CHAPTER 3 - METHODS OF SUMMARISING INJURIES AND ILLNESS

3.1 Introduction

Chapter two discussed past literature on mass gatherings and showed how data collection has been completed. In addition, Chapter two demonstrated the injuries and illnesses occurring at different mass gathering events. It is difficult to comprehensively compare between mass gathering studies to derive trends and enable informed future planning because in many instances the way data is coded is not comprehensively explained, and each author may code in a different manner. This chapter discusses the standards for data collection including international coding methods, as well as their application to mass gatherings. Triage scales are discussed highlighting its importance to this study and to patient's in general. Finally, the chosen coding method for this study is explained including the justifications for its selection.

3.2 Data collection standards

The primary purpose of this research is to determine what injuries and medical emergencies are occurring at mass gatherings. To ensure that the data was collected systematically and consistently it was necessary to first identify what information was needed to determine what injuries and illnesses occur at mass gatherings. After determining what basic information was needed it was then necessary to examine what coding systems currently exist, and then decide which coding system to use. Then data was collected, summarised and each patient care episode coded.

3.3 Types of Coding

3.3.1 Casemix

Casemix is a broad information grouping tool used in health care to classify patient care episodes (Commonwealth Department of Health and Aged Care, 1999). For example a hospital with a Casemix of 50 percent trauma and 50 percent medical would indicate that half the patients are trauma cases and half are medical cases. Casemix focuses on the inputs used to treat a particular illness or injury. There are several systems of Casemix classification throughout Australia and the world, including those specifically designed to assist in classifying inpatient episodes of care, non-acute and acute episodes of care, and ambulatory care (Commonwealth Department of Health and Aged Care, 1999).

Casemix systems identify 'bundles' of goods and services used to treat a particular injury or illness. The range, or bundle, of services used determines to what Casemix classification the particular injury or illness is assigned. According to the Commonwealth Department of Health and Aged Care (1999)

> Casemix data facilitate the management, monitoring and planning of health services by supplying:
>
> - information about the quality of care;
> - a basis for funding, paying and charging for health care services;
> - measures of hospital output; and
> - comparisons between different care options at national and local levels.
>
> (Commonwealth Department of Health and Aged Care, 1999)

The Health Care Network (1999) states that Casemix classifications should give 'useful and meaningful groups.' They go further to say that the classifications should have three features in particular:

- clinical meaning: patients in the same class should have clinical similarities;
- resource homogeneity: patients in the same class should cost roughly the same amount to treat, due to similar resource use; and
- the right number of classes: neither too few nor too many.
  (Health Care Network, 1999)

The Health Care Network finds that a main benefit of coding and Casemix is that it has the ability to compare between facilities when a standard coding system is used. For example, in addition the average costs of treatment, information about costs, resource use, and quality of care provided to patients can also be compared between facilities, and indeed within facilities between different medical units or wards.

There are arguments against the use of Casemix classification. Orchard (1994, p.1493) suggests that Casemix classification and coding methods should be changed depending on individual circumstances. The chosen method should reflect an outcome measure, or what the health state of the patient was at the end of treatment. Orchard maintains that focussing on outputs would make health care managers more accountable for the resources that they use, and would allow for meaningful analysis of targets set. Thus, changing Casemix measures to outcome measures would take the focus off treatment and onto the patient (Orchard 1994, p.1496).

3.3.2 Diagnosis Related Groupings

The Commonwealth Department of Health and Aged Care (1999) states that the best known method of Casemix classification is Diagnosis Related Groupings (DRG's). According to the Commonwealth the Australian National Diagnosis Related Groups (AN-DRG) comprises a description of body systems, separation of medical and surgical procedures and a description of hierarchy of procedures, medical problems and other factors that differentiate processes of care.

Within each Diagnosis Related Group episodes, patient care is assigned to one of 23 Major Diagnostic Categories (MDC). The major diagnostic categories are defined by body system or disease type, and correspond with a particular medical specialty. The 23 major diagnostic categories are shown in Appendix 1.

The classification of an episode of care to the major diagnostic category is based on the principal diagnosis, even though there may have been more than one medical problem with the patient, such as in multi-trauma cases. Within the major diagnostic category there may be several sub-coding classifications based on particular injuries or illnesses that the patient had.

There are a number of coding methods used throughout the world to classify injuries and disease into common groupings that then determines the Casemix of the facility or unit. The geographical location, the purpose of coding and the cause of injury or illness all have an impact on which coding method is used.

