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Technical review and documentation of current NHPA injury indicators and data sources

James Harrison, Malinda Steenkamp

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Abbreviations

AIS	**Abbreviated Injury Scale**
ABS	**Australian Bureau of Statistics**
AIHW	**Australian Institute of Health and Welfare**
ARIA	**Accessibility/Remoteness Index for Australia**
ASCIR	**Australian Spinal Cord Injury Register**
ASGC	**Australian Standard Geographical Classification**
SR	**Age-standardised rate**
BEACH	**Bettering the evaluation and care of health**
CDC	**Center for Disease Control and Prevention**
DHA	**Department of Health and Ageing**
DRG	**Diagnosis-related groups**
ED	**Emergency department**
ERP	**Estimated Resident Population**
GISCA	**National Key Centre for Social Applications of Geographical Information**
GP	**General practitioner**
ICD-9	**9th Revision of the International Classification of Diseases**
ICD-9-CM	**9th Revision of the International Classification of Diseases, Clinic Modification**
ICD-10	**10th Revision of the International Classification of Diseases**
ICD-10-AM	**10th Revision of the International Classification of Diseases, Australian Modification**
ICDMAP	**ICD Modified Anatomical Profile**
Injury ICE	**International collaborative Effort on Injury Statistics**
ICISS	**ICD-based Injury Severity Score**
ISS	**Injury Severity Score**
MUARC	**Monash University Accident Research Centre**
MUNCCI	**Monash University National Centre for Coronial Information**
NDS-IS	**National Data Standards for Injury Surveillance**
NHDD	**National Health Data Dictionary**
NHMD	**National Hospital Morbidity Database**
NHPA	**National Health Priority Area**
NCIS	**National Coroners Information System**
NISU	**National Injury Surveillance Unit**
R	**Age-specific rate**
RCIS	**Research Centre for Injury Studies**
RRMA	**Rural, Remote and Metropolitan Areas Classification**
SCI	**Spinal Cord Injury**
SES	**Socioeconomic Status**
SLA	**Statistical Local Area**
TBI	**Traumatic Brain Injury**
UCoD	**Underlying cause of death**
MCoD	**Multiple cause of death**
VEMD	**Victorian Emergency Minimum Dataset**
VISAR	**Victorian Injury Surveillance and Applied Research System**

WHO **World Health Organization**

Executive summary

This document contributes to a data development plan for the Injury Prevention and Control National Health Priority Area by undertaking a technical review and documentation of the current NHPA injury indicators and data sources. This is achieved by:

- **presenting an updated situation analysis of developments in regard to current data sources relevant to the indicators, highlighting the limitations of these sources and discussing the status of current indicators;**
- **providing specifications to improve the technical adequacy of the indicators reported on previously through developing a framework and writing complete specifications for the injury indicators to the extent possible;**
- **undertaking a thorough technical review and documentation of the current indicators; and**
- **identifying actions and processes required to achieve further improvements in indicators and data sources, by providing a summary of improvements proposed in this and a previous NHPA Report and summarising the information developments required if the foreshadowed improvements are to be achieved.**

Overview

Chapter 1 provides background to the project and the current indicators. Chapter 2 provides a situation analysis concerning the current indicators and the data sources on which reporting depends.

As originally stated, the NHPA injury indicators were not completely specified. Technical aspects left unstated could result in reporting of inconsistent indicator values. Chapter 3 presents a framework for more complete technical specification of the indicators. The framework, an extension of other work, is intended to include all information about each indicator that is necessary to ensure consistent reporting.

Chapter 4 reviews the indicators in terms of their purposes, technical specification, data sources and data quality. Precise statement of indicator purposes provides the necessary basis for assessing whether indicator specifications are capable of serving the purpose and, in turn, for assessing whether available data are adequate.

Appendix A4 presents the results of this process, in two distinct ways, described as the *Minimal Change* model and as the *Technically Revised* model.

The *Minimal Change* model is designed to fully specify and document the existing NHPA injury indicators. This is done with the aim of replicating the sources and methods used in the *NHPA Report: Injury Prevention and Control 1997* (Commonwealth Department of Health and Family Services and Australian Institute of Health and Welfare 1998).

We have not altered any aspect of indicator definition which had been specified at that time. In documenting the many aspects of the indicators which had not been specified at that time, we have sought to minimise change in scope or methods, taking the data reported in the 1997 report as a guide. The

only substantial change is the replacement of ICD-9(-CM) code ranges with ICD-10(-AM) code ranges.

The *Technically Revised* model builds on the *Minimal Change* model by incorporating a set of specific changes to technical specification of the indicators based on deaths data and hospital separations data which are (1) designed to improve the performance of the indicators for the purpose of monitoring injury incidence rates; and (2) can be implemented without requiring changes to source data. The changes do not alter the subject matter of the indicators.

The *Technically Revised* model is proposed for consideration by relevant bodies, and to provide a basis for tests and comparisons.

The changes included in the *Technically Revised* model are based on our assessment of purposes of the indicators, followed by specification of the indicators in a way designed to improve the capacity of measures based on the indicators to serve declared purposes. This process took careful account of the availability of data sources.

We were able to apply this process fully for 24 (71%) of the current NHPA injury indicators. These are the indicators that are based on deaths data or hospital separations data and are indicators of injury occurrence.

Constraints preventing complete application of the process for the remaining indicators were lack of relevant data sources, and insufficient statement of indicator purpose and topic.

