

Acknowledgements

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CONTENTS

ACKNOWLEDGEMENTS

EXECUTIVE SUMMARY

1 INTRODUCTION

- 1.1 Healthy Cities Illawarra and the Safe Communities Approach
- 1.2 The Illawarra Sports Injury Pilot
- 1.3 The Purpose of the Study

2 BACKGROUND LITERATURE

3 RESEARCH METHOD

- 3.1 Research design
- 3.2 Sample selection
- 3.3 Survey tool
 - 3.3.1 Design and development of the tool
 - 3.3.2 Survey procedure
 - 3.3.3 Definition of a sports related injury
- 3.4 Implementation of the survey
 - 3.4.1 Approval to conduct the survey
 - 3.4.2 Data collection

4 RESULTS

Results Part A

- 4.1 Age of participants
- 4.2 Clinician occupation
- 4.3 Postcode of injured persons
- 4.4 Age and the nature of the injury
- 4.5 Gender
- 4.6 Season of injury
- 4.7 Sport or activity played
- 4.8 Cause of the injury
- 4.9 Nature by cause of the injury
- 4.10 Age category by cause of the injury
- 4.11 Sport and cause of the injury
- 4.12 Body region of injury
- 4.13 Nature of the injury
- 4.14 The top 10 sports and nature of injury
- 4.15a Sport by cause by nature of the injury
- 4.15b Sport by cause by diagnosis of the injury

Results Part B

- 4.16 Injury by age
- 4.17 Injury – new or old
- 4.18 When the injury occurred
- 4.19 Injury by nature of injury
- 4.20 Team or individual sports injury



- 4.21 Playing position of injury in the top 5 ranked sports/activities
- 4.22 Number of injuries in team and individual sports by nature of the injury
- 4.23 Onsite treatment
- 4.24 Who treated the injury first on-site
- 4.25 Severity assessment of the injury
- 4.26 Percentage of injuries in the top 5 sports played by severity assessment
Time off sport
- 4.27 Average time off sport in top 5 sports
- 4.28 Percentage of time off sport in top 5 sports
- 4.29 Percentage of time of sport by age category

Results Part C

- 4.30 The top ranked injury sports in emergency department data
- 4.31 Illawarra and NSW participation rates
- 4.32 Conclusion

5 DISCUSSION AND RECOMMENDATIONS

- 5.1 Discussion
- 5.2 Limitations and strengths of the research method
- 5.3 Recommendations

6 CONCLUSION

7 REFERENCES

APPENDICES

Appendix A	Survey instrument
Appendix B	Combined sports
Appendix C	All sports frequencies
Appendix D	Numerical sports codes
Appendix E	Glossary of sports and terms of reference
Appendix F	Percentage of injuries by Cause and Nature in the top thirteen sports
Appendix G	Diagnosis frequencies in the top injury sports and leisure activities (cycling, skateboard, rollerblading, rugby league, soccer)

LIST OF FIGURES

Figure 1	Percentage of injury by age categories
Figure 2	Number of injuries by postcode
Figure 3	Number of male injuries in the top 10 sports/activities
Figure 4	Number of female injuries in the top 10 sports/activity
Figure 5	Percentage of injuries during seasons
Figure 6	Number of injuries in the top 13 sports/activities
Figure 7	Percentage of injury and the level of sport played
Figure 8	Injuries in Rugby League by playing position
Figure 9	Injuries in outdoor Soccer by playing position
Figure 10	Injuries in Touch Football by playing position
Figure 11	Injuries in Rugby Union by playing position
Figure 12	Injuries in Netball by playing position
Figure 13	Injuries in team and individual sport by nature of injury
Figure 14	Injury severity assessment
Figure 15	Injury by time off sport



LIST OF TABLES

RESULTS Part A (all data)

Table 1	Injury treated by doctor or physiotherapist
Table 2	Percentage of injury in age groups by sports/activities
Table 3	Percentage of injury in age groups by nature of injury
Table 4	Overview of the top 3 nature of injury categories in all age groups
Table 5	Percentage of injuries by cause
Table 6	Nature of the injury by cause of the injury
Table 7	Percentage of injury in age groups by cause of the injury
Table 8	Overview of the top 3 causes of injuries in each age group
Table 9	Percentage of injury in the top 10 sports by cause of the injury
Table 10	Percentage of injury to body regions
Table 11	Nature of the injury
Table 12	Injury in top 10 sports by nature of injury
Table 13	Diagnosis results for top 5 sports by nature of injury

RESULTS Part B (physiotherapist and private practice doctor)

Table 14	Percentage of injury by age group
Table 15	Percentage of injury in the top 5 sports by nature of the injury
Table 16	Who treated the injury first?
Table 17	Injury severity in the top 5 sports
Table 18	Percentage off sport in the top 5 sports/activities
Table 19	Time off sport by age category

RESULTS Part C (emergency department data only)

Table 20	Frequency of injury by sport/activity
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RESULTS Part D

Table 21	Comparison of Illawarra and NSW sports participation rates
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EXECUTIVE SUMMARY

In 2000, the Illawarra Safe Communities Program, supported by Healthy Cities Illawarra, undertook a regional sport and leisure activity injury survey. The aim of the surveillance was to look at injury trends in the Illawarra region, and based on the resulting data, make recommendations for future regional sport specific injury reduction programs.

The survey focused on all sport related injury, including recreational activity, informal sport or leisure related activities. Data was collected from nine physiotherapy centres, one specialist sports medicine clinic, four general practitioners, one medical centre, and the emergency departments of two hospitals in the Illawarra region. Collection points were not randomly selected as involvement was subject to clinician interest and commitment to the research. The survey was administered over a twelve-month period, with 127 sports represented, and 2,835 injuries recorded. Injuries were either new, or old injuries requiring further treatment.

The executive summary includes reviews of three survey data sets. Separate reviews have been included because the 'all data' review paints a different injury picture than the data obtained from only physiotherapy and doctors clinics, and the data obtained from only hospital emergency departments. The leisure activity and competitive sports injury pictures also change when viewed from different sources. It is thus important to consider the reviews on their own, as well as within an overall summary.

The 'all data' review discusses 10 out of the original 17 survey questions. This is because the emergency data included in the all data review was not able to provide answers to a number of survey questions. Rather than exclude those questions from the research, they have been included in a separate review of the doctor and physiotherapy data.

All Data Review

Over the twelve-month survey period a total of 2,835 sports injury entries were recorded. 750 surveys were collected from private treatment centres, 615 of these were from physiotherapists, 96 from general practitioners, and 39 were from unidentified clinicians. During the period 01/03/2000 to 8/02/2001 there were 14,889 presentations to Wollongong and Shellharbour Hospital Emergency Departments. 2,035 of these presentations were identified as sport or leisure activity injuries (607 from Shellharbour Emergency Department, and 1,428 from Wollongong Emergency Department). 13.7% of emergency department (ED) presentations during this time were sport or leisure activity injuries.

12% of Shellharbour ED presentations, and 14% of Wollongong ED presentations were sport or leisure related injuries. These figures are considered under-representative of sports injuries, as emergency department injury descriptions did not always provide sufficient information to determine the specific activity that caused suspected sports injuries.

In the 'all' data review, males accounted for 73% of injuries and females 27%. Most injuries occurred in the 10 to 15 years age groups (20%) followed by the 15 to 20 years (19%). Males sustained the most injuries whilst playing rugby league (15%) followed by cycling (14%) and soccer (11%). Females were injured most whilst cycling (10%), playing netball (9.7%) and equally in touch football and rollerblading (4.7%). Overall, injuries occurred mainly during summer, however, suspension of competitive sports during the 2000 Olympics may have impacted reported injury rates during spring.



Cycling accounted for most injuries (13%) closely followed by rugby league (12%) and soccer (10%). Cyclists predominantly sustained lacerations, fractures or 'other' injuries ('other' includes head injury, concussion, contusion and puncture wound); league players sustained fractures, sprains or 'other' injuries; soccer players generally suffered sprains, fractures, soft tissue damage and dislocations.

Overall, most injuries were caused by a 'fall from a height' (20%). A significant number of injuries had 'unknown' causes (the 'unknown' category has been influenced by the large numbers of emergency department presentations not stating a 'cause' of injury). 'Falls on the same level' (16%) and 'overexertion' (12%) were also highly ranked causes. Falls generally (combining height and same level categories), caused over one third of all injuries. Over half of all fractures were caused by falls (from a height 30%, same level 28%). 31% of sprains were the result of falls, 24% of sprains were due to overexertion. A correspondingly high percentage of lacerations were also caused by falls (40%), 22% of lacerations resulted from a person being struck by an object, and 10% from being struck by a person.

Just under half of all strains were the result of overexertion (43%), with overuse and aggravation of a previous injury also ranking highly (12% and 9% respectively). Almost 20% of soft tissue injuries were caused by overexertion, 13% of soft tissue injuries were caused by overuse, and 11% by collisions with moving objects. The majority of joint injuries were due to overexertion (26%), and overuse (20%).

The most predominant site of injury was the head (14%), with the ankle, forearm, knee and lower leg having similar percentages of injury (all approximately 10%). The most common nature of injury was fracture, accounting for almost one quarter of all injuries (24%). Sprains, lacerations and 'other' were between 16 and 19%.

In relation to age, various trends emerged early in the data collection, and similar trends were often mirrored in more than one age group. In the 0-<5 years age group most injuries were caused by 'fall from a height' (45%), followed by 'unknown' (16%), and fall on the same level (13%). The resultant injuries were mainly lacerations (30%), 'other' (27%) and fractures (26%).

Falls were the most common cause of injury in the 5-<10 years age group, with falls from heights accounting for 45% of injuries and falls on the same level responsible for 22% of injuries. 10% of injuries were the result of 'unknown' causes. Injuries were mainly fractures (37%), followed by lacerations (32%) and 'other' (16%).

Falls were also prevalent in the 10-<15 years age group, with 'falls on the same level' being responsible for 25% of injuries, and falls from a height responsible for 19%. The cause of 19% of injuries was unknown. Over one third (33%) of injuries in this age group were fractures, 19% were sprains, and 19% were 'other' injuries.

In the 15-<20 years age group, 24% of all injuries were fractures, 23.5% sprains and 16% were 'other' injuries. There was a relatively even spread of 'cause of injury' in this age group. Most injuries were the result of falls from a height (15.7%), falls on the same level (15.4%), overexertion (15.2%) and struck by a person (14.8%).

The 20-<25 and 25-<30 years age groups had almost identical trends in both their 'nature of injury' and 'cause of injury'. The rank and statistical representation of nature and cause were also very similar. The highest ranked cause of injury in these age groups was 'unknown', followed by fall from a height and struck by a person. Overexertion was actually the third ranked cause of injury in the 25-<30 years, however this was very closely followed by struck by a person. In both age groups, sprains accounted for 23%, and fractures 20% of all injuries. Lacerations were the third highest ranked nature of injury in both age groups (15% and 17% respectively).



In the 30-<35 years, the cause of 18% of injuries was 'unknown', 16% were the result of overexertion and 14% the result of falls from a height. Most injuries were fractures (21%), followed by sprains (19%) and 'other' injuries (16%). The 35 -< 40 years age group followed a similar injury path to the 30-<35 years, with the cause of most injuries being unknown (16%), 15% due to overexertion, and 12% the result of falls on the same level. The top three 'nature of injury' were sprains (18%), 'other' (17.4%) and fractures (17%). Overexertion was the leading cause of injury in the 40-< 45 years group. The cause of 17% of injuries was 'unknown', and 13% were the result of persons being 'struck by an object'. Most injuries were classified as 'other' (17%), with fractures, sprains and lacerations each accounting for 15% of injuries. In the 45-<50 years age group, most injuries were the result of 'unknown' causes, 23% due to overexertion, and 13% the result of falls from a height. Injuries were commonly strains (21%), 'other' (15%), and lacerations (14%).

Falls were common in the 50-<55 years group, with falls in general accounting for 49% of all injuries (fall from a height 24.5%, fall on the same level 16.3%). 'Unknown' injury causes and overuse each accounted for 12% of injury. 'Other' (27%) was the leading nature of injury, followed by fractures (16%) and strains (14%). The 55-<95 years age groups were most injured by falls on the same level (38%) and by being 'struck by an object'. Nature of injury was predominantly fractures (29%), followed by lacerations (19%), 'other' and sprain both 14%.

For the 10 sports recording the most injuries, 'fall from a height' caused most injuries in cycling and on playground equipment; 'struck by a person' injured most in rugby league and soccer; 'fall on the same level' injured most in skateboarding, rollerblading, basketball and running; and overexertion injured most in netball, basketball and touch football.

When looking at age groups and sporting activity, the 0 -< 5 and 5 -< 10 years were most often injured using playground equipment and cycling; 10 -<15 years most injured whilst cycling and playing rugby league; 15-<35 years age groups were most frequently injured playing soccer and rugby league; 35-<40 years were most frequently injured whilst cycling and playing soccer; 40 -<45 years were most often injured playing touch football; 45-< 50 and 50-<55 years age groups were most often injured when cycling; and the 55-< 95 years age groups were injured most when gardening.

Most cycling injuries were lacerations. Most rugby league, skateboarding, rollerblading and playground equipment injuries were fractures. Most soccer, touch football, basketball, running and netball injuries were sprains. The 'other' injuries category (head injury, concussion, contusions, puncture wounds) regularly appeared as the second or third ranked nature of injury in the top 10 sports.

Overall most injuries were fractures (23.7%), closely followed by sprains (18.5%), laceration (16.2%) and 'other' injuries (16.1%).

Physiotherapy and GP Data Review (750 surveys)

79.3% of recorded injuries were new, 18.3% were old and in 2.4% of surveys, the question was left unanswered. Just over half of all injuries were the result of competition sport (53%). 15% of injuries were the result of training practices, and 12% were the result of leisure activity.

Team sport accounted for 64% of injuries, individual sport for 34% of injuries, and 2% of this data was missing. Just over half of all injuries were not treated 'on site' (59.6%).

Of the 39.2% of recorded injuries that were treated on site (58.3% of this data relating to who treated the injury first was missing), 13.5% were treated by a qualified sports trainer, 7.7% were treated by 'self', 7.5% were treated by 'an other' and 4.9% treated by a coach.



Physiotherapists recorded 82% of the data, doctors 12.8%, and 5.2% of the clinician identification section was missing. It has been assumed that the greater volume of sports injured players seek treatment from physiotherapists rather than doctors.

Of the 750 surveys, 38% of injuries were mild and required 1 to 7 days of treatment; 34% of injuries were moderate and required between 8 to 21 days of treatment; 15% of injuries were severe and required more than 22 days of treatment. Only 8% of injuries did not require any further treatment and 5% of the severity assessment questions were not answered.

In relation to time off sport, 24% of injuries required more than 3 weeks off, 19% of injuries did not require any time off sport, 19% of injuries required one week off sport, 18% required 2 weeks off sport, 15% required 3 weeks off sport. Collectively, almost 52% of injuries required between 1 and 3 weeks off. The 15 -<20 years age group required more time off sport than any other age group (including 1, 2, 3 or more weeks categories). They were closely followed by the 20-<25 years group. Rugby league and soccer required the most time off sport in all 'time off sport' categories. Rugby league and soccer also had the highest percentage of injuries that required more than 3 weeks off sport.

Emergency Department Data (2,035)

Emergency department presentations from two hospitals were individually screened at the end of the twelve-month research period. Presentations deemed to be sport or leisure injuries (based on triage descriptive statements) were 'tagged' and the information entered onto the survey database. There were significant numbers of suspected sports injury presentations that could not be included because of insufficient or unclear detail as to their exact cause of injury.

