have come to understand the important role every clinician plays in recommending and encouraging higher levels of physical activity in patients.

The role of physical activity as a determinant of health was highlighted by a number of key studies in the latter part of the twentieth century (1. 2.) and then enshrined in the US Surgeon General's "thirty minutes a day of moderate intensity activity on most days of the week for health benefit" Guidelines of 1996. (3.) Recent research has shown that meeting these Guidelines reduces the risk of diabetes, coronary heart disease, some cancers and may improve mental health and quality of life. (4.)

But since 1996, what appeared to be a relatively straight forward message about the relationship between levels of physical activity and resulting health benefit has become increasingly confused and confounded.

A number of factors have contributed to this confusion:

- What is health benefit? The guidelines talk about diabetes, coronary heart disease and the like, but most popular media focus on obesity – and usually the word obesity is twinned with the word "crisis".
- Is obesity a "disease" in its own right? Or is it an indicator of risk of developing disease?
- Can an obese person still get health benefit from activity? (The "fat/fit" argument.)
- What is moderate intensity? And what about more intense bouts of physical activity of shorter or less frequent duration? Do they also confer any health benefit?
- What does "most" days of the week mean?
- What about types of activity? For example, does walking provide the same benefit as jogging and does stretching provide any benefit?

Constant tinkering with the Guidelines themselves – or criticisms of public health statements and positions - simply adds to the confusion. This year the American College of Sports Medicine (ACSM) and the American Heart Association revised the Guidelines in an attempt to resolve some of the above issues. The new Guidelines clarify issues relating to the 'most days' – they now recommend 'moderate' intensity activity on five days each week, but also specify that three bouts of more vigorous activity can also be beneficial for health.

However, there is no doubt that despite the best intentions of the Guideline setters, confusion – and controversy - still reigns.

Controversy reigns

At around the same time as the ACSM and American Heart were releasing their new Guidelines, the Australian Consumers Association through its magazine "Choice" was advising Australians that exercising three times a week (one of the new Guidelines) was not enough. (5) The Choice article got stuck into "eager fitness instructors (and) lax health groups" for "propagating myths" about exercise. The Choice writer did not seem to be aware of the revised ACSM Guidelines.

Another dissenting voice was raised at the recent annual conference of the Australian Society for the Study of Obesity (ASSO) when keynote speaker Dr Tim Gill disputed the analysis of population health data made by American "fat/fit" proponent Steve Blair. Gill claimed that the same data that Blair used to support his argument that exercise conferred health benefit regardless of weight could be re-analysed to produce contradictory outcomes. (6.) (SMA members attending this year's National Conference in Adelaide ('be active '07 – 13-16 October, Adelaide Convention Centre) will be able to draw their own conclusions about this as Steve Blair is the Plenary Speaker at the Conference.)

While Gill's position in this regard may be somewhat isolated, what is beyond dispute is that the number of obese and overweight people in Australia is increasing. Yet even here clouds tend to gather over the facts. From media reporting and governmental responses, it would appear that the obesity crisis is mainly to do with children. In fact, the more pressing and immediate obesity crisis is in adults.

A fundamental problem is that while there would seem to be little dispute with the general guideline position that most people will get health benefits from thirty minutes of moderate intensity activity a day, it seems that most people who meet these Guidelines generally do not lose weight – or even maintain weight.

This inescapable fact has been one of the drivers behind the urge to tinker with the Guidelines – or to try and find a new Guideline that could accurately prescribe an activity level and intensity that could counter the tendency to put on weight. Crucially, all the Guidelines to date have focused on people increasing Leisure Time Physical Activity (LTPA) – through playing more sport or making more time for recreational physical activity.

But on Sunday 2 September, the parameters of this discussion were dramatically re-drawn.

Two papers presented that day at the ASSO conference in Canberra, by Professor Adrian Bauman from Sydney University and Professor Wendy Brown from the University of Queensland, may well send us all back to the drawing board – not just to do a bit of tinkering and tweaking, but to give the whole machine a drastic overhaul. The papers presented (and they were developed independently of each other from different primary data sources) said in essence that: 30 minutes of recreational sport and physical activity a day - as leisure time activity – is unlikely to prevent weight gain, if the other 23.5 hours each day are spent in sedentary behaviours. In brief, both researchers claimed that the weight of evidence shows that most people do not expend sufficient energy each day to prevent weight gain – let alone cause a reduction in weight.

Adrian Bauman formed his view after an analysis of a large number of papers describing interventions to encourage physical activity conducted in the last twenty years. His conclusion was that "there are not enough hours in the day to increase activity enough through LTPA to impact on obesity". Bauman said that the answer must be found in other areas – i.e. we must encourage more "active living" in other 'domains' of activity such as transport, work and domestic tasks". (7.)

Wendy Brown's paper was based on detailed analysis of one study: the monumental Australian Longitudinal Study of Women's Health, now in its 10th year of operation and starting to reveal true rolled gold data for researchers. Brown's analysis showed that in mid aged women, one hour of leisure time physical activity a day does NOT prevent weight gain. Like Bauman, Brown advocated looking for increased activity in "the rest of our lives". (8.) What does this mean?

In the first place, nothing changes in relation to the message about activity and health benefit. This message needs to be re-stated strongly and constantly and separated from the "obesity" issue.

It is in the area of obesity prevention that the paradigm shift needs to occur.

Firstly and most importantly, we need to know what cohorts of the population are most at risk. This means looking beyond feel-good campaigns solely (and probably ineffectively) focussed on children. Brown's paper showed that while the rates of obesity were highest amongst mid-aged women, the *rate* of increase was fastest amongst women in their late twenties and early thirties. (8.)

Embrace energy balance

Secondly, there needs to be a fundamental re-think of approaches to reducing obesity. Strategies solely focused on LTPA are doomed to failure. Individuals and groups claiming to hold the keys to a solution through manipulating LTPA face being discredited. The notion of "energy balance" needs to be more closely embraced by all those involved in obesity prevention. Physical activity advocates must recognise the role of diet and dietitians the role of physical activity. Governments and other policy makers (like SMA) need to think and act more boldly.

The updated ACSM/AHA Guidelines can be viewed at

http://www.acsm.org/AM/Template.cfm?Section=Home_Page&TEMPLATE=/CM/HTMLDisplay.cfm&CONTENTID=7764

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A Sports Medicine Australia (SMA) Research Foundation

Following a decision by the SMA National Board, Sports Medicine Australia will be establishing a Foundation to raise funds to support research into sports medicine and science.

The aim of the Foundation is to assist young or beginner researchers with their research. It is expected that it will take a number of years to build up sufficient funds for interest earnings on funds deposited with the Foundation to be a significant contributor to funding research. In the interim, SMA will support the Foundation from re-current earnings.

SMA members will be encouraged to make donations to support the Foundation. The current structure of tax laws in Australia means that the Foundation will be initially established with two funds: one that will attract tax deductible donations and be for research that meets tax deduction guidelines by focussing on "disease prevention"; a second fund will not have tax deductibility but will focus more on sports medicine and science. One of the roles of the Foundation will be to lobby the Commonwealth Government to allow donations for sports medicine and science research to be made tax deductible.

The Foundation will be separately constituted from SMA and will be administered by a Board made up of the SMA President and Financial Director, the President of the Australian Sports Medicine Federation Fellows, the Editor of the Journal of Science and Medicine in Sport and the CEO.

SMA would like to acknowledge the assistance of Board Business Adviser Geoff Carter, a lawyer at MinterEllison, in establishing the Foundation.

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Does the incumbent government deserve the support of the sports medicine community?

Dr J

OK, I have a confession to make before I start writing in that I have had a gutful of the Howard government. This Dr J piece was going to tip a bucket on our soon-to-be-judged-by-the-polls government and, for those coalition supporters who are still in the room, it will probably still seem that way. My opinions in this column tend to be strong enough that even when I feel I've watered them down, my detractors still get outraged at a cost of my loyal fans complaining that I've gone soft. However, I am going to try to give a fair summation about the positives and negatives of the Howard years with respect to Sports Medicine. If I complain too much, I am going to come across as being too much from the chardonnay-swilling latte-sipping SMH-reading Eastern Suburbs moaning set, and my life ain't that bad. On a personal level, over the last ten years I've done pretty well, and of course the fact that many so-called aspirational Australians have also been doing OK is the ongoing platform that the coalition will use to try to get re-lected.

Whether you believe me or not, I actually consider myself (potentially) a swinging voter and I have voted John Howard in the past. When he first came into power, I was very impressed with his stance on gun control immediately after the Port Arthur massacre. In retrospect, however, this stance was not because he was passionate about gun control but was because he was passionate about tabloid newspapers and opinion polls. Howard swung to the left when the *Daily-Telegraph* and *Herald-Sun* had bullets on their front page after Port Arthur, but he swung back to the right when the front pages had faked photos of refugees throwing children overboard from the Tampa.

