

# National injury prevention plan priorities for 2004 and beyond



FLINDERS  
UNIVERSITY  
ADELAIDE  
AUSTRALIA



Australian Government  
Department of Health and Ageing

Discussion paper

*Sophie Pointer, James Harrison, Clare Bradley*

AIHW

**National Injury Prevention Plan  
Priorities for 2004 and Beyond:  
Discussion Paper**

The Australian Institute of Health and Welfare is Australia's national health and welfare statistics and information agency. The Institute's mission is to improve the health and well-being of Australians by informing community discussion and decision making through national leadership in developing and providing health and welfare statistics and information.

Injury Research and Statistics Series

Number 18

# **National Injury Prevention Plan Priorities for 2004 and Beyond: Discussion Paper**

**Sophie Pointer  
James Harrison  
and  
Clare Bradley**

**July 2003**

Australian Institute of Health and Welfare  
Canberra

AIHW cat. no. INJCAT 55

© Australian Institute of Health and Welfare 2003

This work is copyright. Apart from any use as permitted under the *Copyright Act 1968*, no part may be reproduced without prior written permission from the Australian Institute of Health and Welfare. Requests and enquiries concerning reproduction and rights should be directed to the Head, Media and Publishing, Australian Institute of Health and Welfare, GPO Box 570, Canberra ACT 2601.

This publication is part of the Australian Institute of Health and Welfare's Injury Research and Statistics Series. A complete list of the Institute's publications is available from the Publications Unit, Australian Institute of Health and Welfare, GPO Box 570, Canberra ACT 2601, or via the Institute's web site (<http://www.aihw.gov.au>). Electronic copies of publications in this series can be downloaded from the Research Centre for Injury Studies web site (<http://www.nisu.flinders.edu.au>)

ISSN 1444-3791

ISBN ...

### **Suggested citation**

Pointer S, Harrison J, Bradley C. 2003. National Injury Prevention Plan Priorities for 2004 and Beyond: Discussion Paper . Injury Research and Statistics Series Number 18. Adelaide: AIHW (AIHW cat no. INJCAT 55).

### **Australian Institute of Health and Welfare**

Board Chair  
Dr Sandra Hacker

Director  
Dr Richard Madden

Any enquiries about or comments on this publication should be directed to:

Sophie Pointer  
Research Centre for Injury Studies  
Flinders University of South Australia  
GPO Box 2100,  
Adelaide 5001, South Australia

Phone: (08) 8374 0970  
email: [Sophie.Pointer@flinders.edu.au](mailto:Sophie.Pointer@flinders.edu.au)

Published by Australian Institute of Health and Welfare

Printed by Snap Printing

Text proofread by Stacey Avefua

Layout by Stacey Avefua

# Contents

<b>Contents</b> .....	<b>v</b>
<b>Executive summary</b> .....	<b>vii</b>
<b>Acknowledgments</b> .....	<b>xiii</b>
<b>Introduction</b> .....	<b>1</b>
Aim of the report .....	1
Building on the past .....	1
Criteria for assessment of potential topics .....	9
Redefining concepts .....	10
Cross cutting issues .....	12
Priority Injury Issues .....	14
<b>Overview: Children 0-14</b> .....	<b>16</b>
Reasons for inclusion .....	16
Developmental Considerations .....	17
Surveillance and Infrastructure Issues .....	17
Surveillance Indicators .....	18
<b>Overview: Emerging Adults 15-24</b> .....	<b>24</b>
Reasons for inclusion .....	24
Developmental considerations .....	24
Surveillance and infrastructure issues.....	25
Surveillance Indicators .....	26
Cross cutting issues.....	32
Discussion.....	33
<b>Overview: The Elderly (75+)</b> .....	<b>34</b>
Reasons for inclusion .....	34
Surveillance and infrastructure issues.....	34
Surveillance Indicators .....	35
Cross cutting issues.....	39
Discussion.....	40
<b>Overview: Aboriginal and Torres Strait Islander Populations</b> .....	<b>41</b>
Reasons for inclusion .....	41

Surveillance and infrastructure issues.....	42
Surveillance Indicators.....	42
Cross cutting issues .....	46
Discussion.....	47
<b>Overview: Rural &amp; Remote Populations.....</b>	<b>48</b>
Reasons for inclusion .....	48
Special considerations .....	48
Surveillance and infrastructure issues.....	49
Surveillance Indicators.....	49
Cross cutting issues .....	53
Discussion.....	54
<b>Overview: Alcohol and Injury .....</b>	<b>55</b>
Reasons for inclusion .....	55
Surveillance and infrastructure issues.....	56
Surveillance Indicators.....	56
Cross cutting issues .....	58
Discussion.....	58
<b>Appendix 1: Data issues .....</b>	<b>59</b>
Deaths data .....	59
Hospitalisations data.....	61
Aboriginal and Torres Strait Islander population data .....	62
Rural and remote population data .....	62
<b>Reference List.....</b>	<b>64</b>

# Executive summary

## Introduction

The National Injury Surveillance Unit (NISU), a collaborating unit of the Australian Institute of Health and Welfare (AIHW), has prepared this report to assist the Department of Health and Ageing (DHA) to identify priority injury issues for the next National Injury Prevention Plan. This discussion paper provides a contextual basis for considering topics and proposes and describes a set of topics as candidates for selection.

## Building on the past and advancing toward the future

- The selection of priority injury issues for 2004 and beyond should continue to build on the goals of the 2001–2003 Plan encouraging cross-jurisdictional cooperation and building partnerships.
- Opportunities for continuity of intervention and prevention strategies developed under the 2001–2003 Plan has been an important consideration and the new priorities discussed in this document provide for this.
- Guidance for the selection of priority topics has come from the broader context in which injury prevention resides within the Australian community.
- The public health approach to injury prevention incorporating a population-based focus has provided the framework in which continued advancement in injury prevention and reduction can be achieved.
- The chosen priorities represent an approach to injury prevention intended to build on, and in some ways challenge, conventional thinking around injury issue selection.
- Recommendations in the current document include the provision of more flexibility in the choice of priorities that will more accurately reflect the complexity of injury.

## The priority topics

- The priority injury issues recommended for consideration for 2004 and beyond consist of 5 broad-based population topics and one risk factor based topic (alcohol and injury):
  - Elderly (75+)
  - Children (0–14)
  - Emerging Adults (15–24)
  - Aboriginal and Torres Strait Islander Population
  - Rural and Remote Population
  - Alcohol and Injury
- The priority areas chosen will allow continuation of work commenced in the injury topics from the 2001–2003 Plan.

## **The public health approach**

- The public health approach to injury prevention has provided a framework in which the parameters of the priority topics can be understood.
- The continuum of 'problem' to 'response' in injury is characterised by 4 steps within the public health approach. The 4 steps are; surveillance, risk factor identification, intervention evaluation and implementation.
- Issues of relevance to priority setting within each of these steps have been identified and discussed.

## **Redefining concepts**

- Two concepts have remained relatively static within the injury prevention field, age categories and severity of injury. Both concepts are important in defining and measuring the impact of injury on at risk populations and both concepts have scope for refinement and advancement.

## **Developmental stage**

- The concept of developmental stage recognises that age is a more complex risk factor for injury than has been previously acknowledged.
- As individuals age chronologically they go through a number of physical, psychological and emotional developmental stages (Moller 1992).
- The age ranges associated with developmental stage are not always the same for each individual and it has been suggested that injury profiles can be better understood according to prescribed age ranges.
- Specific injury profiles are identifiable for each of the developmental stages.

## **Injury severity**

- Within surveillance, the concept of severity of injury has typically been represented by simple and imperfect approaches such as treating deaths and hospital admissions as proxies for degrees of severity, or regarding duration of stay in hospital as a measure of severity.
- The use of rates of death and admission to hospitals is a rather crude indicator of the severity of an injury.
- The usefulness of a severity indicator is dependent on the accuracy of the data on which it is based and it's applicability in the planning area. For example, length of stay in hospital is typically used as an indicator of the severity of an injury yet it fails to accurately take into account transfers between hospitals and variations in clinical and administrative practice, which can inflate or deflate the severity indicator for an injury cause.
- Planning for future needs with respect to rehabilitation and other costs to the health system will be better assisted by the development of more sophisticated indicators of severity.
- The present document identifies severity indicators as a priority area and encourages development of technically better and more useful indicators.

## Cross cutting issues

- The current document proposes using population groups as the main conceptual framework within which to consider priorities for injury prevention.
- Some issues are relevant to injury prevention more generally and for present purposes, we refer to these as 'cross cutting issues', though other terms could be used.
- Cross cutting issues might not be suitable as declared priority areas, but they affect the potential for successful injury prevention in priority areas.
- Four diverse topics have been proposed. These are *monitoring and maintenance of successes, defining and measuring severity, equity issues* and *partnership development*.
- Monitoring and maintaining successes: Inclusion of this issue recognises that significant advances have already been made in a number of injury areas. Attention to gains already made is important because success stories provide much of the basis for arguing that more gains are feasible, and they may provide models for how this can be done. It is also important because failure to 'keep an eye on' the maintenance of some types of preventive intervention could allow a previously well-managed problem to return.
- Defining and Measuring Severity: Definitions and measurement of the severity of an injury are important mechanisms in determining the cost of injury to the individual, in terms of pain and suffering, and to the health care system, in terms of ongoing financial support required. Precise and reliable monitoring of injury incidence can only be done if severity forms part of case definition. The inclusion of defining and measuring severity recognises that more work needs to be done on the basic tools of injury research.
- ♦ Equity: Equity, in this context, refers to equity of access to, and provision of, injury intervention and prevention strategies, without prejudice on the basis of cultural background or socio-economic status.
- ♦ Partnership Development: Partnership development has been included to build on the 2001–2003 Plan and further foster linkages between policy domains. Opportunities for collaboration are abundant and include areas such as sport and recreation, transport, the workplace, consumer safety and the criminal justice system.

## The Priorities

### Children 0–14

- ♦ Children are dependent and susceptible to injury. For this and related reasons they have long been a prominent and widely supported focus for injury prevention.
- ♦ Children progress through a number of developmental stages between the ages of 0–14. The successful progression to adulthood is dependent on successful navigation of these stages and injury prevention and intervention can greatly assist in a successful transition.
- ♦ A developmental perspective can lead to further reduction of injury during childhood, and to interventions in childhood designed to reduce injury at later ages.

- ♦ Success has been achieved in injury reduction in a number of areas. Highlighting and monitoring successes can help to ensure that these gains are maintained and built upon. Review of commonly held views on causal factors and mechanisms from a prevention perspective may open opportunities for further gains, as may further identification of high-risk sub-groups of children.
- ♦ A prevention-based, focused program of information development is needed to underpin an effective intervention plan.
- ♦ Heightened recognition of commonality between risk factors for child injury, and for other problems in childhood, and between factors in childhood and injury at later ages points to new or enhanced partnerships.

### **Emerging Adults 15–24**

- ♦ Individuals between the ages of 15–24 years account for a significant proportion of all hospitalisations (16%) and deaths (14%) from injury in Australia. The age range covers the transition to adulthood, an important developmental stage marked by changes in social independence, family life and work status.
- ♦ Emerging adults are over-represented in a number of injury areas including transport, violence, pharmaceutical poisoning and self-harm. Different patterns of injury can be seen according to age and gender.
- ♦ Key issues to address include suicide and self-harm, risk taking behaviour, alcohol use and workplace injury.
- ♦ Prevention strategies targeting emerging adults have the potential to reduce injury for this age group and provide a flow-on effect of injury reduction as emerging adults successfully negotiate their way through their working lives.
- ♦ Opportunities for collaboration are available.

### **The Elderly (75+)**

- ♦ Elderly people over the age of 75 account for the largest proportion of all hospitalisations (16%) and deaths (21%) from injury in Australia.
- ♦ Falls are the most common cause of serious injury among elderly Australians, but other areas such as complications of surgical and medical care, pharmaceutical poisoning and transport injury also result in a large number of hospital admissions and deaths.
- ♦ Key issues include falls, pharmaceutical poisoning and complications of surgical and medical care, intervention evaluation (e.g. exercise and balance programs for falls prevention), severity measurement, database development to support evaluation and monitoring as well as fostering a community approach.
- ♦ The likelihood of continued political and economic support for maintaining a focus on injury prevention in the elderly is high, particularly given the ageing population in Australia.

### **Aboriginal and Torres Strait Islander Populations**

- ♦ Rates of injury mortality and hospital admission due to injury are substantially higher for Aboriginal and Torres Strait Islanders than for the Australian population as a whole.

- ♦ Injury is the second leading cause of death in Aboriginal and Torres Strait Islander people, the rate of hospitalisation is higher in every injury category except drowning when compared to the non-Indigenous population.
- ♦ Key issues to address include alcohol and other drug misuse, problems with accurate enumeration of Aboriginal and Torres Strait Islander people (in population data and injury case data), and infrastructure building for surveillance and prevention of injury.
- ♦ An implementation plan for injury prevention in Aboriginal and Torres Strait Islander communities is being developed suggesting a mechanism for partnership.

### **Rural and Remote Populations**

- ♦ Rates of death and hospitalisation due to injury are relatively high in the rural and remote population of Australia, with rates increasing with remoteness from metropolitan centres.
- ♦ Rates of suicide and self-harm and road traffic accidents are high among rural youth, particularly males.
- ♦ Key issues to address include remoteness and relatively small populations as factors affecting injury surveillance, research and intervention, suicide and self-harm, farm-related injuries, and capacity building within rural communities.
- ♦ Support for injury prevention and intervention in rural and remote populations has grown, particularly through groups such as Farmsafe Australia.

### **Alcohol and Injury**

- ♦ Alcohol is a major cause of mortality and morbidity in Australia, with an estimated 3,290 deaths in 1997 and 72,302 hospitalisations in 1996–97 attributable to high-risk drinking. Part of this burden is injury.
- ♦ Motor vehicle crashes, motorcycle crashes, falls, interpersonal violence, water-related injury and alcohol use in young males are areas of high injury correlation.
- ♦ Key issues to address are the relationship of alcohol misuse and injury areas such as self-harm, violence, and drowning, alcohol and risk taking behaviour that leads to injury as well as database development of indicators of alcohol involvement in injury.
- ♦ Continuing funding and political support for the issue of alcohol and injury is suggested and attempts should be made to build on the advances in the area of road safety and alcohol and encourage inter-sectorial learning in less well developed areas.



# Acknowledgments

We would like to acknowledge the significant contribution of Jerry Moller. Jerry's extensive knowledge of the injury field coupled with his enthusiasm and support for the production of this document was invaluable.



# Introduction

## Aim of the report

The National Injury Surveillance Unit (NISU), a collaborating unit of the Australian Institute of Health and Welfare (AIHW), has prepared this report to assist the Department of Health and Ageing (DHA) to identify priority injury issues for the next National Injury Prevention Plan. This discussion paper provides a contextual basis for considering topics and proposes and describes a set of topics as candidates for selection.

## Building on the past

Injury prevention and control was first identified as a national health priority area in 1986. The Strategic Injury Prevention Partnership (SIPP) was established in August 2000 to provide a forum for leadership in injury prevention in Australia. SIPP is responsible for priority setting and implementation of the National Injury Prevention Plan.

The National Injury Prevention Plan: Priorities for 2001–2003 targeted 4 priority areas (Commonwealth Department of Health and Aged Care 2001):

**Falls in Older People**

**Falls in Children**

**Drowning and Near Drowning**

**Poisoning Among Children**

The highly focussed approach provided stakeholders in the health sector with an opportunity for immediate action in 4 defined areas. In addition, the Plan encouraged a focus for coordination of work in these areas across jurisdictions and for identifying partnership opportunities across sectors.

Just how well the 2001–2003 Plan achieved its goals is yet to be determined. Preliminary data suggests that advances have been made in the areas of injury reduction and intervention in these topics as a result of the focus provided by a National approach.

The selection of priority injury issues for 2004 and beyond should continue to build on the goals of the 2001–2003 Plan encouraging cross-jurisdictional cooperation and building partnerships. Opportunities for continuity of intervention and prevention strategies developed under the 2001–2003 Plan has been an important consideration and the new priorities discussed in this document provide for this.

## Advancing towards the future

The present document provides a basis for direction and priority setting in injury prevention by SIPP and the Commonwealth Department of Health and Ageing beyond 2004. The chosen priorities represent an approach to injury prevention intended to build on, and in some ways challenge, conventional thinking around injury issue selection.

Some injury types have been chosen which represent the existing train of thought and encompass areas in which there is existing infrastructure and support. These areas demonstrate proven success in interventions but require vigilance in case inattention

allows an increase in injury. Some issues have been chosen which require a different approach, where all the parameters are not fully known, areas where work on interventions may be needed or where a potential exists to develop new databases or monitoring systems.

Recommendations for the next Plan include the provision of more flexibility in the choice of priorities that will more accurately reflect the complexity of injury. For example, the new plan should take into account current and emerging issues and responses at a National level as well as in individual States and Territories. The plan should also move beyond targeting of individual injury issues and utilise an approach which recognises that risk factors are likely to cut across specific injury types, and that greater effective reduction in injury is achievable with an approach aimed at a population level.

As a consequence of moving beyond the specific targeted approach of the past and embracing the challenges of the future, the issue of identifying priority areas becomes much more complex and provides a richness of choice. Guidance for the selection of priority topics has come from the broader context in which injury prevention resides within the Australian community. The Strategic Injury Prevention Partnership promotes a consistent, integrated approach to injury prevention, including monitoring and evaluation across all areas of government. The public health approach to injury prevention incorporating a population-based focus has provided the framework in which SIPP can achieve continued advancement in injury prevention and reduction.

## **The priority topics**

The priority injury issues recommended for consideration for 2004 and beyond consist of five broad-based population topics and one risk factor based topic (alcohol and injury):

**Elderly (75+)**

**Children (0-14)**

**Emerging Adults (15-24)**

**Aboriginal and Torres Strait Islander Populations**

**Rural and Remote Populations**

**Alcohol and Injury**

The selection of population-based priority issues recognises the complex nature of injury prevention and intervention. Within each population group different injury profiles are apparent and the selection of population based groups allows for different injuries to be targeted according to individual stakeholder needs. In contrast, similarities exist within each population group with respect to the underlying infrastructure required to implement and monitor prevention and intervention strategies. The population-based approach allows for a range of targeted strategies to be introduced for particular injury areas but encourages infrastructure development that will benefit the population as a whole.

For example, falls in the elderly (75+) may be an area identified by an individual state as an area of need whereas the increasing incidence of road transport injury in the elderly may be a priority for a different jurisdiction. The population-based approach allows both jurisdictions to prioritise injury reduction and intervention for the elderly in different injury areas. Additionally, infrastructure development occurring in either area should

benefit the whole population group if the goal is the successful implementation of prevention and intervention strategies in the elderly population. Prevention and intervention for both falls and road transport injury will benefit from improvements to existing databases and the development of strategies for monitoring program success at a general level within this population group.

The priority areas will allow continuation of work commenced in the injury topics from the 2001–2003 Plan. As seen below the 2001–2003 priorities can be mapped to the 2004 and beyond priorities encouraging continuity and potentially sparking a renewed approach to some topics.

• <b>Children (0–14)</b>	→	<b>Falls in children</b>
	→	<b>Poisoning in children</b>
	→	<b>Drowning &amp; Near Drowning (0–4)</b>
• <b>Emerging Adults (15–24)</b>	→	<b>Drowning &amp; Near Drowning (alcohol)</b>
• <b>Elderly (75+)</b>	→	<b>Falls in the elderly</b>

In recognition of the need to encourage infrastructure development, 4 cross cutting issues have also been identified. These are ‘success monitoring and maintenance’, ‘defining and measuring severity’, ‘partnership development’, and ‘equity’.

The population based groups and cross cutting issue areas will be discussed in detail in later sections. What follows now is the contextual background for the selection of the injury issues.

## The public health approach

The public health approach to injury prevention provides a framework in which the parameters of the priority topics can be understood. The continuum of ‘problem’ to ‘response’ in injury is characterised by 4 steps within the public health approach as illustrated in Figure 1 (National Center for Injury Prevention and Control 1998).

The steps outlined are likely to occur almost simultaneously rather than sequentially in isolation. The priority issues chosen are best viewed within this framework. Generally speaking, priority issues from the 2001–2003 Plan have concentrated on the middle of the continuum. Risk factor identification has been addressed largely through highlighting specific external causes and at-risk sub populations while the goal of prevention and reduction in injury mortality and morbidity has been addressed largely through intervention evaluations. Issues such as injury surveillance and implementation monitoring have yet to be fully addressed. Each of the steps on the continuum is reviewed below and issues of relevance to priority setting identified.

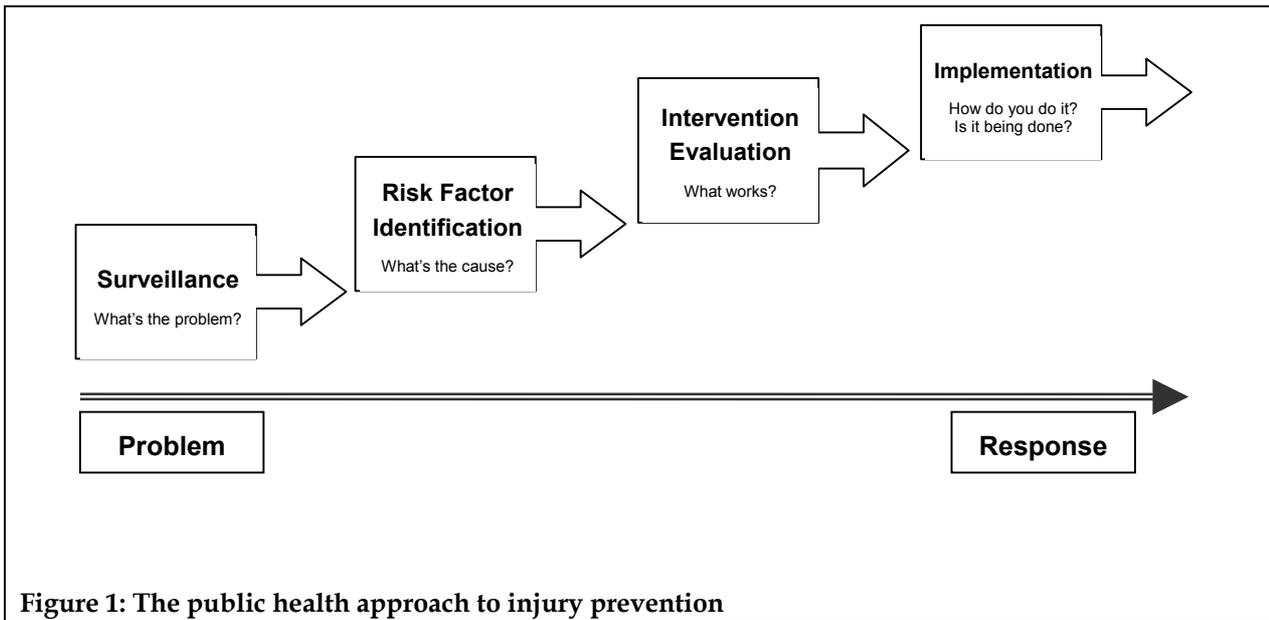


Figure 1: The public health approach to injury prevention

## Surveillance

Surveillance is defined by the World Health Organization “as the ongoing systematic collection, analysis, and interpretation of health data necessary for designing, implementing, and evaluating public health prevention programs” (World Health Organization 2001). Surveillance systems go beyond the simple counting of cases and assist in delineating morbidity, mortality and risk taking behaviours.