Combining data from different sources can result in a relatively accurate picture of injury, however, relying on one source may result in overlooking other important, although not statistically significant data. When physiotherapy and general practitioner data is considered as a separate group, the top 5 injury sports are rugby league, soccer, touch football, rugby union and basketball. Emergency department data viewed on its own, presents cycling, rugby league, soccer, skateboarding, and play on playground equipment as leading injury activities. One set of data predominantly records competitive sports participation, whilst the other captures leisure activity injuries and some competitive sports, and both reflect the nature of the treatment service offered.

The Illawarra Sports Injury Survey has presented the tip of a local 'sports injury iceberg', and the findings from this research will enable injury prevention organisations to target specific areas of need within the Illawarra. The research is descriptive, as opposed to purely statistical in nature, and has been a means to an end, to provide baseline data in an effort to 'get on with the job' of sports injury reduction in the Illawarra.

Recommendation

This research has highlighted several significant sporting injury issues in the Illawarra. There is a need to pursue injury reduction programs in specific sporting/leisure activities including cycling, soccer, rugby league, skateboard riding, rollerblading, playground activity, and netball. Particular attention should be paid to the age groups 0 - 5 years, 5 -10 years, 10 - 15 years and 15 - 20 years within the activity categories above.



1. INTRODUCTION

1.1 Healthy Cities Illawarra and the Safe Communities Approach

Healthy Cities Illawarra (HCI) is a non political, non profit community based organisation that utilises advocacy and networking to positively impact upon environmental, social, cultural and physical health issues of people living in the Illawarra. Healthy Cities' internationally accredited Safe Communities Program plays a lead role in the promotion and implementation of community based injury prevention projects in the region, particularly child injury prevention. The Safe Communities Program works inter-sectorally with a range of government and community organisations and has a major resource commitment to the Illawarra Child Injury Prevention Task Force who initiate and coordinate specific injury prevention projects within the Illawarra area.

Safe Communities has, for some time, been concerned about the inaccessibility of regional injury information, in particular, sports injury data. Whilst sports injury prevention appears in the strategic plans of some local organisations, there is little evidence of significant budgetary allocation or planning processes in place to initiate or coordinate sports injury reduction programs in the Illawarra. Local injury data extracted from hospital Emergency Department Information Systems (EDIS) provides a basic picture of injury, but only a picture of those injuries presenting to hospitals. During a recent evaluation of regional data collection methods, Safe Communities found EDIS to be self-limiting in that it wasn't able to procure specific injury detail for all presentations and was restricted by lengthy coding procedures. Whilst EDIS records a substantial amount of information, its ability to provide specific sporting injury data is restricted by non-standardised methods of data entry and incomplete descriptive detail.

Having considered the lack of sports injury data and the need to determine a sporting injury picture for the Illawarra, Safe Communities (with short term financial assistance from HCI), made a commitment to develop a sports injury data collection tool that could record accurate data from a range of clinical environments. The Safe Communities Program proposed to investigate sports injury at a diagnostic and treatment source – physiotherapists, doctors, sports medicine clinics, medical centres and hospital emergency departments. The proposal was based on the need to gather data from clinical settings in order to be diagnostically accurate and injury specific. The method of data collection also had to be user friendly, time efficient, and easily duplicated by other organisations interested in pursuing injury data collection.

1.2 The Illawarra Sports Injury Survey Pilot

In 1999, Healthy Cities Illawarra agreed to provide seed funding to allow Safe Communities to conduct a sports injury data collection pilot. The main objectives of the pilot were to evaluate a proposed *method* of data collection, and determine the level of compliance of participating clinicians. The evaluation of the pilot data collection method was based on the number of surveys returned within the pilot period; the number of questions fully completed by the clinician and the patient in each survey; and the assessment of the survey method by participating clinicians.

The pilot ran for a six-week trial period at a physiotherapy centre, a general practice (one doctor), and a sports medicine clinic. There were 110 participants. At the conclusion of the data collection, clinicians were asked to identify any characteristics of the tool that were not 'user friendly'.

Clinician evaluation was in the form of a written response to a series of survey related questions. As a result of the clinician survey evaluation, the form was refined and re-tested by a small sample of sports medicine clinic patients who gave verbal feedback on survey readability and question interpretation.



A leading national injury researcher then appraised the resulting survey form. The pilot results and form were included in a funding submission submitted to the NSW Sporting Injuries Committee. At the end of 1999, the NSW Sporting Injuries Committee approved funds for the Illawarra Safe Communities Program to conduct the Illawarra Sports Injury Survey (ISIS).

1.3 Purpose of the study

The purpose of the study was to collect and document detailed sports injury information specific to the Illawarra area. It was anticipated that the information would provide justification for future sports injury reduction programs in selected competitive sports or leisure activities in the Illawarra. A regionally proven data collection *method* was also perceived to be of potential value to other organisations seeking to collect specific regional sports injury data prior to embarking on their own sports injury prevention programs.



2. BACKGROUND LITERATURE

An estimated one million people in Australia experience a sports injury each year¹. In 1992-93 approximately 10,000 people were hospitalised due to sports-related injuries. As a result of limitations in current hospital coding systems, this is likely to be an underestimation of actual hospitalisations for sports related injury². In 1993, Victoria alone recorded 2,500 hospital admissions for injuries incurred in sport - these admissions required some 5,725 hospital bed days of care⁷. An annual estimate of the cost of eye injuries in Victoria, sustained during sport was found to be around \$6.5million (Fong 1994). In 1998/99, Illawarra ambulances alone responded to 6,936 sports injury calls. Thus, the real cost of injury can begin well before the treatment phase.

In 1990, Egger estimated the direct and indirect cost of sports injuries to the economy to be in excess of \$1 billion per annum¹. When considering the number of recreational, leisure and competitive sports injury presentations made to other treatment locations (eg physiotherapists and doctors), one can safely assume that the vast majority of injuries sustained in sport are never reported to hospitals, and that the true cost of sporting injury can only ever be approximated.

Governments have been traditionally reluctant to invest in prevention preferring to fund reactive options that might be more readily identified. “ A state wide approach to reduce sports-related injury has been a long standing item on the health agenda. Although injury prevention, particularly non-intentional injury prevention, has been identified by both State and Federal governments as a public health issue, it has been the poor cousin in their political and health stakes “³.

“Frequently, public health is structured and used as a ‘top’ down information system in which a central agency develops a system through which it seeks to obtain national summary information to guide policies and programs. Concepts and techniques developed in the past decade support another ‘bottom up’ orientation for surveillance. Data collection and analysis tools are made available for use by communities at local and regional levels, thus enabling them to understand their injury experience, and (if they wish), to act on the basis of this information. One strength of the ‘bottom up’ orientation is the local specificity of the information obtained, local hazards and topics of interest can be accommodated. Local information not only has prima facie relevance for local decision-making, but also tends to have strong compelling impact (this is ‘our’ information on injuries that ‘we/our’ children/elderly are sustaining). Equally, involvement in the process of surveillance often stimulates people to become actively engaged in injury expertise”⁴

The Illawarra Sports Injury Survey has adopted a ‘bottom up’ approach, supporting the theory that local, as opposed to national surveillance, would have a greater likelihood of attracting stakeholders prepared to support regional sports injury prevention programs. Illawarra sporting groups and health agencies would then, theoretically, be more likely to take ownership of regional sports injury prevention planning, coordination and implementation. However, it remains the responsibility of government health and sporting departments to adequately finance the injury reduction process.



3. RESEARCH METHOD

3.1 Research Design

A retrospective and current injury data collection approach was adopted. Respondents were asked to record the injury that they were currently receiving treatment for, and to complete a separate survey form for any other past injury they had sustained providing their current treating professional could complete the clinician section of the survey form. Data was collected over a twelve-month period in order to account for seasonal injuries. The survey instrument was designed according to the Australian Sports Injury Data Dictionary Guidelines⁶, and in consultation with local clinicians and a leading national sports injury researcher. An initial sports injury survey method was designed, piloted and evaluated by the Illawarra Safe Communities Program.

The survey consisted of a single A4 sized form split into 2 sections - 'The Injured Person' and the 'Doctor or Physiotherapist'. The survey was completed by persons presenting to selected physiotherapy centres, doctor's surgeries, hospital emergency departments and sports medicine clinics with leisure activity or competitive sports injuries.

3.2 Sample selection

Limited human and financial resources affected the sample size, method of sample selection and research supervision. The research method was not bias free, and is descriptive rather than purely statistical in nature.

Information about a proposed Illawarra Sports Injury Survey was circulated to physiotherapists located within Wollongong, Shellharbour and Kiama Local Government Authorities (LGAs); to Shellharbour and Wollongong hospital emergency departments, to general practitioners with known interests in either sports medicine or sports injury prevention, and to local medical centres.

Phone directory listed physiotherapists in the Wollongong, Shellharbour and Kiama LGAs were contacted by phone and asked to provide verbal approximations of the percentages of sport or leisure injuries treated at their clinic. Thirty-two clinics were contacted, and of these, 18 indicated that 30% or more of their total treatment volume were sport or leisure activity related. The 18 clinics whose sports injury treatment volume was over 30% were then invited to participate in the survey, of these, 9 agreed to take part.

5 medical centres were asked to take part in the data collection, one medical centre responded to the invitation. A small number of general practitioners with known sports medicine expertise were invited to take part in the research. In total, four doctors, one oral maxillofacial facial surgeon and one specialised sports medicine clinic agreed to participate in the data collection.

The return rate of surveys per clinician or centre was not initially monitored, as clinicians indicated that they preferred to remain anonymous. The clinics that elected to take part in 'survey return' incentive programs were identified later in the survey period.

3.3 The Survey Tool

4.3.1 Design and development of the tool

The survey, developed by the Illawarra Safe Communities Program was structured according to the 'Australian Sports Injury Data Dictionary' guidelines, and in consultation with a leading sports injury researcher. The resultant survey form and data collection method were piloted in a centrally located sports medicine clinic.



The survey was in the form of an anonymous self-administering questionnaire. Questions were either short answer or 'check box' in nature and the form was longitudinally split into 'Injured Person' and 'Physiotherapist or Doctor' columns. The questions were all precoded for ease of data entry.

The 'Injured Person' section of the survey form was designed to allow completion within a three-minute period whilst the patient waited for clinician assessment or treatment. The 'Clinician' section was designed to be completed in less than three minutes, thus reducing impact on patient treatment time. A project information sheet together with self-explanatory instructions and the survey form, were handed to potential survey participants by administrative staff. When complete, the forms were transferred to the doctor or physiotherapist (clinician). The clinician then completed the form during patient assessment time.

The survey questions included the following categories:

The Injured Person

- age
- sex
- month of injury
- home postcode of the participant
- new or old injury
- when did the injury occur - competition sport, recreation activity; informal; sport; professional sport; during training; school sport or other.
- the sport, recreational activity or action that caused the injury
- team sport versus individual sport
- the name of the sporting organisation (if applicable)
- whether on site treatment was available
- who treated on site injuries
- cause of the injury

The Clinician (physiotherapist/doctor)

- body region
- nature of the injury
- provisional diagnosis
- occupation (physiotherapist or doctor)
- severity assessment
- 'Time off' sport required

3.3.2 Survey Procedures

Separate information and instruction sheets were provided for administration personnel, clinicians and participants. These were colour coded to avoid confusion between differing participant, administration and clinician roles. The support of administrative staff was crucial to the success of the data collection as the surveys had to be given to patients during waiting room time, and returned to the researcher on a monthly basis. Office administrative staff were often responsible for reminding clinicians to complete the surveys. Their level of compliance was a strong influence on the rate of survey returns.

Participant Survey and Information pads and a supply of pre-paid return addressed envelopes were left with the administration staff at each data collection centre. A monthly reminder call from the research project officer advised administration personnel to return all completed surveys.



'Survey form return incentive packages' were periodically offered in an attempt to encourage a higher rate of compliance, and to motivate administrative staff to remind clinicians to complete the surveys. Clinics were advised of incentive programs by facsimile. Survey data from physiotherapists and doctors was entered onto a SPSS computer program on a monthly basis, and clinicians were provided with bi-monthly data reports.

An extremely low rate of survey return from hospital emergency departments necessitated a modified approach to data collection from these points. Selected data was extracted from Shellharbour and Wollongong Hospital Emergency Department Information Systems (EDIS) at the conclusion of the twelve month survey period..

Separate reports were compiled for the private practice doctor and physiotherapist data, and for hospital emergency department data. A third report was produced based on the combination of all survey data. The separate 'physiotherapist and private practice GP' report was necessary in order to look at the survey data not able to be obtained from the emergency department data.

3.3.3 Definition of a Sports Related Injury

Sports injury in this survey was defined as, 'any injury caused by involvement in a leisure activity, competitive or informal sport, in any setting, that reported for treatment at selected data collection points'.

3.4 Implementation of the survey

3.4.1 Approval to conduct the survey

Ethical approval was obtained through the Office of Research, Wollongong University. The survey was allocated Professional Development Portfolio points from the National Professional Development Committee of the Australian Physiotherapy Association. The Royal Australian College of General Practitioners allocated the research four Professional Development (PD) points per quarter in the RACGP QA and CE Program. Approval was also obtained from the Illawarra Area Health Service to conduct the survey in the Emergency Departments of Shellharbour and Wollongong Hospitals. General practitioners, sports medicine clinics, medical centres and physiotherapists were approached individually with an invitation to participate in the survey process.

3.4.2 Data Collection

The survey was implemented in three general practices (with doctors who had special interests in sports injury prevention); an oral and maxillofacial surgeon's clinic; two hospital emergency departments, one medical centre, a sports medicine clinic and nine physiotherapy practices.

Data was entered on a monthly basis and activities were coded as they presented during data entry. Some sporting or activity categories were combined at the conclusion of data entry. This allowed for a more general overview of injury in similar activity areas (a summary of combined categories appears in Appendix B).



4.RESULTS

Injury has been divided into two groups – injury resulting from leisure activity, or competitive sport (refer to Appendix E for sport classifications). The results presented in this section discuss the broad findings of the survey. Please refer to the Appendices for further detailed injury information. Graph data is reported to the nearest whole number and table data to the nearest one decimal point.

Results - Part A reports on the combined data from physiotherapists, general practitioners, and emergency departments. The original survey method at emergency departments was not successful and EDIS data was analysed at the conclusion of the twelve-month survey period. 73.5% of this data was obtained from emergency departments, 26.5% from physiotherapist and private practice general practitioners. The total sample size consisted of 2,835 injury presentations. Only specific questions from the original survey were able to be answered using EDIS data, thus Part A reports on 9 of the original 17 questions.

Results - Part B reports on all survey questions with data collected from physiotherapists and general practitioners, excluding ED data. (n=750)

Results - Part C looks briefly at trends in Emergency Department data (n=2,035).

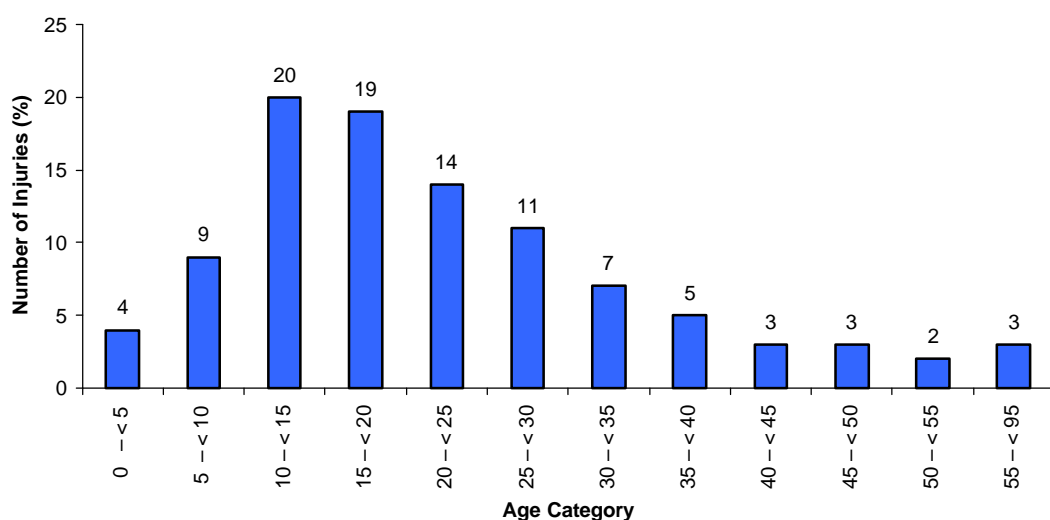
Results - Part D compares Illawarra sports participation rates to state wide sports participation rates.

