Epidemiology of medically treated sport and active recreation injuries in the Latrobe Valley, Victoria, Australia

E P Cassell, C F Finch, V Z Statthakis

Objective: To quantify and describe medically treated sport and active recreation injuries in a defined region of the Latrobe Valley from 7 November 1994 to 6 November 1995.

Method: A geographic target area was defined, restricted to the six postcodes that fell wholly within the catchment area of the Latrobe Regional Hospital. Data describing medically treated sport and active recreation injuries to Latrobe Valley residents aged over 4 years (about 70 000) were selected by postcode from three sources: the Victorian Admitted Episodes Dataset (hospital admissions), the Victorian Injury Surveillance System (ISISS; hospital ED presentations), and the Extended Latrobe Valley Injury Surveillance (ELVIS) project (presentations to general practitioners).

Results: At least 2300 cases of medically treated sport and active recreation injury were recorded. This corresponds to a hospital admission rate of 16/10 000 population, emergency department presentation rate of 169/10 000 population, and a general practitioner presentation rate of 187/10 000 population. There were more male patients than female, and younger age groups were also overrepresented, but these data may reflect the greater participation of these groups in sport and active recreation. Australian football was associated with the highest number of injuries (accounting for 24.0% and 22.0% of presentations to emergency departments and general practitioners respectively) followed by cycling (15.7% and 12.6%) and basketball (17.5% and 13.5%).

Conclusions: This study shows that routine health sector data collections in defined populations can provide useful information on the size, distribution, and characteristics of the problem of sport and active recreation injuries at the community level. However, all current health sector systems for injury data collection and surveillance require attention to improve case capture and identification and data quality.

METHODS

The study area was restricted to six postcodes that fell wholly within the catchment area of the Latrobe Regional Hospital (3825, 3840–3842, 3844, 3869–3870). All residents aged over 4 years were eligible for inclusion.

Data on sporting and recreational injuries that received medical treatment were obtained from three sources: the Victorian Admitted Episodes Dataset (VAED; hospital admissions); the Victorian Injury Surveillance System (ISISS; hospital ED presentations); and the ELVIS project (GP presentations). No sports medicine facility operated in the Latrobe Valley during the study period. All eligible patients recorded in these databases for the period 7 November 1994 to 6 November 1995 were selected. All pedal cycling related injuries were included, as it has been estimated that over 86% of all cycle use in Australia is for sport, exercise, or recreational purposes, rather than commuting.

Hospital admissions

The VAED is a collection of data describing admissions to Victorian hospitals. Injury cases are coded with an external cause of injury code (E-code) under the International classification of diseases system (ICD-9-CM). Unfortunately, the classifications available to identify and describe cases of sport injuries from this and other health sector agencies are limited.

Abbreviations: E LIS, Extended Latrobe Valley Injury Surveillance; GP, general practitioner; VAED, Victorian Admitted Episodes Dataset; VISS, Victorian Injury Surveillance System; ED, emergency department; ISIS, Injury Surveillance Intelligence System; CI, confidence interval.
Table 1 Major external causes of sport and active recreation injuries resulting in hospital admission or general practitioner presentation in Latrobe Valley residents aged over 4 years (7 November 1994 to 6 November 1995)*  

<table>
<thead>
<tr>
<th>External causes of injury or ICD9 E-code group</th>
<th>E-codes</th>
<th>Hospital admissions (VAED)</th>
<th>GP presentations (ELVIS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal riding (horse riding)</td>
<td>(810.5, 811.5, . . . , 825.5)</td>
<td>11 9.8 (4.3 to 15.3)</td>
<td>20 1.7 (1.0 to 2.5)</td>
</tr>
<tr>
<td>Pedal cycling</td>
<td>(800.3, 801.3, . . . , 807.3)</td>
<td>22 19.6 (12.3 to 27.0)</td>
<td>133 11.6 (9.8 to 13.5)</td>
</tr>
<tr>
<td>Water skiing</td>
<td>(830.4, 831.4, . . . , 838.4)</td>
<td>0 -</td>
<td>2 0.2 (0.0 to 0.4)</td>
</tr>
<tr>
<td>Swimming</td>
<td>(830.5, 831.5, . . . , 838.5)</td>
<td>0 -</td>
<td>0 -</td>
</tr>
<tr>
<td>Diving</td>
<td>(883.0, 910.1, 910.2)</td>
<td>1 0.9 (0.0 to 2.6)</td>
<td>9 0.8 (0.3 to 1.3)</td>
</tr>
<tr>
<td>Fall on same level (sport)</td>
<td>886.0</td>
<td>13 11.6 (5.7 to 17.5)</td>
<td>44 3.8 (2.7 to 5.0)</td>
</tr>
<tr>
<td>Struck/crush (sport)</td>
<td>917.0</td>
<td>44 39.3 (30.2 to 48.3)</td>
<td>380 33.2 (30.4 to 35.9)</td>
</tr>
<tr>
<td>Overexertion/strenuous movements†</td>
<td>927.0</td>
<td>21 18.8 (11.5 to 26.0)</td>
<td>558 48.7 (45.8 to 51.6)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>112 1146</td>
<td></td>
</tr>
</tbody>
</table>