Our current surveillance systems are limited in their application. The limitations stem from a number of areas and 4 of these are identified in Figure 2. The databases containing basic morbidity and mortality data require additional development. For example, it is not possible to identify some important external injury factors from basic hospital separations data and the lag-time between injuries occurring and data becoming available is too long.

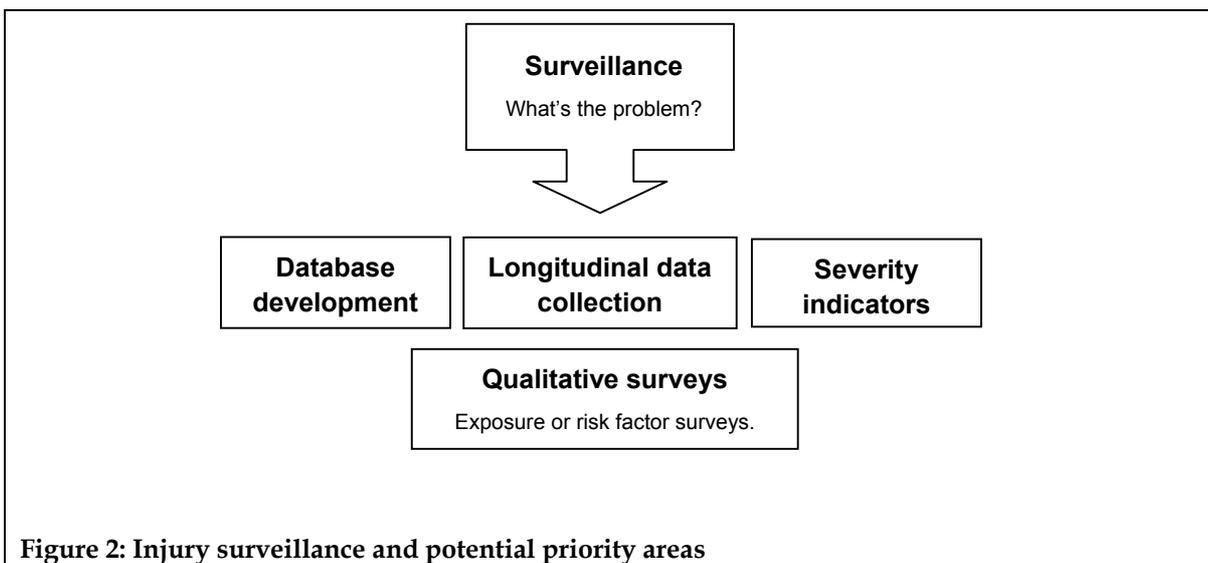


Figure 2: Injury surveillance and potential priority areas

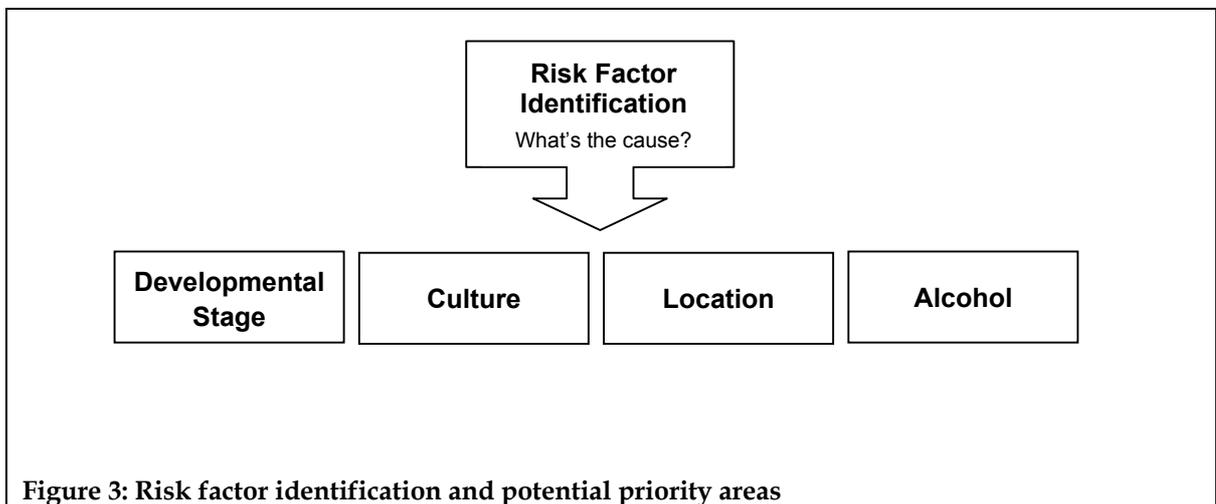
In addition, most identified risk factors for injury are not subject to routine data collection or are collected by other agencies in different systems in different policy areas. Construction of indicators of severity is hampered by the limitations just described as well as the quality and coding of the data currently collected. Research and development is required to establish new databases and explore alternative means of data collection for complex populations (e.g. Aboriginal and Torres Strait Islander). Our current systems are also limited to cross-sectional type analysis when what is needed in some injury areas are longitudinal studies of populations, augmented by information gained from qualitative data collection.

Surveillance systems underpin injury prevention and intervention. The importance of priority setting in this area cannot be overlooked and as will be seen in the following sections, achieving goals in the injury prevention area is dependent on reliable and valid data collection and dissemination.

### Risk Factor Identification

The second stage of the injury prevention continuum is risk factor identification. In discussing the concept of 'risk' mention should also be made of identifying 'protective' factors. Taken together the identification of factors that contribute to injury (risk factors) and protection from injury (protective factors) provide the basis for effective intervention targeting.

Figure 3 provides 4 specific examples of known injury risk factors. While many more risk and protective factors contribute to the injury profile these 4 factors have been identified as potential priority issues. Each factor requires attention with respect to improvements in surveillance and monitoring, intervention evaluation and coordination of implementation of interventions. A brief discussion of each follows.



**Figure 3: Risk factor identification and potential priority areas**

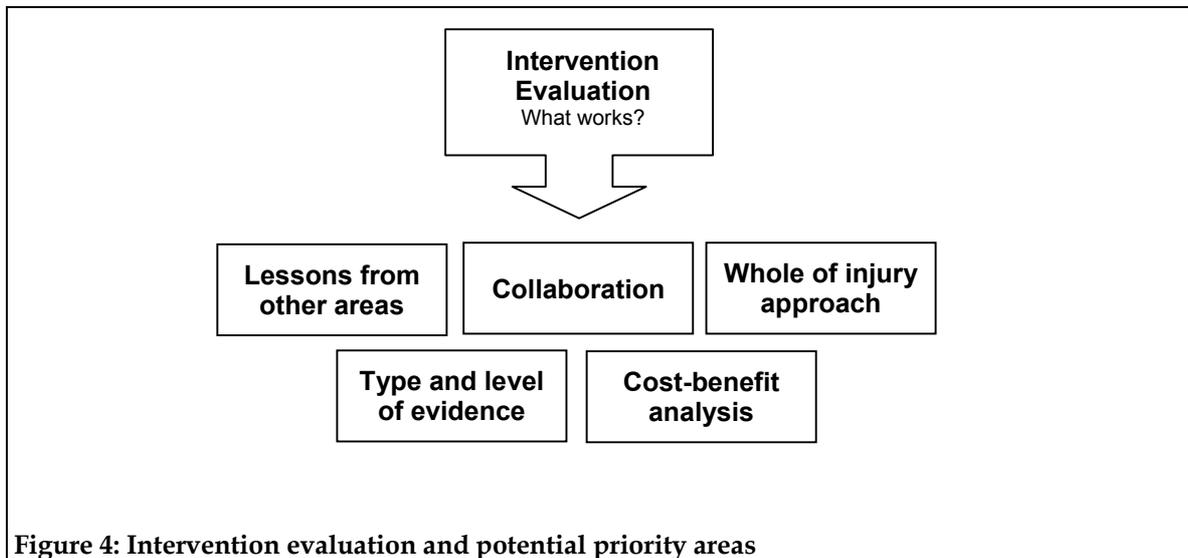
The risk of age of an individual has been examined in the past through demarcation into age ranges such as 0-4, or 65+. The simple division into 5 or 10 year age bands does not account for the potential influence and changing nature of developmental stage. For example the years between early adolescents and young adulthood feature prominently in injury statistics particularly for young males. Considerable work is needed to identify risk factors associated with different developmental stages.

More work is also needed on the contribution of environmental factors such as location to risk of injury, particularly with respect to the urban/rural distinction. Rural dwellers are consistently over-represented in many injury categories (e.g. youth suicide) (Harrison et al 1997). Culture has also been found to play a significant role in injury risk (Lewis et al 1997) and investigations into injury prevention in Aboriginal and Torres Strait Islander populations have begun to gain momentum.

Alcohol is a major cause of mortality and morbidity in Australia and a large number of deaths and hospitalisations are attributed to high risk drinking every year (Chikritzhs et al 2000). Information about the presence or level of alcohol in victims of injury is not routinely collected. Some information about the presence of alcohol is collected in the mortality data sets however there is no reliable or consistent information about the contribution of alcohol to injury in hospitalisation data (Driscoll et al 2003).

### Intervention Evaluation

One of the main goals in the injury prevention field is the development and implementation of successful injury intervention programs. The 1999 National Injury Prevention Advisory Council publication 'Directions in Injury Prevention' suggested that two directions were needed in the injury field (National Injury Prevention Advisory Council 1999). Firstly, a shift towards more strategic research and secondly building of partnerships and collaborative research in interventions between different research areas and practitioners. Figure 4 identifies a number of important factors that contribute to understanding and evaluating interventions for injury.



**Figure 4: Intervention evaluation and potential priority areas**

Collaboration is one of the cornerstones of SIPP and there are many lessons to be learned from allied health areas with respect to interventions. The priority issues chosen encourage a cross-jurisdictional approach to intervention and advance the concept of viewing injury problems from a whole-of-person or whole-of-community perspective. For example injuries to young males need to be addressed in a multidisciplinary environment where expertise on risk factors such as risk taking, alcohol, violence and self-harm can be shared (Moller 1995).

In establishing what works, the type and level of evidence available to evaluate the success of an intervention is an important consideration. Our current surveillance systems

are not well placed to evaluate the effectiveness of specific interventions. Work needs to be done in 2004 and beyond on identifying appropriate and injury specific indicators of success, and in doing so, delineating the type and level of evidence required to establish the success or failure of an intervention. Strong evidence of effectiveness often requires adequately funded special studies.

Cost will always be a consideration and getting value for money for the health dollar an important goal. Identifying proven effective interventions and removing the barriers to their implementation should become a priority. In addition, continued funding of existing proven programs can continue under the banner of the broader priority issues contained within this document. For example the work done on falls in the elderly can continue within the priority issue 'the elderly (75+)'.

## Implementation

Implementation of injury prevention programs should be done in a manner that maximises the chances for a successful outcome both in the planning and roll out phase. Figure 5 identifies 4 priorities around collaboration and cooperation in implementing intervention programs. The first three issues are primarily relevant to the mechanisms of rolling out programs and interventions, the fourth issue highlights the need to monitor the implementation of programs.

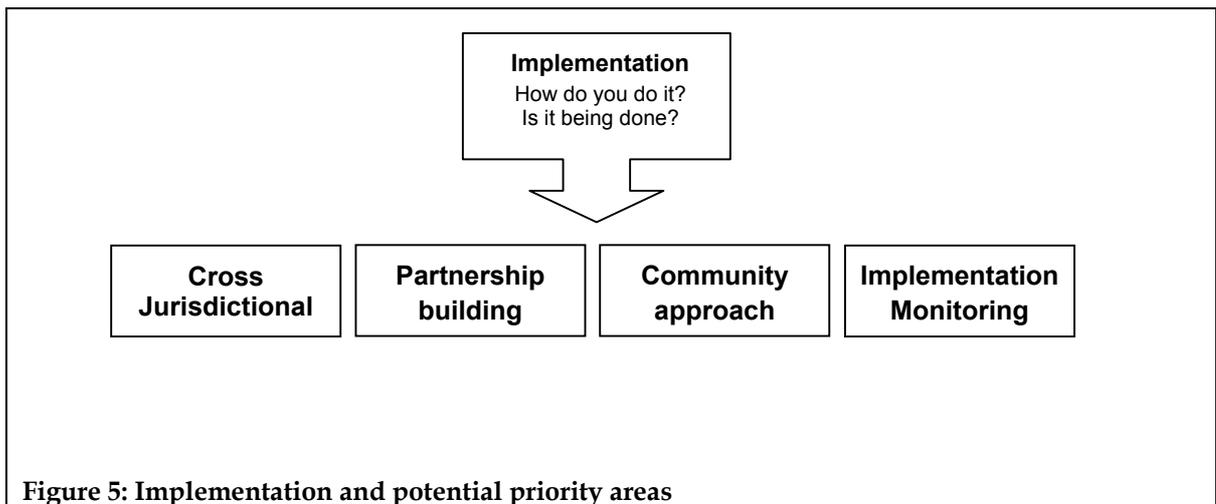


Figure 5: Implementation and potential priority areas

Cooperation from other jurisdictions and the community at which the intervention is aimed should be a priority. In gaining cooperation valuable steps can be taken toward partnership building. There is much to be gained by creating or building on the social capital already present in many communities and among at-risk injury groups. Using a community approach and recognising that the members of a community have a significant role to play in injury prevention is paramount.

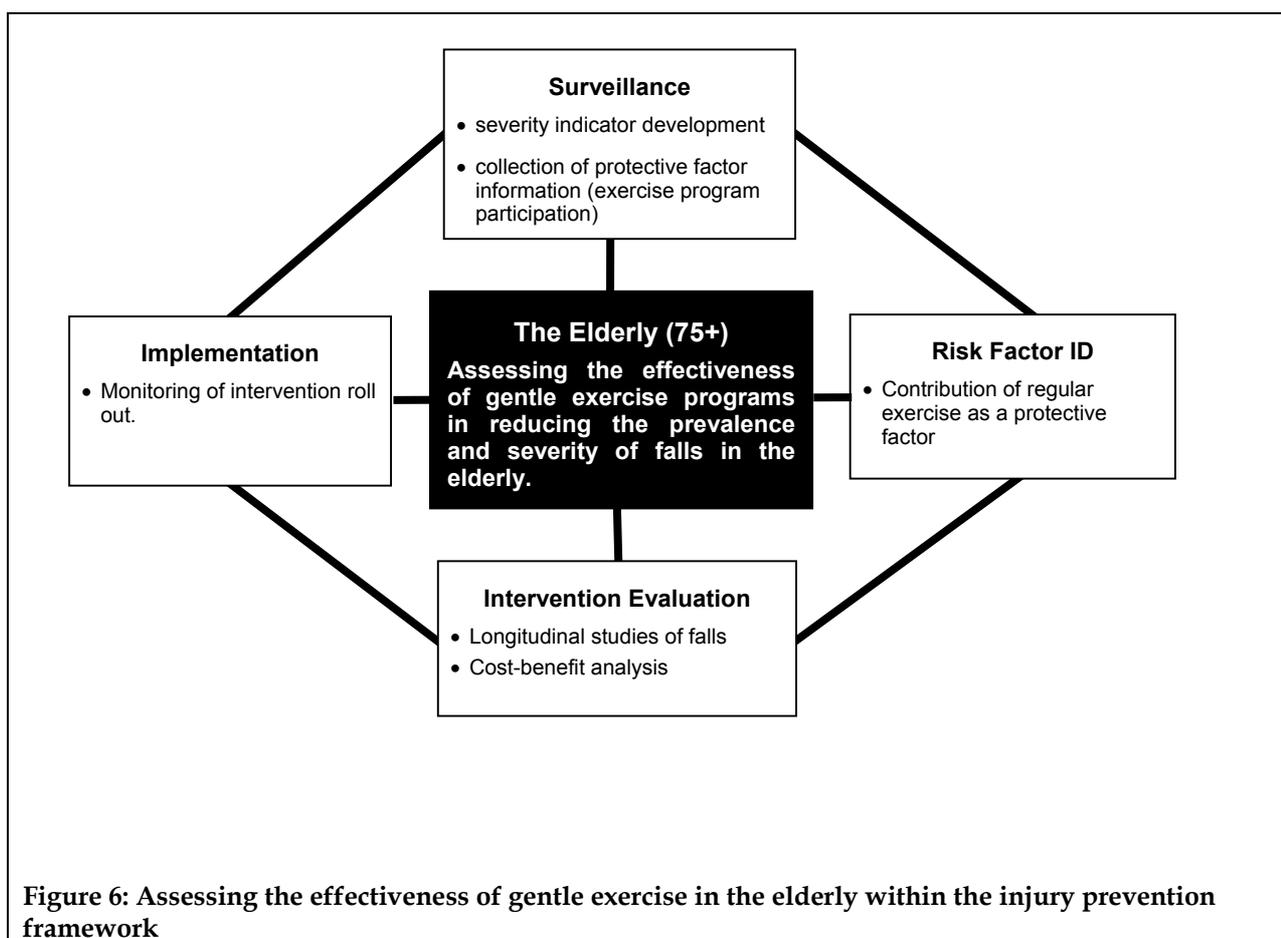
Monitoring the roll out of interventions is also an important part of implementation of injury prevention programs. Assessing whether the program has been implemented and identifying difficulties can assist the implementation of other programs in the future.

## Summary

The 4 steps of the public health continuum provide a framework in which priority setting for injury prevention can take place. Within each step a number of issues can be identified, however, it is important to understand that the steps and issues are not mutually exclusive.

The usefulness of priority setting within the injury prevention framework can be illustrated using the elderly (75+) priority group. Within the elderly population group falls are the most prevalent injury. One promising intervention to prevent falls in the elderly, for example, is the introduction of gentle exercise. Assessing the effectiveness of gentle exercise programs in reducing the prevalence and severity of falls in the elderly using the injury prevention framework is illustrated in Figure 6.

As can be seen from Figure 6, the collection and availability of data identifying whether or not the exercise program (or any exercise program) has been undertaken is a necessary step and contributes to each of the other steps. Expanded data collections contribute not only to risk factor identification and in this case to the identification and monitoring of potential protective factors. Evaluating the effectiveness of gentle exercise will be easier with basic surveillance data and allow longitudinal studies and more effective cost benefit analyses to be carried out. Finally, the extent, or 'reach', of the implementation of the gentle exercise program can be assessed and monitored using the same data, supplemented by population surveys.



## Criteria for assessment of potential topics

The selection of priority areas for the current document was undertaken under the direction and guidance of the Department of Health and Ageing and SIPP. As with the first Plan, the selection of a limited number of topics was seen to maximise the potential for advancement in a number of discrete areas. Such an approach is particularly important as limited economic resources can best be applied to greater effect over a smaller number of areas. The topics chosen were also selected with a view to avoiding duplication of resources. Other Commonwealth and jurisdictional portfolio areas are actively involved in injury prevention and intervention, particularly in the areas of occupation and transport injury.

In addition to the guidance received from DHA and SIPP, information gathered from a number of sources, including consultation with experts in the field and a review of past priority setting documents, narrowed the range of potential priority areas from which to select. Utilising the population based approach 6 thematic areas were chosen. A number of other areas could have been selected, such as a topic focusing on the population of women or culturally and linguistically diverse people. The merits of including or excluding these groups were considered. Their exclusion at this point in time is not a reflection of their degree of importance but is a consequence of the decision to limit the selection to 6 topics, in combination with assessment in terms of a set of criteria below.

Criteria for the assessment of potential topics have been developed. The criteria were used in a limited way to guide the selection of the priority areas, more importantly they have provided a broader picture of the needs of each of the priority areas and within each area, variations in the importance of a number of criteria can be seen.

A brief description of each of the criteria is given below:

**Political and economic climate:** Potential priority areas need to be considered within a political and economic context, as the likelihood of funding and ongoing support may be partially dependent on political and economic factors.

**Lifetime of the Plan:** The next Injury Prevention Plan, like its predecessor will have a limited lifetime. Issues chosen as priorities are considered to have a reasonable chance of demonstrating significant progress within the lifetime of a 3 to 5 year Plan. However, the longer term must also be considered.

**Future potential:** Priority areas have been considered with respect to their future influence, particularly where there is some evidence that they may become problematic in the future. For example, certain issues may develop immediacy due to the ageing population, while they may be small issues now, in 10 years time it is possible that we could see a rapid expansion.

**Momentum of existing topics:** This criterion acknowledges that in some areas a significant amount of expenditure or infrastructure building has already occurred. In order to advance these issues further, continuing attention is required in case a lack of attention results in a backward slide. A related issue is a threshold of effective investment.

**Availability of interventions:** In some areas the availability of interventions is an important consideration particularly with respect to cost-benefit analyses. A criteria such as this assesses whether interventions are available and need to be applied more widely or in contrast, identifies areas where few if any intervention programs exist.

**Frequency and severity of injury:** The size and scope of an injury issue is an important consideration when assessing priority areas. Basic surveillance information can be used to look at areas with rising or unacceptably high levels of morbidity and mortality.

**Data shortfalls:** Some issues have been considered as potential priorities precisely because there is a lack of surveillance infrastructure. Indicators are not always available for all issues and those that do exist may be seriously limited or only reveal a limited aspect of a multi dimensional issue.

## Redefining concepts

Two concepts have remained relatively static within the injury prevention field, age and severity of injury. Both concepts are important in defining and measuring the impact of injury on at risk populations and both concepts have scope for refinement and advancement.