"Yes Minister" logic

Self-interest is always a good horse to back, because you know it is always trying, and despite our comfortable situation, self-interest has made sports physicians pretty disillusioned with the Howard years. The ACSP first applied for sports physicians to be recognised as specialists in the early 1990s. Fifteen years later the status is as follows: sports medicine is now recognised as a specialty, but according to the government there are no specialists practising the specialty. Their twisted "Yes Minister" logic is that this is because no assessment has been made of whether the doctors that the government already recognises as practitioners in sports medicine should be practising in the recognised speciality of sports medicine. The status of sports physicians over the last 8 years of the Howard government has been unique in the history of Australian medicine: recognised, but as a third tier practitioner that is neither GP nor specialist. Many of us are now recognised as specialists in New Zealand and the UK and potentially also in the US and most of Europe. We can't currently get recognised as specialists in the country where we trained because the official position of our government is that it is currently "impossible" to be recognised as a specialist in the "recognised" specialty area of sports medicine until the appropriate committee meeting has been held. The same story as it has been for the last decade.

Now for those hardcore Liberal voters who haven't ripped up the relevant pages of Sport Health and turned them into a paper plane (the paper is obviously too glossy to wipe your backside with) there has been one major upside for individual sports physicians to come from the lack of appropriate government recognition. Because there is no funding for the training program and no guarantee of Medicare recognition for the four years of study, very few doctors (relative to other medical colleges) have enrolled to the Fellowship program of the ACSP over the last ten years. As an *individual* practitioner, given that there is a big market for sports medicine services (demand) and there is hardly anyone doing the training program (supply) the market forces have meant a shortage of sports medicine services. An advantage from the practitioner viewpoint is that the prices of services have been rising, although there is a disadvantage that when a practice is expanding or needs relief for practitioner leave, it is very hard to get new staff. Some selfish sports physicians may think that the Howard government has wonderfully looked after us with the dis-incentivation for much competition to arise from a non-recognised training program. The unselfish viewpoint would be to say that the community has been terribly let down. Most outer suburbs in the capital cities and almost all rural areas do not have sports physician services available. Collectively, sports physicians as a group have been held back from having a more meaningful presence in the community (which I'll get back to later on).

A further undeniable positive of John Howard, and of late his health minister Tony Abbott, is that they have set strong positive role models with respect to physical activity. It helps a smidgin to

promote physical activity when you have the Prime Minister regularly filmed on his morning walks (to the extent that his Wallaby tracksuit has become a staple for comedians). Howard obviously believes *personally* in physical activity to assist his own health, but from his lack of policies it is equally obvious that he does not believe that the government has any meaningful role in assisting physical activity promotion. Cynically, I think he gets his morning walks filmed because advisers have considered it a vote winner.

Media Chameleon

The lesson is that Howard is a media chameleon (and probably every successful politician in the future will need to be the same) and since the media haven't been on his back about lack of action on sports medicine or physical activity, it hasn't been on Howard's radar. The prevailing media view (and consequently government one) is that obesity is a big problem, but it is a problem borne of lazy individuals, not of a lazy government, and therefore should not be subject to government policy. It is reminiscent of the prevailing attitude towards smoking 30 years ago, where it was recognised that it was a bad thing that 30% of the population smoked, but (wrongly thought) that nothing could be done about it by the government because it was entirely an individual choice.

What we need to do in sports medicine and on the physical activity front is to learn from the lessons of the anti-smoking movement (and more recently the issue of climate change) about how to force our issues on to the national agenda. Earlier this year I was watching an old episode of the John Clarke ABC SOCOG-parody series *The Games*. A fascinating historical segment from one of the episodes was Maxine McKew, playing herself as a then-ABC newsreader, interviewing a fictional Spanish bureaucrat who was threatening a European boycott of the Sydney Olympics because Australia had refused to sign the Kyoto protocol. Remember that this series went to air in *Nineteen-Ninety Eight*. In 1998 there were almost certainly climate change evangelists trying to tell the world that disaster awaited us if we didn't act on global warming. The argument was already convincing enough that most European governments were in the process of ratifying the protocol. But in Australia it was considered far enough to the radical left that a parody show was tossing up the then-hilarious notion of a boycott of the Olympics that the poor bastards at SOCOG might have to deal with. The reality in 2008 is that if Sydney was holding the Olympics instead of Beijing, there may well be genuine boycott threats because of our refusal to ratify Kyoto. And of course Maxine McKew is now a genuine chance to win Howard's seat of Bennelong because the Prime Minister is seen to be out of touch with critical issues of the day like climate change. In under ten years climate change has moved from peripheral to key mainstream political issue.

Out of Touch

Our government has been similarly out of touch with physical activity as an issue that is somewhat amenable to government control. This is possibly because the media has also been out of touch with it, and it is our job to convince everyone that public health *policy* on physical activity is the way forward. Contrary to myth, sports medicine practices typically have more middle-aged overweight patients than elite athletes. They suffer from conditions such as Achilles tendinopathy that have stopped them from being able to walk as much as they like. They put on more weight which makes their tendinopathy worse which makes them walk less which leads to more weight gain. Those from the wealthier demographics can afford the high out-of-pocket fees to attend sports medicine centres and get their injury and co-existing weight problems under control. However, there are huge parts of Australia with no sports physicians, and although dieticians, physiotherapists and podiatrists exist in the private system, their fees are often out of the reach of those who rely on public medicine. Many obese patients are held back by injury from performing the physical activity they need to get their weight under control. The bulk-billing GPs only have anti-inflammatory prescriptions at their disposal for the 'free' treatment that these disadvantaged patients need and these medications don't cut the mustard in terms of getting a long-term result. Hence our expanding section of the expanding population, which particularly affects the poorer parts of the community.

Finger-pointing

The response of the government and the media is finger-pointing at the obese as being responsible for their own plight and the public currently buys this line. We need to change the mindset. A "War on Obesity" mentality would work as long as it wasn't a declaration of war on the obese themselves. If it was seriously large funding for a government body whose brief was to lift the rates of people getting enough physical activity by 30%, then there is every chance it could work. Such a body might actually start by looking at the barriers to physical activity and then trying to remove them. Better funded and structured sports medicine services accessible as part of 'public' medicine (which exist in New Zealand currently but not here) are certainly going to be part of the multi-pronged solution.

We can learn a lot from those who have had success in the past and that is why my current reading list includes *Public Health Advocacy and Tobacco Control: Making Smoking History* by Sydney University's Simon Chapman. It is also why I'll be walking to the ballot box at the upcoming Federal election with physical activity policies (or lack of them) in mind when I'm choosing who to vote for. In this sense I'll be in a very small minority of Australians, but in the next 10 years I hope that we can make it on to the national agenda, in the same way that climate change has moved in the last decade and tobacco control has done in the last 30 years.

Box'Tag

A modified form of boxing competition aimed at improving community fitness and health

By Allan Hahn

Recent Australian innovations are opening up a new and exciting opportunity for the many people who use boxing-related activities as a means of fitness development. Several years ago, former amateur boxer Losh Matthews – who has a history of involvement in the fitness industry – conceived the idea of allowing enthusiastic 'boxercise' practitioners to take part in competitive bouts under a strict set of rules designed to greatly minimise the risk of any injury. This idea has now found expression through the introduction of Box'Tag®, an emerging sport in which success depends on skill, speed and physical condition, and not on an ability to hurt the opponent.

Under the rules of Box'Tag®, high-impact punching leads to immediate disqualification and punches to the head are actively discouraged. People wanting to participate in competitions must first undergo a comprehensive training course designed to develop basic boxing skills, fitness, and attention to safety. The sport is suitable for both males and females. Competitors must wear head guards and mouthguards, and the former incorporate nose protectors (Figure 1). In addition, groin protectors are mandatory for the males, while the females must use breast protectors. Contests typically consist of 3 or 4 rounds of 1 or 2 minutes duration, with the rounds separated by 1-minute rest intervals.

Scoring in Box'Tag® is accomplished through use of an automated system initially developed by the Australian Institute of Sport (AIS) in conjunction with the Cooperative Research Centre for Microtechnology, and later improved through scientific and technical inputs from the AIS, CSIRO and the small Melbourne R&D company PWP Designs. The system is intended to be an analytical tool for use in the AIS Boxing program and other high-performance boxing environments, but has proven to be ideal also for the purposes of Box'Tag®.

The scoring system is built around sensors that have been placed in boxing gloves, head guards, and specially constructed vests. The sensors transmit data via wireless mechanisms to a ringside computer, and dedicated software enables the detection of simultaneous impacts from a glove of one competitor and the head guard or vest of the other. In Box'Tag®, an impact to the front or sides of the vest of the opponent yields a score of 3 points, whereas an impact to the head guard incurs a 1-point deduction. Scores are displayed in real time on a large screen, together with a schematic and a table showing impact locations (Figure 2). This adds the feeling of a computer game to the physical challenge of Box'Tag®, a feature which seems to increase the attractiveness of the activity to young people. The data can be recalled after a contest for analysis that can provide insights into technical strengths and weaknesses and changes occurring with fatigue, thereby helping to guide subsequent training focus.

Box'Tag® is run by a company called Strongarm Boxing & Fitness. The company was formed in February 2005, and a year later it opened a dedicated and well-equipped Box'Tag® facility at Caringbah in southern Sydney. Over the past 18 months, the new sport has gained considerable momentum. There are now more than 50 people who attend the Caringbah facility on a very regular basis to train specifically for Box'Tag®. There are others who train occasionally, so that in general the facility is used by about 70 people per day. As a direct result, plans are now being made for a building extension.

Figure 1: The photograph shows the instrumented boxing gloves, head guards and vests worn by Box'Tag contestants.