According to the National Centre for Classification in Health (1997, p.11) there are five major medical Diagnosis Related Grouping coding classification systems in use throughout the world. These are:

- 3M Health Information Systems Procedure Coding System – USA.
- Classification of Surgical Operations and Procedures, Fourth Revision (OPCS4) – UK.
- Physicians Current Procedural Terminology, Fourth Version (CPT'94) – USA.
- Medicare Benefits Schedule (MBS) – Australia.
- The International Statistical Classification of Diseases and Health Related Problems (International), currently version 10 and developed by the World Health Organisation.

Of these five the most widely used and most comprehensive is ICD-10. Therefore it is this system that was examined for possible coding criteria as part of this study.

3.4 International Statistical Classification of Diseases and Health Related Problems, Version 10, Australian Modification

The International Statistical Classification of Diseases and Health Related Problems (ICD-10) was developed by the World Health Organisation. The 10th revision, Australian modification (ICD-10-AM) is published in five volumes which include a tabular list of diseases, procedures, and Australian coding standards (National Centre for Classification in Health 1997, p.10). ICD-10-AM makes minor modification to some ICD-10 codes, however, the two are still compatible and can be compared. This means that whatever international version of ICD-10 is used, results can still be compared between countries.

Each disease or injury in ICD-10-AM is classified under a broader heading of the Diagnostic Related Categories, so that all injuries and illnesses can be quickly related to the medical speciality in which they best fit.

The ICD-10 Casemix classification system appears to be the most comprehensive coding system used. The fact that it includes diseases, procedures as well as causes of injury means that it is extremely comprehensive and can be applied to many different circumstances. When all parts of the ICD-10-AM system are included in a coding system, it is able to provide information for disease and injury surveillance as well as cause of injury and location of injury occurrence.

The international use and comprehensiveness of ICD-10-AM means that it is of great benefit to those studying mass gatherings and the injuries and illness that occur. The use of alpha-numeric codes means that injuries and illness can quickly be entered into databases and comparisons can be made between events, patients and injuries. In addition, ICD-10-AM includes place of occurrence codes which can be used to monitor where injuries are occurring, as well as how the injury occurred. (National Centre for Classification in Health 1997, p.10). The major features of ICD-10-AM are outlined in Appendix 2.

3.5 National Data Standards for Injury Surveillance

In some ways Australia is more advanced than many countries in injury surveillance. According to the Australian Institute of Health and Welfare (1998) the National Data Standards for Injury Surveillance (NDS-IS) describe data items and classifications designed to support public health surveillance of injury and are considered the 'standard' for injury surveillance in Australia.

An injury is an incident as a result of an external influence, rather than a medical condition that may arise unprovoked. As its name suggests the data standards are there to simply collect information on injury, such as a sprained ankle or fall from a chair. A medical incident is one that occurs with no, or difficult to quantify, external influences at the time, such as chest pain or a headache. An important point with the National Data Standards is that they are compatible with the ICD-10-AM coding system. ICD-10-AM also collects information on where the patient was injured, and what the cause of injury was. However, the National Data Standards are far more detailed when it comes to recording where the injury occurred, causal factors, and what the patient was doing at the time of injury.

There are two levels of injury surveillance according to the Australian Institute of Health and Welfare (1998). The first consists of five core injury data items, and the second more detailed classifications for situations where data can be collected more thoroughly. In addition to the two tiers, demographic collection standards are also suggested by the National Data Standards. The five core injury items are:

- description of the event;
- external cause of the event and role of human intent in the injury;
- place of injury occurrence;
- activity when injured; and
- principle diagnosis, injury or poisoning and bodily location of injury.

The second tier of information includes the following items:

- place of injury occurrence sub-type;
- place of injury occurrence specific place;
- activity when injured sub-type and occupation when injured (if working);
- major injury factors (what caused the injury); and
- triage score.

With mass gatherings resulting in a range of injuries and illness, the National Data Standards for Injury Surveillance are obviously inappropriate to use for coding on their own. However, in combination with ICD-10-AM they may allow for a comprehensive analysis of causes of injury and illness and location of the injuries and illness. A summary of the National Data Standards for Injury Surveillance is provided in Appendix 3.

3.6 The Australasian National Triage Scale

The word triage, according to Beveridge et al. (2000), arises from the French 'trier' which means 'to sort'. Beveridge goes further to explain that the triage of patients was first described by Baron Domininque Jean-Larrey, the surgeon to Napoleon who invented the first field ambulance.