## Developmental stage

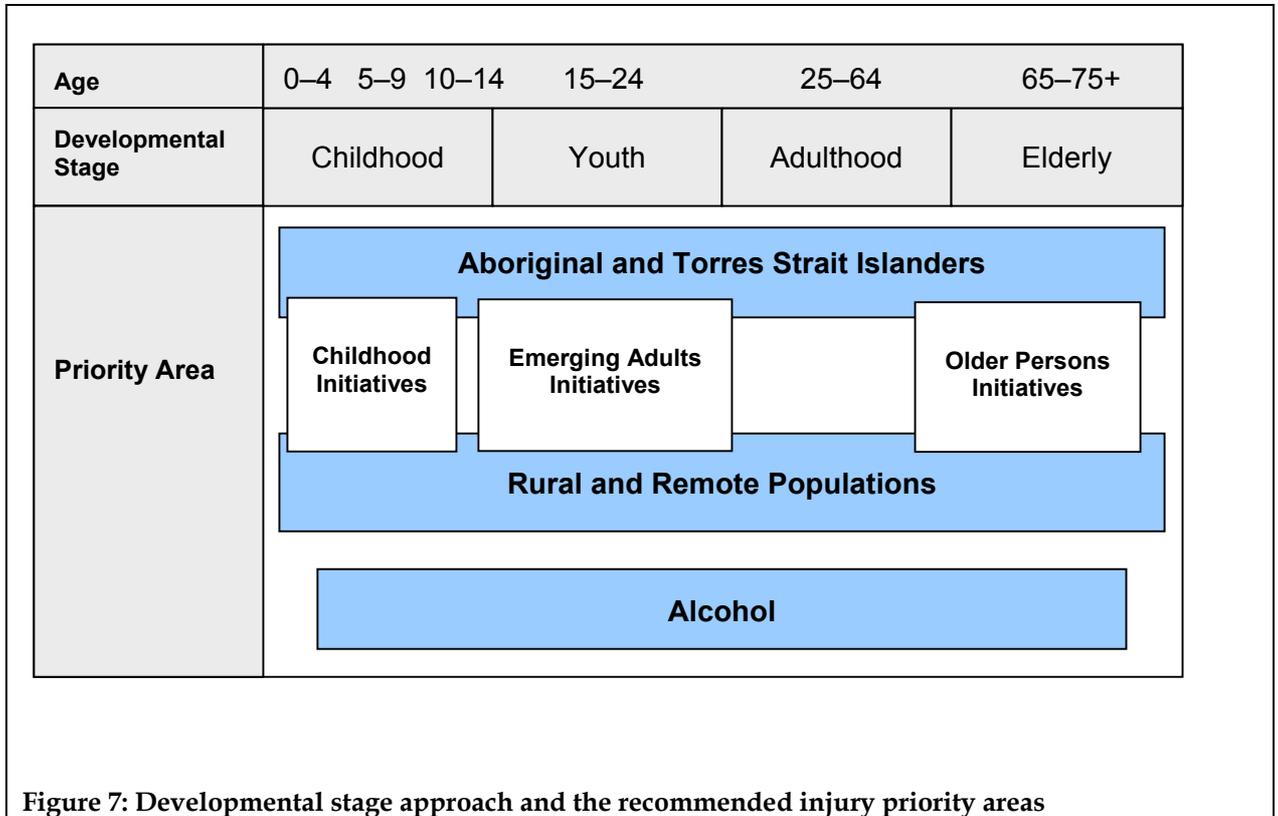
Generally speaking age has been examined in terms of chronology. For ease of comparison, age ranges have typically been used and are usually based on an arbitrary division such as a 5-year age band. Injury varies with age because other factors, such as risk exposure, physical and mental capabilities and so on, also tend to vary with age. However, these associations with chronological age are not tight – two 14 year old girls, or two 74 year old men may respond differently to situations that will have differential effects on risk of injury. Also, age and injury are more closely linked at some periods of life (e.g. early childhood; emerging adulthood) than at others.

The concept of developmental stage recognises that age is a more complex risk factor for injury than has been previously acknowledged. As individuals age chronologically they go through a number of physical, psychological and emotional developmental stages (Moller 1992). The age ranges associated with developmental stage are not always the same for each individual and it has been suggested that injury profiles can be better understood according to the following age ranges:

- ♦ Pre-school 0–4 years
- ♦ School age 5–14 years
- ♦ Independent adolescents 15–17 years
- ♦ Young adulthood 18–24 years
- ♦ Working age 25–64 years
- ♦ Retired 65–74 years
- ♦ Elderly 75 + years

Specific injury profiles are identifiable for each of the developmental stages.

Understanding the risk factors inherent in each developmental stage will assist policy and planning for injury prevention and assist in tailoring injury prevention programs to specific population groups. The way in which developmental stage has been considered in the selection of injury priority areas can be seen in Figure 7.



The five population-based priority areas along with alcohol rest along the developmental continuum. The three age-based priority groups cover 3 of the 4 developmental stages while the remaining 3 priority areas cross over all of the developmental stages.

## Injury severity

Within surveillance, the concept of severity of injury has typically been represented by simple and imperfect approaches such as treating deaths and hospital admissions as proxies for degrees of severity, or regarding duration of stay in hospital as an indicative measure of severity. More rigorous approaches, based on probability of death, exist, and are being developed further and used more widely (Kim et al 2000, Osler et al 1996, Stephenson et al 2002). Injury types are usually compared on the basis of the degree of severity according to these indicators.

The use of rates of death and admission to hospitals is a rather crude indicator of the severity of an injury. The usefulness of a severity indicator is dependent on the accuracy of the data on which it is based and its applicability in the planning area. For example, length of stay in hospital is typically used as an indicator of the severity of an injury yet it fails to accurately take into account transfers between hospitals and variations in clinical and administrative practice, which can inflate or deflate the severity indicator for an injury cause.

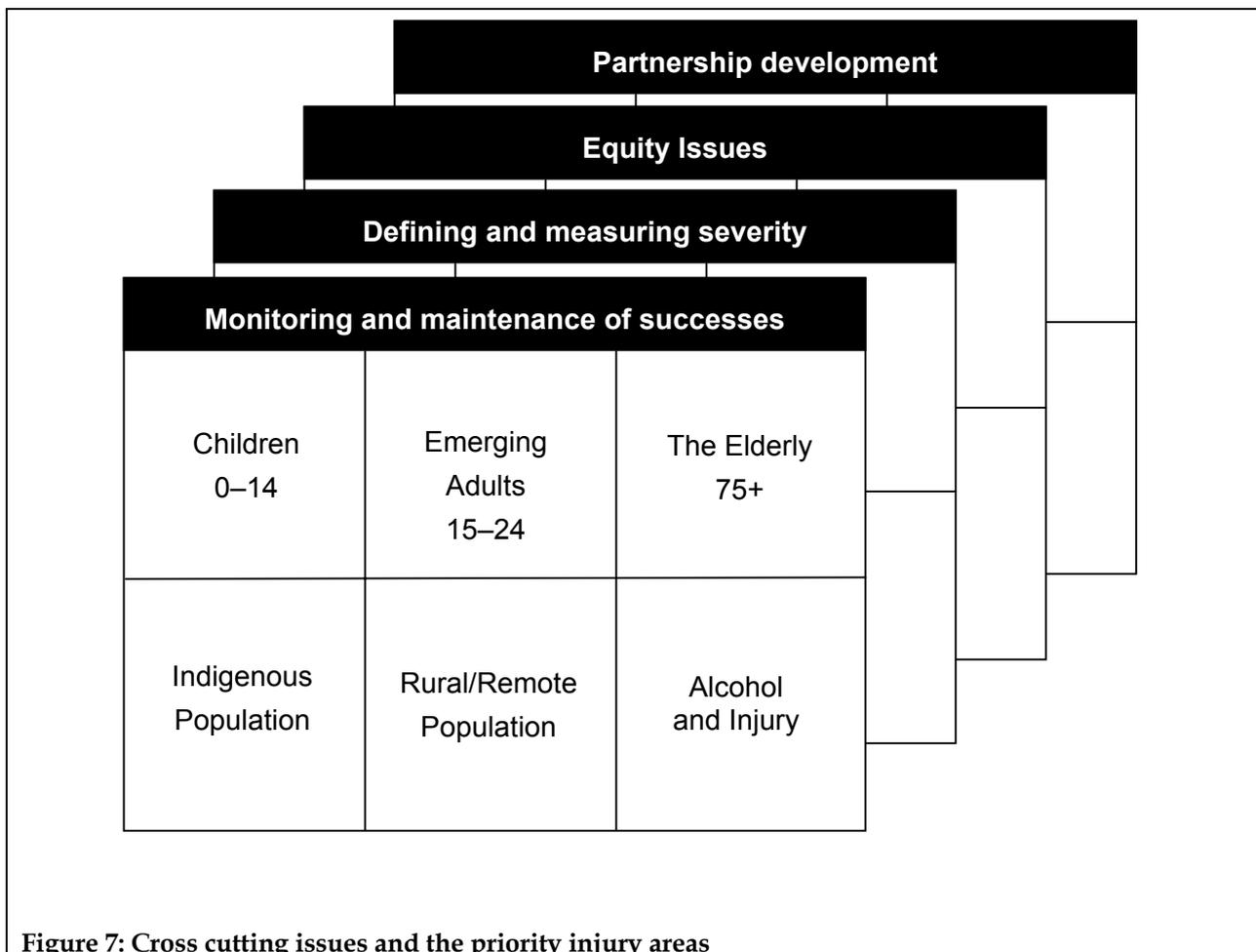
Additionally, such indicators of severity take almost no account of the long-term consequences of injury, other than death. For example, some spinal cord injuries result in life long disability at an enormous cost to the health system, however the average length of stay in hospital may be comparatively short compared to other injuries from which full recovery is the norm.

Planning for future needs with respect to rehabilitation and other costs to the health system will be better assisted by the development of more sophisticated indicators of severity. The present document identifies severity indicators as a priority area and encourages development of technically better and more useful indicators.

## Cross cutting issues

This document proposes using population groups as the main conceptual framework within which to consider priorities for injury prevention. However, some issues are relevant to injury prevention more generally. For present purposes, we refer to these as 'cross cutting issues', though other terms could be used.

Cross cutting issues might not be suitable as declared priority areas, but they affect the potential for successful injury prevention in priority areas. Numerous topics could be considered. In this document, 4 diverse topics have been proposed. These are *monitoring and maintenance of successes, defining and measuring severity, equity issues and partnership development* (see Figure 7).



Attention must be paid to the basic infrastructure associated with injury prevention and intervention in order for any National plan to be successful. Each of the 4 topics identified have been outlined below and addressed more specifically within the discussion of each of the 6 priority areas.

## **Monitoring and maintaining successes**

Significant advances have already been made in a number of injury areas. For example, certain types of injury are much less common than at certain times in the past (e.g. poisoning of children by iron preparations, burns associated with flammable nightwear, poisoning by barbiturates, drowning of older children and adults, many types of road deaths).

Attention to gains already made is important because success stories provide much of the basis for arguing that more gains are feasible, and they may provide models for how this can be done. It is also important because failure to 'keep an eye on' the maintenance of some types of preventive intervention could allow a well-managed problem to return.

In order for the reductions in specific injury areas to be maintained a degree of monitoring and maintenance is required. There are a number of aspects to this including the need to establish thresholds of acceptability in injury numbers, so that when/if levels rise again a flag within the database can signal a need for renewed investment in time and focus. However, case monitoring can only detect a recurrent problem after injury cases have begun to increase. Monitoring of hazards and exposures potentially provides a way to avoid this (e.g. periodic checks for return of flammable nightwear to the market).

Crediting agencies and jurisdictions for success in injury reduction through a program of success monitoring is likely to receive political support. Additionally there are potential financial savings to be made through pro-active management of injury prevalence through the use of early detection systems.

Key issues include:

- ♦ Establishing baseline criteria for success;
- ♦ Development of monitoring systems; and
- ♦ Provision of timely surveillance bulletins.

## **Defining and Measuring Severity**

Definitions and measurement of the severity of an injury are important mechanisms in determining the cost of injury to the individual, in terms of pain and suffering, and to the health care system, in terms of ongoing financial support required. Precise and reliable monitoring of injury incidence can only be done if severity forms part of case definition. The inclusion of defining and measuring severity recognises that more work needs to be done on the basic tools of injury research.

Limitations in the current data collections are hampering progress in a number of areas. The main validated indicators of severity are limited to probability of death and less reliable information is often used (e.g. length of stay in hospital).

Key issues include:

- ♦ Optimising the use of current data collections; and
- ♦ Development and validation of meaningful severity indicators, which refer to non-fatal consequences of injury, as well as to threat to life.

## Equity

Equity, in this context, refers to equity of access to, and provision of, injury intervention and prevention strategies, without prejudice on the basis of cultural background or socio-economic status. Socio-economic status (Mathers 1994a, 1994b, 1995, 1996) and cultural background (Lewis et al 1997) have been demonstrated to be factors in injury across all developmental stages.

The inclusion of equity as a cross cutting issue reflects the need to raise awareness of equity factors and encourage strategic beginnings. Key issues include:

- ♦ Recognition of the unique profile of injury within culturally and linguistically diverse population groups; and
- ♦ Awareness of barriers to access to prevention and intervention strategies on the basis of socio-economic status and cultural background.

## Partnership Development

All of the priority areas identified so far have one thing in common: the need and opportunity for partnership development. The priority areas proposed encourage a cross-jurisdictional approach to injury prevention and intervention and advance the concept of viewing injury problems from a whole-of-person or whole-of-community perspective.

Partnership development has been included to build on the 2001–2003 Plan and further foster linkages between policy domains. Opportunities for collaboration are abundant and include areas such as sport and recreation, transport, the workplace, consumer safety and the criminal justice system. Potential partnerships have already been identified in a large number of areas and initial forays made into collaboration with the National Aboriginal Health Strategy, the National Plan for Suicide Prevention, and the National Road Safety Strategy. Further opportunities exist within the health sector (e.g. concerning alcohol and other drugs, physical activity, and patient safety).

Key issues include:

- ♦ Identifying areas of joint interest;
- ♦ Implementing collaboration; and
- ♦ Evaluating the effectiveness of existing partnerships (e.g. how successfully have promoters been in engaging other stakeholders, what fraction of other funding opportunities, potentially available for injury prevention, have been earmarked for this purpose?).

## Priority Injury Issues

Each of the 6 priority issues identified will be discussed in detail below. Where available, data have been provided on the incidence of injury within each population group along with other surveillance indicators. It should be noted, however, that currently available data sources lend themselves variably to the purposes of this report. Previous reports which have been used as the basis for priority-setting for injury prevention have tended to be shaped very much by the ICD 'external causes' classification, and by mortality data (more recently also hospital inpatient data). This approach was justifiable but it is limited. It tends to highlight certain types of injury and risk factors and not others. It also tends not to take full account of the range of relevant criteria for selection of priority topics. In this report, we have sought to take a different approach, based mainly on population

sectors, but also highlighting a major risk factor (alcohol). This approach does not entirely 'go with the flow' of available data sources. Advantages of this are that it gives a different perspective, which (among other things) reveals limitations of current information (e.g. the lack of information on most risk factors and exposure). The other side of this coin is that data are not presently available to illustrate many points for which data would be desirable.

Data issues are discussed in Appendix 1.

# Overview: Children 0–14

- Children are dependent and susceptible to injury. For this and related reasons they have long been a prominent and widely supported focus for injury prevention.
- Children progress through a number of developmental stages between the ages of 0–14. The progression to adulthood is dependent on successful navigation of these stages and injury prevention and intervention can greatly assist in a smooth transition.
- A developmental perspective can lead to further reduction of injury during childhood, and to interventions in childhood designed to reduce injury at later ages.
- Success has been achieved in injury reduction in a number of areas. Highlighting and monitoring these can help to ensure that these gains are maintained and built upon. A review of commonly held views on causal factors and mechanisms from a prevention perspective may open opportunities for further gains, as may further identification of high-risk sub-groups of children.
- A prevention-based, focused program of information development is needed to underpin an effective intervention plan.
- Heightened recognition of commonality between risk factors for child injury, and for other problems in childhood, and between factors in childhood and injury at later ages points to new or enhanced partnerships.

## Reasons for inclusion

Children (defined here as persons aged 0–14 years) warrant consideration as a priority topic because of current injury levels, special interest in this vulnerable population group, and related considerations. This population group also warrants consideration because:

- Achievements to date in preventing injury in this group provide good examples of success; and
- Factors to which children are exposed influence injury experience at older ages, raising the possibility of early interventions.

Injury cases occurring in childhood make up about 1 in 25 of all injury deaths, and about 1 in 6 of all injury separations from hospital (Table 1.1). Taken together, these topics account for a little over 1 in 4 child injury deaths and a little under 1 in 2 child injury hospital separations (Table 1.2). Drowning (20%) is second only to transport injury (39%) as a cause of child injury death, and falls predominate in terms of numbers of hospital cases (38%).

Injury in children at any age can hinder the successful transition to adolescence and have long-term impacts on both quality of life and the economic cost to the health care system.

Two of the 4 Priorities for 2001–2003 were specific to children (falls by children; poisoning among children) and children were designated as a key priority population for a third (drowning and near-drowning). The inclusion of children as a priority group recognises the work carried out to date for this population and the continued focus on children in the priorities beyond 2004 recognises the need to build on that work.

## Developmental Considerations

Between the ages of 0–14 children progress through a number of developmental stages and the pattern of injury changes as children advance through each stage (Moller 1992). Injury issues and opportunities for prevention vary greatly during the course of childhood and an examination of injury profile by developmental stage can be extremely useful. Generally speaking 4 developmental periods can be identified:

- **Infancy (0 to about 1 year):** arguably the most dependent phase for childhood. The characteristic injury issue is child abuse (Australian Institute of Health and Welfare 2003).
- **Early childhood (about 1–4 years):** at this age children are mobile, but lack knowledge and understanding of hazards. The characteristic injury issue is drowning (Steenkamp 2002).
- **Middle childhood (about 5–9 years):** at this stage children's social development occurs through play and school. Characteristic injury issues include falls from trees, and play-equipment, etc (Steenkamp & Cripps 2001).
- **Late childhood (about 10–14 years):** during this stage a child's wider social and physical development occurs through school, and sport, etc. The characteristic injury issue is sports injury (Finch et al 1998).

Injury risks are higher for some groups of children than for others regardless of developmental stage (Mathers 1995). To some extent, this fact is accommodated by the current population perspective (e.g. injury rates are high for Aboriginal Australians at all ages, including childhood). However, careful scrutiny (e.g. in terms of location, socio-economic factors, etc) can reveal other sub-groups of children who are at special risk, either of injury generally or of particular types.

Late childhood is often marked by the increased occurrence of risk taking behaviours as children progress through to early adolescents. Experimentation with licit and illicit drugs often begins during this developmental stage. Drug use among the young is difficult to monitor and one area of recent concern has been the inhalation of volatile substances. The difficulties of monitoring drug use in children is particularly well illustrated through a recent investigation into the inhalation of volatile substances where issues such as accuracy in self-reporting and risks of morbidity and mortality are discussed (Drugs and Crime Prevention Committee 2002).

## Surveillance and Infrastructure Issues

While monitoring of injury experience by means of existing data collections should continue, work also needs to be done on developing and applying other information. Childhood injury prevention would benefit from large-scale surveys of parental attitudes and behaviour through systems such as Computer Aided Telephone Interviewing (CATI). Surveys of other types will also be valuable. Longitudinal studies (a few of which exist) are essential for understanding relationships between modifiable factors in childhood and injury experience at later ages, as can other types of analytic studies (e.g. case-control). Randomised trials can provide strong information on the effectiveness of interventions.

In the area of success monitoring the advances made in injury reduction in children require careful and systematic monitoring if those successes are to be maintained. The benefits of implementing monitoring systems include recognition of success in injury reduction, potential economic savings in costs associated with instigating additional intervention and prevention programs, and the opportunity to gather information to explore long-term injury patterns.

Additional issues that need to be addressed in the area of information gathering are identified below:

*Serial population surveys:* Considerable information exists about patterns of serious injury to children, the nature of common risk factors and about preventive interventions. Children, more than other age groups, depend on other people for injury prevention. Population surveys (potentially using CATI methods), particularly of parents and other carers of children, provide a means for obtaining information on knowledge, attitudes and behaviours relevant to designing, directing and monitoring prevention in this age group. Socio-economic characteristics of families and communities are also relevant factors.

*Making information more relevant to prevention:* Information provided by routine injury data sources (i.e. ABS deaths data, hospital separations) has varying and limited relevance to specific child injury prevention issues. For example, sources can identify classes of substances involved in serious poisoning, but not the particular preparation, nor how the child gained access to it. Although, improvements have been made recently (e.g. the 3rd edition of ICD-10-AM).

*Longitudinal risk-factor studies:* Studies such as the Dunedin Multidisciplinary Health and Development Study provide crucial insights into causal factors and their inter-relationships. Injury prevention undertaken from a developmental (or life-stages) perspective benefits particularly from this form of information. Longitudinal studies can, for example, provide reliable information on factors predicting injury during childhood (Langley et al 1979), and can also show how factors in childhood (or at older ages) predict injury, or related behaviours, at later ages.

*Intervention trials:* Randomised trials can provide strong evidence concerning the effectiveness of preventive interventions. They are usually expensive, and their feasibility varies greatly between interventions, for reasons of cost, ethical considerations, and technical factors. Identification in injury policy materials of topics on which this form of evidence is seen as particularly important would provide a cue to researchers and, potentially, to funding bodies.

## **Surveillance Indicators**

External causes can be conceptualised in various ways, and conventional perspectives are not necessarily the most fruitful for prevention. For example, current information sources tend to lead to child poisoning being considered mainly in terms of classes of substances. Additional perspectives include how children gain access to poisonous substances, the forms of packaging in use, and regulatory issues (e.g. requirements, their implementation and enforcement, differences between jurisdictions). A critical review of commonly held views on causal factors and mechanisms from a prevention perspective may open opportunities for further gains.

With respect to counts and rates of injury by external cause, poisoning (especially by pharmaceutical substances), drowning, falls, fire, burns and scald injuries have been foci of attention for a number of years. In addition to these topics, transport-related injury of children has been an implicit aspect of general road safety programs, and the specific target of some programs (e.g. infant capsules). Child abuse is another topic of particular interest to a specialist sector.

The following section reports on the counts and rates of hospitalisations and deaths for children aged 0–14 years in Australia. The deaths data are taken from the Australian Bureau of Statistics (ABS) mortality unit record data collection, 1979–00. Population data were obtained from the ABS. The data on hospital separations were provided by the

AIHW (Australian Institute of Health and Welfare 2001a). NISU processed, checked and combined the relevant data years to facilitate analysis. Population data were obtained from the Australian Institute of Health and Welfare and are similar to data presented in the Demographic Statistics Catalogue No. 3101.0 (ABS). Rates were calculated using final population estimates as at 31 December 1999. (See Appendix 1 for a detailed discussion of relevant data issues).