The group training at Caringbah includes quite a few women and children, as well as a diversity of social and ethnic backgrounds. Special sessions for children are held after school on three days per week. They involve an hour of quite intensive activity that incorporates a considerable range of physical and technical exercises, including a small amount of competitive work. The emphasis is on enjoyment and consequently the children, who vary in age from 5 to 14 years (Figure 3), seem barely aware of the physical component. There have been a number of cases in which improved self-confidence and self-image resulting from Box'Tag participation appears to have positively influenced other areas of life, including achievement at school.

Since February 2006, Box'Tag® competition days have been held on an approximately quarterly basis, with 8-14 contests on each occasion (Figure 4). There have been no injuries other than minor bruises and abrasions, and contestants have almost universally reported that although the competitive experience has been physically demanding, it also has been fun.

Competition days are keenly awaited by the rapidly increasing Box'Tag® community, and their frequency to date has been limited only by the availability of the scoring technology. Current demand would permit monthly competitions.

The appeal of Box'Tag® extends beyond just the people training at Caringbah. Recently, a police officer brought 16 indigenous girls and two trainers from Bourke (north-west NSW) to Sydney for an introduction to the sport. The girls are now training devotedly in their home environment with a view to the possibility of taking part in a Box'Tag® tournament within the next couple of months. Also, Box'Tag® training has been introduced as a sports activity at four different high schools in southern Sydney, with a total of more than 50 students participating. Some of the students have expressed interest in going on to complete a full Box'Tag® course as a preparation for taking part in competitions. There have even been enquiries from overseas in relation to the Box'Tag® concept.

A leading Australian paediatrician, Prof John Pearn, has attended two Box'Tag® demonstrations. He describes the sport as a 'brilliant' innovation, in that it enables participants to experience the fitness benefits and special traditions of boxing without the risks of injury inherent in the traditional form of the sport. He feels that, from a medical perspective, it merits strong endorsement. This opinion is shared by other experts, as evidenced by the fact that in 2006 Strongarm Boxing & Fitness was presented with a silver award from the NSW Sporting Injuries Committee for 'outstanding achievement by a sporting organisation in implementing or adopting safe sport practice'.

For the Box'Tag® concept to achieve its full potential, it obviously will need to progressively expand its geographic reach. Since Strongarm Boxing & Fitness is a small company with limited resources, this represents a substantial challenge, but active efforts are being made to address it. At the most immediate level, a course is currently being planned for the development and accreditation of Box'Tag® trainers who eventually could work in facilities other than the existing Caringbah centre. In the relatively near future, a course also may be run for referees, and audio-visual materials will be prepared to help potential Box'Tag® competitors complete at least some components of the required initial training without having to spend a lot of time at Caringbah. Preliminary investigations are being carried out to ascertain the feasibility of establishing Box'Tag® competition structures in various settings where conventional amateur boxing was once strong but (because of altered societal attitudes) is no longer practised. In a broader context, attempts are under way to identify viable and cost-effective business models that would eventually enable the opening of new Box'Tag® facilities. These models provide for using a share of any eventual financial returns to subsidise the involvement of disadvantaged communities in Box'Tag®.

Figure 2: Scorecard generated by the automated scoring system used in Box'Tag contests. The card shows all impacts recorded on the equipment of each boxer. Thus, in the above example, the blue boxer landed 71 punches with the left hand and 35 with the right, and took a total of 82 punches to the vest and 5 to the head guard. Note that 3 points are recorded for each body punch landed, while there is a deduction of one point for a punch to the head. Heavy punches result in disqualification.

Figure 3: Some of the younger enthusiasts currently training for Box'Tag.

Box'Tag® is still at an early stage in its evolution. The scoring technology has become integral to it and almost certainly will be used to help shape its nature. There is scope for the scoring to become slightly more complex so that particular styles of boxing are better rewarded.


Leader Sport
RUGBY LEAGUE
Coaches square off as problems simmer P28-29
Girls' golden gloves
Boxtag tournament a healthy success

Figure 4: A newspaper report on a recent Box'Tag competition day.

From the AIS perspective, it is pleasing to see a technology developed for high-performance sport find application in a more general community sports setting.

It is widely recognised that in order to address the major obesity problem presently affecting our community and to reduce the incidence of diseases directly related to physical inactivity, new initiatives are needed to encourage habitual exercise. Losh Matthews and his colleagues at Strongarm Boxing & Fitness are vigorously pursuing such an initiative and seem to have developed a concept that is appealing to a significant group of young people. The number of people wanting to try Box'Tag® has increased with each competition day, and although the sport is still quite small at this stage and is largely confined to a single Sydney location, its rate of growth over a relatively short period and the remarkable enthusiasm of its devotees suggest that it has considerable potential. It is hoped that this might attract attention from Australian sports science and medicine professionals, and from health authorities.

Box'Tag® is somewhat unusual in being a sport that has originated from the fitness industry but one that also draws heavily on fundamental elements of a traditional sport. Because of its dependence on technology and its close interaction with technology development, it is to some extent also a product of Australian initiatives in sports science and engineering. It is a sport that is not just being supported by these disciplines, but instead is being partially moulded by them, as well as by sports medicine input. In this regard, it is perhaps almost unique. Its bringing together of developments from various areas of the sport and fitness industries is among its highly interesting aspects, and may prove important in its longer term quest for success.

Box'Tag® seems likely to involve a population that is more broadly-based and quite different from that typically engaged in conventional amateur boxing. Its prospective relationship to conventional boxing is perhaps comparable to that of Touch Football to Rugby League. The low risk of injury means that Box'Tag® participants could have considerable longevity in the sport, and this obviously is important in terms of maintenance of a regular exercise habit.

While Box'Tag® is clearly a 'grass roots' initiative and is presently focused on the physical fitness and personal development of participants rather than on a high-performance competition environment, the idea that it could one day progress to holding regional, national and even international championship events is not beyond the scope of imagination.

In addition to his position at the Australian Institute of Sport, Allan Hahn has an adjunct professorial appointment at the University of the Sunshine Coast.

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Sports injury prevention research in Australia – are we doing enough?

By Caroline Finch

Over the past two decades, sports injury prevention research has become a major area of research activity in Australia. No longer solely the realm of sports medicine researchers, the area is now a good example of multidisciplinary efforts including those from the sub-disciplines of behavioural psychology, biomechanics, dentistry, education pedagogy, epidemiology, exercise physiology, health promotion, public health, sociology, and motor behaviour. This paper provides a broad overview of the nature of the Australian sports injury research, as published in the international peer-review literature, over the period 2000-mid 2006. In doing so, it outlines clear gaps in current knowledge and suggests directions for the targeting of future sports injury prevention research.

Review Strategy

The Pub Med database was scanned for relevant papers published during the period Jan 2000-August 2006, inclusive. Papers were selected if the abstract or title included both the words sport (or sports or sporting) and injury (or injuries). This was to identify studies directly related to sports injury. It is recognised, however, that this search strategy may have missed some studies as the more medically or biomechanically focussed papers, for example, would not have been identified if they just used terms such as ACL tears, tendionopathy, etc rather than injury. Also, as the search was restricted to the PubMed database, papers published in journals not indexed in that source, and the many non-peer review journal publications, were not included.

A further selection criterion restricted the selected papers to those that mentioned Australia in either the title, abstract or author affiliations, in an attempt to locate only Australian research – defined as that either conducted in Australian athletes/participants or by Australian authors.

A new framework for underpinning the directions of future sports injury research was published in 2006 (1) (see Table 1). This framework stressed that only those injury prevention measures that could (and would) be adopted by sports bodies and participants had any scope for preventing injuries. For this reason, published Australian sports injury research was categorised against the TRIPP stages to assess the current status of sports injury research in Australia and how likely it is to directly impact on sporting practices. Hand searching of abstracts identified by the above two-step selection process was used to identify studies specifically related to sports injury prevention and to determine which TRIPP stage/s they related to.

Search Results

Overall, a total of 118 papers meeting the above selection criterion were identified. Of these, 34 (or 29%) were commentary or review papers. Only 3 of these reviews were prevention focussed, relating to lightning strikes, pre-participation screening for head injury and military issues. None of these commentary papers are not considered further, as the TRIPP Framework categorisation relates to original research studies.

Figure 1 shows the breakdown of the 84 original research papers mentioning sports injury according to the TRIPP framework categories. Almost half of all studies related to TRIPP Stage 1 and hence related to injury surveillance studies or purely descriptive epidemiological studies of injury patterns in particular populations or athlete groups. This is rather disappointing as a number of commentators have clearly argued why the field needs to move on from pure data description studies (1-3).

About one-quarter of all published studies (Figure 1) described the aetiology of sports injuries and this reflects an international trend in conducting work of this nature. Unfortunately, just exploring the causes of injuries is not sufficient

Table 1: The Translating Research into Injury Prevention Practice (TRIPP) Framework (Adapted from (1))

TRIPP Stage	Focus of each stage
1	injury surveillance
2	Understanding the aetiology of why injuries occur
3	Identification of potential solutions to the injury problem and development of appropriate preventive measures
4	Intervention efficacy assessment and is essentially an "ideal conditions" evaluation of preventive measures
5	Understanding how the outcomes of efficacy research can be translated into actions that can be actually implemented in the real-world context of on-field sports behaviours and sports delivery, i.e. developing and understanding the implementation context
6	Implementing the intervention in a real-world context and evaluating its effectiveness, i.e. determining how effective the scientifically proven interventions are when applied to the real-world context of player behaviours and sporting culture

to ensure their future prevention (1). Further research needs to be conducted on developing solutions to addressing the identified risk and protective factors and demonstrating their efficacy and effectiveness. Figure 1 suggests that, as yet, relatively little research work is being conducted in Australia on these aspects. Nonetheless, the peak of TRIPP Stage 5 work, includes 7 studies of protective equipment (for Australian football, rugby union and squash), 3 studies exploring safety policies and practices adopted by sports clubs, 1 return-to-play after injury study and 1 study in relation to steroid use. There is a general lack of published work in this area internationally, and some of the Australian research is setting the standard in this field.