*This category may include cases from other than sport activities; these cannot be separated out.
†There were 1146 GP presentations when data were selected by E-codes. When data was selected by Injury Surveillance Intelligence System (ISIS) code there were 1003 cases. Because more information can be gained from ISIS coding, the smaller dataset was subjected to detailed analysis.
‡Victorian Injury Surveillance System (VISS) hospital emergency department data are not included in this table because the system does not use the ICD9 E-code classification system.

The selection of sports injury cases is restricted to two main E-codes: E886.0 (fall on the same level from collision, pushing or shoving by or with other person in sports); E917.0 (striking against or struck accidentally by objects or persons in sports). The available codes for recreational injury are also restricted and only cover animal riding (predominantly recreational horse riding), pedal cycling, water skiing, swimming, and diving. All cases classified under E927.0 (overexertion and strenuous exercise) were included, although a small proportion may not be related to sport and active recreation. Private hospital admissions, readmissions within 30 days, medical injuries, and late/adverse effects of injury cases were excluded from the analysis.

The number of injury cases recorded on the VAED represents 100% of all actual injuries admitted to hospital. However, cases of sports injury are underestimated because of the limitations of the coding system mentioned above.

ED presentations
VISS, as it operated in the mid-1990s, collected data on injury presentations to the EDs of five participating hospitals, including the Latrobe Regional Hospital. A standard instrument for injury surveillance11 which collected demographic data and information relating to the injury event such as the mechanism of injury and associated factors was used. On presentation to an ED, the injured patient (or parent/carer) and doctor completed sections of the form, on a voluntary basis.

An audit of ED injury surveillance in the Latrobe Regional Hospital12 determined that the cases recorded on the VISS database represented 85% of all actual ED presentations for treatment of injuries and 100% of all actual cases subsequently admitted to hospital. However, there may be some discrepancy in the admission rate recorded on the VISS database compared with the VAED. This is because cases were selected on postcode of residence and therefore admissions recorded on the VAED may have occurred through hospital EDs that were not part of the VISS system.

The VISS used Injury Surveillance Intelligence System (ISIS) codes13 to generate incidence distributions to compare the nature and extent of injury presentations. Sports injury cases were selected on the basis of ISIS context/activity codes (102 = sport and 301 = sport, representing organised competition or practice, informal sport, and sport not specified respectively. Active recreation cases were identified by factor codes that covered injuries associated with horseback riding, roller skating, trampolining, swimming, skateboarding, and snow skiing. Up to three injuries may be recorded per case, and the system does not allow extraction by primary diagnosis.

GP presentations
The ELVIS project, established by the Central West Gippsland Division of General Practice, collected injury data through a research network of GPs.14 The process for VISS ED data collection was refined and modified for use in the general practice setting. Data on injury presentations to general practice were manually entered on a standardised form, different sections of which were completed by the patient and GP. At the end of the data collection period (June 1995), the incidence of medically treated injuries incurred during sport or active recreation in the Latrobe Valley was calculated per 10 000 population resident in the six target postcodes approximately midway through the data collection period.15

ISIS classification was used, and cases were selected as described above for the VISS ED presentations. The ELVIS data were also manually assigned an ICD9 E-code for cause of injury, which allowed comparison with hospital admissions data on injury causation.