## Hospitalisations and deaths

In the financial year 1999–00 there was a total of 68,134 hospital separations from public, private and psychiatric hospitals in Australia in children due to injury and poisoning from external causes (Australian Institute of Health and Welfare 2001a). Hospitalisations in children accounted for 16.5% of the total number of injury hospitalisations in the general population (see Table 1.1). After adjusting for age, the rate per 100,000 for boys (2,117.2) was almost twice as high as for girls (1,339.7).

**Table 1.1: Key injury indicators for hospitalisations and deaths in children**

Indicator	Males	Females	Persons
<b>Hospitalisations (1999–2000)</b>			
Case counts	42,627	25,507	68,134
Per cent of all injury hospitalisations	17.9	14.6	16.5
Age adjusted rate per 100,000 population	2,117.2	1,339.7	1,738.2
<b>Deaths (2000)</b>			
Case counts	215	117	332
Per cent of all injury deaths	3.90	4.53	4.10
Age adjusted rate per 100,000 population	10.8	6.2	8.6

In calendar year 2000, 332 deaths were registered as a result of injury and poisoning in children. Similar to the pattern of hospitalisation in children, the rate of death from injury and poisoning in boys (10.8) was higher than in girls (6.2) when adjusted for age.

## Patterns of injury and poisoning in children

The pattern of deaths and hospitalisations occurring in children as a result of injury and poisoning can be seen in Table 1.2. The greatest number of hospitalisations is attributable to other unintentional injuries, followed by falls, transportation and medical misadventure. The pattern of deaths from injury and poisoning is similar, however death by drowning is the second leading cause of death in children 0–14 years.

**Table 1.2: Number of cases of hospitalisation and deaths attributed to injury and poisoning in children 0–14 years**

	Deaths (2000)			Hospitalisations (1999–2000)		
	Males	Females	Persons	Males	Females	Persons
Transportation	82	47	129	6,533	3,134	9,667
Drowning & near-drowning	54	14	68	241	141	382
Poisoning, pharmaceuticals	3	3	6	1,459	1,210	2,669
Poisoning, other substances	3	3	6	585	456	1041
Falls	5	7	12	17,443	10,988	28,431
Fires/burns/scalds	7	7	14	1,492	869	2,361
Other unintentional	37	23	60	11,690	6,464	18,154
Intentional, self-harm	7	1	8	103	360	463
Intentional, inflicted by another	15	11	26	569	280	849
Undetermined intent	1	0	1	131	81	212
Complications of surgical and medical care	1	1	2	2,380	1,524	3,904
<b>Total</b>	<b>215</b>	<b>117</b>	<b>332</b>	<b>42,626</b>	<b>25,507</b>	<b>68,133</b>

Note: See Appendix 1 for equivalent ICD-10 external cause codes, hospitalisation totals excludes cases coded as 'not external cause'. Shaded areas represent the 3 highest causes of death and hospitalisation in emerging adults.

## Drowning, pharmaceutical poisoning and fire, burns and scalds in children

Hospitalisations due to near-drowning, pharmaceutical poisoning, and fire, burns and scalds accounted for a total of 5,414 episodes of hospital care in children 0–14 years (see Table 1.3). The highest percentage of hospitalisations in children for each of the 3 types of injury occurred in the pharmaceutical poisoning category. Within this category 3.9% of all hospitalisations for injury in children occurred as a result of pharmaceutical poisoning. Similarly, when adjusted for age, the greatest rate of injury per 100,000 in children is found with pharmaceutical poisoning.

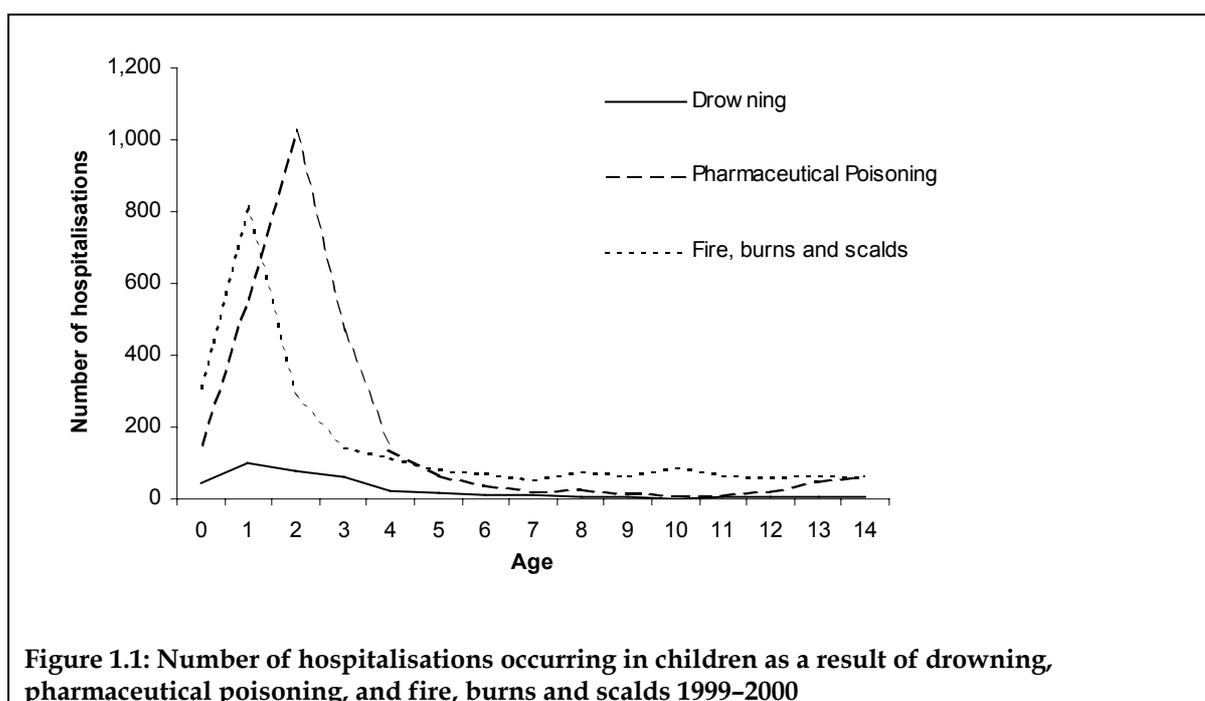
**Table 1.3: Hospitalisations and deaths due to drowning, pharmaceutical poisoning and fire, burns and scalds in children 0–14 years**

	Drowning	Pharmaceutical Poisoning	Fire, burns and scalds
<b>Hospitalisations (1999–2000)</b>			
Number of episodes of hospital care reported	382	2,670	2,362
Per cent of all injury hospitalisations for each type of injury	0.6	3.9	3.5
Age adjusted rate per 100,000	10.0	70.1	61.4
<b>Deaths (2000)</b>			
Number of deaths	68	6	14
Per cent of all injury deaths for each type of injury	20.5	1.8	4.2
Adjusted rate per 100,000	1.8	0.3	0.5

The greatest number of deaths occurs as a result of drowning with 68 recorded deaths in the calendar year 2000. Drowning also leads the count in the percentage of all injury hospitalisations for each type of injury and when adjusted for age. The average length of stay occurring as a result of drowning, pharmaceutical poisoning and fire, burns and scalds is 2.2, 1.4, and 4.4 days respectively.

Patterns of injury vary greatly between younger and older children, reflecting developmental changes and associated differences in exposure to risk factors. For example, hospital admissions due to pharmaceutical poisoning, near-drowning and burns, scalds and effects of fire are concentrated in early childhood (Figure 1.1). This reflects the developmental and environmental vulnerability of young children and infants. A focus on targeting developmental and environmental factors that contribute to injury in young children and monitoring of past successes in injury reduction in older children should be a priority.

When viewed across the ages, a peak in injuries as a result of pharmaceutical poisoning and fire, burns and scalds can be seen in the 0–4 year age band (Figure 1.1). After the age of 4 a significant decrease in the incidence of injury attributable to these 3 causes is apparent.



## Cross cutting issues

### *Monitoring and maintaining successes*

The current data collection systems can be used to develop a monitoring system that provides regular reports on the incidence of injury in children. In addition to monitoring types of injury case, which have not yet been controlled, ‘successes’ can also be monitored. For example, sentinel monitoring could be designed to flag any further occurrence of specific injury types which are thought to be under control (e.g. burns due

to flammable nightwear; child poisoning by iron preparations) in order to prompt follow-up early intervention in case control measures have weakened.

The development of new sources of information is also important in order to supplement existing knowledge and investigate other potential contributory injury factors in children.

#### *Defining and measuring severity*

Definitions and the measurement of the severity of an injury are important mechanisms in determining costs to the individual and the health care system. Within the area of childhood injury providing accurate representation of the long term impact of injury is particularly important.

Special consideration may need to be given to the relative lack of relevant validated measures (e.g. of functional impairment) in childhood, and likely dependence on proxy information providers (i.e. parents and carers).

#### *Equity*

Equitable access to health care for socioeconomically disadvantaged children is a priority. Numerous studies have identified a link between poverty status and health outcomes and there are strong indicators that injury prevalence is also associated with socioeconomic disadvantage.

Access to prevention and intervention programs for culturally and linguistically diverse children is an area which has received little attention. Consideration needs to be given to strategic beginnings in this area and encouragement of scoping studies and other early information gathering techniques an important starting place.

#### *Partnership development*

An approach to injury prevention which gives prominence to population sectors and to developmental stages will tend to highlight commonalities between risk factors for child injury, and risk factors for many other problems in childhood (e.g. bullying, depression, school performance, etc.) which have advocates and constituencies distinct from 'injury prevention'. This approach will also tend to highlight relationships between factors in childhood and injury at later ages. This is likely to encourage the development of new or enhanced partnerships.

## Discussion

Children warrant consideration as a priority topic because of current injury levels, special interest in this vulnerable population group, and related considerations. This population group also warrants consideration because achievements to date in preventing injury in this group provide good examples of success, and factors to which children are exposed influence injury experience at older ages, raising the possibility of early interventions.

Between the ages of 0–14, children progress through a number of developmental stages and the pattern of injury changes as children advance through each stage. Injury in children can hinder the successful transition to adolescents and have long-term impacts on both quality of life and the economic cost to the health care system.

While monitoring of injury experience by means of existing data collections should continue, work also needs to be done to develop and apply other information. Childhood injury prevention, would benefit from large-scale surveys of parental attitudes and behaviour through systems such as Computer Aided Telephone Interviewing (CATI). Surveys of other types will also be valuable. Longitudinal studies (a few of which exist) are essential for understanding relationships between modifiable factors in childhood and injury experience at later ages, as can other types of analytic studies (e.g. case-control). Randomised trials can provide strong information on the effectiveness of interventions.

# Overview: Emerging Adults 15–24

- Individuals between the ages of 15–24 years account for a significant proportion of all hospitalisations (16%) and deaths (14%) from injury in Australia. The age range covers the transition to adulthood, an important developmental stage marked by changes in social independence, family life and work status.
- Emerging adults are over-represented in a number of injury areas including transport, violence, pharmaceutical poisoning and self-harm. Different patterns of injury can be seen according to age and gender.
- Key issues to address include suicide and self-harm, risk taking behaviour, alcohol use and workplace injury.
- Prevention strategies targeting emerging adults have the potential to reduce injury for this age group and provide a flow-on effect of injury reduction as emerging adults successfully negotiate their way through their working lives.
- Opportunities for collaboration are available.

## Reasons for inclusion

Emerging adults (defined here as persons aged 15–24 years) warrant recognition as a priority for a number of reasons. Primarily, the consideration for emerging adults as an injury priority occurs because:

- A disproportionately large number of injuries are sustained by males and females at these ages (Kreisfeld & Moller 1996, Moller 1995); and
- This period includes the transition from the stage of life at which rates of severe injury are lowest (childhood) to the stage at which they are highest (except for old age).

Injury cases occurring in young people aged between 15–24 years of age make up about 1 in 6 of all injury deaths, and about 1 in 7 of all injury separations from hospital (Table 2.1). Emerging adults are over-represented in a number of injury areas including transport, violence, pharmaceutical poisoning and self-harm.

None of the 4 Priorities for 2001–2003 were specific to emerging adults, though males aged 15–34 years were designated as a key priority population for the priority area drowning and near-drowning. Drowning and near-drowning accounts for about 1 in 60 injury deaths in this age group, and for about 1 in 1,300 hospital separations (Table 2.2). The inclusion of emerging adults provides an opportunity for continuation of work conducted to date in the area of drowning and near-drowning.

Perhaps more importantly though, the inclusion of emerging adults as a population group in their own right recognises the enormous impact of injury in this narrow age band. The potential for prevention and intervention is immense and the opportunity for partnership building with a wide range of traditional and non-traditional bodies cannot be overlooked.

## Developmental considerations

Similar to childhood, there is a changing pattern of injury in emerging adults that reflects the developmental and social growth of this cohort. Emerging adults represent the change from childhood, through adolescence, to independent young adulthood

with attendant risks of injury. Risk taking behaviour reaches its highest levels in young adults, particularly in young males. This increase in risk taking behaviour can manifest itself in many ways (e.g. experimentation with drugs and alcohol, participation in high risk sports and driving behaviour) and result in much higher rates of injury.

The progression through to early adulthood reveals an injury profile that reflects the introduction to and accessibility of alcohol as well as the start of working life. The relationship between alcohol and injury in young males is particularly strong and the pattern of injury seen in this group reflects this correlation (e.g. emerging adults and alcohol related motor vehicle accidents).

The rate of fatal workplace injury rises with workers age and work-related injury has been identified as a significant problem in the emerging adult population (National Occupational Health and Safety Commission 1998). A recent Queensland publication identified that almost half of all workplace injuries occurred in young people aged 15-29 years (Queensland Injury Surveillance Unit 1999).

A number of opportunities exist during this age range for targeted prevention strategies to promote the responsible use of alcohol in order to reduce the risks of sustaining injury. In addition the rise in fatal workplace injury with workers age suggests emerging adults as a good starting point for workplace injury prevention strategies.

Suicide and self-harm in emerging adults, particularly young males, became a major area of concern in Australia during the 1990s (Harrison et al 1997, Steenkamp & Harrison 2000). Analysis to date has identified a number of patterns, including increasing incidence of male suicide and self-harm according to birth cohort, marked changes in methods of suicide, and sub-populations at special risk (these include Aboriginal and Torres Strait Islander persons in the emerging adult age range). Risk factors for suicide and self-harm have much in common with risk factors for other types of injury. Cohort-based analysis suggests that suicide rates reached by a cohort during their emerging adult years may persist. Further investigations of both the pattern and incidence of suicide and self-harm in emerging adults is needed.

## **Surveillance and infrastructure issues**

The 2 issues identified above (alcohol and the workplace) have been found to be significant contributors to the injury profile of emerging adults, however the indicators within our surveillance systems are limited, making monitoring and the provision of information in these areas difficult.

For example, during the age range considered here, paid employment becomes a major activity for most Australians, and as just discussed, one that sometimes presents high risks of injury. However, for reasons to do with data collection, it is not yet straightforward to provide reliable summary data showing work-related injuries. Similarly, while there are good reasons to expect that alcohol contributes to many injuries in this age group (McLeod et al 2000, Roche et al 2001), the capacity of routine data sources to describe it is quite limited. (Indicative data are provided later in this section.)

In order to shed more light on these and other injury areas for the emerging adult population more work is needed on existing databases. The development of new sources of information on injury in emerging adults would benefit from both gathering information from allied/alternative data collections (e.g. transportation and road safety) and exploring ways of gaining information from the age group themselves through face-to-face surveys in high risk environments (e.g. nightclubs). The CATI

approach, suggested to gather information from parents about childhood injury, could also be employed to collect information in a more systematic way directly from emerging adults.

## Surveillance Indicators

The counts and rates of hospitalisations and deaths for emerging adults are one source of information on injury in this cohort. As already discussed, limitations have been identified for alcohol and workplace related injury data. However the current surveillance indicators provide a valuable overview of injury in emerging adults particularly around suicide and self-harm.

The following sections report on the counts and rates of hospitalisations and deaths for people aged between 15–24 years in Australia. A detailed discussion of relevant data issues can be found in Appendix 1.

## Hospitalisations and deaths

In the financial year 1999–00 there was a total of 65,073 hospital separations from public, private and psychiatric hospitals in Australia in emerging adults due to injury and poisoning from external causes (Australian Institute of Health and Welfare 2001a). Of all hospitalisations for injury in 1999–2000 emerging adults accounted for 15.7% of the total number (see Table 2.1).

**Table 2.1: Key injury indicators for hospitalisations and deaths in emerging adults 1999–2000**

	Males	Females	Persons
<b>Hospitalisations 1999–2000</b>			
Case counts	46,666	18,407	65,073
Percent of all injury hospitalisations	19.57	10.50	15.73
Age adjusted rate per 100,000 population	3,388.02	1,397.92	2,415.34
<b>Deaths 2000</b>			
Case counts	874	284	1,158
Percent of all injury deaths	15.85	11.01	14.31
Age adjusted rate per 100,000 population	63.15	21.45	42.77

A greater percentage of males were admitted to hospital as a result of injury and poisoning than females. The difference remained when adjustments were made for age with the rate per 100,000 being more than twice as high for males than females.

The difference in the pattern of injury deaths between males and females is even more pronounced in the number of deaths occurring during the calendar year 2000. When adjusted for age, the death rate for males per 100,000 is almost 3 times that of females.

## Patterns of injury and poisoning in emerging adults

The pattern of deaths and hospitalisations occurring in emerging adults as a result of injury and poisoning can be seen in Table 2.2. The greatest number of hospitalisations is attributable to other unintentional injuries, followed by transportation, falls and intentional injuries inflicted by another. While the greatest number of deaths is

attributable to transportation followed by intentional self-inflicted injuries, and pharmaceutical poisoning.

The counts of hospitalisations by gender are greater in males in every injury category except for pharmaceutical poisoning and self-inflicted injuries. Deaths in males are greater in all injury categories compared to females.

**Table 2.2: Number of cases of hospitalisation and deaths attributed to injury and poisoning in emerging adults 15–24 years 1999–2000**

	Deaths (2000)			Hospitalisations (1999–2000)		
	Males	Females	Persons	Males	Females	Persons
<b>Transportation</b>	392	130	522	10,040	3,815	13,855
<b>Drowning &amp; near-drowning</b>	14	5	19	36	13	49
<b>Poisoning, pharmaceuticals</b>	99	38	137	989	1,078	2,067
<b>Poisoning, other substances</b>	9	2	11	311	201	512
<b>Falls</b>	13	3	16	9,174	2,278	11,452
<b>Fires/burns/scalds</b>	5	0	5	744	19	934
<b>Other unintentional</b>	45	6	51	15,715	3,863	19,578
<b>Intentional, self-harm</b>	264	75	339	1,989	3,517	5,506
<b>Intentional, inflicted by another</b>	29	24	53	5,133	1,243	6,376
<b>Undetermined intent</b>	4	1	5	385	365	750
<b>Complications of surgical and medical care</b>	0	0	0	2,130	1,839	3,969
<b>Total</b>	874	284	1,158	46,646	18,402	65,048

Note: See Appendix 1 for equivalent ICD-10 external cause codes, hospitalisation totals excludes cases coded as 'not external cause'. Shaded areas represent the 3 highest causes of death and hospitalisation in emerging adults.

## Suicide and self-harm in emerging adults

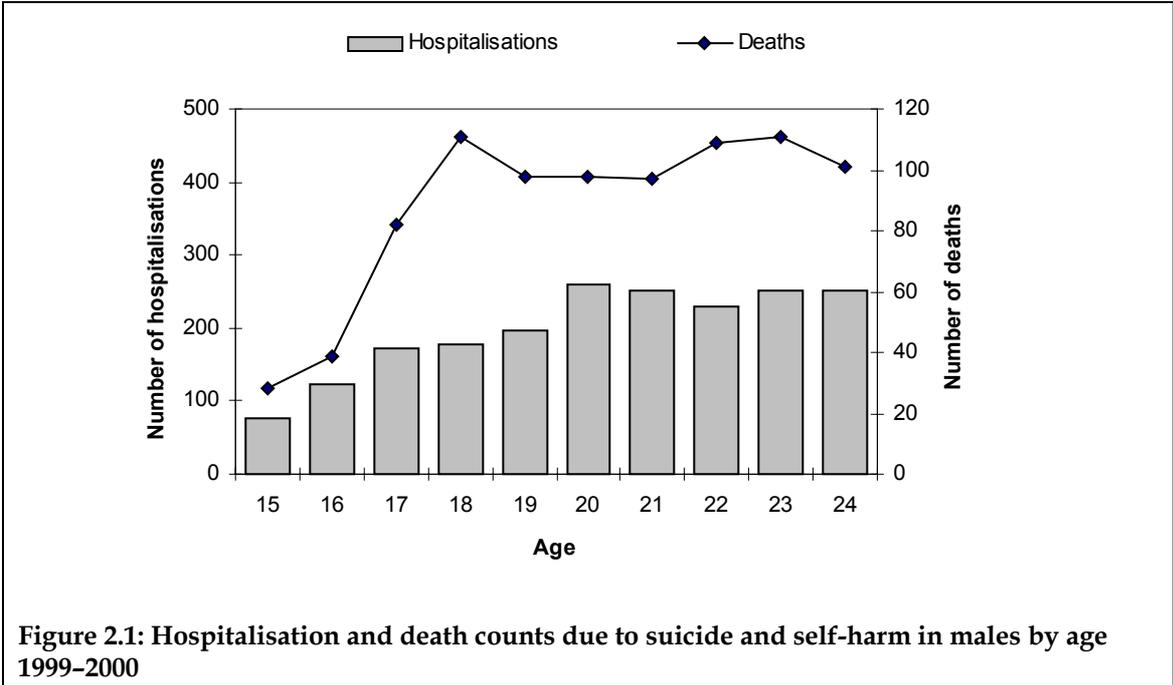
Hospitalisations due to suicide and self-harm in emerging adults accounted for 5,506 episodes of hospital care, which was 8.5% of all injury-related hospitalisations for this age group (see Table 2.3).