Other Gaps in the Literature

Despite children and adolescents comprising the largest number of community-based sports participants (4), only about one-eighth of all published studies have focussed on children (Figure 2). Similarly, a large proportion of published studies have focussed on elite or high performance athletes, which again is not consistent with the general composition of the overall athletic/participant population in Australia (5)(Figure 3). Disappointingly, only10-20% of all published research studies considered female participants at all.

Finally, the breakdown of the published studies according to the sport they are relevant to is shown in Figure 4. Some studies considered more than one sport, and 9 studies did not focus on particular sports, but described injuries in broad population groups. Almost one third of all studies related to Australian football. Gabbe and colleagues have recently called for Australian football research to extend to community participants and not just the elite players (6). The next most commonly studied sport was squash, accounting for 10% of all Australian sports injury research studies. Once again, these sport breakdowns, do not reflect known participation levels in these sports (5).

What is Being Done Well?

This review of abstracts has found that Australian sports injury research has been very good at focusing on:

- adults
- high performance athletes
- male dominated sport
- Australian football.

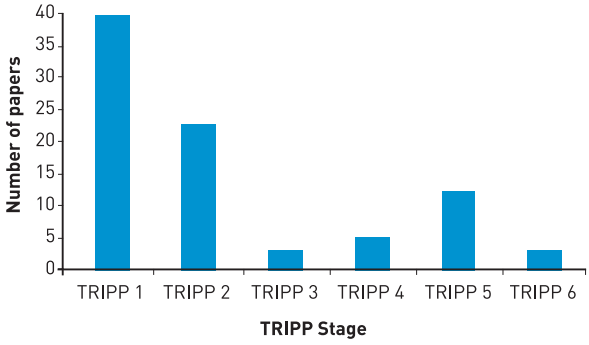


Figure 1: Australian published sports injury research according to TRIPP stages, 2001-2006

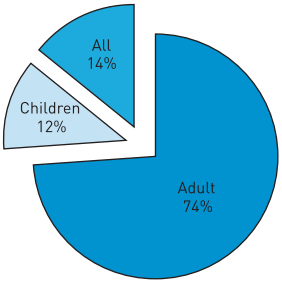


Figure 2: Distribution of Australian sports injury research studies (n=84) according to the age of the sports participants/athletes studied, 2001-2006

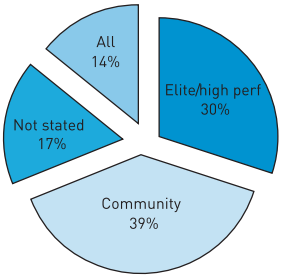


Figure 3: Distribution of Australian sports injury research studies (n=84) according to the broad level of play of the sports participants/athletes studied, 2001-2006

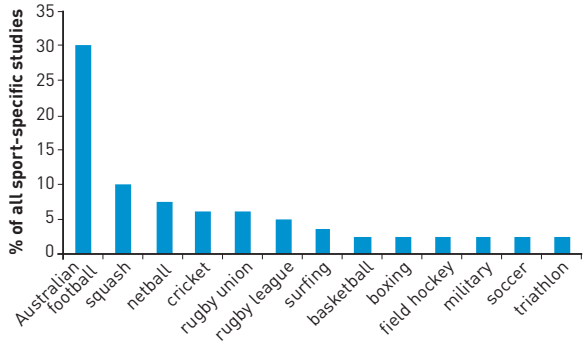


Figure 4: Classification of Australian sports injury research studies according to the sport (n=84), 2001-2006

(n=1: aerobics, bodybuilding, callisthenics, camel racing, canoe paddlers, golf, kickboxing, recreational swimming, rodeo, rugby (nfs), sea water activities, skydiving)

The large number of studies categorised as TRIPP Stage 1 shows that much research focuses only on describing or quantifying the size of the problem. Some research is aimed at building an aetiological evidence base for why injuries occur. However, Australian sports injury research, and indeed that undertaken internationally, needs to involve significantly more intervention-based and implementation studies to further progress sports safety.

What is Not being Done Well

Whilst this review was not a systematic one with a formal assessment of study quality, a few comments can be made on study quality from the review of the published abstracts. Most TRIPP Stage 1 studies purport to be injury surveillance studies but, in fact, do not meet the fundamental requirements of surveillance in that it should be ongoing and routine and used for monitoring purposes. The majority of reports are of descriptive epidemiological studies, relating to a particular group of people in a limited time span. Secondly, whilst there is an increasing focus on aetiological studies, few of these are adequately powered. It will be very important that future studies include enough athletes/participants and injuries to enable confidence in the results and generalisablity of aetiological studies and to ensure that intervention studies are not subject to high levels of statistical errors in the interpretation of results.

Finally, there is a clear gap in the level of attention, as measured by the numbered of published studies, in relation to developing interventions, conducting ideal-conditions evaluations (such as randomised controlled trials) and undertaking implementation research, particularly for interventions other than just protective equipment.

Although this review only considered studies published in the peer-review literature, it is known that there are many sports injury prevention activities and programs that have been implemented in Australia over recent years (7). It would seem that many of these programs are not being formally evaluated and it would significantly progress the field, if such evaluations were undertaken and reported in the peer-review literature.

>> to Page 17

Developing and Assessing Safe Sports Equipment

By Andrew McIntosh

It is highly unusual to play sport without some form of specialised equipment. This article will provide an overview of the role of equipment in injury prevention, how equipment is developed and assessed, and some observations. The article is based on a presentation given at the NSW Injury Risk Management Research Centre's Sports Injury Seminar on August 3, 2007.

There are two general categories of sports equipment. The first is equipment that is fundamental to the sport, eg. balls and pucks, racquets and bats, goal posts and bases, and, skis and boots. The second category is equipment designed to be worn or used to prevent injury risks in a specific sport. This includes body padding and helmets (personal protective equipment (PPE)), padding on posts, and medical equipment. There is clearly overlap. In some sports the use of PPE has become mandatory, and in other sports, the nature of the fundamental equipment may be altered so that injury risks associated with an earlier design are reduced. A very good example of the latter is the breakaway base. Another example is playing surface characteristics. There is good evidence that there is a causal relationship between the coefficient of friction and knee ligament injuries in team handball, and there is current interest in ground hardness and injury in Australia. There is also debate around the topic of behavioural adaptation when PPE is worn. There has been a limited amount of research on risk compensation related to helmet use. There has also been some concern about the role of helmets in facilitating spear tackling in American football, with its associated spinal cord injury risks. What is either lacking or undeveloped are an evidence base and product standards for sports equipment.

A number of people and organisations are involved in the development of sports equipment. There are athletes, inventors, sports equipment companies, sports organisations, and research teams, such as the CSIRO/University of Wollongong's Intelligent Knee Sleeve. The rationale for equipment development includes injury prevention, comfort, applying new technology to improving performance and commerce.

Ideally, a combination of input from the following is needed in order to improve sports equipment: biomechanics; sport and exercise science; human factors/ergonomics; medicine; engineering; industrial design; clothing/textile design; and marketing/business.

No mandatory standard

It is surprising how long things actually take. If we consider helmets in American football, they were first worn in 1896, but the NOCSAE standard for helmets was introduced in 1978 for college football and 1980 for schools. According to Cantu and Muller (2003), the reduction in brain injury in American football was due to helmet standards and rule changes. Collins et al (2006) have reported on further improvements in preventing head injury based on a coordinated approach to the development of helmets. We currently do not have a mandatory standard for cricket helmets or headgear in football. There is an Australian Standard for cricket helmets, but it is largely unworkable and biomechanically meaningless. The International Rugby Board has a law governing the performance of headgear in Rugby Union, but this does not apply to headgear worn in Rugby League.

The performance of equipment can be assessed. There are three levels of assessment: none or minimal (this applies to the majority of equipment); assessment to a standard, eg. crash mats in gymnastics, baseball, ice hockey and American football helmets; and, a process that I would term optimal:

- Laboratory testing and evaluation
- Intervention studies
- Behavioural studies
- Determination of a product standard
- Product certification
- Periodic review of equipment performance, standard and certification process

My research group at UNSW, with partners in Australia and New Zealand, has been involved in some aspects of an 'optimal' approach on the topic of headgear. We have: studied the biomechanics of head impacts in football; undertaken laboratory testing of headgear; undertaken a randomised controlled trial of headgear in rugby; surveyed attitudes towards headgear and player behaviour; and, liaised with the ARU and IRB. As a result of this we know that standard models of headgear do not reduce risks of concussion or more serious head injury. We observed that the use of thicker-denser foam in headgear may reduce the severity of concussion, but more research is required. Players have expressed attitudes that suggest they may tackle harder and play more confidently with headgear. The results regarding headgear performance from the epidemiological studies reflect the results obtained from lab testing. This confirms that lab based development is a cost effective and informative process with some validity.