Data analysis
A descriptive analysis of the data for sports injuries from each of the three injury databases was undertaken. Data from these collections are presented as incidence and proportions, with associated 95% confidence intervals. It is not possible to combine data from the three databases because of the different methodologies and classification systems used to identify and code injury data, and there were no identifiers to enable data linkage.

The Australian Bureau of Statistics 1995 census estimates that there were 69,663 people aged over 4 years usually resident in the six target postcodes approximately midway through the data collection period (June 1995). The incidence of medically treated injuries incurred during sport or active recreation in the Latrobe Valley was calculated per 10 000 population (aged over 4 years). The number of cases reported from each database was multiplied by the inverse of the expected capture rate from that source to estimate the true number of cases. For ED data, this was done separately for the cases in which the patient was admitted to hospital or not because of their differing case capture rates. It was not possible to take into account the age and sex distributions in this
factoring up because the case capture rate information was only available as an overall figure. The ratio of the incidence of hospital admissions to the incidences of ED and GP presentations was calculated to generate a sports injury “pyramid”.

RESULTS

Hospital admissions

In the study period, there were 112 hospital admissions for injury from sport or active recreation in the Latrobe Valley (table 1). This corresponds to an annual incidence of 16 sports injury from sport or active recreation in the Latrobe Valley residents aged over 4 years (95% confidence interval (CI) 14.4 to 42.1).

In the study period, there were 1321 hospital admissions for injury from sport or active recreation in the Latrobe Valley residents aged over 4 years (7 November 1994 to 6 November 1995). This corresponds to an annual incidence of 197 persons attending a hospital ED for treatment per 10 000 population aged over 4 years (95% CI 123.2 to 254.9).

The sports most often associated with ED presentations were Australian football (24.0%), cycling (15.7%), and basketball (13.8%) (table 4). In 73%, the patient was male. Cases were predominantly in three age groups: 10–14 years (29.5%), 15–19 years (19.5%), and 20–24 years (15.9%).

ED presentations

There were 1179 ED presentations for sport injury in the Latrobe Valley in the study period. This corresponds to an annual incidence of 197 persons attending a hospital ED for treatment per 10 000 population aged over 4 years (95% CI 123.2 to 254.9).

A high proportion (80%) of people who attended an ED with a sports injury were subsequently admitted to hospital. Further examination of the data shows rugby injuries to result in the highest rate of hospital admission (16%), followed by trampolining (15%), soccer and horse riding (both 14%), cycling (11%), and football (5%). Just over half (52.8%) of ED presentations required major treatment—that is, they required follow up or referral usually to a GP (25.5%), a review in the ED (17.0%), or another type of referral (8.0%). Approximately one third of presentations (34.1%) required minor treatment, that is medical assessment only or treatment without follow up, and 5.5% required no treatment.

### Table 2

<table>
<thead>
<tr>
<th>Body site</th>
<th>Hospital admissions (VAED) (n=112)</th>
<th>Emergency department presentations (VISS) (n=1321 injuries)*</th>
<th>General practitioner consultations (ELVIS) (n=1003)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper extremity</td>
<td>33.0 (24.3 to 41.7)</td>
<td>39.0 (36.4 to 41.6)</td>
<td>38.4 (35.4 to 41.4)</td>
</tr>
<tr>
<td>Head and face</td>
<td>29.5 (21.0 to 37.9)</td>
<td>20.1 (18.0 to 22.3)</td>
<td>11.8 (9.8 to 13.8)</td>
</tr>
<tr>
<td>Lower extremity</td>
<td>24.1 (16.2 to 32.0)</td>
<td>31.2 (28.7 to 33.7)</td>
<td>39.3 (36.3 to 42.3)</td>
</tr>
<tr>
<td>Trunk</td>
<td>5.4 (1.2 to 9.5)</td>
<td>5.6 (4.4 to 6.8)</td>
<td>8.4 (6.7 to 10.1)</td>
</tr>
<tr>
<td>Other/unspecified</td>
<td>8.0 (3.0 to 13.1)</td>
<td>4.1 (3.0 to 5.2)</td>
<td>2.2 (1.3 to 2.1)</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Values are percentages (95% confidence interval).