Specific products of this are more complete technical specification of all of the current NHPA Injury Indicators (*Minimal Change* model), and an improved framework for specification. In addition, a set of technical changes capable of improving the performance of the indicators based on deaths and hospital separations data for monitoring population incidence of injury are proposed for consideration by relevant bodies and for testing (*Technically Revised* Model). These are detailed in Appendix A4.

Situation analysis

Indicators based on deaths data

Twelve of the current 34 injury indicators are based on mortality data.

Deaths data provided by the Australian Bureau of Statistics (ABS) remain the most comprehensive national data collection relating to health. Two important developments are significant for ABS deaths data:

- **From 1 January 1997, the ABS introduced automated coding of deaths and this has allowed for multi-cause coding; and**
- **From 1 January 1999, ABS deaths data have been coded to ICD-10.**

Limitations of the ABS data are:

- **There is a lag of about 10 months (or more) between date of death occurrence and the date the data become available.**
- **Current data releases are based on calendar year of death registration and not on year of death occurrence.**
- **The change from ICD-9 to ICD-10 has caused uncertainty and some breaks in the time series for some indicators. The indicators concerning mortality due to accidental falls by older people are the worst affected.**

- **ICD-10 allows for the identification of broad types of 'Place of injury' occurrence and 'Activity when injury occurs'. These items were included in the ABS mortality data file for 1999 registrations, but their completeness and reliability remain uncertain.**
- **The Clinical Modifications of the ICD have not, to date, been applied to mortality coding. Some are relevant to injury surveillance.**

A major development in regard to national deaths data has been the establishment of the National Coroners Information System (NCIS). This electronic database (currently maintained at a central location in Victoria) was foreshadowed in a previous NHPA report and has become operative since early 2001. At the time of writing, NCIS data could be accessed for seven of the eight jurisdictions in Australia.

Advantages of the NCIS are:

- **The NCIS will further enhance the depth of information available on deaths. The most relevant to injury is the inclusion of data elements that better describe the circumstances of the injury event that resulted in death.**
- **The NCIS may in future also have the ability to identify work-related injury.**
- **'Occupation' is an item in the NCIS data set and this might be useful in the identification of socioeconomic status.**

Limitations of the NCIS include:

- **The adequacy of the data from this source must be established before it is to be used as the basis for quantitative indicators. The quality of NCIS data had not yet been established at the time of writing.**
- **It will be some time before a time-series of NCIS data is available.**
- **At the time of writing, it was not possible to identify all work-related injury.**

Developments in regard to deaths data have some advantages for the indicators based on these data:

- **Multi-cause coding will allow for indicators to be defined on other bases, e.g. on nature of injury codes. One example is falls in the elderly where the indicator can incorporate 'fractures' instead of only relying on relevant 'External Cause' codes.**
- **Once the NCIS allows for identification of work-related injury, a relevant indicator may be defined.**
- **The availability of the data item 'Occupation' in the NCIS might be useful in identification of socioeconomic status, which have implications for Indicators 2.3 and 2.4.**

Indicators based on hospital separations data

Eleven injury indicators are based on hospital separations data. There have been incremental developments in regard to the availability, quality and coding of hospital separations data:

- **The quality of national data on hospital separations has improved as a result of the various initiatives over recent years.**
- **Data from 1993–94 and later years are noticeably more adequate than for earlier years, and (with careful use) the source now appears to be sufficiently complete and valid to support monitoring of trends.**
- **Up to the end of June 1998, hospital data were coded according to ICD-9-CM. From 1 July 1998, NSW, NT, Victoria and ACT coded data according to ICD-10-AM. The other four jurisdictions started coding data according to ICD-10-AM from 1 July 1999.**

Some problems with the hospital separations data remain:

- **In the National Hospital Morbidity Dataset (NHMD), a record is included for each separation and not for each patient or each injury case.**
- **The quality of data in the External Cause fields, the completeness and quality of data in the 'Type of Place' and 'Type of Activity' item needs to be assessed.**
- **Reliable discrimination of injury cases according to severity needs to be resolved.**
- **Although the *National Health Data Dictionary* definitions form the basis of the NHMD, actual definitions used may vary among data providers and from one year to another. Finer details of the scope of the data collections may vary between jurisdictions.**

The current indicators based on hospital separations data are defined in terms of External Cause. It has been suggested that the validity of these indicators will be improved by recasting them first in terms of 'Principal Diagnosis' and then in terms of External Cause. It is also especially relevant for some of these indicators to be based on diagnosis codes—brain injury being the prime example.

The move to ICD-10-AM has important repercussions for separations-based indicators:

- **The introduction of ICD-10-AM means that Activity will now be available. This will allow for Indicator 6.1 (hospitalised injury due to sport or recreation) to be reported on and for better definition of Indicator 4 (work-related injury). However, the quality of Activity data warrants assessment.**
- **ICD-10-AM is not equivalent to ICD-9-CM on the third-digit level. Even when data are grouped, there are some categories that are not equivalent—falls are a case in point. This complicates the time series for hospitalisations data.**

For purposes related to injury prevention, indicators of injury incidence are of particular interest. The potential of this major national information asset to monitor indicators of injury incidence has not yet been fully tapped. The main steps still required are:

- **Better identification of a sub-set of types of injury case that are always or nearly always admitted to a hospital.**