Surprising indifference

The groups that might drive equipment development are: sports associations; sporting goods manufacturers; and the athletes. It is my personal observation

>> to Page 17

National Health Professions Registration and Accreditation Scheme

By Margaret Grant

In February 2005, the Council of Australian Governments (COAG) agreed that the Productivity Commission should undertake a research project into Australia's Health Workforce. In December 2005, the Productivity Commission published a report entitled "Australia's Health Workforce". The Productivity Commission report and recommendations were considered by COAG at its meeting of 14 July 2006. At that meeting, the Council of Australian Governments (COAG) agreed to establish by July 2008:

1. a single national registration scheme for health professionals; and
2. a single national accreditation scheme for health education and training.

Following the agreement to establish these national schemes, the COAG Health Working Group (HWG) progressed work to develop the detail of the schemes in consultation with stakeholders. The consultation process included several formal roundtable discussions led by the Department of Prime Minister and Cabinet, as well as opportunities for stakeholders to submit responses to consultation papers. Over the course of the consultations, the professional bodies forwarded over 150 submissions to the HWG.

In April 2007, COAG considered recommendations of the HWG in relation to the schemes and agreed on the arrangements for implementation of a national registration and accreditation scheme by July 2008. The final model integrates a new national system for the registration of health professions with a new national system for the accreditation of health professional training and education programs. The final model retains specific national boards for each of the professions.

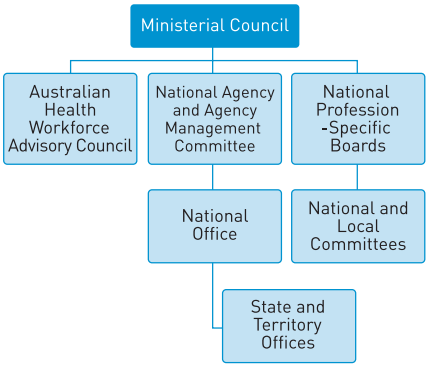
Objectives of the scheme

The objectives of the national health professions' registration and accreditation scheme are to:

- protect the public
- facilitate workforce mobility across Australia and reduce red tape for practitioners
- facilitate the provision of high quality education and training and rigorous and responsive assessment of overseas-qualified practitioners; and
- consider the public interest in promoting access to health services.

Structure of the Scheme

The following diagram outlines the entities that will be involved in the new scheme.



The intergovernmental agreement

The scheme will be underpinned by a national multilateral intergovernmental agreement (IGA) that must be signed by the Commonwealth and all State and Territory governments. The IGA identifies the scheme's objectives, governance arrangements, scope, legislative arrangements and financial arrangements. At the time of writing this article, the IGA had been drafted.

The legislative model for the scheme

Under the Australian Constitution, power for health profession registration and accreditation does not rest with the Commonwealth. Therefore, the legislative model for the scheme will be incorporation by reference. Primary legislation will be passed by the Queensland parliament and referencing legislation will be passed in the other States and Territories.

Implementation of the schemes

Once the IGA is signed, the Health Ministers will be responsible for establishing the new scheme. It is anticipated that the National Agency will be established by July 2008 and the scheme will be fully operational by July 2009.

Initially the scheme will only include the health professions that are currently required to register to practice in all eight States and Territories. The nine health professions that will be included initially are:

- Chiropractic
- Dental Care
- Medicine
- Nursing & Midwifery
- Optometry
- Osteopathy
- Pharmacy
- Physiotherapy
- Psychology

What does it mean for health professionals working with sport?

Under the current regulatory model, a health professional is required to be registered in each jurisdiction in which he or she practices. The legislation and legal interpretation of this requirement

>> to Page 16

Lower lumbar power in cricket fast bowling

By Dr. René E.D. Ferdinands and Dr. Uwe Kersting

The ability of a bowler to propel a ball at high speeds gives the batter less time in which to respond. International cricket teams are developing training programmes to increase the quality and speed of their fast bowlers. The significant problem is that fast bowlers are particularly susceptible to serious lower lumbar injury (Bartlett, 1996). Values of shoulder-hip separation angle and shoulder counter-rotation greater than 30°- 40° have been implicated as lower lumbar injury factors (Elliott, 2000; Portus, 2004). However, there has been little work on the lower lumbar power in fast bowling.

We present a biomechanical analysis of fast bowling using a three-dimensional (3D) fifteen-segment inverse solution model (Ferdinands, 2004). The aim is to calculate the lower lumbar power during the key delivery phases of bowling. It is hypothesised that the lower back must produce large flexion and rotation powers in fast bowling, and this may also influence the susceptibility to injury.

Method

Ten elite fast bowlers, who delivered the ball in excess of 130 km/h, were selected for this study. Eight fast motion cameras (240 Hz) were placed around the subject to capture the performance area of the trials. Forty-eight retroreflective markers were strategically placed on the subject to give a full body representation. We used a 3D motion analysis system (Motion Analysis Corp.) to track and analyse the movement trajectory of these markers when the subject performed a trial.

Each subject performed six trials, which involved bowling a ball at maximum speed while making contact with a Bertec force platform (960 Hz). The kinematics data of each bowler was obtained from the trial that had the fastest ball release speed. These data were smoothed using a Butterworth fourth-order filter (cut-off frequency 8-15 Hz).

Kinetics data were calculated using a 3D fifteen-segment inverse solution model of the human body using the Mechanical Systems Pack (Mathematica V. 5.2, Wolfram Research Inc.). This software uses a Newton-Lagrange multiplier iterative method to generate the dynamic equations of motion. The data was analysed from front foot contact (FFC) to ball release (Rel).

Results

The mean ± SD lower trunk flexion was 38.0° ± 2.1° during the FFC to Rel phase. The mean lower trunk flexion power was 1705 ± 379.0 W, which was positive indicating that the trunk flexion torque acted in the same sense as trunk flexion (Figure 1 – left). Flexion power was largest during 25-35% of the phase. The largest maximum horizontal and vertical ground reaction forces occurred at a similar point in the phase, 20-30%.

The mean lower trunk rotation to the left was 22.9° ± 1.2° during the phase. The mean lower trunk rotation power was -957.1 ± 261.8 W, which was negative indicating that the trunk rotation torque acted in the opposite sense to the trunk rotation to the left (Figure 1 – right). Rotation power was largest during 15-25% of the phase, which was approximately 5% earlier than for the flexion power, but still occurred approximately during the time of largest maximum horizontal and vertical ground reaction forces.

The mean lower trunk lateral bending angle to the right was 5.8° ± 0.7°. The mean lower trunk lateral power was 471.3 ± 257.9 W, which was positive indicating that the trunk lateral flexion torque acted in the same direction as the trunk lateral bending to the right.

Discussion

There was variability in the power magnitudes and time-histories from FFC to Rel. Lower lumbar power peaked around the time of maximum ground reaction forces, and then reduced as ball release was approached. The power analysis shows whether the lower trunk and lumbar muscles are acting concentrically or eccentrically. Lower lumbar flexion and lateral bending to the right were positive indicating that the muscles responsible for these actions were contracting concentrically. However, the trunk rotation power was negative because the trunk rotator muscles acted to decelerate the rotation to the left. These results have implications for injury.

>> to Page 16

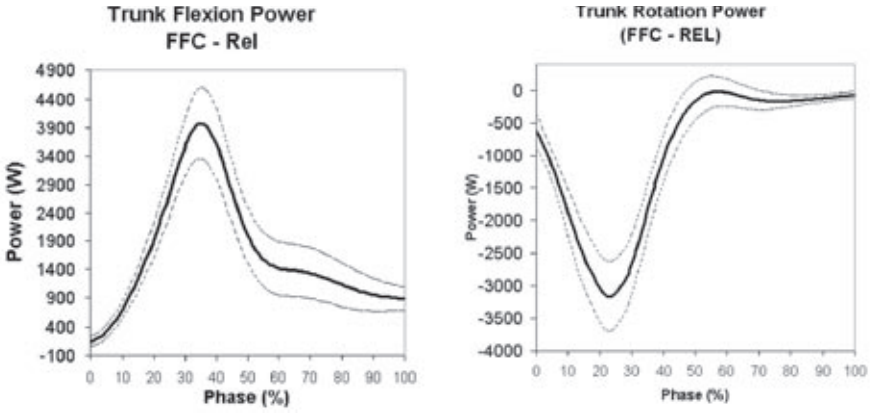


Figure 1: Ensemble average and standard deviation of lower trunk flexion power (left) and lower trunk rotation power (right) from FFC to Rel. Both power peaked and at similar points in the phase cycle. Positive powers (right-hand bowler) were for flexion, and rotation to the left.

Sports Biomechanics Research and Player Service

Quality Application in Cricket

By Bruce Elliott

Sports sciences (such as biomechanics, exercise physiology, sport psychology, motor development and pedagogy) and medicine (such as sports medicine, sport physiotherapy and podiatry) play an integral role in many aspects of cricket performance. While this paper will only deal with the various areas in cricket where sport biomechanics plays an integral role in player development it is acknowledged that this is only a part of the larger field of sciences involved in cricket research and player servicing.