Throughout the world there are various triage scales in use. The United States triage systems, according to Beveridge et al. (2000) use a three tier triage approach. These are emergent (requiring immediate treatment), urgent (which can tolerate some wait), and non-urgent patients (with injuries or illnesses that can be treated within six hours).

In Australia, triage scales have gone through a number of revisions. The first scale was described as the Box Hill Triage Scale, developed in 1977, where verbal descriptions, without time consideration were used to classify patients into five categories from immediate to routine. This scale was refined in 1989 by Fitzgerald where the patient was placed in a category based on whether they should see a medical practitioner within seconds, minutes, one hour, hours or days (Beveridge et al., 2000).

In 1994 the Australasian College for Emergency Medicine (ACEM) formalised the triage scale into what we know it as today, through further refinement of the time frame in which a patient needed to see a medical practitioner (Beveridge et al. 2000). According to the Australian College for Emergency Medicine (1999) the Australasian National Triage Scale (ATS)

> is designed for use in hospital-based emergency services throughout Australia and New Zealand. It is a scale for rating clinical urgency. Although primarily a clinical tool for ensuring that patients are seen in a timely manner, commensurate with their clinical urgency, the ATS is also a useful Casemix measure (Australian College for Emergency Medicine 1999).

The triage score assigned to each patient, according to the Australasian College for Emergency Medicine (1999), is in response to the question 'this patient should wait for medical assessment and treatment no longer than...' Whilst the scale is primarily designed for use in hospital emergency departments, there is no reason, given appropriate training, the triage scale cannot be used at mass gatherings.

It should be noted that the Australasian National Triage Scale used in this study is different to any immediate clinical assessment tools used in the field in a disaster or mass casualty situation where available resources are stretched or overwhelmed. The triage scale described below is for use where the available services are able to cope with the number of patients presenting for treatment. The triage scale is described below in Table 3.1. The performance indicator threshold indicates the percentage of patients who should be medically assessed by a doctor within the given time frame.

Table 3.1 Australasian National Triage Scale

Australasian National Triage Scale Category	Treatment Acuity (Maximum waiting time)	Performance Indicator Threshold
1	Immediate	100 percent
2	10 minutes	80 percent
3	30 minutes	75 percent
4	60 minutes	70 percent
5	120 minutes	70 percent

Source: Australasian College for Emergency Medicine, 1999

Emergency Management Australia in their review of a number of mass gatherings found that there was an expected rate of presentation in each triage category. This information is reproduced below in Table 3.2. It should be noted that Emergency Management Australia does not have a triage category 5.

Table 3.2 Expected percentage of patients in triage categories at mass gatherings

Category	Description	Vital Signs	Mental State	Expected Percentage
1	Critical	Unstable	Abnormal	0.02
2	Serious	Potentially unstable	Potentially abnormal	1.10
3	Moderate	Usually stable	Normal	12.00
4	Minor	Stable	Normal	87.00

Source: Emergency Management Australia (1999, p.47)

3.7 Application of coding standards to mass gatherings and methods used in this study

Various coding systems have been previously proposed for mass gatherings, each focusing on one aspect of a mass gathering parameter. Contact was made with the Health Information Management Association Australia (HIMA) to determine if they knew of, or were working on coding systems for mass gatherings. They indicated they were not aware of any widely recognised system, and suggested that research being carried out by Flinders University could have been useful (HIMA, 1999, pers. comm., 12 February)

Contact with Flinders University through its internet site led to information being sourced about the National Data Standards for Injury Surveillance. In addition, internet searches via Google and Medline for information on coding used in mass gatherings were performed. These searches gave results on coding systems used by the Australian National Centre for Classification in Health, various health information sites situated in the United Kingdom as well as sites situated in the United States. It was found that, currently, there is no uniform data collection and coding methods utilised for mass gatherings.

There are many facets to coding injuries, beyond simply recording what the injury was. For example, there is a need for a record of the mechanism of injury. This is necessary for analysis to ensure similar injuries can be prevented (American Academy of Paediatrics 1999, p.524). In mass gatherings, in areas where large crowds regularly gather, information on where the injury took place and the mechanism of injury becomes more important, not least to prevent litigation but also to identify particular trends that may indicate problem areas requiring attention. For example a number of incidents may indicate a particular problem with a set of stairs, or particular seating location.