- **Better means to avoid multiple counting of incident cases among separations, and to determine the outcome of cases (at least to the extent of identifying those which result in death).**
- **Better distinction of injury resulting from events prior to admission from those that occur after admission.**
- **Better means to avoid multiple counting cases which appear in the hospital separations file and in the deaths data collection.**

Indicators not (yet) defined or based on other data (sources)

Recent developments allow for greater definition of and reporting on three of the remaining eleven indicators:

- **The introduction of the ICD-10-AM Activity code allows work-related injury cases to be identified. This report provides specifications for Indicator 4 (work-related) in terms of hospital separations data. However, these data need to be validated before the indicator is reported.**
- **Indicator 15 (brain injury) can now be defined in terms of hospital separations data, because of a case definition based on Principal Diagnosis that became available. The indicator will still not provide any insight into the residual consequences of traumatic brain injury.**
- **More meaningful reporting of Indicator 14 (spinal cord injury; based on the Australian Spinal Cord Injury Register) is becoming possible as the number of available data points has increased.**

Eight indicators remain undefined and at the time of writing no national data sources were available for these indicators.

- **Quantitative population-based monitoring of Indicator 6.2 (non-hospital admitted sport and recreation-related injury) with the breadth implied by the present wording would be very difficult and expensive to achieve. Population surveys offer better prospects, though sample sizes would have to be large.**
- **Monitoring of Indicator 8.2 (emergency department (ED) attendances resulting from consumer product injury) is complicated by a lack of a widely recognised operational definition of 'consumer product injury', as well as the lack of a national data source for quantitative estimates of ED injury attendance. It should also be noted that only some ambulatory injury cases attend an ED, the fraction doing so being likely to vary over time and between places.**
- **Prospects for specifying and monitoring Indicator 11.3 (number of jurisdictions requiring separation of domestic pools from houses) are good (though specific definition is required).**
- **Population surveys might be capable of providing necessary data for Indicators 9.3 (proportion of house equipped with smoke detectors and earth leakage breakers), 11.4 (proportion of domestic pools with approved child-resistant fences, gates and barriers) and 11.5 (proportion of children and young people who have successfully completed a water safety and lifesaving course). These indicators warrant some refinement, and validation of questions in relation to the intended survey method would be necessary.**
- **Indicators 12.1 (access of injured patients to optimal trauma care) and 13.1 (access of people with trauma injuries to comprehensive rehabilitation**

programs and appropriate long-term care and community support) remain problematic and prospects for reporting on these in the short term are not good. Both embody complex qualitative concepts.

Other data issues

Sources of data on Indigenous Australians

Indicators 2.1 and 2.5 relate to Indigenous Australians. Relevant data to report on these indicators are problematic and the difficulties centre around two main issues, i.e. reliable identification of Indigenous status in national deaths and hospital data; and the reliability of population data for Indigenous Australians. Some progress has been made in regard to the identification of Indigenous people—all States and Territories now have the capability to differentiate between Indigenous and other Australians. Some investigations into the quality of the data have also been made. The application of this capability remains problematic, especially in jurisdictions other than South Australia, Western Australia and Northern Territory for Australian Bureau Statistics (ABS) deaths data. However, even in the NCIS, the identification of Indigenous status remains problematic. Indigenous status is available in hospital data, but there are problems in terms of accuracy.

Rural, remote and metropolitan areas classification

Indicator 2.4 concerns the death rate ratio of the injury status of people living in rural and remote areas compared to the injury status of the general population. Methods for grouping deaths and population data in ways that would allow reporting of this indicator are the Rural, Remote and Metropolitan Areas Classification (i.e. the RRMA), the Accessibility/Remoteness Index for Australia (ARIA) and the revised version of ARIA. The indicator was defined in terms of RRMA and we have not proposed a change.

Socioeconomic status

Indicators 2.3 and 2.6 refer to the health differentials between males from different socioeconomic groups. The most established method for calculating these indicators is the Socioeconomic Indexes for Areas (SEIFA), which have been derived by the ABS based on census data. There are some problems with SEIFA because reporting on the indicator depend on aggregation of 'place of residence' data for small geographic areas. As with RRMA, we have not proposed a change.

Australian population data

Population data for Australia are sourced from the ABS Demography section and are updated as revised/new estimates become available. All population estimates currently produced by the ABS are based on a usual residence concept, i.e. where people usually reside, and are referred to as estimated resident populations (ERPs). The 1991 Australian population is currently used as the reference population for direct standardisation, but will be replaced as soon as the final 30 June 2001 ERP for Australia becomes available.

Technical specifications

(Please see Appendix A4 for specifications for each indicator.)

This report provides specifications to improve the technical adequacy of the indicators that have been reported on previously. This involved the development of a framework and the writing of complete specifications for the twelve indicators based on deaths data, the eleven indicators based on hospital morbidity data, as well as for Indicators 4, 14 and 15. Eight indicators remain undefined mainly because they pose problems related to specification and/or because national data sets for getting information on these do not exist.

Towards more useful and valid injury indicators

This report reviews the status and potential of the current injury indicators in terms of:

- **purposes and topics;**
- **technical specification;**
- **data sources; and**
- **data quality.**

Most of the current indicators refer to injury occurrence (i.e. those based on deaths and hospitalisations data, as well as Indicators 6.2 and 8.2). More precise statement of their purpose (i.e. to monitor population incidence) allows improved specification and more focused assessment of data sources and data quality. This results in enhancements that are included in the specification of indicators in this report, and a set of actions and processes to achieve further development.