The Role of Sport Biomechanics in Cricket

The following topic areas are of importance:

- Technique development - biomechanical changes will only be accepted by players if they improve or at least do not hinder performance.
- Injury reduction - it is essential that all performance changes are linked with a decreased likelihood of injury.
- Equipment design - this may play a role in both performance enhancement and injury reduction.
- Analysis structure - biomechanics by forcing coaches and scientists alike to look for "critical features" in performance, provides a unique opportunity to develop an appropriate analysis protocol for all aspects of cricket.
- Legality issue re bowling performance - in today's game bowling must be such that the rules of play are closely followed with reference to the level of elbow extension permitted during the phase of delivery from "upper arm horizontal to release". Biomechanics provides a means by which this movement may be evaluated.

Mechanical considerations are the basis for alteration to performance such that skill is enhanced without increasing the risk of injury. The next part of this presentation considered a number of these mechanical (neural) factors.

Biomechanics and Performance Enhancement

- Elastic energy (muscle pre-load) - its role, particularly about the shoulder joint in bowling and about the trunk in batting will be discussed from a performance enhancement perspective.
- Increasing segment displacement for increased speed in both batting and bowling.
- Increasing the number of segments to increase speed in both batting and bowling. The concept of decreasing the number of segments in batting for accuracy was also covered.
- Linking of linear and angular motion for optimal speed development in both bowling and batting.
- Power development – this must be viewed as it relates specifically to cricket.

Research has played an integral role in many aspects of cricket performance. Examples of the influence of research on fundamental approaches to player development were discussed with reference to:

Research in Player Development

- Overuse injuries in bowling (Dennis et al., 2003)
- Injury reduction - the role of prospective studies (Foster et al.,1989; Portus et al., 2007)
- An educational approach to modifying technique to reduce back injuries in medium/fast bowlers (Elliott & Khangure, 2002). The need to identify areas of medical concern, establish the mechanical aetiology of the injury selected, the means by which performance re-education is achieved and an evaluation of this approach must all be considered.

While research is the province of Universities, the servicing of athletes through Institutes of Sport and Centres of Excellence is essential if we are to remain competitive internationally. While this servicing is based on all aspects of sports science, the following will be discussed from a biomechanical perspective:

The Role of Biomechanics in Athlete Servicing

- Analysis models - the concept of 'range of acceptability' for those mechanical variables identified above as being critical to successful performance, was explored.
- Visual feedback - biomechanics provides the ideal tool for visual feedback through video linked with appropriate 2D software packages. The use of such packages was reviewed.

The final aspect of this presentation included a brief comparison of how Sports Science is integrated into another international sport – tennis. The development of the elite tennis player from the following perspectives was discussed:

- Athlete development – young champion to touring professional
- Coach education – from the coach of the beginner to the touring professional
- Research support – national and international (International Tennis Federation)

>> to Page 16

Target Variables and Training Considerations

for Improving the Non-Dominant Hand Throwing Technique in Cricketers

By Alexi Sachlikidis, Craig Salter, and Michael McDonald

Compared to the normal (right-biased) population, a higher than normal proportion of left-handers has been reported in the top levels of sport[1,7]. An increased prevalence of left-handed competitors has also been reported in interactive or confrontational sports, but not in non-interactive sports[5]. These findings as well as anecdotal observations have given rise to the notion that left-handed competitors have some sort advantage over their right-handed opponents, for which the majority of information identifies the advantage as being tactical[5,8,11].

It has been argued that the ability to use both hands and/or feet with near equal skill is more important than the ability to use either hand or foot exceptionally well[11], and in some sports, particularly those that take place on a symmetric arena, is considered an important quality required to achieve the professional ranks[2,4]. Training a non-dominant limb may increase a competitor's ability to perform by reducing the reliance on one side of the body, and thereby confer an advantage over competitors that use one side of the body exclusively[6]. Training ambidexterity for the skill of throwing is of particular relevance to the game of cricket, particularly given the symmetric nature of the playing arena.

To determine the kinematic differences between dominant and non-dominant arm throwing techniques for speed and accuracy conditions in U/17 and U/19 high performance cricketers, participants (n = 7) performed ten throws for each arm (dominant/non-dominant) and condition (speed/accuracy) at a target positioned 10m in front of them. Kinematic variables were measured three-dimensionally using a Vicon motion analysis system[9]. Digital footage was used to calculate stride data, ball speed and record target accuracy. The throw model used for the study[9] is shown in Figure 1, and was adapted from Fleisig et al. (1996). Data were analysed using repeated measures ANOVA and Chi-squared tests. Statistical significance was set at $p \leq 0.05$.

The non-dominant hand throws were found to have a significantly shorter stride length, lower maximum lead knee lift, did not extend the lead knee in the arm acceleration phase, had significantly less elbow flexion prior to extension, had significantly less shoulder external rotation at commencement of the arm acceleration phase, did not have a delay between the initiation of pelvic and upper torso internal rotation, and displayed a less than optimal coordination pattern[9]. A speed-accuracy trade-off was found to exist for the dominant arm throws; however no trade-off was identified for the non-dominant arm throws[9]. Differences in temporal parameters were also identified, including a shortened stride phase, prolonged arm-cocking phase, near absent arm-acceleration phase (based on this model), and prolonged arm-deceleration phase for the non-dominant hand throws[9].

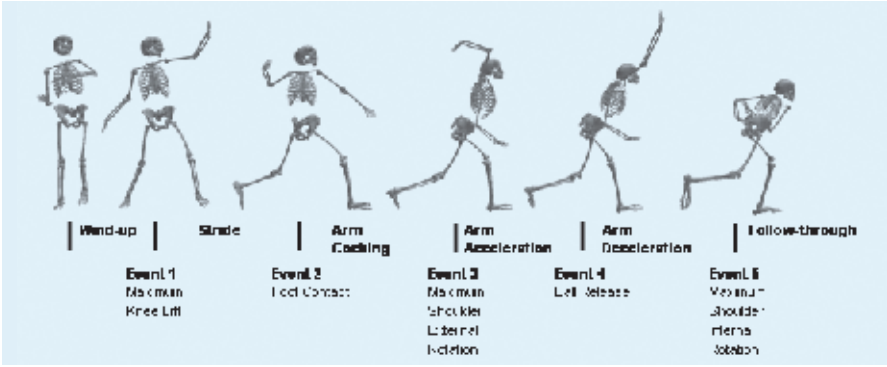


Figure 1. Events and phases used to analyse the throw

Sachlikidis, A. and Salter, C. (2007). A biomechanical comparison of dominant and non-dominant arm throws for speed and accuracy. *Sports Biomechanics*, **6(3)**, 334-344.

One of the challenges that coaches have always faced is how to best implement technical findings similar to those mentioned above as targeted training drills. The stereotypical paradox is that scientists understand technical results of research better than coaches, while coaches understand the real life training environment better than scientists. Sport scientists in the applied field need to spend more time explaining the process of how the findings of their research can be implemented in the training environment, on top of explaining how their findings would be of benefit once they are implemented.

The athlete need not be confused with the afore mentioned technical results. The suggestions to the athlete when learning to throw with the non-dominant hand are: a) point at the target with the lead arm; b) lift the leading knee higher when stepping; c) keep the back foot on the ground ; d) cock the elbow more before throwing; e) train the rotation flexibility of the shoulder; f) delay external rotation of the shoulder until after planting the front foot; g) release the ball in front of and wider than the shoulder; and h) follow through across the body.

Some of the principles coaches and scientists alike should be aware of when planning to implement research findings are those typically found in the field of skill acquisition or motor learning. These may include contextual interference, mode of feedback, learning type, and dependence. Also, other more practical considerations must be made to things

like time, budget, and space constraints, and the cost-benefit ratio of mastering a skill. The suggestions are simply starting points that are made with some background justification (the results), which can be refined further to achieve the training outcomes.

By attaining approximate ambidexterity for the skill of throwing, cricket players, in particular those fielding in the infield can improve their fielding ability. The increase in performance may be manifested as pressure on the batsman, restricted run scoring, and even run outs that may not have previously occurred. The authors have produced real-life recommendations from the technical results to target several areas for training. Applied sport scientists need to make suggestions as to how the results of their research can be implemented, not merely how their results could benefit the sport once implemented. By using principles commonly used in the skill acquisition field, the suggestions can have a format that promotes efficient skill learning.

Acknowledgements:

Thank you to the staff in the Biomechanics Department at the Australian Institute of Sport for your help and use of the laboratory. Thank you also to Cricket Australia and the ACT Cricket Association for allowing us to use your athletes. Thanks most of all the participants, without you research simply cannot proceed.

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>> from Page 12

varies between professions and across jurisdictions. In many professions, it means that a practitioner that travels to another state or territory with a sporting team is required to be registered in that jurisdiction even if he or she only treats members of the team. In some cases, a fee is required for the practitioner to be registered, regardless of the duration of practice in the jurisdiction. Many practitioners are unaware of this requirement.

It is expected that the new national registration scheme will minimise or eliminate the requirement for a practitioner to be registered in each jurisdiction in which he or she practices. That is, that a registered health professional will be able to legally practice anywhere in Australia. The exact processes and mechanisms for national registration will become clearer as the scheme is implemented.

Conclusion

The introduction of a new national registration and accreditation scheme will have positive outcomes for practitioners working with sporting teams.