**Table 2.3: Hospitalisations and deaths due to suicide and self-harm in emerging adults**

	Male	Female	Persons
<b>Hospitalisations (1999–2000)</b>			
Number of episodes of hospital care reported	1,989	3,517	5,506
Per cent of all injury hospitalisations for emerging adults	4.26	19.11	8.46
Adjusted rate per 100,000	144.7	267.1	204.4
Average length of stay (days)	2.2	2.0	2.1
<b>Deaths (2000)</b>			
Number of deaths due to suicide and self-harm	264	75	339
Per cent of all injury deaths for emerging adults	30.21	26.41	29.27
Adjusted rate per 100,000	19.10	5.66	12.53

Of these, 1,989 were males and 3,517 females. In FY 1999–2000, the female to male ratio of hospitalisations due to suicide and self-harm was 1.77:1. Despite the greater number of hospitalisations occurring for females, the number and rate of deaths per 100,000 is much greater in males. In the calendar year 2000, 3.5 times more deaths occurred in males than females as a result of suicide and self-harm injuries.

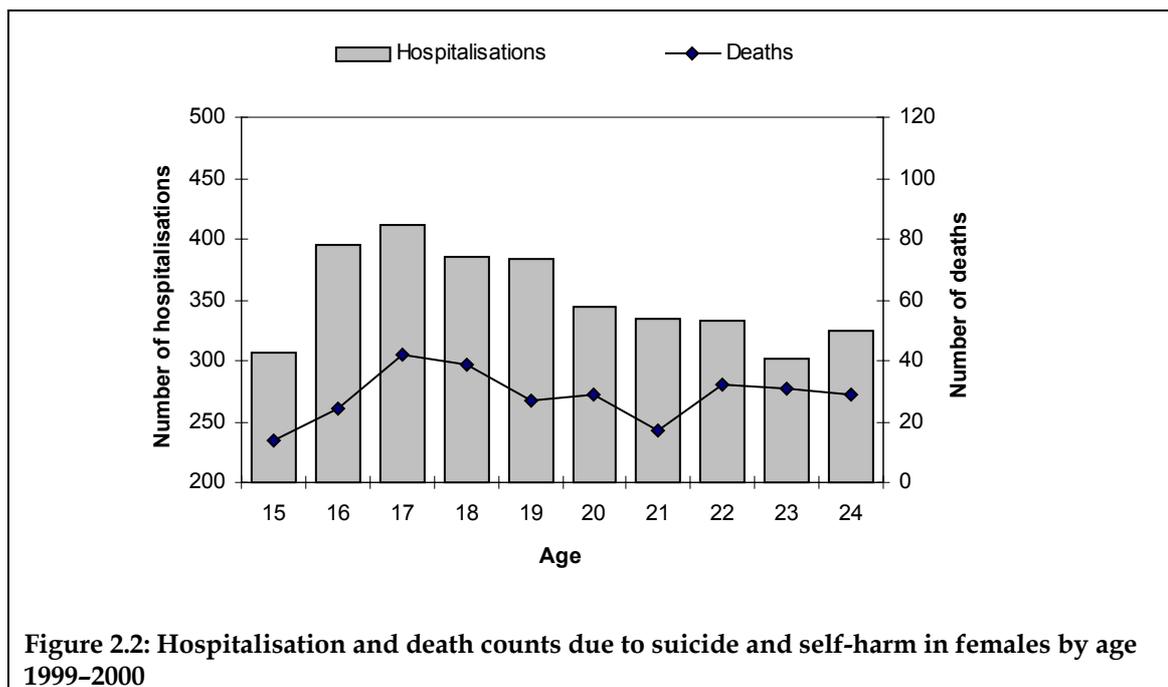
The pattern of hospitalisation and deaths between males and females across the developmental span of emerging adulthood is best illustrated graphically. Figure 2.1 presents a comparison of hospitalisation and death counts for males at each single year of age. Numbers of deaths rise nearly four-fold from 15–18 years, after which case numbers vary much less. The trend for hospitalisations is broadly similar but less pronounced, case numbers rising by a smaller proportion and less steeply, from ages 15–20 years.



**Figure 2.1: Hospitalisation and death counts due to suicide and self-harm in males by age 1999–2000**

In contrast, the pattern of suicide and self-harm hospitalisations and deaths in females in this age-range is quite different (Figure 2.2). The number of female suicide deaths in 2000 at age 15 was half that for males. Like males, the number of female suicides was 3 times as high at age 17 as at age 15, but (unlike males) the number of deaths per year of age was lower at older ages. The number of females hospitalised for suicide and self-harm also peaked at age 17 years, but it was high (and much higher than male case numbers) throughout the age range considered.

Some of the differences can be explained by the choice of suicide method with males often choosing more lethal means of suicide than females (Steenkamp & Harrison 2000, Wilkinson & Gunnell 2000).



## Alcohol and injury in emerging adults

The inclusion of alcohol as a key issue within the area of emerging adults as well as assigning alcohol and injury as a priority area in its own right is a reflection of the likely high incidence of alcohol related injury in this cohort (Australian Institute of Health and Welfare 2002). It is during this stage of life that use of alcohol is most likely to begin, and opportunities exist to encourage patterns of use which do not raise risks of sustaining injury. Of particular concern is the relationship between alcohol-related injury and young men (Steenkamp et al 2002). The precise nature of the relationship between alcohol and injury in emerging adults is presently difficult to describe, largely due to data limitations. However, information is improving, especially for fatal injuries (Driscoll et al 2003).

Routine information on alcohol and its relationship to injury is limited to a drugs indicator flag present in the mortality data. The limitations of the indicator flag are discussed more fully under the priority section on alcohol and injury. We have used it here as the best available indicator in routine injury data sources, though one that requires validation.

The drugs indicator flag identifies whether a death is:

- independent of alcohol or drug involvement;
- smoking related;
- alcohol related;
- drug other than alcohol or tobacco related;
- smoking and alcohol related;
- smoking and drug other than alcohol related;
- alcohol and drug other than tobacco related; or
- a combination of smoking, alcohol and other drugs.

Cases were selected for analysis if alcohol was a contributory factor either alone or in combination with another drug category. In the calendar year 2000, 1,084 deaths were identified in the total population where alcohol was present (see Table 2.4). Injury deaths flagged as associated with alcohol were more numerous for males than females, and made up a larger percentage of all injury deaths. This pattern was very similar for the injury deaths in the total population, and for the emerging adult age-group.

**Table 2.4: Deaths flagged as Alcohol-related deaths by gender, Australia 2000**

	Male	Female	Persons
<b>Total population (all ages)</b>			
Injury deaths where flag indicates alcohol (cases)	850	234	1,084
Flagged cases as percentage of all injury deaths	15%	9%	13%
<b>Emerging adults (ages 15–24 years)</b>			
Injury deaths where flag indicates alcohol (cases)	134	24	158
Flagged cases as percentage of all injury deaths	15%	8%	14%

While the number of cases is small and the validity of the indicator not confirmed, it is still of interest to examine the pattern of injury deaths flagged as being alcohol-related within the emerging adults age range. Figure 2.3 shows numbers of alcohol-flagged injury deaths by gender and single year of age.

The percentage of injury deaths that are flagged as alcohol-related increased with age within the emerging adult age group. Considered in terms of 5-year age groups (15–19 and 20–24 years) proportions of all injury deaths flagged as alcohol-related were 12% and 18% for males, and 5% and 12% for females.



**Figure 2.3: Deaths flagged as alcohol related deaths by gender and single year of age, Australia 2000**

## Work-related injury in emerging adults

Work-related injury is a significant problem in the emerging adult population (National Occupational Health and Safety Commission 1998). Data from emergency departments suggest that injury to young workers is a significant issue (Moller 1995). In support of this, a Queensland publication identified that almost half of all workplace injuries occurred in young people aged 15–29 years (Queensland Injury Surveillance Unit 1999). The rate of fatal workplace injury rises with workers age to peak in the emerging adult range (National Occupational Health and Safety Commission 1998).

Until recent years, almost no useful capacity to identify work-related injury cases among all cases was provided by either the routine deaths data collection or the hospital data collection. The tenth revision of ICD includes an extension to the classification of external causes designed to record certain types of activity at the time of injury. One of the categories is injury 'While working for income'. In principle, information based on this item is now available for deaths and for hospitalised cases. However, activity data from both sources include large proportions of cases in which activity is not specified, leaving considerable doubt about the completeness of collection, and neither source has been formally validated.

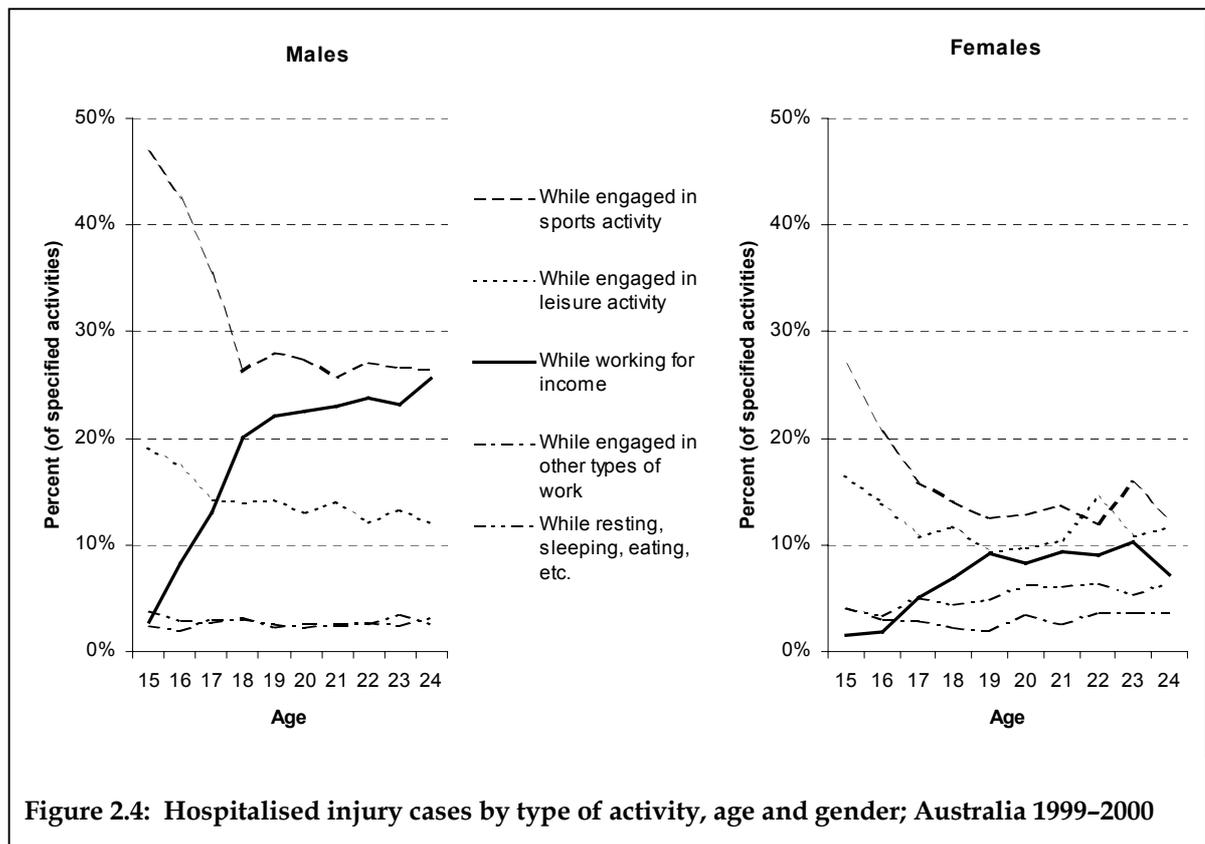


Figure 2.4 shows proportions of hospitalised injury cases in Australia (1999–2000) coded to each specified type of activity, by single year of age and gender. Activity was recorded as specified for 52% of male cases and 44% of female cases, and percentages in the figure are limited to these cases.

As might be expected, work-related injuries become markedly more prominent at late teen-ages, when transition from school to work commonly occurs. Cases recorded as work-related were more prominent for males than females. A preponderance of male cases is also found, for example, among work-related fatal injuries, and is considered to

be mainly due to differences in exposure to hazards (i.e. in general, the more hazardous occupations are mainly undertaken by men).

## **Cross cutting issues**

### *Monitoring and maintaining successes*

One of the important aspects of monitoring and maintaining successes in injury reduction is the development of surveillance systems that provide accurate and valid data. Without such data it is nearly impossible to measure the impact of interventions. Within the area of injury and emerging adults some of the challenges facing researchers and policy developers are the inadequacies of the current surveillance systems particularly with respect to alcohol use.

Prior to a success monitoring system being possible, work needs to be done on the validity and reliability of basic data collections.

### *Defining and measuring severity.*

The issues relevant to emerging adults are largely those that apply to severity measurement generally. Injury in emerging adults can have an enormous impact on the individual, the family of the victim and the health care sector. Developing predictive models of the needs, in terms of on-going health and financial support required by injured emerging adults is an important goal and one that can be facilitated by the development of more valid and reliable severity indicators. In order to develop such indicators more work needs to be conducted on gathering information on the risk factors associated with injury in emerging adults as well as potential protective factors. The latter, in particular, may lead to more effective prevention strategies by assisting emerging adults to take control of their own vulnerability to injury.

### *Equity*

Economically and socially disadvantaged emerging adults have high rates of death and hospitalisation due to injury and illness. In particular, males aged between 15–24 have significantly higher injury death rates than females. Young males are 88% more likely to report injuries than young women (Mathers 1996).

Given the imbalance between socioeconomically disadvantaged emerging adults and other young Australians, equitable access to prevention and intervention programs is an important consideration.

### *Partnership development.*

There are a number of opportunities for collaboration among different policy areas, for example with the National Occupational Health and Safety Commission around injury prevention in the workplace among the young employed. Within the area of alcohol and injury, particular attention should be paid to collaborative work aimed at understanding the role risk taking plays in conjunction with alcohol use and road safety.

## Discussion

The injury profile of emerging adults reveals a number of differences when compared to the general population. The developmental stage representing the transition from independent adolescence to young adulthood is marked by different patterns of injury and requires a sophisticated approach to injury prevention and intervention.

Investigations into both protective and risk factors contributing to injury are needed and exploring alternative means of information collection, perhaps through CATI surveys aimed directly at the population of interest, should be considered.

Emerging adults are over represented in a number of injury areas including transport, violence, pharmaceutical poisoning and suicide and self-harm. In particular the differences between males and females in suicide and self-harm require increased attention to assist in the design of gender specific intervention and prevention programs.

Opportunities for collaboration are available particularly in the area of road transport and workplace safety.

# Overview: The Elderly (75+)

- Elderly people over the age of 75 account for the largest proportion of all hospitalisations (16%) and deaths (21%) from injury in Australia.
- Falls are the most common cause of serious injury among elderly Australians, but other areas such as complications of surgical and medical care, pharmaceutical poisoning and transport injury also result in a large number of hospital admissions and deaths.
- Key issues include falls, pharmaceutical poisoning and complications of surgical and medical care, intervention evaluation (e.g. exercise and balance programs for falls prevention), severity measurement, database development to support evaluation and monitoring as well as fostering a community approach.
- The likelihood of continued political and economic support for maintaining a focus on injury prevention in the elderly is high, particularly given the ageing population in Australia.

## Reasons for inclusion

The elderly are defined here as persons over the age of 75 and the focus on an older cohort recognises the specific needs of this at-risk group and for the first time in injury prevention priority setting distinguishes them as a group worthy of attention in their own right. This population group has been chosen as a priority area because:

- Elderly individuals account for a large proportion of hospital admissions and deaths in a number of different injury areas; and
- Injury rates and death rates from injury in individuals aged over 75 are generally higher than their retirement-age counterparts (Cripps et al 2002).

One of the 4 priorities for 2001–2003 was falls in older people over the age of 65. Given the ageing population and the continued over representation of falls injuries in hospitalisations data the need for prioritising falls injury prevention in an older sub-population is apparent. The targeting of elderly people over the age of 75 will allow programs developed during the 2001–2003 period to be extended into older age groups.

The indicators for priority area inclusion clearly identify the elderly (75+) as a priority at-risk group. The likelihood of continued political and economic support for maintaining a focus on injury prevention in the elderly (75+) is high. The current availability of proven and potential interventions indicates that some success in injury prevention should be achievable in a reasonable timeframe particularly given the advances already made in the specific area of falls in the elderly (National Injury Prevention Advisory Council 1999).

## Surveillance and infrastructure issues

The current mortality and morbidity data sets offer an opportunity for greater analysis and monitoring of injury in all at-risk groups. Within the elderly (75+) group, the emphasis is on the refinement of current indicators of severity, as well as risk factor and protective factor identification.

The development of new sources of information may come from within the health area or through collaboration with other policy domains. For example, further refinement of the 'alcohol and other drugs' indicator in current mortality data to identify medications contraindicated for operation of a motor vehicle coupled with information from road transport areas may contribute to planning and intervention around road traffic injury prevention in the elderly.

## Surveillance Indicators

Basic information about the incidence and rate of injury in the elderly can be found within the mortality and morbidity data sets. As in the case of children and emerging adults, greater refinement and utilisation of existing variables will assist in the identification of protective and risk factors for injury.

The following sections report on the counts and rates of hospitalisations and deaths for people aged 75+ years in Australia. A detailed discussion of relevant data issues can be found in Appendix 1.

## Hospitalisations and deaths

In the financial year 1999–00 there was a total of 66,319 hospital separations from public, private and psychiatric hospitals in Australia in the elderly (75+) due to injury and poisoning from external causes (Australian Institute of Health and Welfare 2001a). Of all hospitalisations for injury in 1999–2000 the elderly (75+) accounted for 16% of the total number (see Table 3.1).

**Table 3.1: Key injury indicators for hospitalisations and deaths in the elderly (75+) 1999–2000**

	Males	Females	Persons
<b>Hospitalisations 1999–2000</b>			
Case counts	21,177	45,142	66,319
Percent of all injury hospitalisations	8.9	25.8	16.0
Age adjusted rate per 100,000 population	5,333.6	6,736.7	6,221.0
<b>Deaths 2000</b>			
Case counts	754	946	1,700
Percent of all injury deaths	13.7	36.7	21.0
Age adjusted rate per 100,000 population	188.4	128.6	151.2

Females over the age of 75 account for almost 3 times the percentage of all injury hospitalisations compared to males. However when the figures are adjusted for the proportion of men and women in this age group the difference is greatly reduced.

In the calendar year 2000, 21% of all deaths were attributable to the elderly (75+) group. The pattern of deaths in the elderly (75+) differs from that of hospitalisations. As can be seen the rate of death from injury and poisoning for men is much higher when adjusted for age.

## Patterns of injury and poisoning in the elderly (75+)

The pattern of deaths and hospitalisations occurring in the elderly (75+) as a result of injury and poisoning can be seen in Table 3.2. Falls predominate for both deaths and hospital cases. (Note that falls have been defined here so as to maintain comparability with ICD9 data – see Appendix 1 for a discussion of data issues). Putting aside the residual category ‘other unintentional’, the causes most frequently recorded as the underlying cause of injury death are falls, transportation, and intentional self-inflicted injury. Complications of surgical and medical care ranked next (not, however, that this cause is recorded much more frequently as a ‘multiple cause of death’ than as the underlying cause). For hospitalised cases, the most frequent types, after falls, are complications of surgical and medical care and transportation.

**Table 3.2: Number of cases of hospitalisation and deaths attributed to injury and poisoning in the elderly (75+) 1999–2000**

	Deaths (2000)			Hospitalisations (1999–2000)		
	Males	Females	Persons	Males	Females	Persons
Transportation	107	72	179	955	1,322	2,277
Drowning & near-drowning	8	4	12	3	1	4
Poisoning, pharmaceuticals	5	10	15	147	249	396
Poisoning, other substances	0	0	0	51	48	99
Falls	373	685	1,058	10,705	33,382	44,087
Fires/burns/scalds	14	12	26	124	170	294
Other unintentional	92	89	181	1,843	2,623	4,466
Intentional, self-harm	113	30	143	149	229	378
Intentional, inflicted by another	4	6	10	79	9	169
Undetermined intent	1	1	2	26	40	66
Complications of surgical and medical care	37	37	74	7,094	6,988	14,082
<b>Total</b>	<b>754</b>	<b>946</b>	<b>1,700</b>	<b>21,176</b>	<b>45,142</b>	<b>66,318</b>

Note: See Appendix 1 for equivalent ICD-10 external cause codes, hospitalisation totals excludes cases coded as ‘not external cause’. Shaded areas represent the 3 highest causes of death and hospitalisation in emerging adults.

## Falls in the elderly (75+)

Falls in the elderly was chosen as a priority in the 2001–2003 Plan on the grounds of a strong burden of injury evidence, a demonstrated high cost to the health system, as well as a strong evidence base of promising and proven interventions that could be implemented by the health sector (Commonwealth Department of Health and Aged Care 2001).

The problem of elderly falls is destined to grow over coming decades. ABS projections suggest that the proportion of older people in general will double between 1999 and 2051. The use of both age- and gender-specific analysis indicate that resources required to treat falls can be expected to increase – for NSW it is estimated that resources will need to be doubled (Moller 1998). This research also shows that most of the demand

will stem from women aged 75 years or more (Cripps & Carman 2001, Cripps et al 2002).

Hospitalisations due to accidental falls accounted for 44,087 episodes of hospital care in people aged 75 years and above, which was 66.5% of all injury-related hospitalisations for this age group (see Table 3.3). Of these, 10,705 (24.3%) were to males and 33,382 (75.7%) to females. In FY 1999–2000, the female to male ratio of hospitalisations due to accidental falls in people aged 75 years and above was approximately 3:1. The average length of stay in hospital was the same for both males (9.9 days) and females (9.9 days). (For comparison, the overall average length of stay for hospitalised injury at all ages was 4.2 days.)

**Table 3.3 Hospitalisations and deaths due to accidental falls in the elderly (75+).**

	Male	Female	Persons
<b>Hospitalisations (1999–2000)</b>			
Number of episodes of hospital care reported	10,705	33,382	44,087
Per cent of all injury hospitalisations for the elderly	50.5	73.9	66.5
Adjusted rate per 100,000	2,731.8	4,886.7	4,080.8
Average length of stay (days)	9.9	9.9	10.0
<b>Deaths (2000)</b>			
Number of deaths due to falls	373	685	1,058
Per cent of all injury deaths for the elderly	49.5	72.4	62.2
Adjusted rate per 100,000	94.1	89.9	92.1

In the calendar year 2000 1,058 deaths in the elderly (75+) were attributed to falls which accounted for 62.2% of all injury deaths in the elderly. Deaths from falls were slightly more prevalent in elderly males than females when adjusted for age. Table 3.3 is restricted to injury deaths as they are usually defined (i.e. 'Underlying Cause' is an external cause code). In addition to these deaths, about as many again occurred where 'Underlying Cause' is not an external cause, but a fall, or a fracture likely to be due to a fall, was recorded as a 'Multiple cause' of death. The extent to which these potential additional cases can be regarded as similar to those in Table 3.3 is not clear.