Most of the remaining indicators lack adequate specification. Moreover, data sources likely to be suitable for measuring the indicators are not available for most of these.

Specific products of this work are:

- **Better technical specification of all of the current NHPA Injury Indicators, based on more comprehensive criteria for specification. This product of the project is presented in Appendix 4 as the *Minimal Change* model. This represents our best endeavour to replicate the explicit and implicit specifications which underlay the NHPA Injury Indicators as originally stated, with particular reference to the indicator data reported in the 1997 indicators report (Commonwealth Department of Health and Family Services and Australian Institute of Health and Welfare 1998).**
- **An assessment of ways in which the performance of the indicators based on deaths and hospital separations data could be improved for the purpose of monitoring population incidence of injury. This product of the project is presented in Appendix 4 as the *Technically Revised* model. It embodies a set of revisions that are feasible now. The *Technically Revised* model is proposed for consideration by relevant bodies, and for testing. It is presented as a step towards a more useful and reliable set of injury indicators.**

The main elements of the *Technically Revised* model are:

- **Specification in relation to a set of technical criteria;**
- **Restriction to cases with specified anatomical or physiological damage (i.e. injury, defined in terms of ICD-10 diagnosis codes);**

- **Restriction of hospital cases to omit most 'same day' cases (rates of 'same day' cases vary greatly probably due to factors largely unrelated to incidence);**
- **Specifying mortality indicators in terms of date of death (not date of death registration); and**
- **Re-specification of all indicators in terms of ICD-10 codes (this includes solutions to the break in series for the indicators of injury due to accidental falls).**

A path for further development injury indicators is outlined. The main actions and processes stated are as follows:

Indicators of injury incidence

In addition to the changes that comprise the *Technically Revised* model, a number of other matter were noted to be important for the development and maintenance of an effective set of injury indicators. The main points are listed here:

- **Maintain consistency of indicators and associated data sources (i.e. ensure enough system stability to enable monitoring to occur).**
- **Implement incremental technical refinement of current indicators of injury incidence to take advantage of advances in knowledge and improvements in data (but keeping in mind the previous point).**
- **Develop indicators of severe injury incidence.**
- **Review indicator specifications periodically.**
- **Undertake quality assurance tests and certain other investigations related to data quality.**
- **Propose changes to data sources if shown to be necessary for adequate reporting of important indicators.**

Other indicators

The information requirements of injury prevention programs are likely to require the development and monitoring of selected indicators on new topics, to complement indicators of injury incidence. Specific discussion of purposes and topics for these is beyond the scope of the present Report. Likely areas of requirement are: (1) monitoring exposure to factors known to influence risk of injury, including preventive interventions and (2) monitoring service access and quality.

Another likely area of interest is to extend the scope of incidence indicators to some types of injury which do not normally result in death or admission to a hospital. Technical feasibility and cost are likely to be the main constraints.

Indicator specification, and assessment of data sources and quality largely depends on development of purposes and topics.

1 Introduction

1.1 Aim

This document contributes to a data development plan for the Injury Prevention and Control National Health Priority Area (NHPA) by undertaking technical review and documentation of current NHPA injury indicators and the data sources relevant to these. In particular the report is intended to:

- **Present an updated situation analysis of developments in regard to current data sources relevant to the indicators, highlighting the limitations of these sources and discussing the status of current indicators;**
- **Provide specifications to improve the technical adequacy of the indicators reported on previously through developing a framework and writing complete specifications for the injury indicators to the extent possible; and**
- **Identify actions and processes required to achieve further improvements in indicators and data sources, by providing a summary of improvements proposed in this and a previous NHPA report and summarising the information developments required if the foreshadowed improvements are to be achieved.**

1.2 Background to the Injury Indicators

The present set of injury indicators emerged from earlier sets that had similar but distinct purposes and origins.

Injury was one of the five topics covered by the Better Health Commission in the mid-1980s. The Commission was formed in the context of the World Health Organization's *Health for All by the Year 2000* initiative. The report of the Commission's Injury Taskforce included outcome goals for the prevention of several aspects of injury (Better Health Commission 1986).

The subsequent *Health Targets and Implementation Commission* had a responsibility to develop national health goals and targets, for injury among other topics. These goals and targets were endorsed by health ministers in 1988, and became a cornerstone of the 4-year *National Better Health Program* then established by health ministers (Health Targets and Implementation Commission 1988). Towards the end of the *National Better Health Program,* projects were undertaken to review the Program and to prepare for subsequent work. One of these focused on goals and targets, and produced a new set. The new set of indicators took account of data developments in the intervening years. The targets were 'an estimate of achievable change by the year 2000' and 'best estimates possible at this time using available information'. The document also provided for 'proposed targets' concerning important topics that lacked necessary data at the time. While target-setting and indicator monitoring were seen as helping to focus policy and programs on priorities and outcomes, '(t)arget setting should not be confused with evaluation. With few exceptions, the range of factors which may support or obstruct achievement of an individual target will be beyond the control of any individual

program or service. To this end, achieving a national or State target could only rarely be seen as the direct responsibility of any individual program or service.' (Nutbeam, Wise et al. 1993) p. 6)

This Report was one of the inputs to processes that gave effect to the 1993 'Sunshine Statement' by the Australian Health Ministers' Advisory Council on achieving 'optimal individual and population health within available resources through a focus on health outcomes' (Department of Human Services and Health 1994). Responses to this Statement included the establishment of Implementation Working Groups on defined priority topics, including injury.