There is also a need to include a patient's triage score, not least of which to provide an indication of the acuity of each patient on initial presentation. In addition, the triage score may be used in conjunction with a medical record to estimate the number of patients who required medical practitioner assessment either at the mass gathering venue or at a hospital compared to those who simply required basic first aid intervention.

Taking into account the different levels of information required from injuries and illnesses occurring at mass gatherings, combined with information sourced on the types of codes available under the different coding schemes it was decided to utilise both ICD-10-AM as well as elements from the National Data Standards for Injury Surveillance in this study. By using a combination of two coding schemes, one of which is international, the other which sets the standard for data collection in Australia, the results of this study could be compared to future mass gathering events and would provide a baseline against which to compare future events. Actual data collected under these two coding schemes is discussed in Chapter four.

3.8 Conclusion

This chapter has described how the summary of patient injuries and illnesses can be classified, from a broad Casemix classification to a more advanced major diagnostic category to a final detailed individual classification for each individual presentation of injury or illness.

In addition this chapter has identified a number of international data standards. There are currently no set standards for the collection of data at mass gatherings. After an examination of various coding methods it was found that the combination of both ICD-10-AM and the NDS-IS would provide an appropriate level of information collection, based on internationally recognised coding terms. The combination of the two methods means that the information collected can be compared across events.

In the next chapter data collected as part of this study will be discussed. In deciding what data to collect reference is made to coding systems, as well as highlighting constraints on collection and coding. In addition, source of the raw data for this study is explained.

CHAPTER 4 - DATA COLLECTION

4.1 Introduction

In Chapter three the various international standards for collection of patient data were examined. The previous chapter discussed what information is collected and how coding is used to identify trends and plan for patient care. In this chapter the source of data for this study is identified. The reasons for inclusion of standards discussed in Chapter three are examined in this chapter. Finally, difficulties in the collection of data are highlighted and the actual coding categories utilised are presented.

4.2 Method of data collection

For this study a simple survey using customised forms was used. The primary aim of this research was collection and analysis of injury and illness data for individual patients. This study collected patient data using medical report forms (the survey form) that were refined to include medical information required to code demographics, injury and illness based on international coding schemes. Hence, the results of the present study are of value both for providing baseline data for other Australian studies, as well as for comparing Australian data with published international data on injuries at mass gatherings.

4.3 Source of data

The source of data was from information recorded on patient medical report forms completed on every individual patient. It is a legal requirement that written records are kept on every presentation to the medical teams or first aiders at major events. I chose to include only the patient medical reports of patients presenting to Immediate Assistants medical staff at the event sites. The reason for selecting only patients presenting to Immediate Assistants medical staff was because patients had a full medical record completed on their medical diagnosis and treatment, and that the researcher did not have access to any other forms which may have been completed.

There were other medical presentations that did take place. Patients who presented to security staff were directed to the medical room or a mobile team was despatched to the patient. This would result in a medical record being completed and hence the patient being included in the study. However, when there were St John Ambulance personnel present, who only operated at Stadium Australia, some patients were not referred to the multi-disciplinary medical team for further diagnosis and treatment. This meant that these patients were not included in the study as they did not have an Immediate Assistants medical record completed. St John Ambulance were not contracted for every event at Stadium Australia which was attended by Immediate Assistants, for example at private functions. In addition, for a large number of events during the collection period St John Ambulance were unable to supply first aid staff. In these instances it meant Immediate Assistants were the only medical provider at the stadium which meant all patients were seen by Immediate Assistants and therefore were included in the study. This counters any potential argument that data from Stadium Australia is not comprehensive enough to draw conclusions.

The information on each patient was written on the patient medical report form at the time of injury or illness on presentation to the medical staff at the event site. This would either occur in the first aid room at the event stadium or within the stands or area where the injured or ill patient was seen by medical staff. The researcher examined each patient medical report form either at the site at a later stage, or in the Immediate Assistants office.

Within the medical records there were two patient medical report forms (or medical encounter forms) used at the point of record of treatment. The first was used for minor injuries and illnesses (see Appendix 4a). Examples for the use of this form included simple headaches, minor cuts and lacerations, and foreign bodies in the external eye. A second form was used for more serious injuries and illnesses that required medical intervention beyond simple first aid. This second form recorded more detailed patient observations, medications prescribed, medical interventions and procedures, and cardiac rhythms monitored.