RESULTS PART A: All Data

4.1 Age of participants

The mean age of the sample was 21.99; standard deviation 13.79; range 0 - 90 years. The 10 - <15 years age group had the highest number of injuries overall. The age group presenting most injuries was the 10 - < 15 years. They were closely followed by the 15-< 20 years

Figure 1: Percentage of injury by age category



4.2 Clinician Occupation

The majority of injuries were treated by doctors. When ED data is excluded, most injuries were treated by physiotherapists. (Refer to Results – Part B)

Table 1: Percentage of injuries treated by doctor or physiotherapist

OCCUPATION	PERCENTAGE*
Doctor	76.9
Physiotherapist	21.7
Missing	1.4
Total	100%

* Ranked in order from highest to lowest percentage.

4.3 Postcode

There were a total of 138 postcodes. The top 11 are reported here with 100+ counts each. The remaining 127 postcodes had less than 100 counts each in total 558. Missing data accounted for 21. In this survey Wollongong and suburbs south of Wollongong have a higher incidence of sports injury. (ED data from both hospitals reported injuries most frequently presented from the southern suburbs. Most active data collection occurred in the southern physiotherapy clinics).

Figure 2: Number of injuries by Postcode - Top Eleven

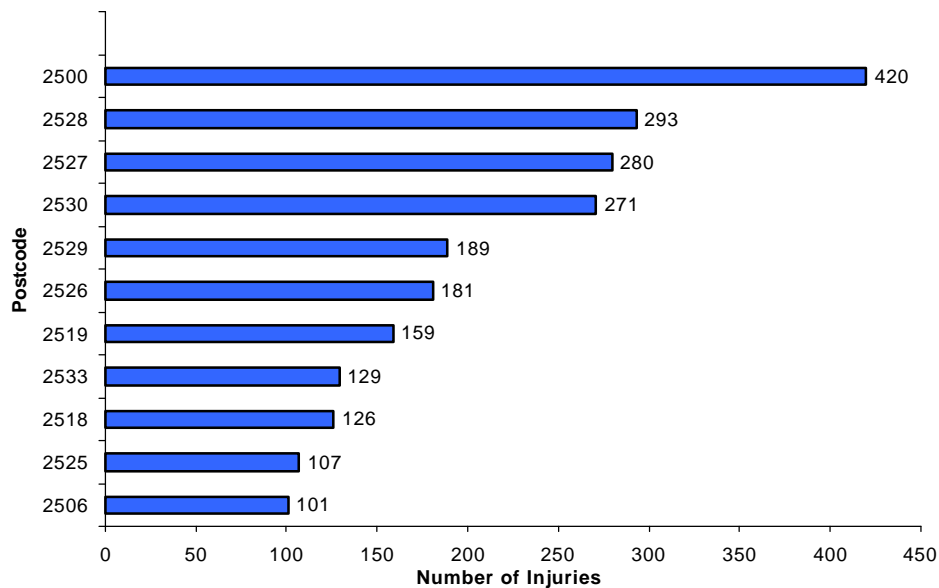


Table 2: Percentage of injury in age categories by sport or activity

AGE	SPORT OR ACTIVITY **	PERCENTAGE *
0 -< 5	Playground equipment	23.5
	Cycling (general)	21.0
	Playing	13.4
	Trampolining	10.1
	Swimming	9.2
5 -<10	Cycling (general)	25.3
	Playground equipment	12.3
	Trampolining	7.8
	Rollerblading/skating	5.6
	Scooter Riding	4.5
10 -<15	Cycling (general)	15.6
	Rugby League	11.0
	Skateboarding	9.9
	Soccer (outdoor)	8.7
	Rollerblading/skating	5.0
15 -<20	Rugby League	16.8
	Soccer (outdoor)	11.1
	Cycling (general)	9.9
	Skateboarding	9.4
	Basketball	5.2
20 -<25	Rugby League	16.9
	Soccer (outdoor)	10.5
	Cycling (general)	9.0
	Skateboarding	4.9
	Basketball	4.6
25 -<30	Rugby League	19.6
	Soccer (outdoor)	12.6
	Cycling (general)	10.0
	Touch Football	4.7
	Rugby Union	4.7
30 -<35	Soccer (outdoor)	14.8
	Rugby League	13.3
	Cycling (general)	8.6
	Touch Football	7.6
	Cricket (outdoor)	6.2
35 -<40	Cycling (general)	11.6
	Soccer (outdoor)	10.9
	Touch Football	5.8
	Basketball	5.1
	Running	5.1
40 -< 45	Touch Football	7.2
	Soccer (outdoor)	6.2
	Tennis	6.2
	Fishing	6.2
	Basketball	5.2
	Hockey (outdoor)	5.2
45 -< 50	Cycling (general)	10.0
	Hockey (outdoor)	7.5
	Running	7.5
	Gardening	6.3
	Tennis	6.3
	Touch Football	6.3
50 -< 55	Cycling (general)	16.3
	Swimming	8.2
	Fishing	8.2
	Surf (body)	8.2
	Horse Riding	6.1
	Tennis	6.1
55 - <95	Gardening	17.3
	Walking	14.8
	Cycling (general)	13.6
	Dancing (general)	4.9
	Tennis	4.9
	Fishing	4.9

* Ranked in order from highest to lowest percentage in each category.

** Only the top 5 sports or activities in each age group have been reported.



The age group presenting most injuries was the 10 -< 15 years. They were closely followed by the 15-< 20 years. Rugby league, soccer, cycling and skateboarding featured in the top 5 causes of injury in both age categories. This trend was also apparent in the 20-<25 years and 25-< 30 years where rugby league, soccer, and cycling featured as the top three sports causing injury

4.4 Age category and the nature of the injury

Table 3: Percentage of injury in age categories by nature of the injury

NATURE	AGE											
	0 - <5	5 - <10	10 - <15	15 - <20	20 - <25	25 - <30	30 - <35	35 - <40	40 - <45	45 - <50	50 - <55	55 - <95
Fracture or suspected	26.3	36.9	32.7	24.3	16.0	19.9	20.5	16.7	14.7	10.3	16.3	28.6
Sprain	14.4	9.0	19.1	23.5	22.5	23.4	18.5	18.2	14.7	12.8	6.1	14.3
Laceration	29.7	32.1	14.6	13.0	15.0	16.8	11.5	12.9	14.7	14.1	10.2	19.5
Other	27.1	16.8	19.0	15.8	14.5	11.3	15.5	17.4	16.8	15.4	26.5	14.3
Dislocation/Subluxation	2.5	3.0	2.7	6.5	10.9	6.9	11.0	4.5	4.2	5.1	6.1	6.5
Strain	0	0.7	3.1	3.0	7.2	10.7	8.5	11.4	12.6	20.5	14.3	2.6
Soft tissue	0	0.7	5.6	7.9	6.2	4.1	8.0	6.1	8.4	10.3	10.2	3.9
Joint	0	0.4	1.3	4.3	3.9	2.7	4.0	8.3	7.4	5.1	4.1	5.2
Inflammation	0	0.4	1.8	0.6	1.3	0.7	1.0	2.3	3.2	2.6	6.1	1.3
Haematoma	0	0	0.2	0	1.6	0.7	0.5	0.8	0	2.6	0	0
Excluded data*	0	0	0.1	1.1	0.9	2.8	1.0	1.4	3.3	1.2	0.1	3.8
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

* Combinations of categories for Nature are not included.

* 'Other' includes head injury, concussion, contusion, puncture wound

Injuries in the 0 -<10 age groups were mainly lacerations and fractures, with 'other' injuries of a significant level in the 0 -< 5 years. Injuries from 10 -< 35 years were dominated by sprains and fractures. Lacerations and 'other' also had significant representation in those age groups. Fractures and sprain injuries were common in the 35 to 55 years age groups, with 'other' injuries being most represented. Fractures were the most common injury in the 55 to 95 years, lacerations were also frequent.

Table 4: Overview of the top 3 nature of injury in all age categories

AGE	NATURE	AGE	NATURE	AGE	NATURE
0 -< 5	Laceration Other Fracture or suspected	20 -<25	Sprain Fracture Laceration	40 -< 45	Other Sprain/Fracture/ Laceration
5 -<10	Fracture Laceration Other	25 -<30	Sprain Fracture Laceration	45 -< 50	Strain Other Laceration
10 -<15	Fracture Sprain Other	30 -<35	Fracture Sprain Other	50 -< 55	Other Fracture Strain
15 -<20	Fracture Sprain Other	35 -<40	Sprain Other Fracture	55 - <95	Fracture Laceration Sprain/Other



4.5 Gender

Males accounted for 73% of the total injures and females 27% in a sample size of 2835. 0.1% of sex detail was missing.

In both genders cycling was ranked in the top 3 sports responsible for injury. (Cycling as a category included all forms of non-motorised pedal sport). Contact sports featured more often in the top 5 sports of injured males. Injury in females was generally caused by non-contact sport or leisure activity.

Figure 3: Number of male injuries in the top 10 sports/activites

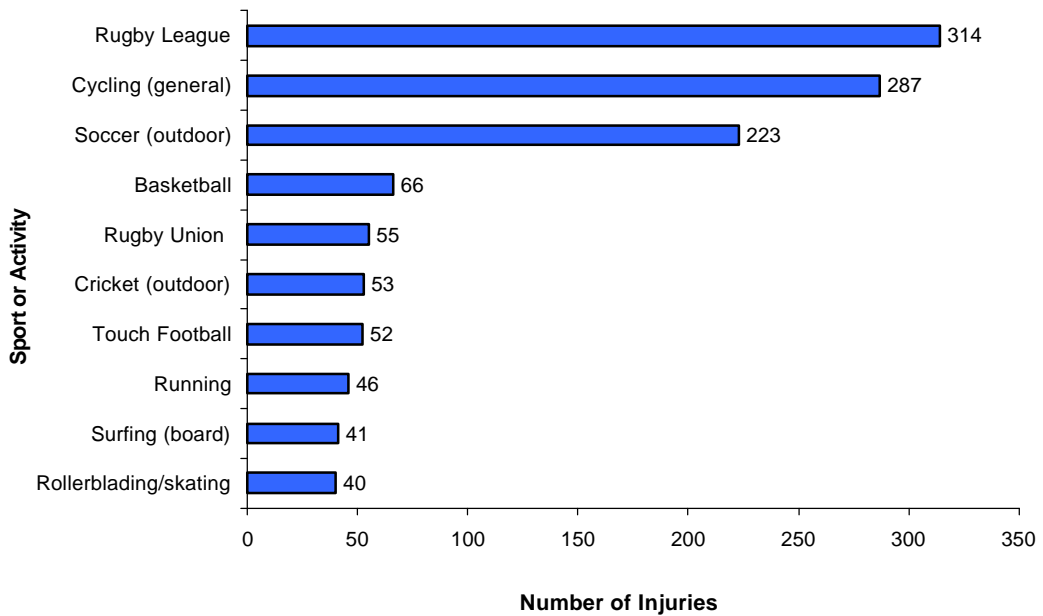
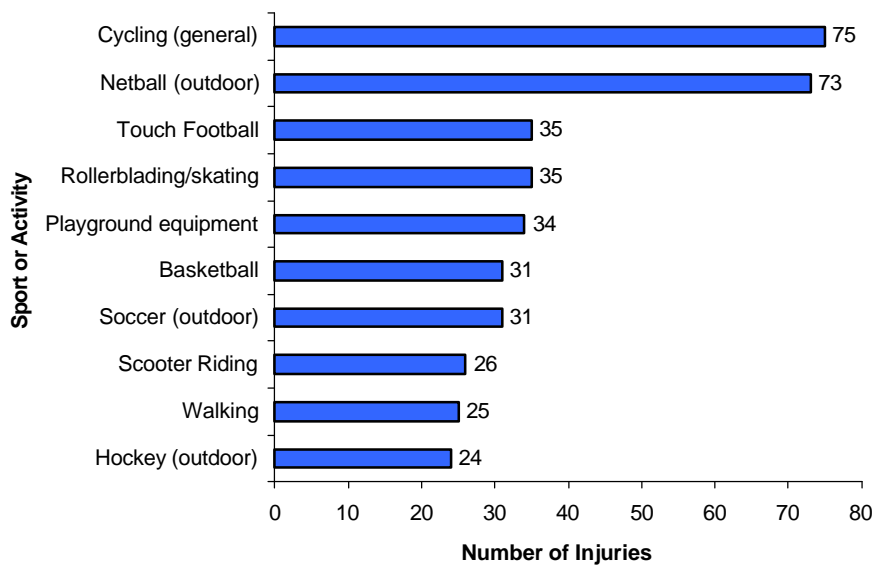


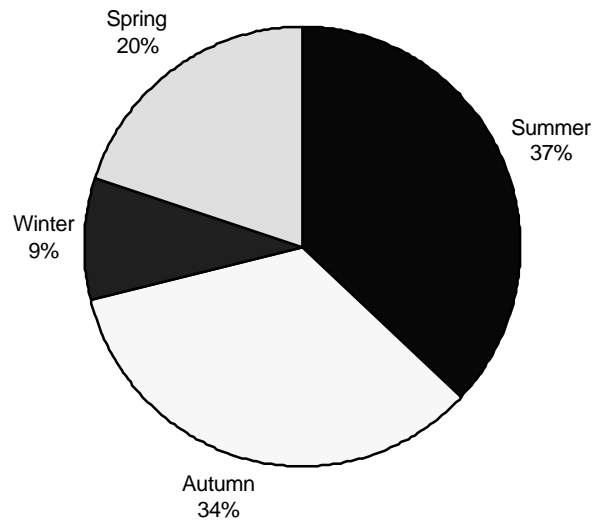
Figure 3: Number of female injuries in the top 10 sports/activities



4.6 Season of Injury

Results indicate that summer has the highest rate of injuries, followed by autumn. The least number of injuries occurred in winter. These figures may have been affected by the cessation of a number of traditional winter sports due to the 2000 Olympics. Most injuries occurred in the first half of the calendar year (69.2%), with significantly less injuries occurring in the second half (29.2%).