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>> from Page 13

Spinal loading is highest during the time of largest ground reaction forces. Also, the effective compression of lumbar vertebral joints needs to account for both concentric and eccentric muscle contractions.

Conclusions

Large lower lumbar flexion, lateral bending and rotation power were produced in the fast bowlers in this study. The estimation of lower lumbar power is important as the lower back is a most vulnerable region in the fast bowler and the subject of much research (Elliott, 2000). Future research should examine how the kinematics factors that increase the risk of lower lumbar injury, such as shoulder counter-rotation, affect the lower lumbar power.

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>> from Page 14

Cricket Australia has gone a long way to incorporating the above factors into player development from beginner to advanced performer. The appointment of a Sport Science Manager to structure the above, together with the other aspects of sports science shows its commitment to this process.

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>> from Page 10

Future Directions

This brief review has highlighted current gaps in Australian sports injury research efforts. Somewhat surprisingly, the major concentrations of research efforts do not seem to be where the major burden of the problem is or where the major sport participant base lies and may be at risk of injury. For example, studies in children's sport account for only 12% of the current research effort and female sport is represented in only 10-20% of all studies; community sport, which accounts for the vast majority of participants and reported sports injuries (8, 9) is only the focus of about 39% of all current research. It would make sense for there to be increased attention given to the prevention of injuries in children, females and community athletes, particularly given broad based efforts to encourage physical activity in these groups. It is unlikely that physical activity strategies will be fully successful if they do not take safety considerations into account (10). In line with broad participation habits, the focus of Australian sports injury research should also be much more than just Australian football.

Prevention efforts require an available and authoritative evidence-base about what potential solutions are likely to work and why (1). There is scope for Australian researchers to set the international standard for contributions to this evidence-base by conducting well designed efficacy and effectiveness trials across a full range of interventions. This is likely to require innovative approaches, methodological developments and the application of innovative study designs, adoption of sophisticated statistical methodologies, attention to ensuring adequately powered studies and consideration of factors relating to intervention uptake and compliance. There has never been a better time to be a sports injury prevention researcher in Australia!

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>> from Page 11

that some Australian sporting organisations demonstrate a surprising indifference to the design and safety performance of equipment used in their sport. In my experience, both the ARU and IRB have demonstrated substantial support for Australian investigations of injury and equipment in rugby. The horse racing industry in Australia has begun to make a similar investment. Internationally, FIFA, IIHF, NFL and many other organisations have invested in these areas. While there are clearly many factors involved, including financial and cultural, sporting organisations have the potential to be advocates for change and improvement.

Sporting goods manufacturers have the capacity to develop products and stand to gain financially. Often equipment sales are driven through endorsements with varying levels of interest in independent testing and evaluation. Often product claims are not supported by scientific evidence. Manufacturers are also beholden to the sports organisations, as they may approach equipment development with some caution due to uncertainty about changes to equipment laws in different sports.

Information unclear

The athletes can potentially make a large difference through their buying patterns, but the pathway for consumer input is unclear. At present, there may be difficulty in identifying safer products from sub-optimal products, as information on safety is unclear or exaggerated. To assist them good advice is required at the point of sale and/or from coaching staff.

To conclude, science and technology can assist greatly in developing sports equipment. In some cases problems and solutions are straight forward, in others they are very complex. Partnership are required between the stakeholders – research institutions, consultants, sports organisations, players, manufacturers and government – and funds are needed to invest in research and development.

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Postgraduate Education Options

Australia leads the world in sports medicine and science innovation. The success of our elite athletes across a wide range of sports is proof of this.

As the profile of the sports medicine disciplines has grown, so too have the educational opportunities for health professionals who want to specialise in the field. Most Universities in Australia now offer sports medicine and science related courses at undergraduate and post graduate levels.

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There is no better way to get ahead in your career than enhancing your skills with a post-graduate qualification. A number of these opportunities are listed in the following pages or on the SMA website at http://www.sma.org.au/degreepath.asp

The government makes postgraduate study by coursework more manageable through FEE-HELP. To find out more about FEE-HELP go to www.goingtouni.gov.au and click on the 'Loans" link. If you choose to pursue postgraduate study by research you may be eligible for a scholarship. Details of available scholarships can be found by contacting the university of your choice.

Sports Medicine Australia host students from Japan studying to be Athletic Trainers

By Patricia Donoghue

Sports Medicine Australia joined with the "American Dream Inc. and Fukuyama Heisei University in Japan, to deliver a course which would promote an intercultural learning experience for students studying to becoming athletic trainers. On September 4th, 14 very excited students from the Fukuyama Heisei University supported by their teacher Mr. Ishibashi Tsuyoshi and their escort Mr. Hiroshi Yoshikawa, President, American Dream Inc., travelled to Canberra Australia, to undertake a three day educational course in the Sports Medicine Australia Safer Sport Training Program.

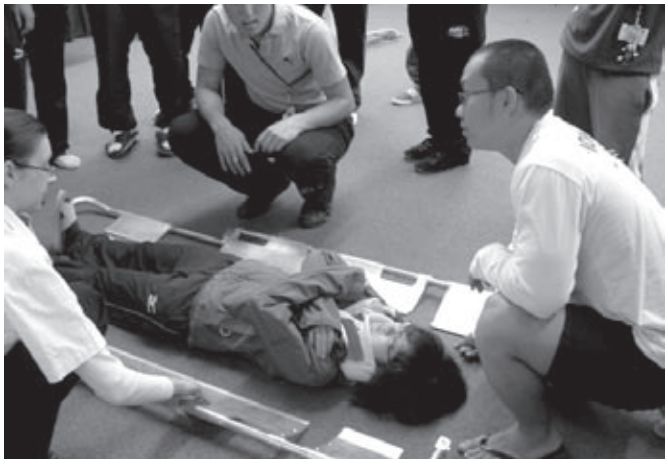
The experience was planned to be more than just being in another culture. It aimed to provide students with the opportunity to learn about a new culture and educational tools from a different perspective. This program promotes the ability for students to gain a real understanding of the Australian culture and society through 'hands on' interactive learning.

One of the most amazing aspects of the success of the course was the cultural barriers in place from the beginning between SMA and the Fukuyama Heisei University Students. Mr Yoshikawa reflected on his first interactions with myself when planning the trip where he stated "Students from Fukuyama Heisei University do not speak English and the group (are a) mixture of first …second ….third …and fourth year college students. Their understanding for sports medicine varies widely. There (is) no doubt that we (will) have to overcome a lot of difficulty."

This course was made possible with the assistance of Mr. Yoshikawa who was a liaison between Sports Medicine Australia – ACT Branch and the Fukuyama Heisei University. This was the first year in which this course was offered and it incorporated a combination of the Sports First Aid and the Sports Trainers course which SMA tailored to reflect the student's prior learning and enable them to become Athletic Trainers in Japan. The objective was to extend the visiting student's knowledge and expose them to new skills which they can take back and use within their chosen sport.

"The program ended as a great success. I am so thankful for the flexibility and the hospitality of the people involved in this program. I am certain that this program will grow even further in the future years." Mr Yoshikawa later wrote.

Mr. Yoshikawa also pointed out that the course went a lot further than educating students to become Athletic Trainers, "Besides the contents covered in the lecture, there was one thing that I aimed the students to learn from this program. It is to realise that people can work together to achieve the same goal even if both are from different cultural background(s). I am a citizen of Hiroshima, born as a second generation …Atomic Bomb victim and I studied at college in the U.S.A. I believe my profession, coordinating the intercultural program, can work as one of many ways to realise …world peace. Through participating in (this) program, people can realise that there are people in other countries and those people are as same as you, (and) …can share happiness or sadness. In this particular program, friendly and enthusiastic to help them to learn. I am sure that they reconfirmed that there are people who care about you and (that) people from different cultural background(s) can work together".



Mr. Ishibashi later wrote to SMA-ACT "It was really meaningful for us to have studied sports medicine at the seminar while (being) able to learn the local culture and language and to establish an international exchange with the extremely friendly people…. The SMA program proceeded logically and rationally…And, it was well-organized according to the merit of each student…. It was especially a precious experience for us to have been able to accompany one of the professional rugby teams to see (them) practice."

The students experienced various forms of Australian hospitality during their stay. Housed at the Australian Institute of Sport for the duration of the course, the students were given the opportunity to work with the sports trainers at the Australian Judo Selections and the Canberra Raiders Rugby League team. Providing this 'hands on' experience added to the overall learning and culture experience. Seeing a kangaroo and swimming in the AIS pool which Ian Thorpe would have swam in, was one of the many highlights.

Students from St. Clare's College in Canberra took part in the visit by preparing three banners and paper cranes as a welcome for the students. Three Students from the college delivered a five minute welcome speech in the Japanese language. "This experience provided the students from St Clare's college, studying the Japanese language, with the opportunity to put their skills into practice and experience a small portion of the culture which they are studying" Patricia Donoghue Executive Officer, SMA-ACT.

This program is to continue, with 50 students expected to take part in 2008. This relationship is building lasting friendships with people from other cultures and helping Sports Medicine Australia promote a sharing of knowledge through out the world.