## **Complications of surgical and medical care in the elderly (75+)**

Due to their over-representation in the hospital system the elderly are more likely to be exposed to injury within a hospital setting and complications of surgical and medical care accounts for a large proportion of hospitalisations among this age group.

Hospitalisations due to complications of surgical and medical care accounted for 14,082 episodes of hospital care in people aged 75 years and above, which was 21.2% of all injury-related hospitalisations for this age group (see Table 3.4).

**Table 3.4: Hospitalisations and deaths due to complications of surgical and medical care in the elderly (75+)**

	Male	Female	Persons
<b>Hospitalisations (1999–2000)</b>			
Number of episodes of hospital care reported	7,094	6,988	14,082
Per cent of all injury hospitalisations for the elderly	33.5	15.5	21.2
Adjusted rate per 100,000	1,761.2	1,110.0	1,360.5
Average length of stay (days)	8.4	9.8	9.1
<b>Deaths (2000)</b>			
Number of deaths reported	37	37	74
Per cent of all injury deaths for the elderly	4.9	3.9	4.3
Adjusted rate per 100,000	9.3	5.1	6.6

Of these, 7,094 (33.5%) were attributable to males and 6,988 (15.5%) to females. Despite the similar numbers of hospitalisation after adjusting for age, the rate of hospitalisation for males (1,761.2) per 100,000 was higher than that of females (1,110.0). Similar to falls, the average length of stay in hospital for this age group was quite high.

The number of deaths for which the Underlying Cause of Death was attributed to complications of surgical and medical care in the calendar year 2000 was relatively small (n = 74) with the number of deaths equal between males and females. After adjusting for age, the number of deaths in elderly males (9.3) from medical misadventure was higher than elderly females (5.1). Many more deaths, mostly cases falling outside the usual definition of 'injury death', have complications of surgical and medical care recorded as a 'multiple cause of death'.

## Pharmaceutical poisoning in the elderly (75+)

The elderly are at considerable risk from pharmaceutical drug-related morbidity and mortality through accidental poisoning. There are multiple risk factors associated with pharmaceutical poisoning and the elderly including pharmacokinetic factors (factors which affect the concentration and distribution of medicines), pharmacodynamic factors (the effect of medicines at the site of action), physical functional status, cognitive functions, financial factors and the complications of multiple medical conditions (Moodabe 2001).

Hospitalisations due to pharmaceutical poisoning accounted for 396 episodes of hospital care in people aged 75 years and above, which was 0.6% of all injury-related hospitalisations for this age group (see Table 3.5). Of these, 147 (0.7%) were attributable to males and 250 (0.5%) to females. After adjusting for age, male and female rates of hospitalisation were similar with 36.9 and 38.7 hospitalisations per 100,000 respectively.

**Table 3.5: Hospitalisations and deaths due to pharmaceutical poisoning in the elderly (75+)**

	Male	Female	Persons
<b>Hospitalisations (1999–2000)</b>			
Number of episodes of hospital care reported	147	249	396
Per cent of all injury hospitalisations for the elderly	0.7	0.5	0.6
Adjusted rate per 100,000	36.9	38.7	37.7
Average length of stay (days)	4.8	5.4	5.1
<b>Deaths (2000)</b>			
Number of deaths reported	5	10	15
Per cent of all injury deaths for the elderly	0.7	1.1	0.9
Adjusted rate per 100,000	1.3	1.5	1.4

The relative number of hospitalisations for pharmaceutical poisoning cases is small, although the average length of stay in hospital as a result is quite high. While the absolute numbers are smaller than falls injuries, there is a recognised link between the two. In particular, attention needs to be paid to poly-pharmaceutical drug use and its relationship to falls prevention. Elderly individuals taking more than 4 different medications have been found to be at increased risk of falls (Nygaard 1998, Yip & Cumming 1994). Prevention of pharmaceutical poisoning and a reduction in other injury areas that may result due to use of a large number of prescribed medications, should be readily achievable through educational campaigns and other cost-effective strategies.

Relatively few deaths are attributable to pharmaceutical poisoning in the elderly. In the calendar year 2000, only 15 deaths in the elderly (75+) were registered with pharmaceutical poisoning as the major cause of death.

## Cross cutting issues

### *Monitoring and maintaining successes*

Monitoring the incidence of injury in the elderly is one mechanism by which the successes achieved to date in injury reduction can be identified and maintained over time. Our current surveillance systems can be better utilised to assist in this process particularly given the advances in classifications offered by the most recent edition of the ICD (ICD-10). For example, the greater level of detail available on the type of substance associated with a pharmaceutical poisoning incidence has the potential to provide the basis for an incidence flag for particular types of poisoning. The successes that have been achieved in reducing pharmaceutical poisoning through unintentional drug interactions can be monitored and if increasing cases of particularly lethal drug interactions reappear, systems can be put into place to address the rise.

As with the discussions on monitoring and maintaining successes in childhood and emerging adulthood injury reduction, similar caveats apply. Prior to instigating a success monitoring system, work needs to be carried out on the validity and reliability of the mortality and morbidity data collections.

### *Defining and measuring severity*

Despite high and increasing life expectancies at birth for the general Australian population, life expectancies in the population segment aged 75 and older are relatively short. In addition, the prevalence of many chronic diseases and disabilities increases with age, and maintenance of health and wellbeing become matters of concern rather than unremarked expectations. In this context, 'injury severity' can be expected to have special meanings, especially for people in this population segment. For example, some modes of decline and death are dreaded more than others, maintenance of social independence is a very important consideration for many people, and perceptions about injury can impact on wellbeing (e.g. fear of falling can impact on independence).

### *Equity*

People in this age group are very diverse, in terms of health, and in terms of socio-economic and demographic characteristics. Effective understanding of, and prevention of, injury in this group will require attention to this diversity.

### *Partnership development.*

A whole of community approach to injury prevention in the elderly should be encouraged and supported. The Safe Communities Program appears to be one way in which injury prevention in the elderly can be achieved through collaboration with a range of stakeholders (e.g. private enterprise, local government, and government agencies). Developments in several jurisdictions concerning falls prevention provide a good basis.

## **Discussion**

Elderly individuals account for a large proportion of hospital admissions and deaths in a number of different injury areas. The following 4 areas have been identified as priority areas:

- Falls;
- Complications of surgical and medical care;
- Maximising the use of existing data and identification and development of new sources of information, including development of appropriate severity measures; and
- Fostering a community approach to injury prevention.

Elderly individuals aged 75+ are a particularly vulnerable population when it comes to injury. As a result of Australia's ageing population there is a sense of urgency to put systems in place to reduce the cost to the individual and the health care system as numbers expand. The opportunities to build on previous work in the elderly particularly in the area of falls prevention, needs to be seized. An opportunity to lay the groundwork for future surveillance of injury in the elderly should also be taken up in order to assess the effectiveness and cost benefits of prevention and intervention programs already in place. Developments flowing from the 2001-2003 priority topic 'falls in older people' provides a foundation for this work.

# Overview: Aboriginal and Torres Strait Islander Populations

- Rates of injury mortality and hospital admission due to injury are substantially higher for Aboriginal and Torres Strait Islanders than for the Australian population as a whole.
- Injury is the second leading cause of death in Aboriginal and Torres Strait Islander people, the rate of hospitalisation is higher in every injury category except drowning when compared to the non-Indigenous population.
- Key issues to address include alcohol and other drug misuse, problems with accurate enumeration of Aboriginal and Torres Strait Islander people (in population data and injury case data), and infrastructure building for surveillance and prevention of injury.
- An implementation plan for injury prevention in Aboriginal and Torres Strait Islander communities is being developed suggesting a mechanism for partnership.

## Reasons for inclusion

Injury prevention and intervention in Aboriginal and Torres Strait Islander populations is still in its infancy from a policy point of view. Inclusion of the Aboriginal and Torres Strait Islander population as a priority topic recognises the need to 'kick start' injury prevention and intervention in this area, contribute to its 'strategic beginnings' and promote partnership with the Aboriginal and Torres Strait Islander Injury Prevention Action Committee (ATSIIPAC). The inclusion of the Aboriginal and Torres Strait Islander population will also promote partnership building more broadly, with organisations controlled by Aboriginal and Torres Strait Islander people.

Recognition of Aboriginal and Torres Strait Islander populations as a priority area was also influenced by the following factors:

- High rates of injury in Aboriginal and Torres Strait Islander populations; and
- The lack of targeted intervention and prevention programs.

The 2001–2003 Plan recognised the embryonic state of injury prevention and intervention within the Aboriginal and Torres Strait Islander population and led to an undertaking to develop a complementary Plan. ATSIIPAC's role in providing a conduit for intensive consultation and information gathering around injury prevention within Aboriginal and Torres Strait Islander populations has been an important step and the findings of the Indigenous Injury Prevention Activity Project (In preparation, Department of Health and Ageing, 2003) will contribute greatly to addressing injury prevention and intervention.

Selecting Aboriginal and Torres Strait Islander populations as a priority area for 2004 and beyond returns injury prevention in this area to the National arena and provides more opportunity for collaboration.

The focus within this priority area needs to be on laying the groundwork for future collaborative intervention/prevention strategies, identifying limitations in the data and

suggesting alternative means for monitoring as well as working with the concept of community health. Within this area aspects of data collection and monitoring should be a priority.

## **Surveillance and infrastructure issues**

Available information is sufficient to show that serious injury (like many other conditions affecting health and longevity) is sustained by Aboriginal and Torres Strait Islander Australians at much higher rates than is the case for the rest of the population (Harrison et al 2001).

In order to achieve the fundamental aim of eliminating the higher rates of injury in Aboriginal and Torres Strait Islander populations priority needs to be given to measuring and monitoring progress (or lack of progress) in intervention and prevention programs. More specifically we need answers to the following types of questions; which injury-related problems in which parts of the Aboriginal and Torres Strait Islander populations in which parts of Australia are improving? Which are not? How do these trends relate to investment in risk factors, prevention or services?

These questions are particularly difficult to answer for Aboriginal and Torres Strait Islander populations. The principal reason is poor and variable identification of which of the few per cent of records in the main routine data collections correspond to Aboriginal and Torres Strait Islander people. The quality of identification (and information about quality) varies between parts of Australia, between data collections (e.g. deaths, hospital records, census) and over time. The upshot is that estimates of population-based rates of mortality and morbidity, and particularly estimates of trends in these rates, are too uncertain for many purposes. Despite efforts in recent years to reduce this problem, continuing concern is reflected in the common practice of restricting statistical reports of Aboriginal and Torres Strait Islander injury or disease to 4 jurisdictions, Queensland, Western Australia, South Australia and the Northern Territory. (This practice has been followed in this report.)

While this issue is not specific to injury, some aspects of it are of particular relevance. For example, coroners are the main source of information about injury deaths, and this has prompted close involvement of the injury prevention sector in the development of the National Coroners Information System. The quality of Aboriginal and Torres Strait Islander identification in this data source is particularly important because such a large proportion of (recognised) deaths of Aboriginal and Torres Strait Islander people are referred to a coroner (33% of deaths during 1997–2000, compared with 14% of deaths not identified as Aboriginal and Torres Strait Islander) (Strong et al 1998).

## **Surveillance Indicators**

The limitations of the existing data sources for enumerating Aboriginal and Torres Strait Islander injury cases needs to be acknowledged but given the dearth of information available it is nevertheless important to examine the available data (Harrison et al 2001). As mentioned, in keeping with common practice, data collected from New South Wales, Victoria, the Australian Capital Territory and Tasmania have been excluded from this analysis. Aboriginal and Torres Strait Islander statistics presented here are derived from data collected in South Australia, Western Australia, Queensland and the Northern Territory. Data for these jurisdictions are likely to be more complete, though still subject to uncertainties.

## Hospitalisations and deaths

In the financial year 1999–00 a total of 12,363 hospital separations from public, private and psychiatric hospitals in Australia that were due to injury and poisoning were recorded as involving Aboriginal and Torres Strait Islander persons (Australian Institute of Health and Welfare 2001a). Hospitalisations of Aboriginal and Torres Strait Islander people accounted for 7.2% of the total number of injury hospitalisations in this year (see Table 4.1), a disproportionate figure given that Aboriginal and Torres Strait Islander people are estimated to represent about 2% of the total Australian population.

Aboriginal and Torres Strait Islander males had a higher rate of injury than Aboriginal and Torres Strait Islander females, both in absolute numbers and in terms of the age-standardised rate per 100,000 population. However, injuries sustained by Aboriginal and Torres Strait Islander females represented a higher proportion of the total number of female injury and poisoning hospital separations. Even so, the rate of injury-related hospitalisation for both Aboriginal and Torres Strait Islander males and females is much higher than that of the general population (persons age adjusted rate for all injuries in the 4 states included here = 2416.1 per 100,000 population). This excessive rate of injury incidence has been consistently observed for a number of years (Australian Bureau of Statistics & Australian Institute of Health and Welfare 2001, Moller 1996)

**Table 4.1: Key injury indicators for hospitalisations and deaths in the Aboriginal and Torres Strait Islander population**

	<b>Males</b>	<b>Females</b>	<b>Persons</b>
<b>Hospitalisations (1999–2000)</b>			
Case counts	6,687	5,676	12,363
Percent of all injury hospitalisations	6.6	8.0	7.2
Age adjusted rate per 100,000 population	5,735.5	4,801.4	5,260.8
<b>Deaths (2000)</b>			
Case counts	175	72	247
Percent of all injury deaths	7.5	6.7	7.3
Age adjusted rate per 100,000 population	157.6	65.2	109.7

Note: Restricted to Western Australia, South Australia, Queensland and the Northern Territory only. See text above and the data issues section.

Shaded areas represent the 3 highest causes of death and hospitalisation in emerging adults.

Similar to the percentage of hospitalisations due to injury and poisoning, 7.3% of all deaths in the calendar year 2000 were attributable to the Aboriginal and Torres Strait Islander population. Again, this figure is incongruent with the actual proportion of Aboriginal and Torres Strait Islander people in the Australian population. Here though, Aboriginal and Torres Strait Islander males have a far higher rate of death per 100,000 population than females and represent a higher proportion of the total number of male deaths than female deaths. This pattern has been observed previously, as has the excessive number of injury-related deaths in the Aboriginal and Torres Strait Islander population compared to the Australian population in general (Australian Bureau of Statistics & Australian Institute of Health and Welfare 2001).

## Patterns of injury and poisoning in the Aboriginal and Torres Strait Islander population

The pattern of deaths and hospitalisations occurring in the Aboriginal and Torres Strait Islander population as a result of injury and poisoning can be seen in Table 4.2.

Excluding cases which fall into the 'other unintentional' category, the greatest number of hospitalisations are attributable to intentional injuries inflicted by another person, followed by falls and complications of surgical and medical care. This pattern is the same as that observed for the previous year's data (Australian Bureau of Statistics & Australian Institute of Health and Welfare 2001).

**Table 4.2: Number of cases of hospitalisation and deaths attributed to injury and poisoning in the Aboriginal and Torres Strait Islander population\***

	Deaths (2000)			Hospitalisations (1999–2000)		
	Males	Females	Persons	Males	Females	Persons
Transportation	43	18	61	724	344	1,068
Drowning & near-drowning	6	4	10	9	16	25
Poisoning, pharmaceuticals	10	4	14	115	145	260
Poisoning, other substances	2	3	5	46	49	95
Falls	3	2	5	1,165	827	1,992
Fires/burns/scalds	1	3	4	205	114	319
Other unintentional	31	9	40	1,691	970	2,661
Intentional, self-harm	56	10	66	298	312	610
Intentional, inflicted by another	21	17	38	1,805	2,121	3,926
Undetermined intent	2	1	3	96	87	183
Complications of surgical and medical care	0	1	1	513	683	1,196
<b>Total</b>	<b>175</b>	<b>72</b>	<b>247</b>	<b>6,667</b>	<b>5,668</b>	<b>12,335</b>

\* Restricted to Western Australia, South Australia, Queensland and the Northern Territory only.

Note: See Appendix 1 for equivalent ICD-10 external cause codes, hospitalisation totals excludes cases coded as 'not external cause', Shaded areas represent the 3 highest causes of death and hospitalisation in emerging adults.

The pattern of causes relating to deaths is quite different to that of hospitalisations. While intentional self harm is recorded as the cause for less than 5% of all Aboriginal and Torres Strait Islander hospitalisations, it is shown to be the leading cause of death in this population, being listed as the cause of death in more than 27% of Aboriginal and Torres Strait Islander deaths in 1999–00. Similarly, the second most common cause of death, transportation, represents a much higher proportion of deaths than it does as a cause of hospitalisations. The third most common cause of death in the Aboriginal and Torres Strait Islander population in 1999–00 excluding "other unintentional" deaths, was attributable to intentional injuries inflicted by another person.

## Alcohol and injury

Surveys by the ABS and the AIHW indicate that while Aboriginal and Torres Strait Islander people are less likely to consume alcohol, a higher proportion of the Aboriginal and Torres Strait Islander population, particularly Aboriginal and Torres

Strait Islander males, are likely to be classified as 'high risk' in relation to alcohol consumption than in the non-Aboriginal and Torres Strait Islander population (Australian Bureau of Statistics & Australian Institute of Health and Welfare 2001). Other studies have proven that alcohol is a common contributing factor to the incidence of injury, particularly transport-related injuries, assaults and intentionally self-inflicted injuries (Australian Bureau of Statistics & Australian Institute of Health and Welfare 2001).

It is suggested that alcohol plays a role in more than half the fatal road accidents in the Northern Territory, where a great proportion of Australia's Aboriginal and Torres Strait Islander population resides (Condon et al 2001). These types of injuries are 3 of the most common causes of injury-related deaths and hospitalisations in the Aboriginal and Torres Strait Islander population and as such, injury prevention programs, which concomitantly target excessive alcohol consumption, may prove strategic.

As discussed in the emerging adults section, routine information on alcohol and its relationship to injury is limited to a drugs indicator flag present in the mortality data. The flag itself requires further validation and should only be used as a rough indicator. To recap, the drugs indicator flag identifies whether a death is:

- independent of alcohol or drug involvement;
- smoking related;
- alcohol related;
- drug other than alcohol or tobacco related;
- smoking and alcohol related;
- smoking and drug other than alcohol related;
- alcohol and drug other than tobacco related; or
- a combination of smoking, alcohol and other drugs.

While there are distinct limitations to the data available that describes the involvement of alcohol and injury in the Aboriginal and Torres Strait Islander population it is nevertheless an important exercise to examine what is available. Table 4.3 provides information on the involvement of alcohol in injury related deaths in Australia and provides a comparison between Aboriginal and Torres Strait Islander and non-Aboriginal and Torres Strait Islander individuals for South Australia, Western Australia, Queensland and the Northern Territory. While a similar percentage of drug-related deaths can be seen between Aboriginal and Torres Strait Islander and non-Aboriginal and Torres Strait Islander individuals the percentage of alcohol only cases is more than 4 times as great for Aboriginal and Torres Strait Islander individuals.

**Table 4.3 Deaths flagged as Alcohol-related deaths by Aboriginal and Torres Strait Islander status, Australia 2000.**

	<b>Aboriginal and Torres Strait Islander</b>	<b>Non-Aboriginal and Torres Strait Islander</b>
Total number of deaths	247	2,377
Flagged cases as percentage of all injury deaths	33.6%	32.8%
Injury deaths where flag indicates alcohol only (cases)	56	161
Alcohol only flagged cases as percentage of all injury deaths	22.7%	5.1%

## Cross cutting issues

### *Monitoring and maintaining successes*

One of the primary aims of including Aboriginal and Torres Strait Islander people as an injury priority group is to assist with its strategic beginnings. Their inclusion provides a unique opportunity to establish data bases that will assist in the monitoring and maintenance of future successes in injury prevention and intervention.

Applicable to issues surrounding monitoring and maintenance as well as other aspects of surveillance is the issue of reliability and validity of the current indicators of Aboriginal and Torres Strait Islander status and other highly relevant indicators such as the involvement of alcohol in mortality and morbidity. Considerable work needs to be done in both these areas before any meaningful enumeration of Aboriginal and Torres Strait Islander injury can occur to a level where monitoring and maintaining successes is possible.

### *Defining and measuring severity*

As with defining and measuring severity in the elderly population, consideration needs to be given to the impact particular injuries may have on Aboriginal and Torres Strait Islander populations. Simple severity measures in current widespread use may be at best inappropriate and at worse useless when applied to the Aboriginal and Torres Strait Islander population for planning and policy around injury. More culturally relevant indicators need to be developed in partnership with the Aboriginal and Torres Strait Islander community.

### *Equity*

Much has been written concerning the socioeconomic disadvantage facing Aboriginal and Torres Strait Islander individuals. Equity of access to affordable and culturally appropriate injury prevention and intervention programs should be a consideration for all stakeholders.

### *Partnership development*

The inclusion of the Aboriginal and Torres Strait Islander population in the injury priorities, aims to foster partnerships between injury general prevention programs and programs concerned with Aboriginal and Torres Strait Islander health and welfare. ATSIIPAC will provide the primary avenue at a National level for engagement with broader activities concerning Aboriginal and Torres Strait Islander health and welfare, and engagement with relevant Aboriginal and Torres Strait Islander-controlled organisations.

The Cooperative Research Centre on Aboriginal Health (CRC-AH) provides a major opportunity for partnerships in injury prevention and control. The Department of Health and Ageing, through the Office of Aboriginal and Torres Strait Islander Health, is an industry partner in the CRC-AH, along with 3 other industry partners and 8 are research partners. An injury prevention program forms part of the CRC's business plan.

## Discussion

Injury is the second leading cause of death in Aboriginal and Torres Strait Islander people, the rate of hospitalisation is higher in every injury category except drowning when compared to the non-Indigenous population. Several issues have been highlighted including the need to address alcohol and other drug misuse, problems with accurate enumeration of Aboriginal and Torres Strait Islander people (in population data and injury case data), and infrastructure building for surveillance and prevention of injury.

There is a demonstrable need for injury prevention and intervention in Aboriginal and Torres Strait Islander populations. While there are significant limitations in the current surveillance systems, what information does exist underscores this need. Inclusion of the Aboriginal and Torres Strait Islander population as a priority topic recognises the need to contribute to its 'strategic beginnings', not only from a surveillance perspective but also employing a collaborative approach. Opportunities for collaboration lie not only with ATSIIPAC and the CRC-AH, but also with the Aboriginal and Torres Strait Islander communities themselves.