After a pilot of this second medical form it became apparent this second form was inadequate for the medical emergencies seen, and a new form (see Appendix 4b) was developed by the researcher in conjunction with the Chief Executive and medical staff of Immediate Assistants. Whilst not directly arising as a result of this study because the company had previously been experimenting with different forms, this study was an impetus to implement an improved form. Substantially drawing on the old form, it added items to meet the National Data Standards for Injury Surveillance, as discussed earlier in Chapter three, and hence enabled increased data collection for future analysis.

4.4 Timing of data collection

Data collection occurred at three sites from January to December 2000. The three sites, Stadium Australia, the Sydney Cricket Ground and Sydney Football Stadium are all used for different types of events at different times of the year. The collection of data over a one-year period allowed for a range of event data to be collected and analysed.

Events analysed included:

- one day cricket matches;
- test cricket matches;
- rugby Union test matches and state matches;
- rugby League test matches and state matches;
- a religious festival;
- a school track and field festival; and
- an open air concert.

Before data collection began approval to use patient information was obtained from the company participating in the study, Immediate Assistants. On behalf of the researcher they approached stadia management and obtained their approval. A letter (included in Appendix 5) was submitted as part of the ethics approval application in support of the study.

A data table was developed to ensure that information collected was recorded in a consistent manner across all events through the year. The table, set up as a spreadsheet in Microsoft Excel, was hyperlinked to the various coding standards to ensure information was accurately recorded and coded whilst maintaining patient confidentiality in line with NHMRC guidelines and the University's ethics approval notice.

4.5 Inclusion of standards in the collection of data

The Commonwealth Department of Human Services and Health (1993, p.4) recommends that when considering coding standards and data collection that:

- patient characteristics should be routinely collected;
- there should be a manageable number of classifications which can encompass all patients;
- each classification should contain patients with a similar pattern of resource level; and

- each classification should contain patients who are similar from a clinical perspective.

The coding system used for this study brings together:

- the National Data Standards for Injury Surveillance (NDS-IS);
- the data and injury and illness classification system used in the International Classification of Diseases and Health Related Problems, Version 10, Australian Modification (ICD-10-AM);
- the cause of injury as used in ICD-10-AM;
- Australasian Triage Scale; and
- other information that is relevant and unique to mass gatherings and collected as part of information from each stadium. This included start and finish times and crowd numbers.

The use of both ICD-10-AM and the National Data Standards for Injury Surveillance meant that some patient information was coded under both systems. Examples of this included cause of the injury or illness and where the injury or illness occurred. The coding of some information twice was done deliberately so that there could be a comparison between the two systems and as a quality measure to ensure data consistency across each recorded patient encounter. A summary of the data collected as part of this study is described below in Table 4.1.

Table 4.1 Information Collected

Broad Heading	Information	Source of Standard/Code
Event Details	Date of event	NDS-IS
	Name of event	Researcher
	Event type	NDS-IS
	Attending Crowd size	Researcher
	Total number of patients	NDS-IS
Patient Details	Patient sex	NDS-IS
	Age / Date of birth	NDS-IS
	Usual residence	Researcher
	Time seen and time discharged	NDS-IS
	Total treatment time	Researcher
	Cumulative treatment time	Researcher
	Average treatment time	Researcher
	Location discharged to	NDS-IS
	Mode of transport	NDS-IS
	Activity when injured	NDS-IS
	Industry / occupation if working	NDS-IS
	Sub-industry	NDS-IS
	Occupation if working	NDS-IS
	Role of human intent	NDS-IS
	External cause of injury	NDS-IS
	Mechanism of injury	NDS-IS
	Exact injury location	Researcher
	Place of injury occurrence (sub-type to above)	NDS-IS
	Sub-place of injury occurrence	NDS-IS
	Major injury factor	ICD-10-AM
	Injury factor sub-group	ICD-10-AM
	External cause of morbidity / mortality	ICD-10-AM
Injury Details	Trauma or medical incident	Researcher
	Major diagnostic category	ICD-10-AM
	ICD-10-AM sub-category	ICD-10-AM
	Nature of main injury	NDS-IS
	Body location of main injury	NDS-IS
	Triage score	ATS

4.6 Data collection problems

The legal requirement for all patients to have a medical record completed and kept by Immediate Assistants providing medical services, and the support of the company for the project, meant that the researcher had access to patient medical report forms completed on each patient.