* Up to three injuries can be recorded per case in the VISS database (n=1179 cases).

VAED, Victorian Admitted Episodes Dataset; VISS, Victorian Injury Surveillance System; ELVIS, Extended Latrobe Valley Injury Surveillance.

### Table 3

<table>
<thead>
<tr>
<th>Nature of injury</th>
<th>Hospital admissions (VAED) (n=112)</th>
<th>Emergency department presentations (VISS) (n=1321 injuries)*</th>
<th>General practitioner presentations (ELVIS) (n=1003)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fractures</td>
<td>44.6 (35.4 to 53.8)</td>
<td>17.8 (15.7 to 19.9)</td>
<td>11.4 (9.4 to 13.3)</td>
</tr>
<tr>
<td>Intracranial [not skull fracture]</td>
<td>17.9 (10.8 to 25.0)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Dislocations</td>
<td>9.8 (4.3 to 15.3)</td>
<td>3.1 (2.2 to 4.0)</td>
<td>1.5 (0.7 to 2.2)</td>
</tr>
<tr>
<td>Open wound</td>
<td>6.3 (1.8 to 10.7)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Sprains/strains</td>
<td>6.3 (1.8 to 10.7)</td>
<td>23.3 (21.0 to 25.6)</td>
<td>38.8 (35.8 to 41.8)</td>
</tr>
<tr>
<td>Bruises, haematomas, crushing</td>
<td>3.6 (0.1 to 7.0)</td>
<td>14.1 (12.2 to 16.0)</td>
<td>23.6 (21.0 to 26.3)</td>
</tr>
<tr>
<td>Internal (chest/abdomen/pelvis)</td>
<td>3.6 (0.1 to 7.0)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Abrasion</td>
<td>–</td>
<td>6.1 (4.8 to 7.3)</td>
<td>4.6 (3.3 to 5.9)</td>
</tr>
<tr>
<td>Inflammation</td>
<td>–</td>
<td>12.9 (11.1 to 14.7)</td>
<td>8.0 (6.3 to 9.7)</td>
</tr>
<tr>
<td>Cuts and laceration</td>
<td>7.0 (5.4 to 8.6)</td>
<td>16.3 (14.3 to 18.3)</td>
<td>7.0 (5.4 to 8.6)</td>
</tr>
<tr>
<td>Other injuries</td>
<td>8.0 (3.0 to 13.1)</td>
<td>6.5 (5.2 to 7.8)</td>
<td>5.2 (3.8 to 6.6)</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Values are percentages (95% confidence interval).

* Up to three injuries can be recorded per case.

VAED, Victorian Admitted Episodes Dataset; VISS, Victorian Injury Surveillance System; ELVIS, Extended Latrobe Valley Injury Surveillance.
GP presentations

There were 1003 presentations to GPs for injuries associated with sport and active recreation. This corresponds to an annual incidence of 187 persons presenting to a GP for a sports injury per 10 000 resident population aged over 4 years (95% CI 160 to 214).

Australian football (22.0%), basketball (17.5%), and cycling (12.6%) were the sports most often associated with GP presentations (table 4). The major causes of injury were “overexertion and strenuous movement” (48.7%), “struck/crush in sport” (33.2%), and pedal cycling (11.6%) (table 1). Two thirds of patients were male. The age groups that accounted for most injuries were 10–14 year olds (34.2%) and 15–19 year olds (16.7%).

The most common types of injury presentation were sprains/strains (38.5%, mostly to the lower extremity), bruising (23.6%, commonly to the head/face), fracture (11.4%, mostly to the upper extremities), and inhalation (8.0%) (table 3). Overall, the lower and upper extremities were the most commonly injured body sites (39.3% and 38.4% respectively), followed by the head and face (11.8%), and trunk (8.4%) (table 2).

Almost as many GP presentations required minor treatment (41.8%, treated without further referral) as more major treatment (40.7%, treated with follow up or referral). An appreciable proportion required assessment only (17.5%). Two patients presenting to GPs were referred to an ED.