The 1994 report *Better Health Outcomes for Australians* includes the report of the Injury Implementation Working Group. This is framed in terms of goals, targets and implementation strategies. '(I)ndicators provide a specific and measurable way of assessing progress towards the goals' stated by the program (Department of Human Services and Health 1994). Goals were 'general statements of intent and aspiration, outcomes which Australia might reasonably hope to achieve, in light of current knowledge and resources' (p. 4). The rationale for selecting goals and priority areas for injury is presented briefly. The process for selection of indicators is not discussed separately. It was largely determined by data availability, and this was recognised as being absent or inadequate for some topics considered to be priority areas.

The National Health Goals and Targets process was reviewed, beginning in 1995. The subsequent National Health Priority Areas program built on the previous work. Changes reflected concern that a national reporting requirement was needed, that the number of indicators was too large, and that treatment warranted more attention in the set of indicators. The focus shifted to indicators of health outcomes, and 'health outcome indicator' was defined as '…a statistic or other unit of information which reflects, directly or indirectly, the effect of an intervention, facility, service or system on the health of its target population, or the health of an individual' (Australian Institute of Health and Welfare and Department of Health and Family Services 1997). Injury remained a priority area, and the topics and specification of indicators, though reduced in number, remained substantially as before.

The first report on the NHPA injury indicators was published in 1998 (Commonwealth Department of Health and Family Services and Australian Institute of Health and Welfare 1998). That report included an appendix on data and statistical issues which is the basis for much of the present report.

1.3 Current Injury Indicators

At the time of writing there were 34 NHPA Injury Indicators, 12 based on deaths data and 11 on hospital morbidity data (Table 1.1). The remaining eleven refer to other data sources (which were not available when the indicators were written) or are not defined sufficiently to refer to a specific data source.

Table 1.1: List of NHPA Injury Indicators

1.1	Death rate for injury and poisoning in the total population
1.2	Hospital separation rate for injury and poisoning in the total population
2.1	Death rate ratio comparing the injury status of Indigenous and non-Indigenous populations
2.2	Death rate ratio comparing the injury status of males and females
2.3	Death rate ratio comparing the injury status among males aged 25–54 years from low socioeconomic groups with males from high socioeconomic groups
2.4	Death rate ratio comparing the injury status among people living in rural and remote areas and the general population
2.5	Hospital separation rate ratio comparing the injury status among Indigenous and non-Indigenous populations
2.6	Hospital separation rate ratio comparing the injury status among males aged 25–54 years from low socioeconomic groups with males from high socioeconomic groups
3.1	Death rate for road transport-related injury in the total population
3.2	Death rate for road transport-related injury among males aged 15–24 years
3.3	Hospital separation rate for road transport-related injury in the total population
3.4	Hospital separation rate for road transport-related injury among males aged 15–24 years
4	Work-related injury
5.1	Death rate for falls among people aged 65 years and over
5.2	Hospital separation rate for falls among people aged 65 years and over
5.5	Hospital separation rate for falls among children aged 0–4 and 5–9 years
6.1	Hospital separation rate for sport and recreation-related injuries
6.2	Non-hospital admitted sport and recreation-related injuries
7.1	Death rate for homicide among people aged 20–39 years
7.2	Death rate for homicide among children aged 0–9 years
8.2	Emergency department attendances resulting from product-related injury
9.1	Death rate for injury resulting from fire, burns and scalds among people aged 55 years and over
9.2	Hospital separation rate for injury resulting from fire, burns and scalds among children aged 0–4 years
9.3	The proportion of houses equipped with smoke detectors and earth leakage breakers
10.1	Hospital separation rate due to poisoning among children aged 0–4 years
11.1	Death rate for drowning in the total population and among children aged 0–4 years
11.2	Hospital separation rate for near drowning among children aged 0–4 years
11.3	Number of States and Territories requiring separation of domestic pools from houses
11.4	The proportion of domestic pools with approved child-resistant fences, gates and barriers
11.5	The proportion of children and young people aged 10–16 years who have successfully completed a water safety and lifesaving course
12.1	Access of injured patients to optimal trauma care
13.1	Access of people with trauma injuries to comprehensive rehabilitation programs and appropriate long-term care and community support
14	Annual incidence rate of persistent spinal cord injury from traumatic cases
15	Brain injury

1.4 Structure of report

Chapter 2 provides an update of developments in regard to current data sources relevant to the indicators. We also highlight the limitations of these data sources and discuss the status of current indicators.

Chapter 3 discusses the framework of specifications for the indicators, with the actual specifications for the indicators provided in Appendix A4.

Chapter 4 identifies and discusses actions and processes needed to further improve indicators and data sources.

References are provided in Chapter 5, followed by Appendices. Appendix 4 contains a major product of the report: technically revised specifications for the NHPA Injury Indicators.

The point of departure for this Report was to discuss the indicators in separate groups and to focus on data issues pertaining to these. We divided the indicators into:

- **indicators based on mortality data;**
- **indicators based on hospital separations data; and**
- **those not yet defined or based on other data sources.**

This report focused on injury indicators intended for use at a national level. Although some indicators may be appropriate for use in some States (especially those with larger populations), there may be problems with applying some indicators on a regional level (especially for States with smaller populations). In this Report, we did not consider the applicability of the current set of indicators other than for use on a national level.