# Overview: Rural & Remote Populations

- Rates of death and hospitalisation due to injury are relatively high in the rural and remote population of Australia, with rates increasing with distance from metropolitan centres.
- Rates of suicide and self-harm and road traffic accidents are high among rural youth, particularly males.
- Key issues to address include remoteness and relatively small populations as factors affecting injury surveillance, research and intervention, suicide and self-harm, farm-related injuries, and capacity building within rural communities.
- Support for injury prevention and intervention in rural and remote populations has grown, particularly through groups such as Farmsafe Australia.

## Reasons for inclusion

Rural and remote communities are an important focus for injury prevention and intervention. This population group warrants consideration because:

- Population groups living in rural and remote areas have unique health concerns that relate directly to their living conditions, social isolation and distance from health services; and
- Partnership building is particularly important given the sparse population, rapidly shrinking infrastructure and ageing population.

While rural and remote populations were highlighted as a population at risk of injury in the 2001–2003 Plan, none of the 4 priority topics selected specifically addressed injury in rural and remote populations. Within the injury arena there are several specific injury areas (e.g. transport, suicide and self-harm) which are of particular concern in rural and remote populations due to their high rates of occurrence.

## Special considerations

Injury prevention and intervention in rural and remote communities poses a number of challenges to health and policy professionals. A range of factors contributes to the increased rate of injury and the mechanisms by which intervention and prevention programs can be delivered are greatly reduced. The following issues impact directly on the health and well being of rural and remote communities;

- geographic and social isolation, distance to health care facilities and infrastructure,
- shortage of health services,
- socioeconomic disadvantage,
- greater exposure to injury through employment,
- lower road quality and typically longer travelling times, and
- Aboriginal and Torres Strait Islander health needs.

Aboriginal and Torres Strait Islander injury issues have already been discussed in the previous priority group section but one aspect that requires further discussion is the impact of the relatively poorer health of the Aboriginal and Torres Strait Islander populations in remote areas on injury statistics. The proportion of Aboriginal and Torres Strait Islanders in rural and especially remote communities is relatively high and the health status of the Aboriginal and Torres Strait Islander community becomes worse with increasing distance from urban centres (Strong et al 1998). The proportion of Aboriginal and Torres Strait Islander members of the community is estimated to be 1% in metropolitan centres increasing to 2% in rural centres, 13% in remote centres and as high as 26% in other remote centres (Strong et al 1998). Researchers and policy makers addressing injury in remote centres need to take into account the impact that a high proportion of Aboriginal and Torres Strait Islanders within a community can have on the injury profile.

## **Surveillance and infrastructure issues**

A number of prevention and intervention strategies have been introduced over the last few years by a number of different stakeholders in rural and remote communities. In order to continue to build on the work already completed priority needs to be given to monitoring and surveillance system improvement. Greater development of surveillance systems will also allow effective evaluations of intervention and prevention programs to take place.

For example, there is an unacceptably high rate of farm related injury in rural and remote communities however there are considerable limitations to current data collections which makes the task of monitoring and evaluation extremely difficult. The National Farm Injury Data Centre recently stated that “there is no single database that holds all the information necessary to define the nature and scale of the health and safety problems of the farming community” (Fragar & Franklin 2000 p. viii).

A number of factors have been identified which may contribute to the high rates of farm injury in rural and remote areas including the high proportion of Aboriginal and Torres Strait Islander members, the predominance of hazardous industries, dependence on long distance travel, reduced access to services and factors associated with low socioeconomic status.

Three key issues for the farming population have been identified:

- fatalities due to tractor, farm machinery and child injuries;
- hospital admissions due to tractors and machinery, animals (notably horses), and motorcycles; and
- workers compensation claims from injuries as a result of tractors and machinery, animals, workshop tools, manual handling and commodity-specific hazards (Fragar & Coleman 1996b).

Establishing surveillance systems in collaboration with relevant industry partners in order to monitor variables associated with injury should be a priority.

## **Surveillance Indicators**

In the current document the categorisation of rural and remote communities is based on Rural, Remote and Metropolitan Areas (RRMA) classification derived from Statistical Local Area information prescribed for collection in the National Health Data Dictionary (Australian Institute of Health and Welfare 2001b). Rural and remote communities were defined as those areas of Australia where the population of the

nearest urban centre is less than 100,000 residents (Strong et al 1998). (See Appendix 1 Data Issues for more information.) Future analysis of rural and remote injury statistics will be undertaken using the ABS Australian Standard Geographic Classification (ASGC) Remoteness Structure.

## Hospitalisations and deaths

In the financial year 1999–2000 there was a total of 145,158 hospital separations from public, private and psychiatric hospitals in Australia of people from rural and remote regions, due to injury and poisoning (Australian Institute of Health and Welfare 2001a). Hospitalisations of people from rural and remote areas accounted for 35.1% of the total number of injury hospitalisations in this year (see Table 5.1).

**Table 5.1 Key injury indicators for hospitalisations and deaths in rural and remote areas.**

	<b>Males</b>	<b>Females</b>	<b>Persons</b>
<b>Hospitalisations (1999–2000)</b>			
Case counts	86,879	58,278	145,158
Percent of all injury hospitalisations	36.4	33.2	35.1
Age adjusted rate per 100,000 population	3,292.3	2,028.1	2,683.0
<b>Deaths (2000)</b>			
Case counts	1,935	842	2,777
Percent of all injury deaths	35.1	32.6	34.3
Age adjusted rate per 100,000 population	73.4	27.7	50.6

Males from rural and remote areas had both a higher absolute number of injuries and a higher rate of injury than females. Rates of hospitalisations due to injury were also higher for both males and females from rural and remote areas than for the general population. Males from rural and remote areas also had a much higher death rate (as well as absolute numbers) than rural females in the year 2000, and by a much larger degree than for hospitalisations.

## Patterns of injury and poisoning in rural and remote areas

Table 5.2 illustrates the pattern of causes of death and hospitalisation resulting from injury and poisoning in the rural and remote Australian population in 1999–2000. Leaving aside hospitalisations attributable to 'other unintentional' injuries, the greatest number of hospitalisations occurred as a result of falls, followed by complications of surgical and medical care, transportation and intentional injuries inflicted by others. In comparison to the rates of hospitalisation for intentional injuries inflicted by others in the general population, the rate within rural and remote communities is much higher. Potential contributing factors include increased alcohol use leading to violent behaviour, the higher proportion of Aboriginal and Torres Strait Islander people and higher domestic violence incidence.

**Table 5.2: Number of cases of hospitalisation and deaths attributed to injury and poisoning in people from rural and remote areas**

	Deaths (2000)			Hospitalisations (1999–2000)		
	Males	Females	Persons	Males	Females	Persons
Transportation	610	223	833	13,866	6,052	19,919
Drowning & near-drowning	67	15	82	129	63	192
Poisoning, pharmaceuticals	111	56	167	1,398	1,452	2,850
Poisoning, other substances	18	4	22	888	536	1,424
Falls	178	261	439	20,970	21,818	42,788
Fires/burns/scalds	25	13	38	1,774	726	2,500
Other unintentional	190	56	246	27,964	10,288	38,252
Intentional, self-harm	633	136	769	2,420	3,294	5,714
Intentional, inflicted by another	75	54	129	5,588	3,070	8,658
Undetermined intent	10	6	16	573	489	1,062
Complications of surgical and medical care	18	18	36	11,277	10,481	21,758
<b>Total</b>	<b>1,935</b>	<b>842</b>	<b>2,777</b>	<b>86,879</b>	<b>58,278</b>	<b>145,158</b>

Note: See Appendix 1 for equivalent ICD-10 external cause codes, hospitalisation totals excludes cases coded as 'not external cause'. Shaded areas represent the 3 highest causes of death and hospitalisation in emerging adults.

In contrast to hospitalisations, transportation accidents in rural and remote populations were the leading cause of death followed by suicide and falls. In comparison with the pattern of deaths in the general population, transport related deaths and deaths due to other unintentional injuries rank higher within rural and remote communities than in the general population.

## Transportation

Patterns of major causes of injury are also superficially similar between the rural and remote population and the general population at large. When comparing rates of injury however, some issues stand out as being more prominent in the rural and remote population. One such example is hospitalisations due to transportation injuries. As can be seen in Figure 5.1, below, the rate of transportation-related injury in rural and remote areas exceeds the rate for the general population, for all but one age group. Suggested reasons for this include the increased exposure to hazardous road conditions (e.g. unsealed roads, travelling at high speed) faced by people in rural and remote areas (Strong et al 1998). Similarly, deaths caused by transportation occur at a higher rate than for the general population for all but a single age group, and again this is the people aged 85+ group.

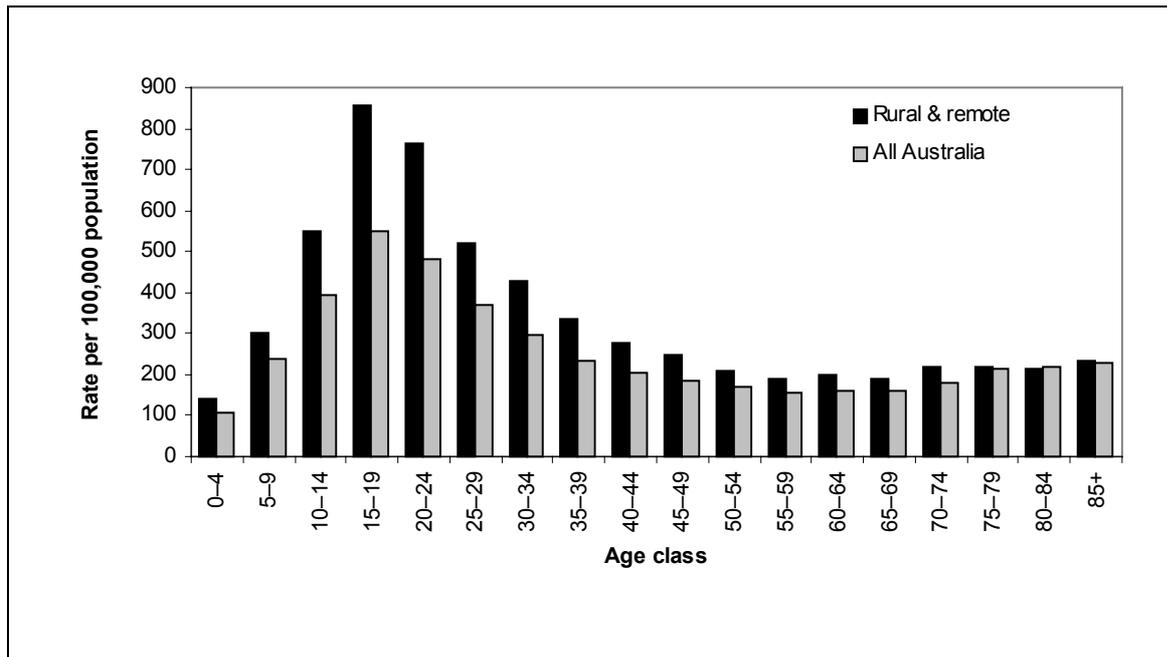


Figure 5.1: Rates of transportation-related injury hospitalisations, in rural and remote areas and the general population, 1999-00

## Suicide and self-harm

Cursory analysis of the deaths caused by intentional, self-inflicted injuries in 2000 supports the view that suicide rates are higher in rural areas, particularly in younger adults (Figure 5.2).

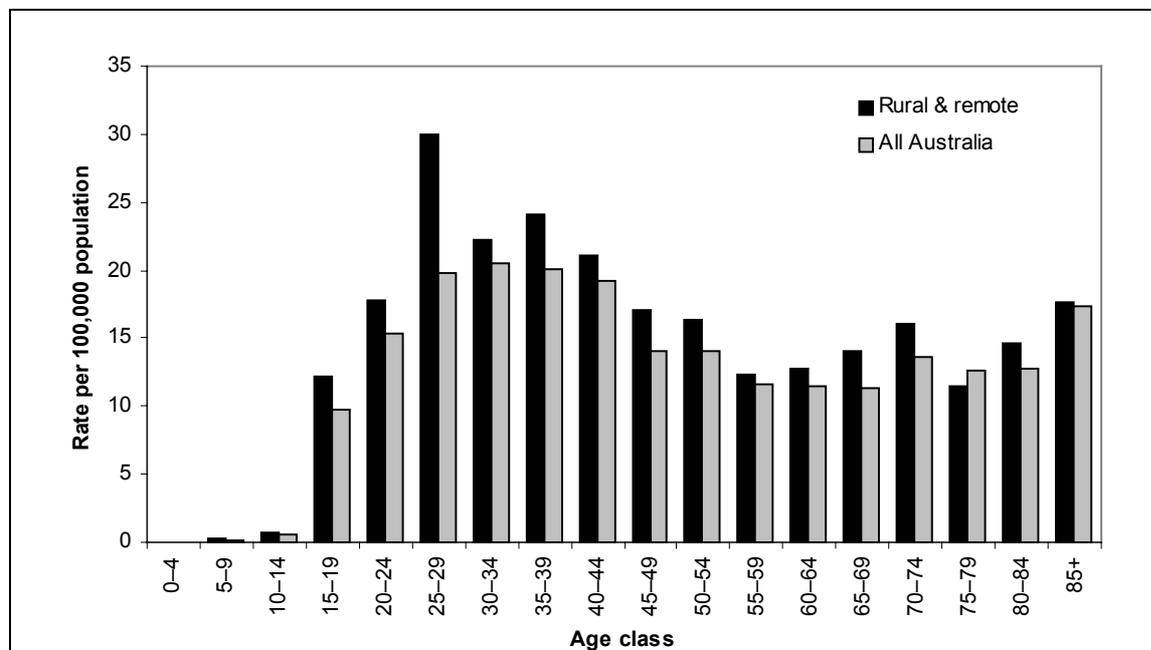


Figure 5.2: Death rate due to intentional, self-inflicted injury, in rural and remote areas and the general population, 2000

The rate of suicide and self-harm in rural and remote populations is higher than in the general population (Moller, 1994). In particular, young males show a pattern of elevated risk in rural and remote areas. An analysis of the distribution of suicides shows that suicide rates for males are significantly higher in 'large rural' centres, 'other rural' and 'other remote' areas, while suicide rates for females are generally lower than for metropolitan areas (Harrison et al 1997, Strong et al 1998).

Injury prevention and intervention programs aimed at suicide and self-harm in rural and remote populations need to take into account the complex nature of the risk factors and potential protective factors at play within the community. One of the difficulties facing health care providers and community organisations is the lack of knowledge about best practice in suicide prevention in rural and remote communities.

## **Cross cutting issues**

### *Monitoring and maintaining successes*

In order to monitor the rates of injury in rural and remote communities much more work needs to be done on the current surveillance systems. Mention has already been made of the difficulties in tracking farm-related injury, and other injury categories are presenting just as great a challenge. For example, recent speculation suggests it is possible that a number of rural transport injury deaths in young males may actually be suicide deaths. Being able to identify the risk factors for suicide within the injury data may help identify potential cases of transport related suicide. Once identified, it will be possible to more accurately assess the effectiveness of intervention and prevention programs on rural youth suicide.

Given the high proportion of Aboriginal and Torres Strait Islanders living in remote areas issues relevant to improving surveillance in the Aboriginal and Torres Strait Islander community will also be applicable to remote communities. As mentioned previously one of the current challenges is the reliability and validity of the current indicator of Aboriginal and Torres Strait Islander status. The ability to monitor and maintain future successes in injury reduction in remote communities will be influenced by the outcomes of attempts to improve identification of the Aboriginal and Torres Strait Islander population in current data collections. Assistance in this task employing local information at a community level should be sought.

### *Defining and measuring severity*

Two issues of relevance to defining and measuring injury severity in rural and remote communities are the limitations of current severity measures based, in whole or in part, on length of stay in hospital and the potentially different impact that particular injuries may have on rural and remote community populations.

Length of stay as an indicator of severity has limitations based on the higher rates of hospital in-patient care in rural and remote areas. For example, patients with conditions that require short-term follow-up treatment are more likely to be hospitalised, especially if they have to travel long distances to seek care (Strong et al 1998). Any severity index or measure that employs a length of stay variable will be subject to a degree of error.

Given the distances to health care facilities different injuries may impact differently on rural and remote dwelling individuals. For example, injuries due to burns may require repeated skin grafts and would be considered more severe for someone unable to access a health facility offering such a service due to distance.

### *Equity*

The relationship between socioeconomic status, locality and injury is a complex one and equity in the provision of services can be difficult to achieve. Equity issues revolve around high Aboriginal and Torres Strait Islander populations in the remote regions and socioeconomic status as a greater proportion of rural dwellers tend to be from a lower socioeconomic class.

### *Partnership development*

Particular attention needs to be given to developing partnerships and community-based intervention and prevention programs within rural and remote communities. To date, one of the more successful partnerships in rural and remote communities has been Farmsafe. The Farmsafe program has contributed to reducing occupational injuries, of which many injuries are transport-related (Strong et al 1998), and may be successfully utilised to reduce injury incidence in rural and remote areas in general.

Given the sparse availability of specific services in rural and remote areas, organisations such as community groups, sporting groups, schools and general welfare services should be encouraged to work together. Evaluations of the Safe Communities programs in rural and remote settings should also be conducted and wider implementation of the programs carried out if proven to be successful in reducing injury.

## **Discussion**

The injury profile of people in rural and remote areas suggests that there are a number of specific areas of injury incidence that affect this population to a greater degree than the general population. As such, injury prevention strategies may be targeted within this population to greater effect if concentrated on these topics. Specifically, the high rates of transport-related injury hospitalisations and deaths and high rates of hospitalisations and deaths caused by intentional self-harm need to be addressed for this group.

Relevant considerations include socioeconomic factors, distinctive risk factors (e.g. for road transport: typically longer journeys, more likely on unsurfaced roads), and the multiple consequences of relatively small populations and low population densities (e.g. medical retrieval times and availability of specialist medical services). Care must be taken to recognise the great diversity within non-metropolitan Australia.

High rates of injury in rural and remote areas are also compounded by the fact that a large proportion of the nation's Aboriginal and Torres Strait Islander population reside here, a population which also exhibits a higher rate of transport and self-harm injury. Thus, injury prevention programs specifically designed to target both of these populations simultaneously may prove to be the most strategic method by which to reduce the incidence of injury in rural and remote areas.

The key injury issues such as suicide and self-harm and farm related injury lend themselves to a community approach to prevention and intervention. There are a number of cooperative programs operating in rural and remote areas to address suicide and farm safety. In order to continue the support for community-based collaborative programs, such as Farmsafe, comprehensive evaluations need to be undertaken and are identified as a priority activity in this topic. Valuable lessons may be learned and applied to other injury areas from these 2 injury issues alone.

# Overview: Alcohol and Injury

- Alcohol is a major cause of mortality and morbidity in Australia, with an estimated 3,290 deaths in 1997 and 72,302 hospitalisations in 1996–97 attributable to high-risk drinking. Part of this burden is injury.
- Motor vehicle crashes, motorcycle crashes, falls, interpersonal violence, water-related injury and alcohol use in young males, are areas of high injury correlation.
- Key issues to address are the relationship of alcohol misuse and injury areas such as self-harm, violence, and drowning, alcohol and risk taking behaviour that leads to injury as well as database development of indicators of alcohol involvement in injury.
- Continuing funding and political support for the issue of alcohol and injury is suggested and attempts should be made to build on the advances in the area of road safety and alcohol and encourage inter-sectorial learning in less well developed areas.

## Reasons for inclusion

In the past alcohol and the role it plays in injury has been examined only as a specific risk factor. Alcohol itself has never been elevated to National priority status. A great deal of the recognition afforded to the relationship between alcohol and injury has come from the transport arena where the relationship between alcohol and road traffic accidents has been extensively researched. Beyond this relationship though alcohol misuse is associated with a wide range of injuries, age groups and population groups. For example 2 recent publications have highlighted the relationship between alcohol and water safety (Driscoll et al 2003) and alcohol and injury in young males (Stenkamp et al 2002).

Injury occurring as a result of alcohol misuse was identified as a secondary priority area in the 2001–2003 Plan but was only specifically addressed as a causative factor in drowning in young males. Alcohol and injury has been included as a primary priority injury area in the present document for a number of reasons:

- Alcohol has been demonstrated to be a risk factor for a large number of injuries (Chikritzhs et al 2000);
- Significant advances have been made in some injury areas associated with alcohol misuse such as transport suggesting that existing strategies may be usefully applied to other injury areas; and
- Alcohol and injury is a priority area, which offers much in the way of opportunities for the continuation of work begun during the lifetime of the last plan.

Of particular interest is the relationship between alcohol, risk taking behaviour and injury. An understanding of the interplay among risk taking behaviours and alcohol misuse may lead to more targeted and ultimately more effective intervention and prevention programs.

## Surveillance and infrastructure issues

Within Australia our knowledge of the relationship of alcohol and injury has stemmed mainly from international literature and anecdotal evidence due to a lack of Australian-based research, other than for alcohol and road traffic injury (McLeod et al 2000, Roche et al 2001). Very few studies exist which examine the incidence and prevalence of alcohol related injury (Roche et al 2001).

Australian specific studies examining the role alcohol plays with respect to suicide and self-harm, violence and drowning are limited. A recent publication examining water safety and alcohol concluded that very little information exists on the role of alcohol in recreational water activity and serious and fatal injury associated with it (Driscoll et al 2003). Similarly, little information exists about the role of alcohol with respect to violence within the Australian setting and most investigations stem from a criminal justice perspective (Bryant & Williams 2000, Makkai 1997). Coupled with severe limitations within existing data collections on alcohol levels a large portion of work undertaken under the next plan should be on infrastructure building.

## Surveillance Indicators

Little information about alcohol is contained in the morbidity data sets. The Australian Modification of the International Classification of Diseases (ICD-10-AM) provides categories for coding alcohol involvement (notably Y90 and Y91). However it is difficult to interpret the resulting data in the absence of formal validation studies. The absence of a coding category for alcohol involvement in a particular case cannot be assumed to mean that alcohol was not present or a contributing factor. As a result, data for alcohol related hospitalisations will not be presented.