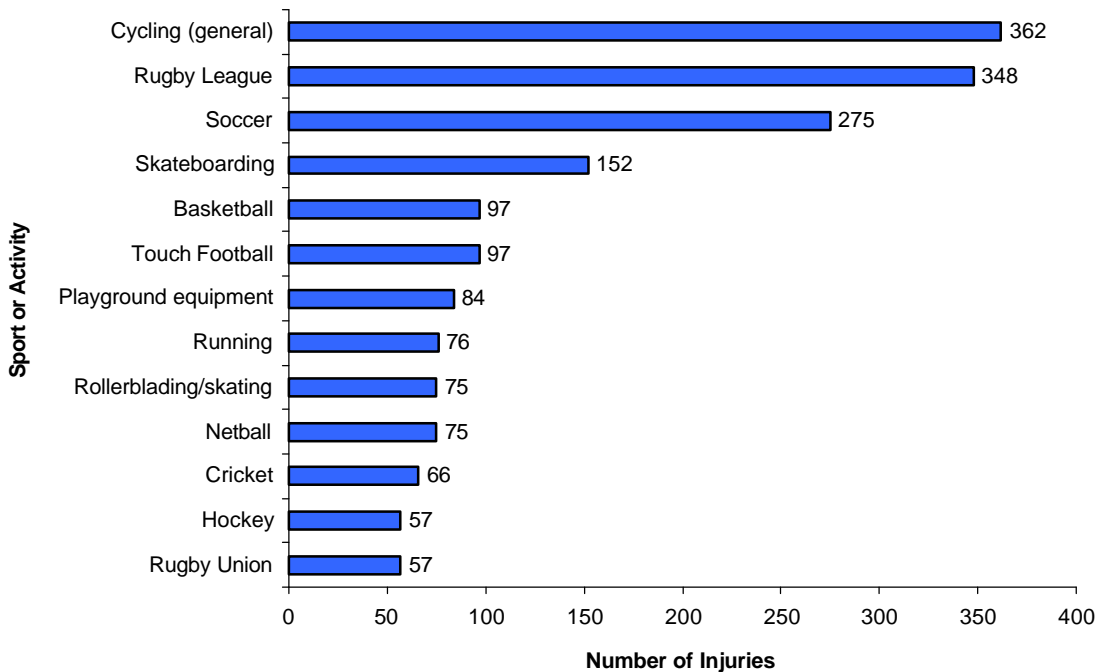
Figure 5: Percentage of injuries during seasons



4.7 Sport/activity played

Cycling (362) and rugby league (348) were responsible for the majority of injuries. Cycling was responsible for 13% of injuries and rugby league for 12.4%. Soccer was also prominent in the injury count, representing 9.9% of all injury. Whilst not overly significant in percentage terms, the injury counts for skateboarding, basketball, touch football and playground equipment certainly pose questions for future preventive action in particular age groups in particular leisure activities. Some leisure activities rank more highly than some contact sports (eg rugby union).

Figure 6: Number of injuries in the top 13 ranked sports/activities



*Categories have been consolidated to allow for overall comment. Combinations of sporting categories have not been used in any other section of this report. There were a total of 127 sports. The top thirteen sports have 50+ counts each. Only the major categories have been reported in Figure 6. Categories include combinations, and actually represent 23 sports. The other 104 sports account for 991 entries, with missing data accounting for 23. Refer to appendix C for all categories.



4.8 Cause of the injury

Fall from a height was the most common cause of injury. When combined, 'fall from a height' and 'fall on the same level' contributed to just over 35% of all causes. Over-exertion was also a leading cause of injury with a substantial percentage of cause 'unknown'. The large 'unknown' category is a result of the 'cause' not being clearly stated on emergency department information system (EDIS) print outs.

Table 5: Percentage of injury by cause of the injury

CAUSE	PERCENTAGE *
Fall from a height	19.6
Unknown	16.2
Fall on the same level	16.0
Overexertion	12.1
Struck by a person	9.9
Struck by an object	8.8
Collision - moving object	4.4
Overuse	3.3
Collision - fixed object	2.6
Aggravation of a previous injury	2.5
Other	1.7
Missing	1.3
Excluded data **	1.6
Total	100%

* Ranked in order from highest to lowest percentage.

** Combinations of categories for Cause are not included.

4.9 Nature by cause of the injury

Most fractures and lacerations were caused by falls from heights. Sprains, soft tissue, strains and joint injuries were attributed to overexertion; inflammation was generally caused by overuse, and haematomas by players being 'struck by another person'.

Table 6: Nature of injury by cause of the injury

CAUSE	NATURE*									
	Fracture	Sprain	Laceration	Other	Dislocation/ Subluxation	Strain	Soft Tissue	Joint	Inflammation	Haematoma
Fall from a height	29.5	13.9	26.5	25.2	13.3	3.1	5.1	3.4	5.7	0
Unknown	17.4	21.8	17.8	18.6	30.3	0.6	0.6	1.1	0	0
Fall on the same level	27.7	17.2	13.9	12.0	14.5	4.3	7.6	6.7	2.9	0
Overexertion	4.5	23.9	0.2	0.5	13.9	42.9	19.6	25.8	8.6	15.4
Struck by a person	9.4	9.7	10.2	12.3	7.9	6.7	9.5	7.9	0	38.5
Struck by an object	6.0	1.9	22.0	16.2	4.2	0.6	4.4	1.1	2.9	7.6
Collision - moving object	2.7	3.1	3.5	6.3	2.4	5.5	11.4	7.9	2.9	23.1
Overuse	0.7	0.4	0	0.2	1.2	11.7	13.3	20.2	34.3	0
Collision - fixed object	1.5	2.3	5.2	3.1	1.8	1.2	1.9	1.1	2.9	15.4
Aggravation of a previous injury	0.1	1.7	0.2	0.9	6.1	9.2	7.6	7.9	17.1	0
Other	0.1	1.5	0.2	0	1.2	5.5	6.3	6.7	14.3	0
Missing	0.1	1.3	0	0.2	1.8	3.1	7.6	4.5	5.7	0
Excluded data**	0.3	1.3	0.3	4.5	1.4	5.6	5.1	5.7	2.7	0
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

* Combinations of categories for Nature are not included.

** Combinations of categories for Cause are not included.



4.10 Age category by cause of the injury

'Fall from a height' was the leading cause of injury in 0 -<10 years, falls overall (from height and same level), were the leading cause of injury in the age range 0 - <15 years. 'Fall from a height' remains a significant cause of injury in age groups up to and including 30 -<35 years. 'Overexertion' and 'struck by a person' rank highly in the 20 -<30 age group, and almost 20% of injury cause is 'unknown'. Overexertion remains a leading cause of injury throughout the 30 -< 50 years range. There is also a relatively high percentage of 'unknown' cause information in these age groups. Overexertion in the 40-<50 years is the leading cause of injury. Fall from a height accounted for most injuries in the 50 -<55years, fall on the same level was most represented in the 55 -<95 age groups.

Table 7: Percentage of injury in age categories by cause of the injury

CAUSE	AGE											
	0 - <5	5 - <10	10 - <15	15 - <20	20 - <25	25 - <30	30 - <35	35 - <40	40 - <45	45 - <50	50 - <55	55 - <95
Fall from a height	45.4	45.0	18.8	15.7	16.7	15.9	13.8	9.4	5.2	12.5	24.5	11.1
Unknown	16.0	10.0	19.1	13.1	19.0	17.3	17.6	15.9	16.5	26.3	12.2	9.9
Fall on the same level	13.4	21.9	25.0	15.4	11.5	9.3	7.6	11.6	10.3	3.8	16.3	35.7
Overexertion	4.2	4.1	6.9	15.2	12.8	15.9	16.2	15.2	25.8	22.5	6.1	11.1
Struck by a person	3.4	3.3	7.4	14.8	14.9	14.6	12.4	10.1	5.2	0	2.0	0
Struck by an object	10.9	6.7	10.1	7.6	7.4	7.0	11.4	8.7	13.4	8.8	10.2	13.6
Collision - moving object	3.4	3.7	3.5	4.2	5.4	6.0	4.3	5.8	4.1	5.0	2.0	6.2
Overuse	0	0.7	1.9	2.7	4.1	2.3	4.3	5.8	6.2	10.0	12.2	7.4
Collision - fixed object	2.5	4.1	2.3	2.7	2.3	3.0	2.9	2.9	3.1	1.3	0	2.5
Aggravation of a previous injury	0.8	0	1.4	2.8	3.1	2.0	3.3	5.1	6.2	5.0	6.1	0
Other	0	0	1.8	2.5	1.0	2.0	1.0	3.6	1.0	2.5	2.0	2.5
Missing	0	0.4	1.2	1.5	0.3	2.7	2.4	2.2	1.0	1.3	2.0	0
Excluded data*	0	0.1	0.6	1.8	1.5	2.0	2.8	3.7	2.0	1.0	4.4	0
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

* Combinations of categories for cause are not included.

NB: The large 'unknown' category of data is the direct result of 'cause' not being clearly detailed in emergency department data. As a result, 'unknown' has not been discussed in the cause of sporting injury. 'Struck by a person' excludes personal assault during a game.

Table 8: Overview of the top 3 causes of injury in each age group

AGE	CAUSE	AGE	CAUSE	AGE	CAUSE
0 -< 5	Fall from a height Fall on the same level Struck by an object	20 -<25	Fall from a height Struck by a person Overexertion	40 -< 45	Overexertion Struck by an object Fall on the same level
5 -<10	Fall from a height Fall on the same level Struck by an object	25 -<30	Fall from a height Overexertion Struck by a person	45 -< 50	Overexertion Fall from a height Overuse
10 -<15	Fall on the same level Fall from a height Struck by an object	30 -<35	Overexertion Fall from a height Struck by a person	50 -< 55	Fall from a height Fall on the same level Overuse
15 -<20	Fall from a height Fall on the same level Overexertion	35 -<40	Overexertion Fall on the same level Struck by a person	55 - <95	Fall on the same level Struck by an object Fall from a height/overexertion



4.11 Sport by cause of the injury

Injuries sustained during leisure activity were more likely to be caused by falls. Injuries sustained during contact sports were more likely to be caused by ‘struck by person/objects’ or by overexertion. Most cycling and playground equipment injuries were the result of ‘fall from a height’; soccer and rugby league injuries were mainly the result of being struck by a person; skateboarding, rollerblading, basketball and running injuries were caused by ‘falls on the same level’; and touch football and netball injuries were the result of over exertion.

Table 9: Percentage of injury in the top 10 sports by cause of the injury

CAUSE	SPORT									
	Cycling	Rugby League	Soccer	Skateboarding	Basketball	Touch Football	Roller-blading	Netball	Playground Equipment	Running
Fall from a height	76.7	0.9	1.6	2.6	3.1	2.3	0	2.7	80.5	1.7
Unknown	4.4	26.4	22.8	3.9	19.6	21.8	4.0	31.1	5.6	15.0
Fall on the same level	1.7	7.1	7.9	82.2	17.5	6.9	90.6	9.5	0	33.3
Overexertion	0	12.7	20.5	3.9	17.5	34.5	0	29.7	0	13.3
Struck by a person	0	33.9	25.6	0	10.3	14.9	2.7	6.8	1.4	0
Struck by an object	1.1	1.6	5.1	3.9	5.2	0	0	5.4	6.9	3.3
Collision - moving object	11.9	6.8	3.5	3.3	5.2	5.7	0	2.7	0	0
Overuse	0.6	1.2	2.8	0	7.2	2.3	0	2.7	0	16.7
Collision - fixed object	3.3	2.5	0.4	0	4.1	3.4	2.7	1.4	5.6	3.3
Aggravation of a previous injury	0.3	2.5	2.0	0	4.1	4.6	0	2.7	0	5.0
Other	0	0.9	3.9	0	1.0	1.1	0	2.7	0	5.0
Missing	0	1.9	3.1	0	2.1	1.1	0	1.4	0	3.3
Excluded data*	0	1.6	0.8	0.2	3.1	1.4	0	1.2	0	0.1
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

* Combinations of categories for Cause are not included.

4.12 Body region

The predominant site of injury was the head, followed by the ankle, forearm, knee and lower leg. Overall, the leg (inclusive, of ankle, knee, lower leg, foot, and thigh), sustained the most injuries.

Table 10: Percentage of injury to body regions

BODY REGION	PERCENTAGE *
Head	14.2
Ankle	10.4
Forearm	9.9
Knee	9.6
Lower leg	9.1
Hand	8.2
Shoulder	8.1
Foot	5.8
Upper arm	3.7
Thigh	2.8
Face	2.8
Elbow	2.6
Wrist	2.4
Lower back	2.3
Neck	2.0
Thorax	1.5
Eye	1.4
Pelvis	0.7
Hip	0.7
Abdomen	0.5
Multiple injuries	0.4
Unspecified location	0.2
Missing	0.7
Total	100%

* Ranked in order from highest to lowest percentage.



4.13 Nature of injury

Fractures or suspected were the most common nature of injury, accounting for 23.7% of all injuries. Sprains, lacerations and ‘other’ were ranked 2nd, 3rd and 4th respectively and were separated by small margins.

Table 11: Nature of the injury

NATURE	PERCENTAGE *
Fracture or suspected	23.7
Sprain	18.5
Laceration	16.2
Other	16.1
Dislocation/Subluxation	5.8
Strain	5.7
Soft tissue	5.6
Joint	3.1
Inflammation	1.2
Haematoma	0.5
Missing	2.5
Excluded data **	1.1
Total	100%

* Ranked in order from highest to lowest percentage.

** Combinations of categories for Nature are not included.

4.14 Top 10 sports by nature of injury

Fractures, lacerations, sprains and ‘other’ were the most represented nature of injury in the top 13 sports. Touch football was the only sport that ranked dislocation as the third highest nature of injury. Fractures were predominant as the nature of injury in the leisure associated sports of rollerblading, cycling, playground equipment, and skateboarding. The competitive sports tended toward sprains, lacerations, and ‘other’ injuries, although fractures were consistently ranked in the top 3 ‘nature of injuries’ in all sports.

Table 12: Nature of the injury in the top 10 sports

NATURE	SPORT									
	Cycling	Rugby League	Soccer	Skateboarding	Basketball	Touch Football	Roller-blading	Netball	Playground Equipment	Running
Fracture or suspected	24.2	24.2	19.7	38.4	17.2	19.8	68.5	21.4	47.1	18.3
Sprain	10.3	18.2	29.3	20.5	21.5	25.9	11.0	42.9	8.6	26.7
Laceration	32.6	9.7	5.2	19.9	11.8	3.7	9.6	1.4	15.7	8.3
Other	26.7	15.7	8.4	15.9	14.0	6.2	9.6	10.0	20.0	13.3
Dislocation/Subluxation	3.1	10.1	9.2	2.6	5.4	14.8	1.3	7.1	7.1	1.7
Strain	1.1	7.5	8.4	0.7	9.7	12.3	0	8.6	1.4	6.7
Soft tissue	1.1	6.9	9.6	0.7	9.7	8.6	0	4.3	0	11.7
Joint	0.3	3.1	4.0	0.7	7.5	4.9	0	4.3	0	3.3
Inflammation	0	2.2	2.4	0	0	2.5	0	0	0	5.0
Haematoma	0	1.6	1.2	0	1.1	1.2	0	0	0	0
Missing	0	0	0	0	0	0	0	0	0	0
Excluded data*	0.6	0.8	2.6	0.6	2.1	0.1	0	0	0.1	5.0
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

* Combinations of categories for Nature are not included.



4.15a Sport by Cause by Nature

Refer to Appendix F for table representation of the following comments.

Cycling – general

The most common ‘causes of injury’ were fall from a height, collision (moving object) and unknown. Overall, the most common ‘nature of injury’ was laceration and soft tissue. Within ‘fall from a height’ cause, laceration was the most common result; for collision (moving object), the most common result was ‘other’; and for unknown the most common result was laceration.

Rugby League

The most common ‘causes of injury’ were; struck by a person, unknown and overexertion. Overall the most common ‘nature of injury’ was sprain and dislocation/subluxation. Within struck by a person, ‘other’ was the most common result; for unknown the most common result was fracture or suspected; and for overexertion, the most common result was sprain.

Soccer

The most common ‘causes of injury’ were; struck by a person, unknown and overexertion. Overall, the most common ‘natures of injury’ were sprain, fracture, soft tissue and inflammation. Within struck by a person, sprain was the most common result; for unknown, the most common result was sprain; and for ‘overexertion’, the most common result was sprain.