2 Situation analysis

Appendix 2 'Data and statistical issues' in the NHPA report *Injury Prevention and Control 1997* considers data issues concerning the current set of 34 NHPA injury indicators (Commonwealth Department of Health and Family Services and Australian Institute of Health and Welfare 1998). This appendix included an assessment of the status of injury indicators and the main data sources on which their reporting and monitoring depended at the time it was written.

This chapter updates that situation analysis in view of data system changes and improvements in knowledge that have occurred in the years since the Appendix was written. We also present the limitations and remaining issues regarding available data sources (or lack thereof).

The work for this chapter was based on the authors' knowledge of these issues, supplemented by consultation with other individuals and agencies. In particular, we sought advice on data availability from nominated State and Territory contact persons.

2.1 Data sources

Sources for indicators based on mortality data

These indicators aim to provide a perspective on the causes of death. Twelve injury indicators are currently based on mortality data (Table 2.1).

Table 2.1: List of indicators based on mortality data

1.1	Death rate for injury and poisoning in the total population
2.1	Death rate ratio comparing the injury status of Indigenous and non-Indigenous populations
2.2	Death rate ratio comparing the injury status of males and females
2.3	Death rate ratio comparing the injury status among males aged 25–54 years from low socioeconomic groups with males from high socioeconomic groups
2.4	Death rate ratio comparing the injury status among people living in rural and remote areas and the general population
3.1	Death rate for road transport-related injury in the total population
3.2	Death rate for road transport-related injury among males aged 15–24 years
5.1	Death rate for falls among people aged 65 years and over
7.1	Death rate for homicide among people aged 20–39 years
7.2	Death rate for homicide among children aged 0–9 years
9.1	Death rate for injury resulting from fire, burns and scalds among people aged 55 years and over
11.1	Death rate for drowning in the total population and among children aged 0–4 years

Deaths data provided by the Australian Bureau of Statistics (ABS) remain the most comprehensive national data collection on health. Another source of mortality data was foreshadowed in the previous NHPA report *Injury Prevention and Control 1997,* i.e. the establishment of a National Coroners Information System (Commonwealth Department of Health and Family Services and Australian Institute of Health and Welfare 1998). Major developments in this regard are outlined below.

Mortality data provided by ABS

The State and Territory Registrars of Births, Deaths and Marriages are responsible for the registration of deaths in Australia. Medical practitioners certifying a death, or coroners to whom a death is reported, supply information on the cause of death. Other information about the deceased is supplied by a relative or another person acquainted with the deceased, or by the official institution where the death occurred. It is a legal requirement that deaths should be registered in Australia. Compliance with this is commonly regarded as being nearly complete, though we are not aware of formal investigations in this matter.

The information obtained by the Registrars is provided to the ABS. The ABS is the national statistical authority in Australia and codes the data from the Registrars, whereafter national statistics are compiled. This includes data on external causes of death. Since 1993, data coding has been centralised at the Brisbane office of the ABS.

The national mortality database has definite advantages, i.e. it constitutes a long, and generally consistent and reliable series based on widely accepted classifications.

Deaths registered from 1979 to 31 December 1998 were coded according to the 9th Revision of the International Classification of Diseases (ICD-9). From 1 January 1999, death registrations have been coded according to ICD-10. Deaths are usually reported by the calendar year during which they are registered. Thus national deaths data currently reflect case numbers by year of death registration rather than by year of death occurrence.

A major development in regard to ABS deaths data was the introduction of multi-cause coding, largely due to the introduction of automated coding software developed by the US National Centre for Health Statistics (Harrison and Alexander 1999). Multi-cause coding applies to deaths registered from the beginning of 1997.

The use of the automated coding software made multi-cause coding viable. This entails the coding of both the underlying cause of death and all other contributory causes mentioned on the certificate of death (Harrison and Alexander 1999). Appendix A1 provides an example of how multi-cause coding enhances mortality data.

It is important to note that the automated coding software does not code External Causes well. For example, if a death record states a relatively simple cause, such as 'drowning', the software will code it, but will allocate a non-specific code. In most cases ABS coders intervene manually to determine more specific details about the case, e.g. whether the death was due to an unintentional incident, a suicide, a homicide or an event of undetermined intent. Another example is that the automated coding software always codes 'stabbing' to 'homicide' and this is not always correct. Approximately 80% of all external cause deaths are still coded manually, as indicated by Coleen Hill, Senior Coder, Health and Vitals, Australian Bureau of Statistics, February 2001).

Although the introduction of multi-cause coding greatly enhances the deaths data available for surveillance purposes, it still does not completely alleviate the problem of fairly limited case information.

Limitations of the ABS mortality database are:

- **The reliability of the data is uncertain as formal, published validation studies are not a routine part of the system.**
- **The ABS releases a new mortality data set once each year. The deaths in each new set are those registered in a particular calendar year, and known to the ABS by a cut-off date some months after the end of that year. Reflecting this, injury mortality indicators have been reported in terms of annual rates based on death registrations rather than in terms of rates based on date of death (or 'occurrence'). Occurrence-based rates are preferable for most public health purposes because they represent population incidence, while registration-based rates may be affected by aspects of the death registration process. This issue was recognised in the 1997 NHPA Injury Prevention and Control report, though the recommendation for occurrence-based reporting made there was limited to Indigenous mortality (p. 105). If the time to registration varied little over time, or between types of deaths for which indicators are reported, it would not matter much which approach was used. In practice, considerable variation has occurred between jurisdictions, over time, and between types of injury death (e.g. type of External Cause, whether recorded as Aboriginal, whether certified by a coroner). Suicide data for 1997 illustrates the point and is outlined in Appendix A2.**
- **Only with deaths registered from 1997 has the ABS mortality file included information on the nature of the injury sustained (i.e. equivalent to diagnosis in separations data).**
- **There has been a lack of an item that enables the identification of injury deaths related to work, to sport, and to certain other types of activity. Implementation of the 'Type of Activity' item that is part of ICD-10 would do much to overcome this problem. (The 'Place' item would also help.) These items were included in the ABS mortality data file for 1999 registrations. However, their completeness and reliability remain uncertain. Therefore, there continues to be a lack of data that enables satisfactory identification of injury deaths related to work, to sport, and to certain other types of activity.**
- **The use of ICD for recording of cause of death is limiting although this latter restriction has been reduced to some extent by the multi-cause coding and the introduction of ICD-10.**
- **The database is also limited for surveillance of other potential indicator topics because of the lack of variables relating to risk factors (i.e. other than age, sex and place of usual residence).**
- **The Clinical Modifications of the ICD have not, to date, been applied to mortality coding. The rationale for this appears to be that the additional categories are (as the term 'Clinical Modification' might suggest) relevant to clinical circumstances and are either irrelevant or inapplicable for mortality coding. This argument may be true for some of the additional diagnosis categories, but it does not apply to the additional external cause categories that have been added to the clinical modifications. However, extensions to the coding of external causes of deaths have been made by the addition of additional data items. Examples are items for coding circumstances of drowning, and types of firearms involved in shooting deaths. This flexibility is welcome, but it has brought potential for lack of coordination with development of coding of external causes in hospitals data and other sources. One instance of divergent**

classification has occurred: different approaches have been taken for the mortality data file and in ICD-10-AM to providing information on type of firearm that goes beyond that provided by ICD-10 External Cause codes.

National Coroners Information System

In Australia nearly all sudden and/or unexpected deaths, such as cases where a person dies violently, or from an unusual, suspicious or unknown cause, as well as deaths in custody, are required to be reported to a coroner. Most injury deaths are reported to a coroner.[1]

A coroner is a judicial officer whose role is to determine the identity of the deceased person and to enquire into the place, medical cause and circumstances of death. If judged necessary by the coroner, this includes a formal inquest. A coroner works together with a forensic pathologist. The role of the coroner has evolved from that of straightforward investigation of unnatural deaths to one of actively highlighting risk factors and making recommendations to prevent such deaths in the future.

Coroners' records are the single richest repository of information about unnatural deaths, including most injury deaths. However, until recently coronial information systems were not able to provide efficient access to information that is required by both the coroners and the major users of coronial data. Australia's eight coronial jurisdictions each have their own systems of data collection and storage. In some jurisdictions coronial records were based on a manual filing system without indexes to identify or retrieve clusters of similar cases.

The idea for the development of a National Coroners Information System (NCIS) began about 15 years ago when the potential of coronial data was recognised, along with the fact that problems accessing it prevented the potential from being realised. At that time there was no one agency which had a national perspective or overarching responsibility for such data. The Australian coroners formed a national society in 1992 and then commissioned a feasibility study into the establishment of a NCIS (Moller 1994). This feasibility study was supported by an implementation report developed by Drummond Research (Drummond 1996). Monash University and the Victorian Department of Justice provided capital funding to enable the development of the NCIS by a consortium called the Monash University National Centre for Coronial Information (MUNCCI). MUNCCI is a research centre of Monash University located at the Victorian Institute of Forensic Medicine in Melbourne.

The Standing Committee of Attorneys-General (SCAG) gave in principle approval for the development of NCIS in 1997. Additional funding received from the then Commonwealth Department of Health and Family Services (now Health and Ageing) enabled a pilot program to commence in the ACT on 1 July 1998. This was followed by NSW coming on-line on 1 November 1998 and Victoria on 1 February 1999. The next phase of development began on 1 July 1999 and was based on a 3-year national funding strategy. This current phase involves the conversion of NCIS from a development project to an ongoing service. In July 2000, SCAG approved rules to apply to all applicants for access to NCIS data. The rules currently restrict access to

[1] The main exception is deaths of elderly people where a fall is the underlying cause. Under certain circumstances, these need not be reported to a coroner, and most are not. This fact, and some related factors concerning the way that information is gathered on injury deaths, have important implications for the reliability and usefulness of mortality data on deaths attributed to accidental falls by older persons.

Coroners and their death investigation staff, and to government and research agencies. All government and research applications are first required to be approved by the relevant Monash University ethics committee.

At the time of writing, all States and Territories were contributing data to the NCIS and numerous third parties had been authorised to access NCIS data (except Queensland data) for approved purposes (Monash University National Centre for Coronial Information 2001).