## Deaths

Information on alcohol and its relationship to injury death is also difficult to quantify. One potential source of information which indicates the presence of alcohol for any given injury death is the 'drugs flag' within the ABS mortality data. The drugs flag is designed to indicate 'drug-related' deaths and takes into account alcohol, tobacco, other drugs and a combination of all three. The flag identifies whether a death is:

- independent of alcohol or drug involvement;
- smoking related;
- alcohol related;
- drug other than alcohol or tobacco related;
- smoking and alcohol related;
- smoking and drug other than alcohol related;
- alcohol and drug other than tobacco related; or
- a combination of smoking, alcohol and other drugs.

The conceptual basis and coding criteria for the use of the flag have not been published and there are no published validation studies (Driscoll et al 2003). Investigations undertaken by Driscoll et al (2003) for an alcohol and water safety project reported that the flag provides a reference to alcohol primarily during the establishment of an underlying cause of death. Where a blood alcohol reading above zero is present in the

records or in cases where diagnoses have reference to alcohol (e.g. alcoholic cirrhosis) the indicator flag may be used.

The drugs indicator flag has not been validated and until such a task is undertaken its reliability must also remain questionable. However given the dearth of information available on analysis of the 2000 mortality data set has been undertaken for the current report. Cases were selected for analysis if alcohol was a contributory factor either alone or in combination with another drug category. In the calendar year 2000, 1,084 deaths were identified in which alcohol was present in the total population (see Table 6.1). Deaths associated with alcohol were higher in males than in females in the general population.

**Table 6.1: Number of deaths associated with alcohol in emerging adults, 2000**

	Male	Female	Persons
Number of cases	850	234	1,084
Per cent of cases	78.5	21.6	100.0

## Patterns of alcohol injury deaths

The pattern of alcohol injury deaths is presented in Table 6.2 below. Overall the greatest number of alcohol associated deaths are attributed to intentional self-inflicted injuries. Approximately half as many alcohol associated deaths are attributed to transport injuries. The third most common alcohol associated injury death is attributed to pharmaceutical poisoning. Both males and females exhibit a similar pattern of alcohol deaths when counts alone are examined.

**Table 6.2: Number of cases of alcohol associated deaths attributed to injury and poisoning, 2000**

	Deaths (2000)		
	Males	Females	Persons
Transportation	182	30	212
Drowning & near-drowning	22	10	32
Poisoning, pharmaceuticals	141	45	186
Poisoning, other substances	18	8	26
Falls	54	17	71
Fires/burns/scalds	12	7	19
Other unintentional	39	4	43
Intentional, self-harm	346	93	439
Intentional, inflicted by another	28	16	44
Undetermined intent	7	4	11
Complications of surgical and medical care	1		1
<b>Total</b>	<b>850</b>	<b>234</b>	<b>1,084</b>

Note: See Appendix 1 for equivalent ICD-10 external cause codes, hospitalisation totals excludes cases coded as 'not external cause'. Shaded areas represent the 3 highest causes of death and hospitalisation in emerging adults.

## Cross cutting issues

### *Monitoring and maintaining successes.*

In order to monitor the association between alcohol and injury we need to be able to first measure the problem. Investigations into the reliability and validity of the ABS drugs indicator flag need to be undertaken. In addition, studies of the morbidity data set should be encouraged in order to examine the usefulness of the ICD-10-AM categories for coding alcohol involvement.

### *Partnership development.*

Much can be learnt from the extensive literature and work in the area of alcohol misuse and transport injury. Opportunities for the continuation of partnerships with existing bodies engaged in work on alcohol and road traffic safety should be encouraged and avenues for cross collaboration with other major bodies explored.

## Discussion

Alcohol misuse is associated with a wide range of injuries, age groups and population groups. In the past, alcohol and the role it plays in injury has been examined only as a specific risk factor. Given the relationship between alcohol and injury its inclusion as a priority topic is seen as timely.

Significant advances have been made in some injury areas associated with alcohol misuse such as transport and the workplace. Inclusion of alcohol and injury as a priority will offer many opportunities for the continuation of past work and the application of existing strategies to different aspects of injury. The recent publication of an examination of the relationship between alcohol and water safety is a prime example of the opportunities for partnership (Driscoll et al 2003).

A great deal of work needs to be carried out on our current surveillance systems in order to provide a reliable and valid indicator of alcohol use and its relationship to injury. In addition to work on existing sources of data, the exploration of alternative means of accessing information should be encouraged. For example, opportunities to access alternative databases should be explored and surveys of at-risk groups may provide unique information into the patterns of alcohol use, particularly as they related to the elevation of risk taking behaviour.

# Appendix 1: Data issues

## Deaths data

Deaths data are from the Australian Bureau of Statistics (ABS) mortality unit record data collection, 1979–00. Population data were obtained from the ABS.

## Case definition

The underlying cause of each death (UCoD) registered in Australia is classified by the ABS according to the International Classification of Diseases (ICD). The 9th Revision (ICD-9) was used for death registrations between 1979–1998, (World Health Organization 1977). The 10th Revision (ICD-10) was used for deaths registered from 1999 onwards, (World Health Organization 1992). All deaths given an ICD-10 External Cause code (Registrations in 2000) by the ABS are included in this report.

Data are presented according to the year in which deaths were registered. A small proportion of deaths registered in 2000 occurred in an earlier year. A similar proportion of deaths, which occurred in 2000, will not have been registered until after 2000.

## Cause code aggregations

NISU statistical publications have traditionally made use of standard aggregations of the ICD-9 external cause (E-code) classification. With the introduction of ICD-10 at the beginning of 1999, a map was developed by NISU in order to arrive at an equivalent set of standard aggregations under the new classification scheme. Table 1 presents the external cause code equivalents for each of the injury indicator categories used throughout this report.

**Table 1: Injury indicator categories and external cause code equivalents for deaths**

	ICD-10 External Cause Code
Unintentional	
Transportation	V01–V99
Drowning & near-drowning	W65–W74
Poisoning, pharmaceuticals	X40–X44
Poisoning, other substances	X45–X49
Falls	W00–W19; X59 in combination with a “multiple cause” code for fracture
Fires/burns/scalds	X00–X19
Other unintentional	W20–W64, W75–W99, X20–X39, X50–X58; X59 (part), Y85–Y86, Y89.9
Intentional, self-harm	X60–X84, Y87.0
Intentional, inflicted by another	X85–Y09, Y35–Y36, Y87.1, Y89.0, Y89.1
Undetermined intent	Y10–Y34, Y87.2
Complications of surgical and medical care	Y40–Y84, Y88.0–Y88.3

Note should be made of the fact that 'Accidental falls' mortality has been defined in a manner that maintains comparability with the 'Accidental falls' category usually reported under ICD-9 (i.e. E880–E888). The case-counts shown in Tables throughout this report include deaths where the code for Underlying Cause of Death (UCoD) was in the range W00–W19, and also deaths where the UCoD was coded as X59, in combination with one or more Multiple Cause of Death codes indicating a fracture (i.e. 'Fracture Cause Unspecified', equivalent to ICD-9 E-code, E887). Categorisation of external cause in injury-related hospital separations has been dealt with similarly (Harrison & Steenkamp 2002b).

## **Age adjustment**

Most all-ages rates have been adjusted for age to overcome the effect of differences in the proportions of people of different ages (and different injury risks) in the populations that are compared. Direct standardisation was employed, taking the Australian population in 1991 as the standard. Changes in age composition are small within narrow age bands (e.g. 65–69 years) and adjustment has not been applied to 5-year age groups. Where crude rates are reported this is noted.

## **Data quality**

The reliability of information about cause of death depends on the reliability of ICD codes provided by the ABS. This depends largely on the adequacy of the information provided to the ABS through Registrars of Births Deaths and Marriages, and originating from coroners and medical practitioners. Little published information is available on the quality of the data resulting from this process, particularly as it applies to injury deaths. Centralisation of mortality coding in the Brisbane office of the ABS since the mid 1990s has reduced the potential for variation due to local differences in coding practice. However, factors affecting information recording, provision, or coding could affect data in different ways for different jurisdictions, periods or population groups. Hence, apparent differences should be interpreted with caution (Harrison & Steenkamp 2002b).

## **Drugs Flag**

The ABS introduced a Drugs Flag in 1999 in order to increase the level of detailed information about the role played by drugs in Australian deaths. A discussion of the validity and reliability of the drugs flag can be found on pages 55–56 of this report. The sub-categories employed are:

1. Smoking related death
2. Alcohol related death
3. Drug other than alcohol or Tobacco
4. Combination of 1 and 2 (i.e. Tobacco plus Alcohol)
5. Combination of 1 and 3 (i.e. Tobacco plus Drug other than alcohol)
6. Combination of 2 and 3 (i.e. Alcohol plus Drug other than alcohol)
7. Combination of 1, 2 and 3 (i.e. Tobacco plus Alcohol plus Drug other than alcohol)

## Hospitalisations data

The data on hospital separations were provided by the AIHW (Australian Institute of Health and Welfare 2001a). NISU processed, checked and combined the relevant data years to facilitate analysis.

Population data were obtained from the Australian Institute of Health and Welfare and are similar to data presented in the Demographic Statistics Catalogue No. 3101.0 (ABS). Rates were calculated using final population estimates as at 31 December 1999.

## Selection criteria

The case selection criteria for this report are that the Principal Diagnosis was within Chapter XIX ('Injury and Poisoning', S00-T98), and the first appearing external code was in the Chapter XX range (V01-Y89). This criterion excludes cases not recording a Principal Diagnosis from Chapter XIX, whether or not an external cause code is present.

The coding system allows for a number of external causes to be recorded. For consistency between reporting locations, the 'first appearing', rather than the 'main' external cause code has been used uniformly.

## Cause code aggregation

As mentioned with the mortality data, NISU statistical publications have traditionally made use of standard aggregations of the ICD-9 external cause (E-code) classification. With the introduction of ICD-10-AM at the beginning of 1999, a map was developed by NISU in order to arrive at an equivalent set of standard aggregations under the new classification scheme. Table 2 presents the external cause code equivalents for each of the injury indicator categories used throughout this report.

**Table 2: Injury indicator categories and external cause code equivalents for hospital separations data**

	ICD-10 External Cause Code
Unintentional	
Transportation	V01-V99
Drowning & near-drowning	W65-W74
Poisoning, pharmaceuticals	X40-X44
Poisoning, other substances	X45-X49
Falls	W00-W19; X59 in combination with a "multiple cause" code for fracture
Fires/burns/scalds	X00-X19
Other unintentional	W20-W64, W75-W99, X20-X39, X50-X58; X59 (part), Y85-Y86, Y89.9
Intentional, self-harm	X60-X84, Y87.0
Intentional, inflicted by another	X85-Y09, Y35-Y36, Y87.1, Y89.0, Y89.1
Undetermined intent	Y10-Y34, Y87.2
Complications of surgical and medical care	Y40-Y84, Y88.0-Y88.3

## **Hospitalised cases versus other cases**

Not all injuries result in hospital admission. It has been estimated that one admission occurs for every 7 injury cases presenting to Emergency Departments, and that at least as many injury cases again consult a GP rather than present to a hospital (Harrison & Steenkamp 2002a). In addition, an unknown number of injuries occur that resolve without professional treatment. Similarly, severe injury cases resulting rapidly in death go unrecorded in terms of hospital separations, but are captured as mortality data.

## **Errors, inconsistencies and uncertainties**

This report uses data collected from State and Territory hospitals. After coding and collection from the States and Territories, the data is further processed by the AIHW and NISU. The geographical spread of the data and the large number of people involved in its processing increases the risk of inconsistencies across time and place in the data. Variations in reporting and coding continue to exist across jurisdictions, although National Minimum Data Sets have been in place for some considerable amount of time.

## **Calculation of rates**

For relevant comparisons across ages and years, rates have been adjusted by direct standardisation to correct proportional differences in age, using the Australian population in 1991 as the standard. Age groups are presented in 5-year bands up to an 85+ year age group. Rates not specified to be age standardised are crude rates or age-specific rates.

## **Aboriginal and Torres Strait Islander population data**

As mentioned in the text, the most basic issue influencing the data pertaining to the Aboriginal and Torres Strait Islander population is that of identification. In keeping with common practice, data collected from New South Wales, Victoria, the Australian Capital Territory and Tasmania have been excluded from this analysis as it is thought that these data-sets may be unreliable regarding issues of Aboriginal and Torres Strait Islander status. Aboriginal and Torres Strait Islander statistics presented here are derived from data collected in South Australia, Western Australia, Queensland and the Northern Territory. These data-sets are considered to be relatively reliable. Data for these jurisdictions are likely to be more complete, though still subject to uncertainties.

## **Rural and remote population data**

The categorisation of the rural and remote population in this work is based on the Rural, Remote and Metropolitan Areas (RRMA) Structure as derived from Statistical Local Area information prescribed for collection in the National Health Data Dictionary (Australian Institute of Health and Welfare 2001b). Seven categories are provided in this classification system and this analysis has included data with coded values ranging between 3 and 7 (3 = Large rural centre; 4 = Small rural centres; 5 = Other areas; 6 = Remote centres; 7 = Other remote areas). This decision system thus defines our rural and remote category as all areas of Australia where the population of the nearest urban centre is less than 100,000 residents (Strong et al 1998).

Population estimates were derived from data provided by the AIHW, giving estimated resident population by 5-year age groups and sex by RRMA category by State and Territory. Injury rates calculated from this data were age-standardised against the 1991 population census figures for whole-population rates of injury hospitalisation and death. The 5-year age group rates presented here are all-ages rates.

# Reference List

- Australian Bureau of Statistics, Australian Institute of Health and Welfare. 2001. *The health and welfare of Australia's Aboriginal and Torres Strait Islander peoples 2001*. Canberra: A joint program of the Australian Bureau of Statistics and the Australian Institute of Health and Welfare
- Australian Institute of Health and Welfare. 2001a. *Australian Hospital Statistics 1999–00*. Rep. AIHW cat. no. HSE 14 (Health Services Series no. 17), Australian Institute of Health and Welfare, Canberra
- Australian Institute of Health and Welfare. 2001b. *National Health Data Dictionary. Version 10*. Rep. AIHW Cat. no. HWI 30, Australian Institute of Health and Welfare, Canberra
- Australian Institute of Health and Welfare. 2001a. *Australian Hospital Statistics*. Rep. AIHW Cat. no. HSE 14, Australian Institute of Health and Welfare, Canberra
- Australian Institute of Health and Welfare. 2002. *Australia's health 2002*. Canberra: Australian Institute of Health and Welfare
- Australian Institute of Health and Welfare. 2003. *Child protection Australia 2001–2002*, Australian Institute of Health and Welfare, Canberra
- Bryant M, Williams P. 2000. *Alcohol and other drug-related violence and non-reporting*, Australian Institute of Criminology, Canberra
- Chikritzhs T, Jonas H, et al. 2000. *Alcohol-caused deaths and hospitalisations in Australia, 1990–1997*. Rep. National Alcohol Indicators Project Technical Report No. 1, National Drug Research Institute, Perth
- Commonwealth Department of Health and Aged Care. 2001. *National Injury Prevention Plan: Priorities for 2001–2003*, Department of Health and Aged Care, Canberra
- Condon JR, Warman G, Arnold L, eds. 2001. *The health and welfare of territorians*. Darwin: Epidemiology Branch, Territory Health Services
- Cripps R, Carman J. 2001. *Falls by the elderly in Australia: Trends and data for 1998*, Australian Institute of Health and Welfare, Adelaide S.A.
- Cripps R, Steenkamp M, Harrison J. 2002. *Hospital separations due to injury and poisoning, Australia 1998–99*, Australian Institute of Health and Welfare, Adelaide, SA
- Driscoll T, Steenkamp M, Harrison JE. 2003. *Alcohol and water safety*, Commonwealth of Australia, Canberra
- Drugs and Crime Prevention Committee. 2002. *Inhalation of Volatile Substances – Final Report*, Parliament of Victoria, Victoria
- Finch C, Valuri G, Ozanne-Smith J. 1998. Sport and active recreation injuries in Australia: evidence from emergency department presentations. *British Journal of Sports Medicine* 32: 220–5
- Fragar L, Coleman R. 1996b. *A National Data collection for Farm Injury Prevention; Final Project Report*. Moree, NSW: Australian Agricultural Health Unit. – pp.
- Fragar L, Franklin R. 2000. *The health and safety of Australia's farming community*, ACAHS & RIRDC, Moree
- Harrison J, Miller E, Weeramanthri T, Wakerman J, Barnes T. 2001. *Information sources for injury prevention among Indigenous Australians: status and prospects for improvement*. Rep. AIHW Cat. no. INJCAT 38, Australian Institute of Health and Welfare, Adelaide, SA

- Harrison J, Moller J, Bordeaux S. 1997. Youth suicide and self-injury Australia. *Australian Injury Prevention Bulletin* (Supplement)
- Harrison J, Steenkamp M. 2002a. *Technical review and documentation of current NHPA injury indicators and data sources*, AIHW National Injury Surveillance Unit, Adelaide
- Harrison J, Steenkamp M. 2002b. *Technical review and documentation of current NHPA injury indicators and data sources.*, Australian Institute of Health and Welfare, Adelaide
- Kim Y, Jung Y, et al. 2000. Validation of the International Classification of Diseases 10th Edition-based Injury Severity Scores (ICISS). *Journal of Trauma* 48: 280–5
- Kreisfeld R, Moller J. 1996. Injury amongst women in Australia. *Australian Injury Prevention Bulletin*
- Langley J, Dodge J, Silva PA. 1979. Accidents in the first five years of life: a report from the Dunedin Multidisciplinary Child Development Study. *Australian Paediatric Journal*. 15: 255–9
- Lewis M, Szabo R, Weiner K, McCall L, Piterman L. 1997. Cultural barriers to exercise amongst the ethnic elderly. *Internet Journal of Health Promotion*
- Makkai T. 1997. *Alcohol & disorder in the Australian Community: Part 1 – victims.*, Australian Institute of Criminology, Canberra
- Mathers C. 1994a. *Health differentials among adult Australians aged 25–64 years. Rep. 1*, Australian Institute of Health and Welfare, Canberra
- Mathers C. 1994b. *Health differentials among older Australians. Rep. 2*, Australian Institute of Health and Welfare, Canberra
- Mathers C. 1995. *Health differentials among Australian children. Rep. 3*, Australian Institute of Health and Welfare, Canberra
- Mathers C. 1996. *Health differentials among young Australian adults. Rep. 4*, Australian Institute of Health and Welfare, Canberra
- McLeod R, Stockwell TR, Stevens M, Phillips M. 2000. *The influence of alcohol and drug use, setting and activity on risk of injury: A case-control study.*, National Drug Research Institute, Perth, WA
- Moller J. 1992. Childhood injury prevention: The role of the community. *Australian Early Childhood*. 17
- Moller J. 1995. Injury among 15 to 29 year old males. *Australian Injury Prevention Bulletin*
- Moller J. 1996. *Understanding national injury data regarding Aboriginal and Torres Strait Islander peoples. Rep. AHIIW Cat. no. INJ3*, Australian Institute of Health and Welfare, Adelaide
- Moller J. 1998. Cost of Injury. National Injury Surveillance Unit
- Moodabe K. 2001. Drug-related morbidity and mortality – the elderly at risk: Medicines to be wary of in the elderly. *New Zealand Family Physician* 28: 272–8
- National Center for Injury Prevention and Control. 1998. *Violence Prevention: A Public Health Priority*, WHO Collaborating Centre on Injury Control
- National Injury Prevention Advisory Council. 1999. *Directions in Injury Prevention. Rep. 1*, Department of Health and Aged Care
- National Occupational Health and Safety Commission. 1998. *Work-related traumatic fatalities in Australia, 1989 to 1992.*, National Occupational Health and Safety Commission, Canberra

- Nygaard HA. 1998. Falls and psychotropic drug consumption in long-term care residents: is there an obvious association? *Gerontology* 44: 46-50
- Osler T, Rutledge R, al. e. 1996. ICISS: An international classification of disease-based injury severity score. *Journal of Trauma* 41: 380-8
- Queensland Injury Surveillance Unit. 1999. *Workplace injury. Rep. 53*, Queensland Injury Surveillance Unit, Brisbane
- Roche A, Watt K, McClure R, Purdie D, Green D. 2001. Injury and alcohol: A hospital emergency department study. *Drug and Alcohol Review* 20: 157-68
- Steenkamp M. 2002. *Persisting morbidity among hospitalisations for near-drowning, Australia 1997-98. Rep. AIHW Cat. no. INJCAT 45*, Australian Institute of Health and Welfare, Adelaide
- Steenkamp M, Cripps R. 2001. *Child injuries due to falls. Rep. AIHW Cat. no. INJCAT 37*, Australian Institute of Health and Welfare, Adelaide, SA
- Steenkamp M, Harrison J. 2000. *Suicide and hospitalised self-harm in Australia. Rep. AIHW Cat. no. INJCAT 30*, Australian Institute of Health and Welfare, Adelaide
- Steenkamp M, Harrison J, Allsop S. 2002. *Alcohol-related injury and young males. Rep. 1*, Australian Institute of Health and Welfare, Canberra
- Stephenson SC, Langley JD, Civil ID. 2002. Comparing measures of injury severity for use with large databases. *Journal of Trauma-Injury Infection & Critical Care*. 53: 326-32
- Strong K, Trickett P, Titulaer I, Bhatia K. 1998. *Health in rural and remote Australia: the first report of the Australian Institute of Health and Welfare on rural health. Rep. AIHW Cat. no. PHE 6*, Australian Institute of Health and Welfare, Canberra
- Wilkinson D, Gunnell D. 2000. Youth suicide trends in Australian metropolitan and non-metropolitan areas, 1988-1997. *Australian and New Zealand Journal of Psychiatry* 34: 822-8
- World Health Organization. 1977. *International Classification Diseases: Manual of the International Statistical Classification of Diseases, Injuries and Causes of Death*.
- World Health Organization. 1992. *International Statistical Classification of Diseases and Related Health Problems: Tenth Revision*. Geneva
- World Health Organization. 2001. *WHO, Injury Surveillance Guidelines*, Department of Injuries and Violence Prevention, World Health Organization, Geneva
- Yip Y, Cumming R. 1994. The association between medications and falls in Australian nursing-home residents. *Medical Journal of Australia* 160: 14-8

# INJURY RESEARCH & STATISTICS

This document was written to assist in the identification of priority injury issues for the next National Injury Prevention Plan in Australia. The document provides a discussion of injury priority setting in a global context by reviewing the public health approach to injury prevention and in a local context by identifying a developmental approach to injury prevention within Australia.

Each of the proposed priority injury areas is discussed with respect to monitoring and maintenance of successes, defining and measuring severity, equity issues and partnership development. The document will be relevant to those interested in priority setting in a health arena, health and policy planners, health administrators, researchers and the public.