Skateboarding

The most common ‘causes of injury’ were; fall on the same level, overexertion and struck by an object. Overall, the most common ‘natures of injury’ were fractures and sprains. Within fall on the same level, fracture or suspected was the most common result; for overexertion, the most common result was sprain; and for struck by an object the most common result was laceration.

Basketball

The most common ‘causes of injury’ were; unknown, fall on the same level and overexertion. Overall, the most common ‘natures of injury’ were strain, fracture, sprain and laceration. Within ‘unknown’, sprain was the most common result; for fall on the same level the most common result was fracture; and for overexertion, the most common result was sprain.

Touch Football

The most common ‘causes of injury’ were; overexertion, unknown and struck by a person. Overall, the most common ‘natures of injury’ were soft tissue, fractures, sprain and strains. Within overexertion, sprain was the most common result; for unknown the most common result was fracture; and for struck by a person the most common result was fracture.

Playground equipment

The most common ‘causes of injury’ were; fall from a height, struck by an object, collision (fixed object) and overexertion. The most common ‘natures of injury’ were laceration and fracture. Fracture was the most common result of fall from a height; for struck by an object, the most common result was laceration and ‘other’; for overexertion the most common result was sprain; and for collision (fixed object) the most common result was laceration.

Running -general

The most common ‘causes of injury’ were; fall on the same level, overuse, unknown and overexertion. The most common ‘natures of injury’ were sprains, lacerations, strains and soft tissue. Within fall on the same level, sprain was the most common result; for overuse the most common result was strain; for both unknown and overexertion, the most common results were sprains.

Rollerblading/skating

The most common ‘causes of injury’ were; fall on the same level, unknown and struck by a person. The most common ‘natures of injury’ were fractures or suspected and ‘other’. The most common result in fall on the same level, ‘unknown’ and struck by a person, was fracture.

Netball

The most common causes of injury were; unknown, overexertion and fall on the same level. The most common ‘natures of injury’ were sprains, fractures or suspected, strains and soft tissue.



Within unknown, sprain was the most common result; for overexertion the most common result was sprain; and for fall on the same level the most common result was sprain.

Cricket

The most common 'causes of injury' were; struck by an object, unknown and overexertion. The most common 'natures of injury' were 'other' and strains. Within struck by an object, 'other', was the most common result; for unknown the most common result was dislocation/subluxation; and for overexertion the most common result was strain.

Hockey

The most common 'causes of injury' were; struck by an object, overexertion and struck by a person. The most common 'natures of injury' were sprains, lacerations, strains, soft tissue and inflammation. Within struck by an object, laceration was the most common result; for overexertion the most common result was strain; and for struck by a person the most common result was fracture.

Rugby Union

The most common 'causes of injury' were; struck by a person, collision (moving object) and overexertion. The most common 'natures of injury' were fractures, sprains and joint. Within struck by a person, fracture was the most common result; for collision (moving object), the most common result was a joint injury; and for overexertion the most common result was strain.

4.15b Sport by Cause by Diagnosis

Refer to Appendix G for table representation of the cause by sport by diagnosis for each of the following sports.

Cycling – general

Cycling's most common 'cause of injury' was 'fall from a height' resulting in mostly lacerations. According to the diagnosis analysis most lacerations occurred to the head/face/scalp (49). The second highest cause of injury was collision (moving object) this resulted in mostly 'other' injuries. The most common diagnosis was head injury (40). The third highest cause was 'unknown' resulting in lacerations to the head, face and scalp.

Skateboarding

The most common cause of injury was 'fall on the same level', resulting in mostly fractures. The most common site of fracture was the forearm with fractures to the radius and ulna (32). The second highest cause of injury is overexertion resulting in mostly in ankle sprains (15). The third highest cause of injury was 'struck by an object' resulting in mostly lacerations to the head/face (10).

Rollerblading/skating

The most common cause of injury was 'fall on the same level' resulting in mostly fractures. The most common fracture was of the radius and ulna (31). The second and third most common cause, 'unknown' and 'struck by a person' resulted in fractures and results are therefore the same as for fall on the same level.

Rugby League

The most common 'cause of injury' was 'struck by a person' resulting in mainly 'other' injuries. The most common 'other' injury was head injury (25). The second highest cause was unknown which resulted in mostly fractures, the most common diagnosis being fractured radius and ulna (22). The third highest cause is overexertion resulting in sprains; the most common diagnoses being ankle sprain (17).

Soccer

Soccer's most common cause of injury was 'struck by a person' resulted mostly in sprains. The most common area of sprain was the ankle (36). The second and third ranked 'causes of injury' were unknown and overexertion. These also resulted mostly in sprains.



Table 13: Diagnosis results for top 5 sports by nature of injury

NATURE	SPORT				
	Cycling	Skateboarding	Rollerblading/ skating	Rugby League	Soccer
Laceration	Head/face	Head/face	Head/face	Head/face	Head/face
Sprain/strain	Wrist	Ankle	Wrist	Ankle – Sprain Hamstring - Strain	Ankle
Fracture	Radius & Ulna	Radius & Ulna	Radius & Ulna	Radius & Ulna	Radius & Ulna
Dislocation	Shoulder	Shoulder Finger Wrist	Wrist	Shoulder	Shoulder
Other (includes head injury, concussion, contusion, puncture)	Head injury	Contusion Upper limb	Contusion Upper limb, wrist and hand	Head injury	Contusion Lower/Upper limb

Lacerations occurred mainly to the head and face and fractures to the radius and ulna. Wrist and ankles were common sites of sprain/strain injuries. Dislocations were most common in shoulders, arm and wrist regions in all sports. Contusions featured prominently as the ‘other’ injury in all sports, with the exception of cycling and rugby league where head injury was the most reported.

Helmet use was not consistently indicated in emergency department statements and as such there can be no conclusion regarding cyclist head injury.

RESULTS - Part B: Physiotherapist and General Practitioner Data

Physiotherapists completed 82% of surveys, private practice general practitioners completed 12.8%, and 5.2% of surveys did not specify the treating clinician.

4.16 Injury by Age

The mean age was 26.16, standard deviation 11.95 and the maximum age was 95.

Table 14: Percentage of injury by age category

AGE	PERCENTAGE
5 - <10	0.8
10 - <15	14
15 - <20	21.2
20 - <25	16.4
25 - <30	14.3
30 - <35	10.4
35 - <40	6.9
40 - <45	0
45 - <50	4.8
50 - <55	2.4
55 - <60	0.9
60 - <65	0.5
65 - <70	0.4
70 - <75	0.3
Missing	6.7
Total	100%

4.17 Injury New or old

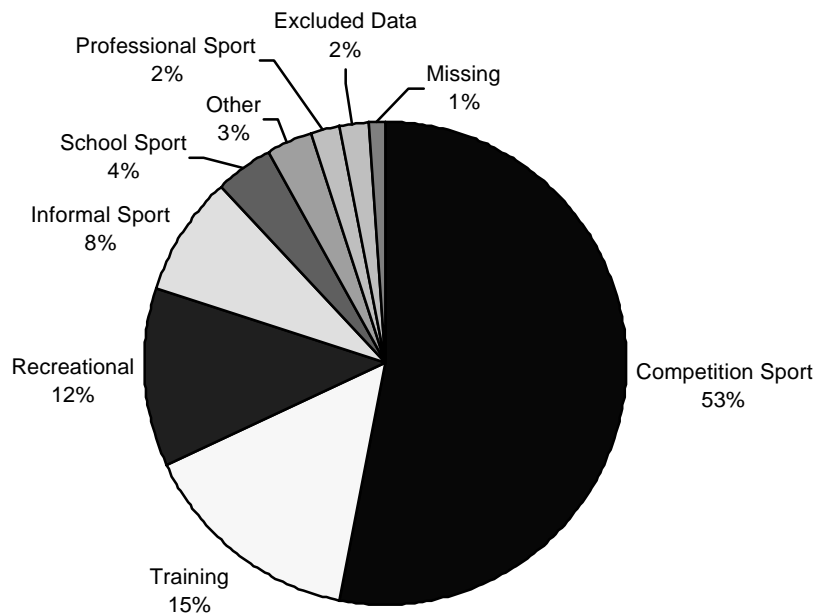
79.3% of injuries were new, 18.3% were old and 2.4% of this data did not specify whether the injury was new or old.



4.18 When the injury occurred

Most injuries were sustained during competition sport, followed by informal sport and recreational sport. Data may be inaccurate due to participant interpretation of the definition of each category.

Figure 7 : Percentage of injury by level of sport played



NB: Excluded data comprised of various combined categories.

4.19 Injury by the nature of injury

Strain, soft tissue and sprain were clearly the most common ‘nature of injury’ in the top ranked sports. Joint injuries were ranked highly in rugby union and basketball. Overall, strain, soft tissue, sprains and joint injuries were almost double other types of injuries in all top 5 sports.

Table 15: Percentage of injury in top 5 sports played by nature of the injury

NATURE	SPORT				
	Rugby League	Soccer (Outdoor)	Touch Football	Rugby Union	Basketball
Strain	19.8	20.4	23.3	17.5	22.5
Soft tissue	19.0	23.3	16.3	10.0	20.0
Sprain	15.5	20.4	20.9	22.5	15.0
Joint	8.6	7.8	9.3	17.5	17.5
Fracture or suspected	12.1	5.8	9.3	15.0	7.5
Dislocation/subluxation	10.3	2.9	14.0	10.0	5.0
Inflammation	6.0	5.8	4.7	0	0
Other	2.6	3.9	0	2.5	5.0
Haematoma	4.3	2.9	2.2	0	2.5
Laceration	0.9	1.0	0	0	0
Missing	0	0	0	0	0
Excluded data*	0.9	5.8	0	5.0	5.0
Total	100%	100%	100%	100%	100%

* Combinations of categories for Nature are not included.



4.20 Team or individual sports injury

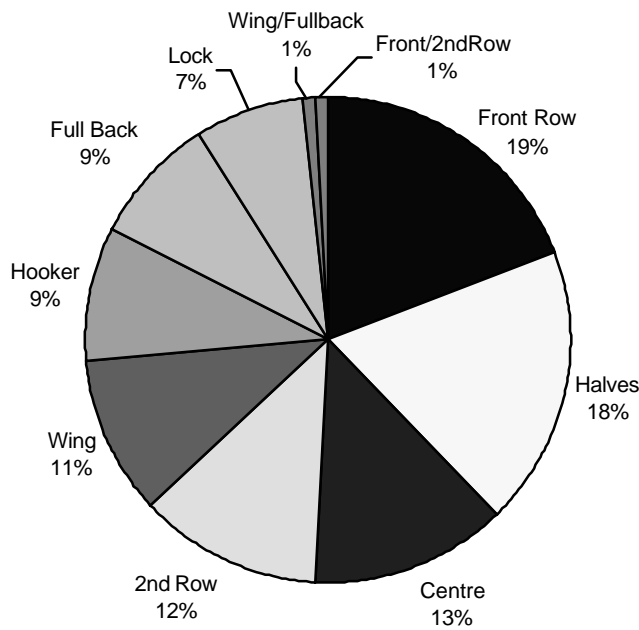
Team sports or team activities accounted for 64% of injuries, individual sports accounted for 34% of injuries, and 2% of the data was missing. The mean age for team sports was 24.26 with a range 7 – 62 years. The mean age for individual sports was 29.66 with a range 7 – 73 years.

4.21 Playing position of injury in the top 5 sports/activities

Rugby League

Most injuries occurred in the front row and half position. The Lock position recorded the least number of injuries.

Figure 8: Percentage of injury in rugby league by position



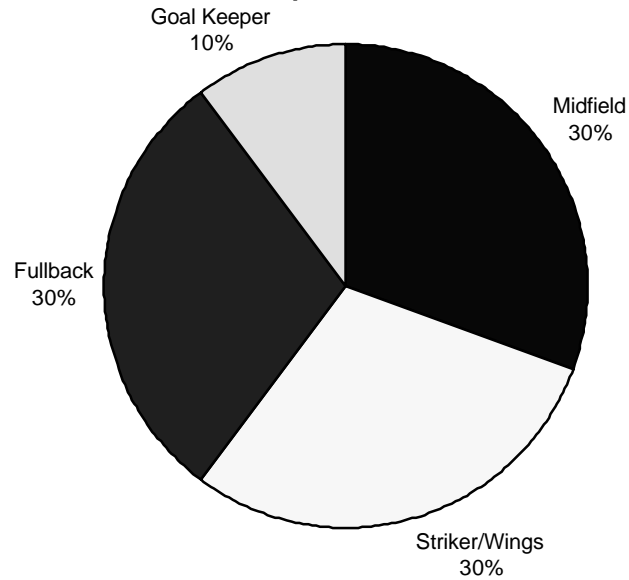
The 2% of rugby league surveys indicated that the injury had been sustained in two field positions (wing/fullback and front/second). This information has been excluded from the summary.



Outdoor Soccer

One third of soccer injuries were sustained in the midfield, fullback, and striker positions. 10% of injuries were sustained by the goal-keeper position.

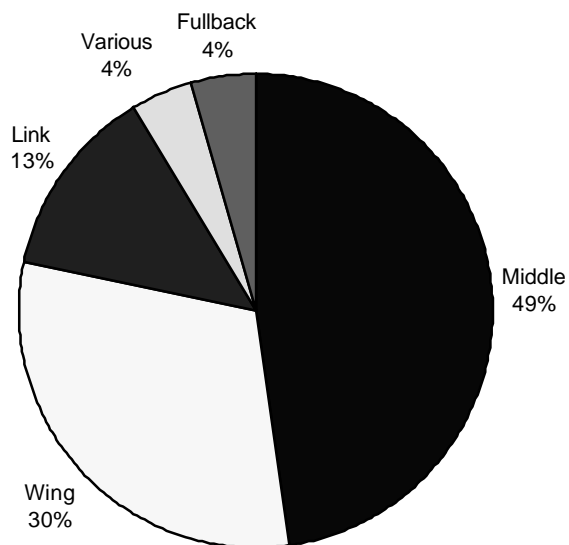
Figure: 9 Percentage of injury in soccer (outdoor) by position



Touch Football

Most touch injuries were sustained in the ‘middle’ position, one third of injuries in the wing position.

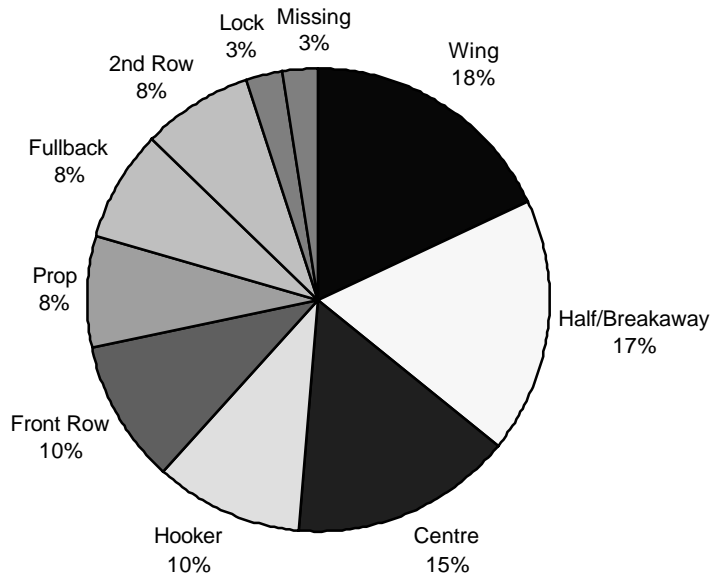
Figure 10: Percentage of injury in touch football by position



Rugby Union

Most injuries occurred on the wing and in the half/breakaway position. The 'lock' position sustained the least injury.