Injury pyramid

A pyramid of medically treated sports injuries was constructed for the Latrobe Valley. Over any 12 month period, for every 10 000 head of population in the Latrobe Valley, it can be expected that for each hospital admission for treatment of a sports injury, there will be 10.6 ED presentations and 11.7 GP presentations (1:11:12). The sport and active recreation activities most often associated with medically treated injuries in Latrobe Valley, accounting for 22–24% of presentations. Cycling, basketball, netball, cricket, and soccer were also associated with appreciable (and similar) proportions of injuries presenting to both EDs and GPs. Care should also be exercised in drawing inferences from these findings because comparisons are based solely on injury incidence. A finer but more complex method of determining the relative risk of injury in the various sporting and recreational activities would factor in participation or sports medicine clinics.

One British study found that about 75% of all reported sports injuries were not treated at an ED or admitted to hospital. In a study of Australian football injuries in children and adolescents, EDs treated only 28% of all reported injuries.

An injury pyramid was constructed to describe the profile of injuries within the Latrobe Valley. It is estimated that over a 12 month period, per 10 000 population, 16 people will be admitted to hospital for treatment for a sports injury, 169 will present at an ED, and 187 people will receive treatment from a GP (adjusted proportions 1:11:12). These figures suggest that most sports injuries presenting to clinical services are mild to moderately severe, which is also indicated by the short stay (fewer than two days) of most admitted cases. As would be expected, fractures and intracranial injuries comprise a higher proportion of hospital admissions than ED and GP presentations. Injuries presenting to the ED and general practice are usually sprains and strains, although fractures are not uncommon. The substantial number of fracture cases treated by GPs is noteworthy as it is often assumed that injuries of this severity generally present to hospital EDs.

Our data suggest a higher rate of hospital admission for sports injuries than other studies, although they are consistent with previous Australian data.

Finch et al described sport and active recreation ED presentations across Australia over a four year period. Some 8% of the injured adults were subsequently admitted to hospital for further treatment, compared with just over 14% of children aged <15 years. In contrast, among sports injury cases presenting to an ED, only 2% of cases in Glasgow, 5% of child cases in Canada, and 2% of 10–19 year olds presenting in Columbia, USA required admission to hospital.

Men and boys were much more likely to present for medical treatment of a sports injury than women or girls, and younger age groups were also overrepresented in injury data, but these differences may just reflect the greater participation of these groups in sport and active recreation.

The available data, limited to ED and GP presentations, show that Australian football is the sport most often associated with medically treated injuries in Latrobe Valley, accounting for 22–24% of presentations. Cycling, basketball, netball, cricket, and soccer were also associated with appreciable (and similar) proportions of injuries presenting to both EDs and GPs. Care should also be exercised in drawing inferences from these findings because comparisons are based solely on injury incidence. A finer but more complex method of determining the relative risk of injury in the various sporting and recreational activities would factor in participation.
data (to estimate the risk per participant) and, preferably, exposure or time at risk data (estimating risk per time unit). These adjustments are important because, in general, sports with the highest numbers of participants have the highest incidence of injuries, especially in communities where a small number of sports dominate. Nonetheless, popular sports that produce sizeable proportions of the injury problem in a given community are legitimate targets of prevention efforts, even if less popular sports are shown to carry greater risks of injury when data are adjusted for exposure.

Although the three data sources used for this study provide rich information on the size and nature of the sports injury problem, they have limitations. Firstly, the VAE-D underestimates hospital admissions for sports injuries because, under ICD9-CM, sports specific E-codes are limited and restrict the counting of hospital admissions. Secondly, the data only cover the injuries for which medical treatment was sought from hospitals and GPs. Many sports injuries, particularly overuse and other soft tissue injuries, are attended to by other practitioners such as sports medicine specialists, physiotherapists, chiropractors, masseurs, and sports first aiders, or are self treated. The available statistics therefore probably represent a fraction of those injured in sport and active recreation. Indeed, comparison of the health sector data with results from a population survey conducted in the same region indicates that the available injury databases describe less than 30% of all self reported sports injury cases. Despite these limitations, health sector data are essential for quantifying and describing injuries that are severe enough to require medical treatment, and they assist the identification of high risk sport and active recreation activities.