To assist in identifying problems in data collection methods as well as common deficiencies in the patient medical records, test or pilot information from events not part of the study were analysed. The major problem encountered was incomplete patient information contained on the patient medical report form. The pilot data showed that two deficiencies in recording were time of discharge and age of patient.

After the pilot data collection and by the time data collection for this study began all staff were aware of not only the project, but what types of data were required in a full medical record. Unfortunately this did not solve all medical record completion issues. A deficiency in the medical record that continued was the time of discharge for minor injuries such as headaches. Even with these two recording problems they did not impact significantly on coding or on the overall conclusions from this study.

4.7 Recording bias

In analysing the data there was a possibility of recording bias by interpreting each medical patient report form differently. For example, the researcher could classify injuries incorrectly under ICD-10-AM. In addition, there was the possibility that the researcher could allocate a wrong triage score to a patient making their presenting acuity to be either more or less critical than it was in reality.

The potential for recording bias was overcome through a review of triage categories by an experienced emergency department nurse. In this review the triage score for patients from all three stadiums was examined by the nurse. It was confirmed that the patients examined had had the correct triage score appropriate to the given condition of the patient as per the patient report form. This is confirmed in the letter at Appendix 6. In addition, the potential for incorrect coding was reduced through monitoring by a medical practitioner. As much of the data entry by the researcher occurred at events where there were registered nurses and medical practitioners, any queries could be quickly answered and an opinion on how serious the injury or illness was sought to ensure correct coding. Where data entry occurred after events or off-site, staff of Immediate Assistants, who were either present at the event or experienced health care professionals were available to answer queries.

4.8 Data analysis

To enable data analysis the raw information collected was broken down to a number of sub-headings to ensure that common themes and relevant data could be compared. The major headings were:

- event information – focussing on overall events and stadiums;
- patient information – focussing on overall patient presentations; and
- patient injuries – focussing on the injuries and illness that were treated.

Patient information was recorded from each individual patient report form and each injury or illness was coded against the identified coding system. Analysis of the data was undertaken in a number of different ways. Simple counting methods were used to analyse the number of spectators and the number of persons injured. The number of spectators present at each event was supplied by individual stadium management based on their official records. This figure did not include staff working at the event.

Limited cross-tabulation of the various facets of analysis was undertaken, as discussed in the results chapter. Analysis included differences between stadiums, as well as differences between different types of sporting events. The difference in the number of persons injured versus crowd numbers was undertaken.

The primary aim of this research was to identify what injuries are occurring at Australian events through use of an internationally accepted patient injury and illness coding system. Therefore whist it remains an option for future research to develop a model for predicting patient load at mass gatherings, this study did not attempt to develop such a model.

4.9 Limitations of the research

This study was limited to Sydney because of ease of access for the researcher. Sydney has a large number of gatherings each year, and each has a medical response provided by different organisations from government Ambulance Services to private organisations. It was decided to approach each, and a favourable reply was received from Immediate Assistants Pty Ltd. This company provides medical care at each of Sydney's three biggest stadia – The Sydney Cricket Ground, Sydney Football Stadium and Stadium Australia. This meant that whilst a large number of events held at these sites could be studied, the study would have to exclude many unbounded events such as the City to Surf or Mardis-Gras.

Therefore it is a limitation to this study that only events held in a bounded area were included. The fact that only a number of venues in Sydney, over the specific time frame of a year have been examined means that it will be hard to generalise these results to all mass gathering situations throughout Australia.

In examining the mass gathering experience in Australia, a set time period was required to collect and code data. For this purpose the calendar year of 2000 was chosen in which to collect the data. Since the Sydney 2000 Olympic Games were held at each of the three stadiums, the timing of the Olympic Games and locations meant that the regular cricket and football seasons were compressed into a tighter time frame. However, to the best of my knowledge, no games were cancelled at any of the stadiums or fewer games played than in previous years. However, given the shorter timeframe to play all matches as compared to previous years, it is plausible in that the study data may differ slightly to what occurs over a normal season.

As previously highlighted St John Ambulance Australia (NSW) Operations Branch are also employed at Stadium Australia to staff first aid rooms throughout the stadium, with anything other than very minor injuries and illnesses being referred to Immediate Assistants for diagnosis and treatment. The main reason for this referral pattern is that St John Ambulance does not guarantee to event organisers specific nurse/doctor/paramedic teams at this venue. The use of St John Ambulance staff at Stadium Australia meant that the overall recorded patient presentation rate at Stadium Australia is slightly lower than the actual rate of presentation, and recorded presenting problems are more serious. This limitation is countered by the fact that St John Ambulance did not attend a number of events as previously discussed.