Figure 11: Percentage of injury in rugby union by position



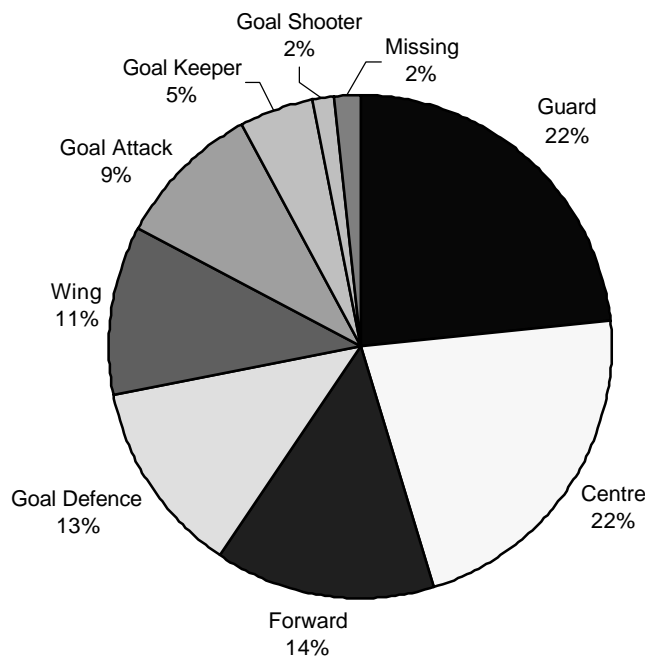
Basketball

Injury positions not reported due to limited data.

Netball

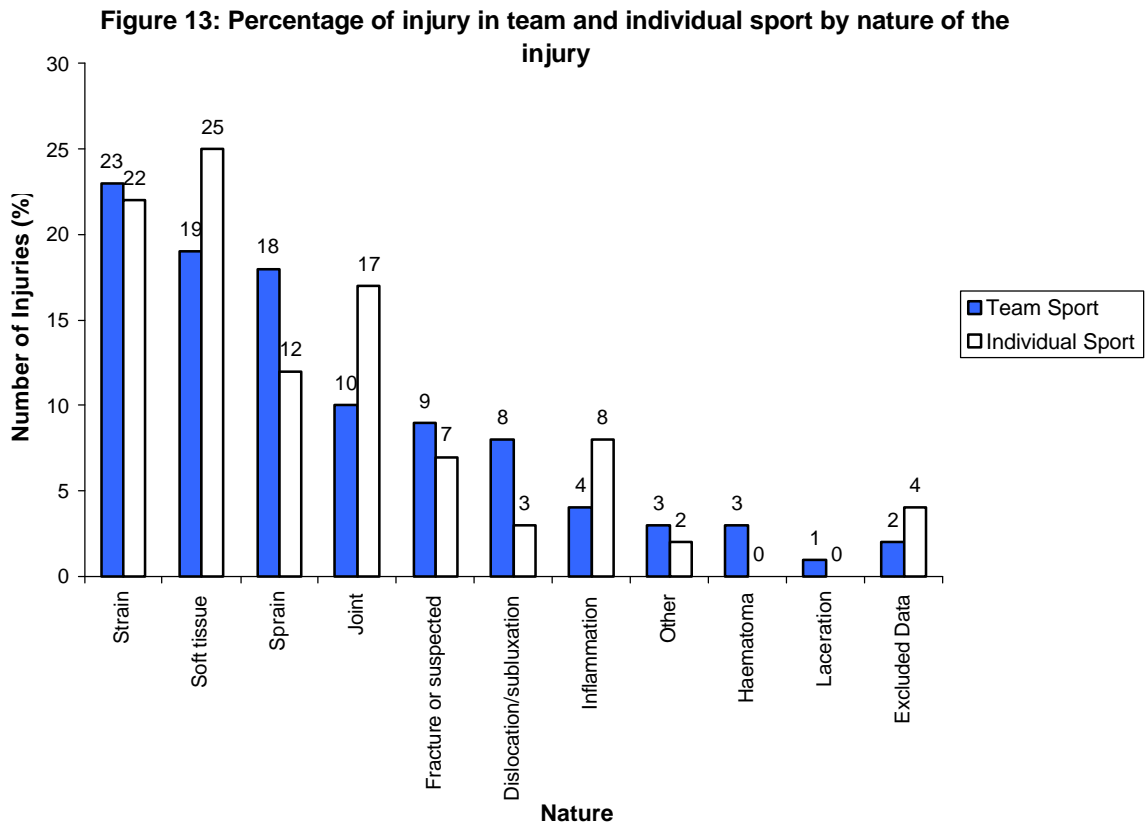
It is difficult to determine the position of most injury due to players naming a 'guard' position on the surveys. The term 'guard' is not a recognised position in netball. Excluding 'guard', the centre position sustained the most injuries in netball.

Figure 12: Percentage of injury in netball by position



4.22 Number of injuries in team and individual sports by the nature of the injury

It appears that playing a team or individual sport has little bearing on the nature of an injury. Individual sports appear to have a higher incidence of inflammation, soft tissue and joint injury than do competitive sports. Team sports have slightly higher rates of strains, sprains, fractures, dislocations and ‘other’ injuries than individual sports.



NB: Excluded data is combinations of categories that have not been included. Missing data is non-reported cases.

4.23 Onsite treatment

59.6% of injuries were not treated on site, 39.2% of injuries were treated ‘on site’ and 1.2% of data was missing. This may have implications when assessing whether qualified ‘on site’ treatment could reduce the severity of the injury and the subsequent recovery period.

4.24 Who treated the injury first on site?

Over half the data from this question was missing. Of the remainder, 13.5% of injuries were treated by a qualified sports trainer; just under 10% were treated by the injured person or by another person, and less than 5% treated by a coach or a parent.

Table 16: Who treated the injury first

WHO TREATED THE INJURY	PERCENTAGE *
Qualified sports trainer	13.5
Self	7.7
Other	7.5
Coach	4.9
Parent	2.8
St John's Ambulance	1.9
Nurse or Doctor	1.1
Missing	58.3
Excluded data**	2.3
Total	100%

*Ranked in order from highest to lowest percentage.

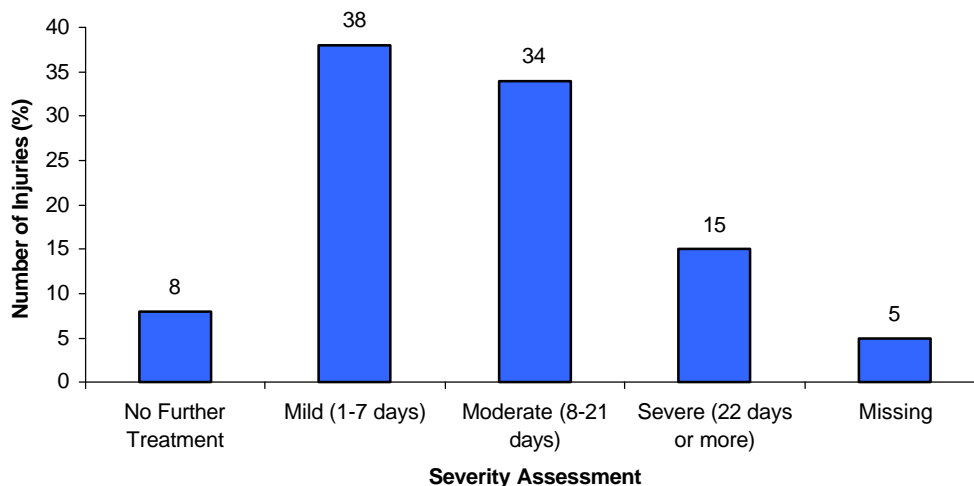
** Combinations of categories for ‘who treated the injury’ are not included.



4.25 Severity assessment of the injury

Most injuries were mild, requiring 1 – 7 days of treatment. A significant number of injuries were moderate, requiring between 8 - 21 days treatment.

Figure 14: Percentage of injury by severity assessment



4.26 Percentages of injuries in the top 5 sports played by severity assessment

Overall one third of injuries in all top ranked sports were mild and one third were moderate (excluding rugby union in mild injuries). Touch football and rugby union had the highest percentage representations of injuries requiring 22 days or more of treatment. Soccer had the higher percentage of injury that did not require further treatment (10%), and all basketball injuries required further treatment.

Table 17: Injury by severity in top 5 sports

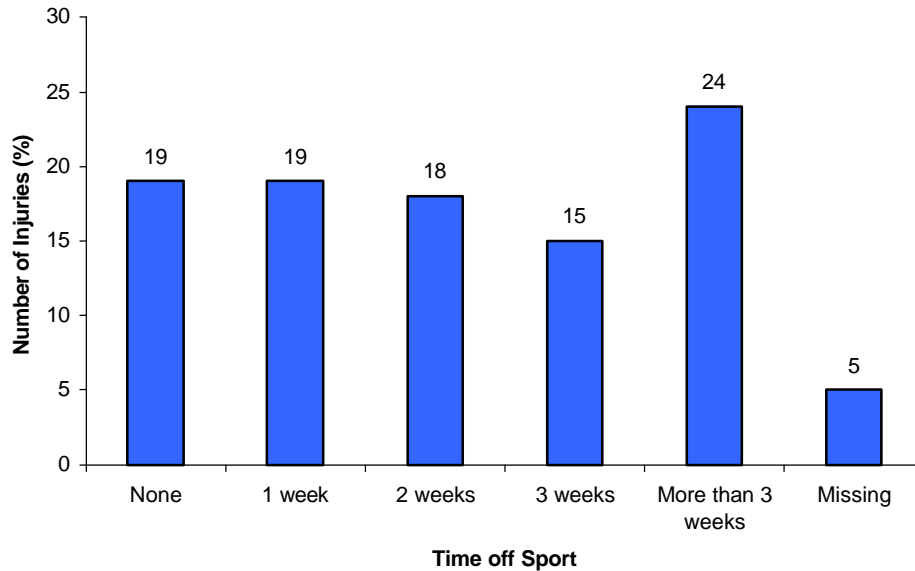
SEVERITY	SPORT				
	Rugby League	Soccer (outdoor)	Touch Football	Rugby Union	Basketball
No further treatment	5.9	10.2	6.1	2.3	0
Mild (1-7 days)	37.8	38.9	32.6	25.6	39.5
Moderate (8-21 days)	35.3	39.8	34.7	37.2	41.9
Severe (22 days or more)	13.5	7.4	18.4	23.3	13.9
Missing	5.9	3.7	8.2	11.6	4.7
Total	100%	100%	100%	100%	100%



4.27 Average ‘time off sport’ in the top 5 sports

Whilst most injuries in the top 5 sports were mild requiring 1-7 days of treatment or moderate (8 – 21 days of treatment), most injuries required more than 3 weeks time off sport.

Figure 15: Percentage of injury by time off sport



4.28 Percentage of ‘time off sport’ in the top five sports

11% of soccer and 17% of rugby league injuries required more than 3 weeks off sport. These two sports compared to the remaining top injury sports, also had higher percentages in the other ‘time off’ sport categories.

Table 18: Percentage of time off sport in the top 5 sports/activity

SPORT	TIME OFF SPORT %				
	None	1 week	2 weeks	3 weeks	More than 3 weeks
Rugby League	16.8	17.0	14.2	15.3	17.4
Soccer (Outdoor)	16.0	14.9	16.4	18.9	10.7
Touch Football	2.3	6.4	6.7	8.1	7.9
Rugby Union	4.6	6.4	5.2	7.2	5.6
Basketball	3.8	7.8	4.5	4.5	7.3



4.29 Percentage of injury in Time off Sport by age categories

Significant percentages of presentations in age categories between 10 and 30 years required time off sport. These age categories were the most represented in the survey.

Table 19: Time off sport by age category

AGE	TIME OFF SPORT					
	Missing	None	1 week	2 weeks	3 weeks	More than 3 weeks
5 - <10	0	1.5	0.8	1.6	0	0.5
10 - <15	7.9	18.0	15.7	16.0	10.7	15.6
15 - <20	23.7	19.5	26.1	23.2	23.3	21.6
20 - <25	21.1	19.5	16.4	16.8	15.5	18.0
25 - <30	21.1	18.0	13.4	13.6	16.5	13.8
30 - <35	7.9	8.3	11.9	8.8	15.5	12.6
35 - <40	7.9	5.3	5.2	9.6	6.8	9.6
40 - <45	0	0	0	0	0	0
45 - <50	2.6	3.0	6.7	4.8	8.7	4.2
50 - <55	2.6	2.3	3.0	4.0	1.0	2.4
55 - <60	2.6	1.5	0	0.8	1.0	1.2
60 - <65	0	1.5	0	0.8	0	0.5
65 - <70	0	0.8	0.8	0	1.0	0
70 - <75	2.6	0.8	0	0	0	0
Total	100%	100%	100%	100%	100%	100%

RESULTS – Part C Emergency Department

4.30 Top ranked sports in emergency department data

Three of the top five sports in emergency department data are regarded as leisure activities. This highlights the importance of gathering data from more than one source to plan injury prevention programs. Physiotherapist and GP data on its own, ranks competitive sport in all of the top 5 positions. When data is combined a clearer picture evolves showing both competitive sports and leisure activity as worthy of preventative action.

Table 20: Frequency of injury by sport or activity – 97 sports

SPORT or ACTIVITY	FREQUENCY
Cycling general	352
Rugby League**	228
Soccer**	156
Skateboarding	147
Playground equipment**	83
Rollerblading	74
Basketball	54
Cricket**	54
Scooter riding	46
Netball	45
Fishing	42
Playing	42
Surfing (board)	39
Surfing (body)	38
Touch football	38
Trampolineing	37
Running	36
Swimming	36
Hockey	35
Horse riding	35
Walking	29
Gardening	29
Missing	28
Other *	382
Total	2085

* Other 69 sports have less than 25 counts each

** Combined Categories refer to Appendix B.



RESULTS - Part D Illawarra and South Coast Player Registration Data 2000/01

4.31 Illawarra and NSW participation rates

Competitive sport player registration information was collected from the most current data available. The accuracy of this data is questionable because the Illawarra region is not distinct, and even overlaps other regions within a sporting code (eg. the Group Seven geographical area of participation is not the same as Illawarra Rugby League even though they are both registered as rugby league codes). (State participation rates have been taken from 'Participation in Sport and Physical Activities' Journal, 4177.0 - 1999-2000, Australian Bureau of Statistics).

Rugby League

The total number of player registrations for rugby league in the Illawarra is 2323. This data was difficult to collate due to the many different divisions of league played in the Illawarra (eg. group 7 league).

Some records may overlap, and thus data is not considered to be accurate. The divisional data consisted of Mini Footy (<9 years), Mod League (10-12 years), International (13-17 years) and Seniors (18+ years).

The total number of injuries in rugby league was 348 and the percentage rate of injury within league was 15%. Rugby league is ranked 5th in percentage of injuries per participation rates available in the Illawarra. According to the NSW participation rates, rugby league has a participation rate of 1.1% and is ranked 22nd (ABS*).

Soccer

The total number of player registrations for soccer in the Illawarra is 7190. This data consisted of Sub Junior (5-11 years), Junior (12-18 years) and Seniors (18+ years); data is primarily male (NSF). The total number of injuries for soccer was 275 and the percentage rate of injury within soccer is 4%. Soccer is ranked 1st in percentage of injuries per participation rates in the Illawarra. According to the NSW participation rates, soccer has a participation rate of 1.7% and is ranked 18th (ABS*).

Basketball

The approximate number of player registrations for basketball in the Illawarra is 1300. This data consisted of both junior and senior players and was of mixed sex (IBA). The total number of injuries for basketball was 97, and the percentage rate of injury within basketball is 7%. Basketball is ranked 7th in percentage of injuries per participation rate in the Illawarra. According to the NSW participation rates, basketball has a participation rate of 1.7% and is ranked 18th (ABS*).