In summary, this study shows that routine health sector data collections in defined populations can provide useful information on the size, distribution, and characteristics of the sports injury problem at the community level. However, all current health sector systems for collection of injury data require attention to improve case capture and identification and data quality. Recent coding changes are improving the potential to identify sports injury cases among all cases admitted to hospital. The new ED surveillance system operating across 25 public hospitals has extended Victoria’s capacity to provide injury data for defined populations, but identification of the sport or recreation activity involved is inconsistent at present. There has been some expansion of routine collection of injury data at the level of general practice in Victoria, modelled on ELVIS. These clinical sources provide some of the information needed to guide programme planning and implementation in the area of community sports safety.

ACKNOWLEDGEMENTS

This study was jointly funded by the Victorian Health Promotion Foundation, the Commonwealth Department of Health and Aged Care, and the Australian Sports Commission (through the Australian Sports Injury Prevention Taskforce). During the data collection phase, CF was supported by a Public Health Research and Development Committee (of the NH&MRC) Research Fellowship. The Victorian Emergency Department data were provided by VISS, based at Monash University Accident Research Centre (MUARC). Ms Karen Murdoch (MUARC) and Ms Cathylin Little (Deakin University) are acknowledged for their contributions to data analysis and sections of this paper.

Epidemiology of sports injuries

Take home message

If our figures are a true estimation of sports injury incidence, for every 10,000 head of population, we can expect that for each hospital admission for treatment of sport and active recreation injury, there will be 10.6 emergency department presentations and 11.7 general practitioner presentations (1:11:12).

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REFERENCES

Scuba diving can induce stress of the temporomandibular joint leading to headache

In ordinary recreational scuba diving, many anatomical parts can be involved in disorders of cranial regions: ears and eyes are involved but also sinuses. Dental problems are generally involved in barotraumas because of bad dental fillings or other matters of interest to the general dental practitioner. Very few papers have looked at the articular and periodontal problems of the temporomandibular joint (TMJ).

Local factors such as joint laxity, anatomical factors, capsular or muscular inflammation, and articular stress of long duration resulting from holding the regulator mouthpiece in scuba diving or the snorkel mouthpiece in skin diving can lead to TMJ disorders including headaches and myalgic symptoms.

We examined the biomechanics of the TMJ in relation to diving, particularly looking at the disc-condylar position during mouthpiece biting and with the mouth closed and wide open (submaximal opening). The aim was to see if during scuba diving the TMJ is maintained in a stressed position leading to pathology (myalgia, headaches, discal subluxations) under certain conditions.

Methods

To measure condylar and discal displacement in divers, we studied 30 TMJs in a population of 15 divers aged 18–55, including six women. None had symptoms of TMJ disorder such as joint noise, pain, or luxations. All were fully informed about the experimental paradigm and agreed to have magnetic resonance imaging (MRI) of both TMJs.

MRI was used so that the intra-articular disc and condyle body could be viewed in the same image and scale to allow angular measurements. Six sagittal and parasagittal slices were viewed on each side (T1 weighted sequences, performed with a 6.5 cm circular coil at each side of the head). All the procedures were consistent with actual TMJ MRI techniques. Measurements were made on the same subject in three standard mouth positions:

1. Closed mouth (biting position)
2. Mouth holding regular diving mouthpiece
3. Mouth submaximally opened holding a 40 mm uncompressible non-magnetic plastic tube (fig 2)

Results

Figure 3 shows that there was a significant difference between the closed mouth position and the two other standard mouth positions (wide open, p<0.001; holding a standard mouthpiece, p<0.05), but no difference was found between the two latter positions.

Conclusions

From the results we cannot reject the hypothesis that the prolonged position of the TMJ during scuba diving may induce pain as the result of stress to the retrolingual portion of the joint, which is near neurovascular elements. It is recommended that divers should be taught not to overstress the TMJ to avoid headache and other myalgic syndromes. The reader is referred to the paper on temporomandibular dysfunction in scuba divers by Aldridge and Fenlon (p ??).

References

What are your favourite books of all time? Which books have changed your life? Many people include *Lore of running* among the answers to those questions. Approaching the 20 year anniversary of the genesis of this “runner’s bible”, Tim Noakes has released the extremely comprehensive, yet very practical 4th edition.