As part of the data collection process patients were either classified as spectators or working at the event. For those working at the event there was a lack of detail in the medical records of what industry the person was employed in at the time of injury. With many employees at mass gatherings being employed in different industries from cleaners, food staff, beverage staff, grounds people, security staff and so on, it is important to record exactly what industry the person works in.

Another limitation of this study is that because accurate recording of the time of discharge, and the industry of staff who presented with injuries and illnesses was not well completed limited conclusions can be drawn from this section of the data. In all cases patient injuries and treatment were recorded, and where the patient was a staff member this information was recorded. However, in many cases it was difficult to identify what type of staff member they were (such as catering, grounds person etc). In addition, in some cases it was difficult to determine what time the patient was discharged in the case of minor injuries such as headaches.

Mass gatherings that are not held in enclosed stadiums or defined grounds may not benefit from this study. However, expanding the number of venues at which data was collected, to include such venues as minor football grounds, would not have enhanced the data collected. Expanding the number of venues for research would have expanded the sample size, however, made the project unworkable for a single researcher. It is a possibility that future research could compare findings with this study to determine if differences exist between bounded and unbounded areas.

4.10 Ethical concerns

The risks to individual patients as a result of this project were considered to be minimal. No treatment was delayed or changed and no inconvenience was caused to the patient because examination of records occurred after each event. Nonetheless there are two major ethical issues that are brought out by this project. These issues are patient consent and confidentiality of medical records.

It was important to ensure confidentiality of information. This issue was picked up by the University's Ethics Committee and after preliminary approval for the project was given (Appendix 7a) they requested further information about confidentiality of patient information before final approval (Appendix 7b). Information and resulting data will be kept confidential in a number of ways. The actual medical record of each patient is the property of Immediate Assistants, the company who provide first aid services at each of the venues. The Chief Executive Officer allowed the researcher access to the medical records for the purposes of recording injury data and other relevant information. The records were then returned to the company. No individual identifiable patient data, such as name, was recorded, and all data is aggregated in the final analysis to further ensure patient anonymity. Data collected will be kept by the researcher on a computer disk, locked in a filing cabinet and will be password protected. The Chief Executive Officer (a medical practitioner) of Immediate Assistants was involved in overseeing data collection, as was the Chief Medical Officer of Immediate Assistants. They ensured that all individual medical records were returned and that no data identifying individuals were included in the final study.

On behalf of the researcher, Immediate Assistants approached each of the stadium management groups and sought their approval for the study. Prior to each management group making a decision on the study they were provided with a comprehensive research proposal as supplied to the University. Each management group approved the study. This was confirmed by the Chief Executive Officer of Immediate Assistants.

The second major ethical problem with this study was the issue of informed consent. It was not possible for the researcher to attend every mass gathering event due to conflicting work schedules, and hence the researcher could not individually talk to each patient. In addition, on some days there were multiple events at different sites at the same time. Even if the researcher could have attended every event it was not feasible for the researcher to obtain informed consent from every patient because it would have interfered with medical care.

Another issue in obtaining informed consent was the fact that employees are not able to control every facet of where a patient is treated. Therefore the medical record may be filled in at the patient's seat in a stand, a bar where they were eating, or in the medical room which was set up to assess and provide primary treatment for more seriously injured patients. This made it impossible for the researcher to attend every patient, even if it was possible to attend every mass gathering event, and obtain informed consent for inclusion in the study.

Discussions were held with the Chief Executive of Immediate Assistants with regards to having medical staff obtain consent from every patient. Due to the emergency nature of the work involved at mass gatherings the Chief Executive was unable to give a guarantee of staff ability to explain the study and obtain informed consent from every patient. The time taken to explain the study and allay patient concerns about individual data not being published would have delayed treatment. If consent were to occur after treatment, it could delay the medical team responding to the next emergency.

4.11 Conclusion

This chapter has discussed the approached used in this study to collect and then code patient data to produce results. Information collected and ethical issues surrounding the collection of personal information have also been discussed. In determining what information was to be collected it was decided to use international coding standards to ensure that this study could be compared to future studies. In the next chapter the results of the study are discussed. The Results Chapter highlights the number of people injured or taken ill, where patients were injured, the injuries sustained, as well as the location to which patients were discharged.