Touch Football

The total number of player registrations for touch football in the Illawarra is 3400. There are 16 'touch' playing associations in the area from Kiama to Thirroul. Four are affiliated and twelve unaffiliated with the 'Touch System'. Conclusions are unreliable because recorded participation rates are for the affiliated associations only. The affiliated associations represent approximately one quarter of the touch data. The recorded data is made up of junior and senior (summer and winter) injury statistics. Senior teams generally consist of 12 to 15 players (WTA). Accuracy is also hampered by team registration as opposed to player registration. The total number of injuries for touch football was 97, and the percentage rate of injury is 3%. In this sample touch football is ranked 2nd in percentage of injuries per participation rate in the Illawarra. This ranking is not considered to be representative of touch football's true injury position in the Illawarra. According to the NSW participation rates touch football has a participation rate of 2.0% and is ranked 16th (ABS*).



Netball

The total number of player registrations for netball in the Illawarra is 2960. This data consists of junior and senior players (mainly female). The total number of injuries for netball was 75, the percentage rate of injury is 3%. Netball is ranked 3rd in the percentage of injuries per participation rate in the Illawarra. According to the NSW participation rates, netball has a participation rate of 2.1% and is ranked 14th (ABS*).

Cricket

The total number of player registrations for cricket in the Illawarra is 2691. The total number of injuries in cricket was 66, the percentage rate of injury is 2%. Cricket is ranked 4th in the percentage of injuries per participation rate in the Illawarra. According to the NSW participation rates cricket has a participation rate of 0.9% and is ranked 25th (ABS*).

Hockey

The total number of player registrations for hockey in the Illawarra is 847. This data is a mixture of sexes and includes juniors and seniors (Illawarra Women's Hockey Assoc.), and seniors (Illawarra Men's Hockey Assoc.). The total number of injuries for hockey was 57, the percentage rate of injury is 7%. Hockey is ranked 7th in the percentage of injuries per participation rate in the Illawarra. There is no rank listed in ABS* data.

Ruby Union

The total number of player registrations for rugby union in the Illawarra is 1627. This data is for seniors only and represents both males and females. The total number of injuries in rugby union was 57, the percentage rate of injury is 4%. Rugby Union is ranked 6th in the percentage of injuries per participation rate in the Illawarra. There is no rank listed in ABS* data.

Table 21: Comparison of Illawarra and NSW sports participation rates

Sport	Illawarra		Australian Bureau Statistics	
	Injury No.	Rank	NSW Participation Rates	NSW Rank
Rugby league	348 (15%)	5th	1.1%	22nd
Soccer	275 (4%)	1st	1.7%	18th
Basketball	97 (7%)	7th	1.7%	18th
Touch Football	97 (3%)	2nd	2.0%	16th
Netball	75 (3%)	3rd	2.1%	14th
Cricket	66 (2%)	4th	0.9%	25 th
Hockey	57 (7%)	7th	-	-
Rugby Union	57 (4%)	6th	-	-

* **Australian Bureau of Statistics**, (State participation rates have been taken from 'Participation in Sport and Physical Activities' Journal, 4177.0 - 1999-2000).

4.32 Conclusion

The participation rates as described in the ABS NSW document 'Participation in Sport and Physical Activities' are quite different from those reported in this study. Of the top ten sports in NSW, only running and cycling appeared as they did in the top thirteen sports of the Illawarra Sporting Injury Survey. They were ranked 6th and 8th in the ABS NSW report, and ranked 8th and 1st respectively in the ISIS survey. Thus, only two sports out of the top 13 in the Illawarra survey were somewhat comparable to the ABS NSW data. This reinforces the notion that a regional view of sports injury is essential to look at regional injury trends and resultant injury reduction strategies.



5. DISCUSSION and RECOMMENDATIONS

5.1 Discussion

The combined data has provided a picture of overall injury and age specific injury. The age category injury information will be extremely useful for planning sports injury interventions, particularly in relation to injuries in the 0 to 10 years age groups, and the potential role of carers within injury prevention strategies. The data can also be utilised to determine the percentage of various types of injury within specific age categories; the severity of an injury within a sporting code; or the frequency of overall injury. Further research might indicate that whilst the majority of injury occurs within a certain age group, the treatment costs of those injures are less than the treatment costs of another age group where injury rates are lower, but the actual rehabilitation cost is higher. This aspect has not been explored in this report, but poses interesting questions for future research.

Males presented for sports injury treatment three times more often than females. Both sexes were injured by competitive sport and leisure activities. Most males in the sample were injured playing rugby league, cycling, and soccer (the research has also identified the rugby and soccer clubs whose players presented for assessment or treatment). Rugby league and soccer injuries required the most 'time off sport' with 33% of league and 30% of soccer injuries requiring three or more weeks rest from the sport. Conducting investigations within clubs to determine if injuries could be attributed to particular coaching methods or club policies, would be of considerable interest, and could possibly allow for very specific club 'owned' injury reduction programs. This is certainly a strategy that could substantially impact injury reduction within selected sporting codes, and is an area that the researcher intends to follow up in relation to future funding applications.

Most females in the sample were injured cycling, and playing outdoor netball. It is important to look at female data separately, in light of the fact that males tend to dominate the injury picture through sheer number and choice of activity. For example, netball is the second most injury prone activity for women, however, it does not rank highly in the overall injury picture, and an incorrect conclusion could be made that netball is not an area requiring further injury prevention action.

Pedal cycling was responsible for most injuries, was the leading cause of injury within 5 age categories, and was the third ranked cause of injury in a further 5 out of the remaining 7 age categories. The 10 to 15 years age group had the highest number of injuries overall, with cycling accounting for most injuries in this age group. Clearly, cycling requires greater attention in regard to injury prevention programs and is an 'all age' category concern. When rugby union and rugby league data is combined into a 'general league' category, it becomes, by a very small margin, the leading cause of injury in the Illawarra.

There were thirteen sports that recorded 50 or more injuries. Five out of the thirteen were leisure activities, the remaining 8 were competition sports. It is interesting to note that of the 1,820 injuries sustained in the top 13 sports, leisure activity accounted for 41% of injury and competition sport 59%. Whilst some sports require specific intervention based solely on frequency of injury, combined categories of some leisure activities should not be overlooked in favour of those sports statistically ranked higher. For example, the combined total of rollerblading and skateboarding injuries is 227, this is 30% of the leisure activities ranked in the top 13 sports, and 13% of all recorded injury in the top 13 sports.

Creating new leisure clubs (eg; a registered skateboarding association), may well be a way of promoting the use of safety equipment within these sports. Appropriate incentive programs would also be necessary to promote the concept of leisure clubs and the advantages of safety equipment to certain age groups.



Falls in general ('same level' and 'from a height' inclusive), were responsible for 35% of all injuries, with fractures being the most common result. Injuries to the 0-< 5 and 5-<10 years age groups were mostly lacerations and fractures. Fractures and sprains dominated age categories from age 10 through to age 45. Laceration also featured strongly as the nature of injury in many categories. Strains were common in the 45 - 50 years age group, and fractures in the 55 - 95 years. The head was the most reported body region of injury. With the assumption that some falls are preventable, there is huge scope to develop strategies to reduce the number of falls or at least minimise their injury impact through coaching action, protective equipment and behavioural modification. Further research needs to be carried out in order to determine how best to reduce falls in specific leisure activities.

Central Wollongong and its southern suburbs were most represented in the survey. Physiotherapists and a specialist sports medicine clinic provided the most 'active' data collection (the highest number of surveys returned), whilst the highest volume of data came from emergency department information systems (EDIS). The survey return rate from private practice doctors was generally low, and it has been assumed that either the rate of compliance was poor, or that sports medicine trained physicians do not regularly treat sports injuries within a general practice environment. The oral and maxillofacial surgeon did not return any sports surveys, but verbally reported that some injuries presenting for treatment were the result of personal assault with sports equipment.

Even though not strongly substantiated by statistical data, playground equipment and trampoline injuries are an issue in the 0 to 10 years age groups. Early intervention is essential in the form of strategies including carer education, playground design and management, and policy development by stakeholder organisations such as councils, preschools, schools and other groups responsible for recreational facilities.

5.2 Limitations and Strengths of the research model

Limitations

- Most limitations were the result of project financial constraints. There were insufficient personnel to promote the project face to face within the research period. This may have been factor in the occasional slow return of surveys, and a reduced volume of return from selected physiotherapy clinics.
- Only one data entry technician was employed. This was problematic during the entry of emergency department data.
- Hospital emergency departments recorded sprain and strain as one injury.
- Low, to no compliance from Emergency Departments regarding the return of original surveys
- Possible recall bias for retrospective injuries treated at physiotherapy centres
- Reporting bias due to respondent interpretation of questions.
- Possible double reporting of injuries from emergency department to physiotherapist or doctor.

Strengths

- The method allowed for an accurate clinical diagnosis
- The method of data collection was easily integrated into clinician routine.
- The survey form, on average, took less than three minutes for participants to complete, and under two minutes for clinicians to complete.
- There was minimal impact on administrative function within clinics.
- The data collection method was able to survey a large geographical area.



5.3 Recommendations

Research findings point directly to the need for preventive measures to be developed for the following sporting/recreational activities and their specific injury issues.

- *Soccer*: because of the high frequency of medically treated injury in males. Soccer and rugby league required the most time off sport in all ‘time off sport’ categories, and had the highest percentage of injuries that required more than 3 weeks off sport.
- *Rugby league*: because of the high frequency of medically treated injury in males (In particular a number of head injuries). Rugby league as reported above, was one of two sports that required the most time off sport, and had a high percentage of injuries that required more than 3 weeks off sport.
- *Playground injuries*: because of the high percentage of injury in the 0-<5 and the 5-<10 years age groups, and the preventable aspect of the major cause of injury (fall from a height). Research needs to monitor the incidence, cause and nature of playground injuries, and target parents, carers and other stakeholder groups (of 0 to 10 year olds), with specific injury prevention programs.
- *Cycling*: because of the high frequency of medically treated injury and the severity of injury. Issues may pertain to helmet use and design, bicycle safety, riding behaviours and driver awareness.
- *Youth aged 10 to 15 years*: because of the high frequency of injury compared to younger and older adults. Issues include raising the level of ‘injury awareness’ in this age group, and encouraging them to adopt safer behaviours.
- *Adults aged 15 to 20 years*: because of the high frequency of injury in comparison to other age groups. Issues include raising the level of ‘injury awareness’ in this age group, and encouraging them to adopt safer behaviours.
- *Skateboarding and rollerblading*: because of the high number of presentations to hospital emergency departments. Issues include equipment design, protective gear, skill instruction, and safe skating areas.
- *Netball*: because of the moderately high frequency of medically treated injury in females.



6. CONCLUSION

Sports injury has long been recognised as a major health issue, yet very little long-term action has resulted from this recognition. In theory, research justifies the planning of preventive action, however, there is yet to be a ground swell of support from government bodies or health service organisations to commence this action. The focus within sports injury, irrespective of research data, appears to remain firmly on treatment and cure, as opposed to prevention or even injury reduction.

Reducing injury in leisure related activity (such as skateboarding and cycling) is a much harder task than formal competitive sport, where, at the very least, there are often set playing regulations and enforced use of protective equipment. Whilst there is certainly an element of risk inherent in being active, risk and the injury associated with it, can be greatly reduced by encouraging and educating children and youth to value safe attitudes and behaviours, and by also creating safer, hazard free activity environments. Children are becoming involved in sports at earlier ages with higher levels of intensity and expectation. They also appear to be sustaining injuries that could influence physical function during growth years, or later in life. 'Choosing' to 'play safe', respecting and using recommended safety procedures, are aspects of junior sport that require further attention.

A high percentage of youth (15 to 20 years) and young adults (20 to 25 years) are involved in competitive sports. This direct involvement offers an ideal opportunity for injury prevention teams to work with sports clubs to investigate the best ways to encourage safety behaviours in a variety of age groups, in and out of a formal sporting environment. There is also potential to improve training and coaching practices to reduce the rate of competitive sports injury. It would be logical to assume that a high percentage of these age groups are also involved in some type of leisure activity, and that safe sports practices adopted during a sports injury reduction program in organised sport, may be continued during other leisure activities. The Safe Communities Model, with its philosophy that safety has a role to play in every aspect of life, is one that could be further utilised within this process.

This research has found that the key to determining a comprehensive picture of local injury is to adopt a data collection method that is cost effective, relatively simple to operate and that can provide precise information on a range of injury issues. Emergency department data on its own is not representative of all injury, and physiotherapy and general practice clinics do not capture the high number of recreational child/youth injuries that present at emergency departments. A combined data collection approach appears to be the best way in which to capture sports injury data.

The Illawarra Sports Injury Survey has painted a clear picture of sport and leisure activity injury in the Illawarra, and has provided the data necessary to embark on regionally specific sports injury prevention programs. Equally as important, the *method of data collection* used in the survey has been proven to be simple, cost effective, efficient and accurate. The short-term objective has been met, and there is now regional justification for government organisations to provide funds to plan and implement sports injury reduction programs in the Illawarra. Sports injury can no longer be 'swept under the carpet' and accepted as an inherent risk of participation, especially when community organisations produce baseline data proving the high rate of sports injury and its estimated high financial cost to the local community.

The scope for realistic sports injury reduction appears to be wide, and the total cost of injury is much more than just physical repair and rehabilitation. If we are serious about reducing the overall cost of sports injury, then the most logical place to begin is at 'grass roots' regional level with the provision of funds to plan, implement and coordinate long-term sports specific injury reduction programs.



Whilst most government organisations have recognised that injury is a shared problem, they have yet to effectively coordinate the resources necessary to action existing recommended injury reduction strategies. Sport in Australia is worth \$8 billion annually and employs more than 95,000 people (Confederation of Australian Sport, Jan 1998). The subsequent cost, economic and social, of sports injury has enormous impact upon our society, and it is in the interest of government and corporate business to promote injury prevention in order to reduce associated costs, and thereby reduce the financial burden on individuals and the health care system.



7. REFERENCES

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Abbreviations Key

- (NRL) NSW Rugby League
- (NSF) NSW Soccer Federation
- (IBA) Illawarra Basketball Association
- (WTA) Wollongong Touch Association
- (IDNA) Illawarra District Netball Association
- (NCA) NSW Cricket Association
- (IDRU) Illawarra District Rugby Union
- (IWHA) Illawarra Women's Hockey Association
- (IMHA) Illawarra Men's Hockey Association



Appendix A



Illawarra Sports Injury Survey



Please tick the box that best suits your sport or recreational injury

This column should be completed by the Injured Person

1. Age (last birthday) _____

2. Sex Male 1 Female 2

3. In what month did the injury occur? _____

4. Postcode of your usual residence _____

5. The injury is new 1 old 2

6. When did the injury occur?

During competition sport (not professional)	1 <input type="checkbox"/>
During informal sport	2 <input type="checkbox"/>
Recreational activity	3 <input type="checkbox"/>
Professional sport	4 <input type="checkbox"/>
During training	5 <input type="checkbox"/>
School sport	6 <input type="checkbox"/>
Other (specify) _____	7 <input type="checkbox"/>

7. What sport or activity were you playing when the injury occurred? _____

8. a. Were you playing a team sport (2 or more persons playing against 2 or more persons)

No 1 Yes 2

b. If the activity requires certain playing positions what position were you playing? Eg wing centre

3 _____

9. If you were playing for a sport or recreation club when the injury occurred, please write down the name of the club (eg Tigers Rugby Club, North's Walking Group)

10. a. Did you receive 'on site' treatment for this injury?