Unlike J K Rowling, who dicis her adolescent psychology and astrophysics research into seven books and four movies, T D Noakes provides his reader with the equivalent of four substantial books within the covers of this 1277 page tome. Firstly, *Lore* is a fascinating historical biography of runners and running. The running reader loves to know the secrets of the champion’s mind and motor, and *Lore* provides almost 200 pages of unique insights into the Who’s Who of running, including (1861), Paavo Nurmi, Arthur Newton, Emil Zatopek, Jim Peters, Kip Keino, Bruce Fordyce, Grete Waitz, Robert De Castella, Carlos Lopes, Frank Shorter, to list just some. Noakes provides enough detail to satisfy the most diligent of trainers, yet weaves the psychological and personal insights with the training details to craft a fascinating tapestry. This part alone (Chapter 16 “Learning from the experts”) is worth the price of the book and is a substantial expansion and update from its popular predecessors in earlier editions of *Lore*.

Next, *Lore* provides up to date exercise related physiology and biochemistry in a manner that is understandable by those with, and without, training in the formal biological sciences. This has always made *Lore* unique among “running” books (it is so much more than that alone). A particular feature of this edition is the quality of the artwork that explains the science, and the very useful case histories of how athletes have had their problems solved by sports science. In this part, an exercise physiologist outlines, for the first time, the dominant role played by the brain in determining performance in any form of physical activity.

The importance of this new model is illustrated in what I consider the 3rd book within *Lore*—a practical guide to training for and racing over distances from 10 k to the ultramarathon. When a patient presented asking my advice for the “Marathon of the sands” (a 7 day 150 mile race across the Sahara desert in Morocco, http://web.outsideonline.com/ system/t/mds99/), I dithered between making a psychiatric referral and lending my personal copy of *Lore*. It seems that the latter sufficed—an extremely happy (but thin, with big blistered feet) borrower returned the book saying it had been a crucial factor in his success. Where else does one find over 50 pages with eight different detailed training schedules dedicated to ultramarathon alone? Noakes himself acknowledges having run over 70 marathons, but given that this count credits each 92 km Comrades marathon as just one, his personal marathon experience is over 100. This, combined with his access to leading athletes and South Africa’s tradition in endurance events, explains why *Lore* provides unique insight for the distance minded runner.

Finally, and importantly, *Lore* is a practical sports medicine book with almost 300 pages devoted to the role of ergogenic aids, tips on staying healthy, and discussion of the benefits and hazards. This section includes a self help approach to treating injuries, discussion of the most common injuries, and cutting edge research both from Noakes’ own laboratory—for example, exercise associated collapse, avoiding water intoxication—and that of others whose work affects runners’ health.

Those who have been fortunate enough to attend Noakes’ (the Michael Moore of sports medicine (www.michaelmoore.com)) international conference presentations will be aware of his attention to detail and aesthetics, and this book mirrors that care. From the historical black and white prints of runners such as Nurmi to the clear, extremely informative figures, every page is an invitation. Examples of boxed panels that will capture the curiosity of many include “the 15 laws of training”, “animals with great athletic ability”, “physiological explanations for the superior distance running ability of black africans”: The section discussing Sir Roger Bannister’s mental approach is compulsory reading. Also, *Lore* has international appeal—it is for runners whether they live in Aachen or Zyryanovo or any place between.

If you enjoyed a previous edition of *Lore* (as I have), you must see this 4th edition with its wonderfully expanded miniographies, detailed schedules to help you with training and racing, and the exposition of crucial scientific data that have lain unexplored for 75 years. You are unlikely to need much convincing.

If you are new to *Lore*, but a runner, or friends with a runner, please take my advice to examine this masterpiece. You will be very pleased you did. *Lore* will add to your joy of running. This edition will again enhance the lives of many readers. I have presented copies to several close friends and graduating scientists and clinicians and I know they treasure it, as I do.