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Opening the Time Capsule

"The more things change, the more they remain the same…"

Sport Health - Ten years ago – September 1997

- Dr Karim Khan was Editor and editorialising about failure and fear of failure. (Karim is currently editor-designate of the British Journal of Sports Medicine. Current BJSM editor Paul McCrory was also a Sport Health editor, so maybe the role is a useful proving ground…)
- The Edition theme was "Winter Codes with articles on Australian Football – footwear, podiatry, nutrition and skiing.
- Highlights of the imminent 1997 Conference were featured:
- Dr Andrew Pipe from Ottawa presenting on "The Doping Dilemma: the role of the sports physician" in an Australian Sports Drug Agency (ASDA) sponsored session. Pipe was in Australia last year as Canadian Com. Games Team CMO; on the topic of doping, ASDA's successor, the Australian Sports Anti-Doping Agency (ASADA), is presenting a session at this year's conference.
- The Federally-funded Australian Sports Injury Prevention Taskforce had an invited speaker from the University of Calgary. The Taskforce was defunded at the end of that year and it has taken constant lobbying by SMA and groups like the NSW Sporting Injuries Committee until 2007 to get sports injury back onto the Federal radar.
- A new Conference research prize – the Wendy Ey Award – was presented for the first time at the 1997 Conference. The award was made possible thanks to a donation from Dr Ken Maguire. Ten years on, Dr Maguire continues to provide financial support to the Conference awards.

Sport Health – Twenty years ago – September 1987

- The magazine had a much more formal feel, with lead articles by the Editor (Dr Barry Oakes), President (Professor Tony Parker) and Executive Director (Terry Sanders).
- Themes and issues included discussion of the emergence of "the emerging College of Sports Physicians"; related discussion of the problems of servicing the needs of specific disciplines within a multi-discipline organisation; concussion in sport with a call for SMA (then called the Australian Sports Medicine Federation) to issue a Position Statement on Concussion); sports medicine and water polo; and the difficulty of establishing sports medicine as a distinct area in the health system.
- Two areas where things have moved on: the issue also included some historic photos of members such as Peter Larkins and Peter Brukner with spectacular moustaches and Peter Barnes with a full head of hair. Most interestingly, in opening the Conference, the South Australian Minister for Sport devoted most of his address to attacking tobacco advertising in sport.

Swim, run, ride

A case study of elite triathlete Simon Thompson: a complicated history of hamstring pain and stress fracture of the sacrum.

AUSTRALIAN PHYSIOTHERAPY ASSOCIATION
Sports Physiotherapy Australia

By Danealle Lilley

This case study will outline the background, presentation of injury, and management progression of an elite triathlete who sustained a stress fracture of the sacrum during an elite triathlon training camp in a small village in France. This case highlights the difficulties associated with diagnosis of injuries while travelling internationally.

Past history

Simon Thompson, a 27 year old male triathlete, was treated for chronic, left sided hamstring origin tendinopathy over a four month period. This program consisted of running load modification, assessment of bike set up (including adjustment of crank width) and alteration to pedal technique to reduce hip internal rotation at the top of the pedal stroke. Treatment also included muscle retraining aimed at increasing gluteal activation and reducing the load of what appeared to be an overactive hamstring. EMG testing revealed interesting results in that the biceps femoris was actually found to be very under active in the stance phase of gait, alluding to the possibility of overactive adductors.

A cortisone injection into the space between adductor magnus and hamstring origin tendon accelerated the recovery of the irritated tendon. Manual treatment included hip mobility work as the left hip tended to be stiff into internal rotation and flexion. This was in addition to myofascial work through the hamstring and trigger point treatment at the gluteals. Muscle re-education exercises concentrated on improving hamstrings and gluteal function.

After four months of rehabilitation and a gradual progression back to full training load he returned to racing and raced at two world cup races over a three week period. He reported some tightening in the glutseal and hamstring but not the same level of soreness as previously.

The following week he reported some vague symptoms of right sided low back tightness, but attributed this to training soreness. The end of the week included a heavy training day, with five training sessions planned (run, ride, swim, strength and recovery run). During the final session of the day, an eight kilometre jog, he experienced a sudden and acute onset of right sided low buttock and low back pain. He was unable to complete the jog and walked the rest of the distance.

On assessment an hour later he had significant buttock pain that he could localize by pointing over the sacroiliac joint (SIJ). There was muscle spasm through the right lumbar erector spinae to the level of L2 and acute tenderness over the L2/3 facet joint on the right. There was significant pain on walking, in particular when transferring weight onto the right leg. The SIJ alignment was not altered. There was pain on all lumbar movements and range was reduced in all directions due to pain, more so with movements increasing weight through the right side of the lumbo-pelvic area such as right lateral flexion and right quadrant.

After three days of rest, there was some improvement in the lumbar spasm but no change at all in the buttock pain. He was unable to transfer weight onto the right leg without pain, causing limping during walking and he was unable to hop. The pain worsened with walking distances greater than 100 metres. The lumbar spine range had improved, flexion was nearly normal, but there was pain on extension and right lateral flexion. Lumbar rotation was normal.

Further rest did not improve his symptoms, and due to a lack of appropriate medical expertise in the small French town where we were staying, he was flown to London to see a sports physician at day 10 post injury. A lumbar MRI demonstrated mild degeneration of the two lower lumbar discs and associated mild lumbar facet joint changes. It was felt that these changes were not correlating with the degree of impairment and the lumbar spine was ruled out as causative of the pain. A CT scan of the pelvis showed a normal SIJ and sacrum. The decision was made to inject the right SIJ with cortisone. He was reviewed three days later, and his pain had not responded to this intervention. The doctor then injected the L3/4 and L4/5 facet joints as well to rule out any possibility that the problem was being referred by the lumbar facet joints. He returned to the training camp in France for further rehabilitation.

At 18 days post onset, the acute buttock pain was still well localised but settling from constant to a more intermittent nature. The pain was directly related to activity – the athlete could walk up to 150 metres pain free, but further walking caused the pain to increase and it would take some hours to settle. He was able to swim about 400 metres but any intensity tended to aggravate his pain and he reported that he would fatigue quite quickly. The pain was also aggravated by bending and lifting type movements.

Around the third week post injury he resumed some riding on rollers for an hour at a time, with no increase in symptoms. At this stage there was stiffness at the right ilium, the SIJ alignment was within normal limits and lumbar ROM was almost returned to normal.

He continued with a graduated progression of activity over the following two weeks, including muscle retraining exercises, which focused on pelvic stability, activation of the gluteals and transversus abdominus. At five weeks post injury he was still unable to hop without pain and was unable to jog even a few paces without pain.

The athlete returned to Australia at week six post injury and underwent a bone scan, which demonstrated a hot spot in the region of the right SIJ, particularly the sacrum. A follow up MRI demonstrated a significant size stress fracture of the right sacral alar, which was diagonal in direction, extending into the right SIJ.

Injury management progression

The athlete was able to commence jogging up to 500 metres and cycling on the road at seven weeks post injury and up to 30 minutes of jogging by week nine.

The prior left sided hamstring injury recurred during this time, particularly worsening once the athlete commenced jogging. The athlete complained of increasing tightness in the hamstring during weeks five and nine post sacral injury, and described it as the 'worst it had ever been'. The left hip was also stiff into internal rotation and flexion.

The hamstring pain was now the primary limitation to return to training and despite the continued healing of the sacral stress fracture, the athlete was unable to resume normal training. Further investigation into the hamstring pathology was performed.

An MRI of the hamstring origin showed thickening at the ischial attachment of around 30 per cent compared to the other side, and was suggestive of a thickened band of fascia wrapping around the anterior aspect of the tendon, close to the ischial attachment. This thickened band was postulated as the cause for this recurrence of dysfunction, despite the considerable rest period and very low load of training.

An MRI of the left hip showed a small labral tear and some alterations in the chondral surface. The decision was made not to perform any intervention for this pathology, but to monitor it closely and treat regularly to maintain range of motion in the hip, particularly flexion and internal rotation.

The athlete went on to have surgery to debride the thickened fascia around the hamstring origin tendon at week 11 post stress fracture onset. The rehabilitation for this procedure was six weeks of rest with gentle range of motion exercises. His rehabilitation included soft tissue work and strengthening exercises with particular focus on hip-on pelvis and pelvis-on-spine control, as well as correcting asymmetries between sides.

The athlete then commenced a six week progressive return to training program and was training near his pre injury volume at week 12 post surgery; intensity was added after this time. He resumed racing at 18 weeks, with a return to pre injury form.

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SPORTS MEDICINE AUSTRALIA
ACT Branch

2008 South East Coast Conference of Science and Medicine in Sport
February 16th & 17th 2008 Murramarang Resort Eco Point

- The 2008 South East Coast Conference of Science and Medicine in Sport will be held at the Murramarang Resort Eco Point.
- The conference program has been sent to the RACGP for adjudication. It is expected that this conference will attract a total of 30 points as an Active Learning Module (ALM) if attending both days, single day registration will attract 2 points per hour.
- Registration for attending GP's is at SMA member rates.
- The Keynote Address is to be delivered by Dr. David Martin (Senior Sports Physiologist - AIS)

Schedule

The conference will be held over the weekend of February 16th and 17th 2008 and the schedule promises to offer something for everyone! The conference is open to all and the schedule is designed to enable delegates to enjoy all that Murramarang has to offer. On the Saturday, presentations will run from 9am-3.30pm with the conference networking dinner to be held on the Saturday night by the pool. On Sunday the program begins at 9am and concludes at 3pm.

Email admin@sportsmedicineact.org.au for expression of interest.