Yes 1 No 2

b. If 'Yes' who treated you first? (tick one)

Coach	1 <input type="checkbox"/>
Parent	2 <input type="checkbox"/>
Qualified sports trainer	3 <input type="checkbox"/>
Self	4 <input type="checkbox"/>
St Johns Ambulance	5 <input type="checkbox"/>
Nurse or doctor	6 <input type="checkbox"/>
Other	7 <input type="checkbox"/>

11. Cause of the injury (tick the main one)

Aggravation of a previous injury	1 <input type="checkbox"/>
Collision - fixed object	2 <input type="checkbox"/>
Collision – moving object	3 <input type="checkbox"/>
Fall from a height	4 <input type="checkbox"/>
Fall on the same level	5 <input type="checkbox"/>
Overuse	6 <input type="checkbox"/>
Struck by a person	7 <input type="checkbox"/>
Struck by an object	8 <input type="checkbox"/>
Overexertion (sudden speed, stopping, twisting action)	9 <input type="checkbox"/>
Other (specify) _____	10 <input type="checkbox"/>

Thank you for completing this survey

This column should be completed by the Doctor or Physiotherapist

12. Body region (tick one in the primary region)

Multiple Multiple injuries (more than one location) 0

Primary region

Eye	1 <input type="checkbox"/>
Head (excludes eye)	2 <input type="checkbox"/>
Face (excludes eye)	3 <input type="checkbox"/>
Neck	4 <input type="checkbox"/>
Thorax	5 <input type="checkbox"/>
Abdomen	6 <input type="checkbox"/>
Lower back (includes loin)	7 <input type="checkbox"/>
Pelvis (perineum, anogenital area, buttocks)	8 <input type="checkbox"/>
Shoulder	9 <input type="checkbox"/>
Upper arm	10 <input type="checkbox"/>
Forearm	11 <input type="checkbox"/>
Elbow	12 <input type="checkbox"/>
Wrist	13 <input type="checkbox"/>
Hand (includes fingers)	14 <input type="checkbox"/>
Hip	15 <input type="checkbox"/>
Thigh	16 <input type="checkbox"/>
Knee	17 <input type="checkbox"/>
Lower leg	18 <input type="checkbox"/>
Ankle	19 <input type="checkbox"/>
Foot (includes toes)	20 <input type="checkbox"/>
Unspecified location	21 <input type="checkbox"/>

13. Nature of the injury (tick one)

Soft tissue	1 <input type="checkbox"/>
Laceration	2 <input type="checkbox"/>
Joint	3 <input type="checkbox"/>
Strain	4 <input type="checkbox"/>
Sprain	5 <input type="checkbox"/>
Fracture or suspected	6 <input type="checkbox"/>
Inflammation	7 <input type="checkbox"/>
Haematoma	8 <input type="checkbox"/>
Dislocation /subluxation	9 <input type="checkbox"/>
Other (specify) _____	10 <input type="checkbox"/>

14. Provisional diagnosis (write neatly, medical terminology please)

15. Occupation Physiotherapist 1 Doctor 2

16. Severity assessment (approximation)

No further treatment	1 <input type="checkbox"/>
Mild (1 – 7 days treatment)	2 <input type="checkbox"/>
Moderate (8 – 21 days treatment)	3 <input type="checkbox"/>
Severe (22 days or more)	4 <input type="checkbox"/>

17. How much time off sport will be required?

None	1 <input type="checkbox"/>	1 week	2 <input type="checkbox"/>		
2 weeks	3 <input type="checkbox"/>	3 weeks	4 <input type="checkbox"/>	More than 3 weeks	5 <input type="checkbox"/>

Thank you for completing this survey



ILLAWARRA SPORTING AND RECREATIONAL INJURY SURVEY PARTICIPANT INFORMATION SHEET

The Illawarra Sports Injury Surveillance project is investigating sporting and recreational injury in the Illawarra region. The project is an initiative of Healthy Cities Illawarra Incorporated, a non-political, non-profit, community based organisation. In 1999 Healthy Cities Illawarra secured a grant from the NSW Sporting Injuries Insurance Scheme with which to coordinate a regional sporting and recreational injury survey.

Sporting and recreational injuries can have an enormous financial and social impact on not only the health care system but on the individual. This study will determine the nature and cause of local sports injury; what types of injuries occur in all age groups (for males and females) in particular sports; and what treatments were given on site to the injured person. The survey will provide specific information on an exhaustive range of sports in the Illawarra region. At the end of the 12month study we will have a clear picture of what sport and recreation injuries are occurring in this region. The final report will provide statistical breakdown on sports injury incidence in the Illawarra.

- ❖ **The survey is completely confidential. Your name is NOT required**
- ❖ **Your participation is voluntary, you are free to refuse to participate and free to withdraw from the research at any time. Your refusal to participate or withdraw will not affect your treatment in any way.**
- ❖ **This sport and recreational survey will be conducted at selected physiotherapy centres, doctor's surgeries, medical centres and hospital emergency departments.**
- ❖ **By completing the survey form you are indicating that you have given your consent to take part in this research.**
- ❖ **The program has the support of the Illawarra Area Health Service, the Department of Sport and Recreation, the Australian Physiotherapist Association and the NSW Sporting Injuries Insurance Scheme.**
- ❖ **Local sporting, recreational clubs, and state sporting associations will be provided with a final report of information relevant to their sport.**
- ❖ **The form is simple and easy to understand, and will take you about 3 minutes to complete.**

If you would like any further information please contact healthy Cities Illawarra on (02) 422650090. If you have any complaints about this research contact the Ethics Officer, Office of Research, University of Wollongong (02) 42214457 or fax (02) 42214338

Please give the survey form to your doctor or physiotherapist at the beginning of your appointment. The doctor or physiotherapist will complete the right hand side of the form. Please leave your survey with the reception desk on your departure.



Appendix B

Combined sports categories

SPORT	COMBINED SPORTS
Rugby League	Includes: Rugby League League Training Football (general)
Soccer	Includes: Soccer (outdoor) Soccer (indoor)
Touch Football	Includes: Touch Football Oztag
Playground equipment	Includes: Playground equipment Earth ball Jumping Castle
Running	Includes: Running (general) Jogging
Netball	Includes: Netball (outdoor) Netball (indoor)
Cricket	Includes Cricket (outdoor) Cricket (indoor)
Hockey	Includes: Hockey (outdoor) Hockey (indoor)



Appendix C

Sports injury frequency (2835 entries-127 sports)

SPORT	Count	SPORT	Count	SPORT	Count
Cycling – General	362	Diving	11	Paint ball	2
Rugby League	322	Oztag	10	Ice skating	2
Soccer - Outdoor	254	Jumping Castle	10	Frisbee	2
Skateboard	152	Martial Arts – General	10	Handball	2
Basketball	97	Softball	9	Boxing	2
Touch Football	87	Gym workout	9	Acrobatics	2
Rollerblade/skate	75	Tree climbing	9	Dancing – ballet	2
Netball – Outdoor	74	BMX riding	9	Table tennis	2
Playground equipment	72	Cricket – Indoor	8	Weightlifting	2
Running – general	60	AFL	8	Tobogganing	2
Cricket - outdoor	58	Snow boarding	8	Racquetball	2
Rugby Union	57	Athletics – Field	8	Bowls	2
Hockey – Outdoor	56	Volleyball	7	Earth ball	2
Scooter	47	Athletics	6	Netball – indoor	1
Surf – board	46	Water skiing	6	Triathlon	1
Swimming	46	Rock pool injury	5	Cardio boxing	1
Tennis	45	Long jump	4	Kickboxing	1
Fishing	43	Judo	4	Javelin throwing	1
Playing – general	42	Hiking	4	Rhythmic gymnastics	1
Surf – body	38	Jet skiing	4	Rock drilling	1
Horse riding	37	Go Kart	4	T-ball	1
Trampoline	37	Climbing – General	4	Tug-of-war	1
Walking	36	Athletics – Track	4	Darts	1
Gardening	31	Aerobics	4	Power walking	1
Squash	26	Hurdling	3	Sand skiing	1
Baseball	26	High jump	3	Sitting	1
Dancing – general	25	Rowing – Surf	3	Warming up	1
Beach walking	24	Running – X Country	3	White water rafting	1
School – general	23	Stretching	3	Hapkido	1
Football –	23	Sprinting (running)	3	Hockey – indoor	1
Unknown	23	Water polo	3	Kayaking	1
Gymnastics	22	Wood chopping	3	Hang gliding	1
Trail bike riding	22	Referee – All sports	3	Harness racing	1
Soccer – indoor	21	Bull riding	3	Kids toys	1
Skiing - Snow	20	Para jump	3	Canoeing	1
Jumping	18	Ten pin bowling	3	Sailing	1
Mountain bike riding	17	Grid Iron	3	Bush walking	1
Marine Injury	17	League training	3	Paragliding	1
Jogging	16	Badminton	3	Grass tobogganing	1
Golf	12	French cricket	2	Pole vaulting	1
Motor cross	12	Various	2	La Crosse	1
Weight training	12	Water slide	2	Shot put	1
Wrestling	12	Archery	2	Missing	23



Appendix D

Numerical sports codes

SPORT	CODE	SPORT	CODE	SPORT	CODE
Aerobics	1	Running – X Country	48	Wrestling	92
Triathlon	2	Skiing – Snow	49	School – General	93
AFL	3	Snowboarding	50	Hang Gliding	94
Athletics – Field	6	Soccer – Outdoor	51	Jet Skiing	95
Athletics – Track	7	Stretching	52	Surf – Body	96
Oztag	8	Squash	53	Go-Kart	97
Badminton	9	Softball	54	Trampoline	98
Baseball	11	Skateboard	55	Harness Racing	99
Boxing	12	Surf Lifesaving	56	Water Slide	100
Basketball	13	Surf – Board	57	Diving	101
Abseiling	14	Sprinting (running)	58	Tree Climbing	102
BMX	15	Swimming	59	Jumping Castle	105
Acrobatics	16	T-Ball	60	Bull Riding	106
Cricket – Outdoor	17	Tennis	61	Jumping	107
Cycling – General	18	Table Tennis	62	Kids Toys	108
Dancing – General	19	Touch Football	63	Canoeing	109
Cardio Boxing	20	Tug of War	64	Archery	110
Ballet Dancing	21	Roller blade/skate	65	Sailing	111
Gardening	22	Darts	66	Paint Ball	112
Golf	23	Rugby Union	67	Earth Ball	113
Gym Workout	24	Volleyball	68	Para-jump	114
Gymnastics	25	Walking	69	Marine Injury	115
Hurdling	26	Power Walking	70	Ten Pin Bowling	116
High Jump	27	Water Polo	71	Ice Skating	117
Hockey – Outdoor	28	Weight Training	72	Frisbee	118
Cricket – Indoor	29	Water Skiing	73	Grid Iron	119
Soccer – Indoor	30	Wood chopping	74	Bush walking	120
Kick Boxing	31	Weightlifting	75	Beach walking	121
Jogging	32	Referee – All Sports	76	Spectator	122
Hockey – Indoor	33	French Cricket	77	Tobogganing	123
League – Training	34	Trail Bike Riding	78	Bowls	124
Motor cross	35	Sand Skiing	79	Playing	125
Long Jump	36	Various	80	Paragliding	126
Mountain Bike Riding	37	Sitting	81	Rock pool injury	127
Judo	38	Playground Equipment	82	Climbing – General	128
Netball – Outdoor	39	Warming Up	83	Handball	130
Javelin	40	Netball – Indoor	84	Grass Tobogganing	131
Rhythmic Gymnastics	41	Fishing	85	Boogie Board	132
Rock Drilling	42	Football – General	86	Pole Vaulting	133
Horse Riding	43	White Water Rafting	87	La Crosse	134
Racquet Ball	44	Hiking	88	Martial Arts – General	135
Rugby League	45	Hapkido	89	Shot-put	136
Rowing – Surf	46	Kayaking	90	Unknown	140
Running – General	47	Scooter	91		

NB: Codes 4,5,10,103,104,129,137,138 and 139 (9) were not allocated with any sports/activity and are not represented by any sports. Allocated codes of 14, 56, 122 and 132 (4) were not represented in the report. Total code count = 140



Appendix E

Glossary of sports and terms of reference

SPORT	CLASSIFICATION
Aerobics	Excludes cardio boxing.
Athletics – Field	Excludes high jump, long jump, javelin, shot put, tug of war and pole vaulting.
Athletics – Track	Excludes triathlon, hurdling and sprinting.
Bowls	Includes lawn and carpet bowls. Excludes ten- pin bowling.
Bush walking	Excludes hiking.
Climbing – general	Excludes tree climbing.
Competition sport	Includes basketball, hockey, touch football, rugby league, rugby union, netball, soccer and cricket.
Competitive sport (as ranked in the top 13 sports)	Soccer, hockey, rugby league, rugby union, netball, basketball, touch football,
Cycling - general	Includes non-motorised road or pathway cycling. Unless specified as a 'race' situation, cycling was included as a leisure activity. Excludes BMX, mountain bike riding, trail bike riding and motor cross.
Dancing – general	Includes line dancing, dancing at a club scene and all other types. Excludes Ballet.
Football – general	Includes the entries that did not specify whether it was union, league or soccer. (Combined with league and league training in final data)
Go-kart	Includes billy-cart riding.
Gym workout	Includes circuit training. Excludes aerobics, cardio boxing and weight training.
Gymnastics	Includes cartwheels and handstands. Excludes trampoline, acrobatics and rhythmic gymnastics.
Horse riding	Riding a horse or working with horses.
Hospital Emergency Department	ED
Jumping	Includes jumping over obstacles e.g. fences. Excludes hurdling.
Kids toys	Injury by direct contact with a toy of some kind.
Leisure activity (top 10 only)	Incorporates informal and recreational activity. Includes scooter riding, cycling, skateboard riding, swimming, shoreline marine activity, fishing, playground equipment, walking, rollerblading and running (general).
Marine injury	Includes stingray stings, oyster shell cuts and sea urchin spines. Excludes fishing and rock pool injuries.
Martial arts – general	Includes all forms of tae kwon-do and karate. Excludes judo, hapkido and kick boxing.
Other (nature of injury)	This category includes head injury, concussion, contusion and puncture wound.
Outdoor/Indoor sports	Is specified where necessary in the report. Some indoor and outdoor sports have been combined in the final report.
Oztag	Excludes Touch Football (however they are combined in the final report).
Playground equipment	Includes monkey bars, swings and slippery dips. Excludes jumping castle and earth ball (however they are all combined for overall analysis).
Playing	Non-aquatic; Includes 'mucking around' and 'piggy backing' and ground 'wrestling', and activity described as 'playing' in triage injury statements.
Rock drilling	Excludes abseiling.
Rock pool injury	Injuries sustained around or in a rock pool.
Rollerblade/skate	Includes inline skates/rollerblades and normal skates. Excludes ice-skating.
Rugby League	Excludes football general and league training (however they are all combined for overall analysis).
Running – general	Includes non-competitive. Excludes sprinting, jogging and cross-country.
School – general	Miscellaneous sports related injuries that have occurred at school.
Scooter riding	Motorised and non-motorised. Includes being on, tripping over and folding up scooters.
Sitting	Injury sustained whilst in a seated position.
Spectator	An onlooker at a sporting event.
Stretching	Excludes warming up.
Surf – board	Excludes boogie/body board.
Surf – body	Includes beach swimming.
Swimming	Includes pool and river. Excludes beach swimming.
Tobogganing	Excludes grass tobogganing.
Trampoline	Includes back yard trampoline injury, excludes professional trampoline or competition
Unknown	Sport was not indicated or clearly described in emergency department data.
Various	Description used when the injured person was unsure of which sport was responsible for the injury.
Walking	Excludes power, beach and bush.
Warming up	Excludes stretching.