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**BOOK REVIEW**

*Lore of running, 4th edn.*

The 6th STMS World Congress on Medicine and Science in Tennis in conjunction with the LTA 2004 Sports Science, Sports Medicine and Performance Coaching Conference

Keynote speakers include Professor Per Renstrom (SWE), Professor Peter Jokl (USA), Professor Savio Woo (USA), Dr Carol Otis (USA), Dr Mark Safran (USA), Dr Ben Kibler (USA), Prof Bruce Elliott (AUS), and Professor Ron Maughan (UK).
Further details: Dr Michael Turner, The Lawn Tennis Association, The Queen’s Club, London W14 9EG, UK; email: michael.turner@lta.org.uk

The Leeds Sports Imaging Course
6–7 September 2004, Leeds, UK
This two day course is aimed at both radiologists and clinicians who are involved in sports imaging. The course will comprise an imaging and clinical overview of all relevant joint, bone and soft tissue sporting injuries.
The faculty will comprise internationally recognised skeletal imaging and clinical experts from the UK, Europe and North America who will deliver state of the art lectures and lead sessional discussions. Each session will cover the spectrum of injury for a specific anatomical area beginning with clinical lectures that will allow the subsequent imaging lectures to be placed in context. All aspects of imaging will be discussed but will concentrate on the use of ultrasound, conventional MR imaging and MRI arthrography for the diagnosis, staging and prognosis of sporting injuries. Therapeutic image guided intervention using fluoroscopy, CT and ultrasound will also be demonstrated.
13 RCR category one CME credits have been awarded.
Further details: Carol Bailey, Course co-ordinator, MRI Department, B Floor, Clarendon Wing, Leeds General Infirmary, Leeds LS1 3EX; tel: +44 (0)113 3922826; fax: +44 (0)113 3928241; email: Carol.Bailey@leedsth.nhs.uk

BASEM Conference 2004
14–17 October 2004, Belfast, UK
Main themes: Overuse Sports Injuries and Muscle Injuries. Keynote speakers include: Chris Bradshaw, Medical Director, Olympic Park Medical Centre, Melbourne and Kim Bennell, Assistant Professor, School of Physiotherapy, Melbourne University.
Further details: Email: fionnuala.sayers@greenpark.n-i.nhs.uk

1st World Congress on Sports Injury Prevention
23–25 June 2005, Oslo, Norway
This congress will provide the world’s leading sports medicine experts with an opportunity to present their work to an international audience made up of physicians, therapists, scientists, and coaches. The congress will present scientific information on sports injury epidemiology, risk factors, injury mechanisms and injury prevention methods with a multidisciplinary perspective. Panel discussions will conclude symposia in key areas providing recommendations to address the prevention issue in relation to particular injuries and sports.
Further details: Oslo Sports Trauma Research Centre and Department of Sports Medicine, University of Sport and Physical Education, Sognsveien 220, 0806 Oslo, Norway. Email: 2005congress@nih.no; website: www.ostrc.no

ECHO

Fitness to dive should rest on a clear CT chest scan

Professional divers should have a computed tomographic (CT) examination during their initial medical for certification to exclude conditions that can lead to fatal lung damage during diving. This is especially important if they smoke or have had chest infections, as one case series from Turkey has shown.

The three male divers were aged between 25 and 56 years with 6 months to 15 years’ diving experience. Two were regular long term smokers, smoking 20 cigarettes/day for 20 years and 23-30 cigarettes/day for 10 years, respectively. Symptoms occurred during ascent from a dive and included chest pain, breathing difficulties, and—in two instances—neurological symptoms. All divers recovered eventually with treatment, but all were excluded from diving.

CT scans of the chest showed air cysts or bullae predisposing to pulmonary barotrauma that were simply not evident in plain chest x ray films for each diver. In one case a large apical bulla was present; in another an azygous lobe on the right side and many air cysts in both lungs; and in the third a small bleb in the upper right lung.

Smoking and lung infections increase the risk of air sacs or bullae developing in the lung. These in turn increase the risk of pulmonary barotrauma, a complication of which—arterial gas embolism—caused almost a third of deaths from diving, according to one study.

Owing to the change over of typesetters at the BMJ Group the authors’ corrections to the paper by Cassell et al, which was published in the October 2003 issue (Epidemiology of medically treated sport and active recreation injuries in the Latrobe Valley, Victoria, Australia Br J Sports Med 2003;37:405–409) were omitted. This mistake is much regretted and we would like to offer our sincerest apologies to the authors. The major error on page 407 of the Results section (ED presentations: first sentence of fourth paragraph) should read: Approximately 8% of people who attended an ED with a sports injury were subsequently admitted to hospital.

A fully corrected version of the paper will be posted on the web in the near future.