NCIS is an electronic database currently maintained at a central location at MUNCCI in Victoria. Data entry is undertaken locally by coronial jurisdictions. Data items are uploaded to the NCIS on a nightly basis. Retrieval is decentralised via the Internet with password and firewall security to prevent unauthorised access. The NCIS core data set currently include these groups of data items:

- **case demographics—such as the deceased's age at time of death, sex, marital status, usual occupations, and Indigenous status;**
- **cause of death details—such as the circumstances of the death, i.e. the intent, mechanism, object involved in death, as well as the nature of the injury. (ICD-10 codes for causes of death were to be provided by the ABS by mid 2001.)**
- **incident information—i.e. the location of where death occurred/where the body was found; activity at time of death; and**
- **textual information is also included—such as a brief description of the circumstances of death noted on the police *Report of Death Form*, pathology report, toxicology report as well as the final finding by the coroner in cases where an inquest was held.**

It is also intended that enhancements will be made to the database from time to time to provide increased quantity and quality of data on certain categories of coronial deaths, such as drug-related deaths, suicides and work-related deaths. Stakeholders for such enhancements will need to identify the additional data they want and will have to provide the funding for the routine collection and coding of these data items. At the time of writing, the development of a drugs module was well advanced and implementation of the Drugs Module was due to occur on 1 July 2002 (Monash University National Centre for Coronial Information 2001). It was also foreseen that the next update to the NCIS would apply from the same date.

There is an initiative to standardise the *Report of Death Form* used by police to notify coroners' offices of sudden or unexpected deaths. Each jurisdiction had used their own form and much work has gone into providing a standardised form across all jurisdictions. The new standardised form is called the *National Minimum Data Set for Police Investigation of Coronial Deaths in Australia*. This will further enhance coronial information. As indicated by Lyndal Owens, Project Officer, Monash University National Centre for Coronial Information, August 2001.

The implications of the NCIS in regard to the injury indicators are that, in principle, more detailed data will be available on injury deaths, potentially more promptly. At the time of writing, data were just becoming available and validation studies of this data source still need to be done.

Sources for indicators based on separations data

Eleven injury indicators are currently based on hospital separations data (Table 2.2). These indicators provide some insight into non-fatal injury. There have been incremental improvements in the availability and quality of separations data and this warrants an update.

Table 2.2: List of indicators based on hospital separations data

1.2	Hospital separation rate for injury and poisoning in the total population
2.5	Hospital separation rate ratio comparing the injury status among Indigenous and non-Indigenous populations
2.6	Hospital separation rate ratio comparing the injury status among males aged 25–54 years from low socioeconomic groups with males from high socioeconomic groups
3.3	Hospital separation rate for road transport-related injury in the total population
3.4	Hospital separation rate for road transport-related injury among males aged 15–24 years
5.2	Hospital separation rate for falls among people aged 65 years and over
5.5	Hospital separation rate for falls among children aged 0–4 and 5–9 years
6.1	Hospital separation rate for sport and recreation-related injuries
9.2	Hospital separation rate for injury resulting from fire, burns and scalds among children aged 0–4 years
10.1	Hospital separation rate due to poisoning among children aged 0–4 years
11.2	Hospital separation rate for near drowning among children aged 0–4 years

Australian hospitals collect administrative and clinical data about the patients they treat and these collections have existed for various periods in the States and Territories. Efforts to assemble comparable data into a national collection began in the 1980s.

Currently, hospital separations data for all admitted patients are compiled by the health authorities of the different States and Territories, as well as by the Department of Veterans' Affairs. The AIHW receives the collections from various agencies and maintains a national hospital separations database. This National Hospital Morbidity Database (NHMD) does not contain unique personal identifiers and the data are based on the patient-level data items of the annually-updated National Minimum Data Set for Institutional Health Care (Australian Institute of Health and Welfare 1999a).

The source database contains records for all separations by admitted patients in the reference period from almost all hospitals in Australia.[2] The hospitals that are included in the NHMD are public acute hospitals, public psychiatric hospitals, private acute hospitals, private psychiatric hospitals and private free-standing day hospital facilities. There are exceptions and these have varied a bit between years. The exceptions have been minor in relation to the total number of records, and are outlined in Appendix A3.

Data quality has improved as a result of the various health information initiatives of recent years. Data from 1993–94 and later years are noticeably more adequate than for earlier years, and (with careful use) the source now appears to be sufficiently complete and valid to support monitoring of trends. However, some problems remain, as outlined below and in Appendix A3 and Chapter 4.

[2] A hospital separation refers to an episode of care, which can be a total hospital stay (from admission to discharge, transfer or death), or a portion of a hospital stay beginning or ending in a change of type of care (for example, from acute to rehabilitation). It is defined as the process by which an admitted patient completes an episode of care by being discharged, dying, transferring to another hospital or changing type of care (Australian Institute of Health and Welfare 1999a).

Up to the end of June 1998, hospital data were coded according to a clinical modification of ICD-9 (ICD-9-CM). A first version of the Australian modification of ICD-10 (i.e. ICD-10-AM) was introduced at various stages in the different States and Territories. From 1 July 1998, NSW, NT, Victoria and ACT coded data according to ICD-10-AM. The other four jurisdictions coded data according to ICD-10-AM from 1 July 1999. Hospital separations data are reported according to financial year. The second version of ICD-10-AM has been used since 1 July 2000. The third version became available in early 2002 and was to be implemented from 1 July 2002.

A new feature of the External Causes classification in the tenth revision of the ICD is a classification of activity at the time of injury. Consequently, the introduction of ICD-10-AM should enable monitoring of two indicators for which data have not been available, i.e. Indicators 4 (work-related injury) and 6.1 (hospital separations rate for sport and recreation-related injuries). The quality of the new data requires assessment.

It should be noted that although it is theoretically possible to report on Indicators 4 and 6.1 for data coded to ICD-10-AM, the actual application of the activity codes needs to be assessed.

There are several other issues to be noted in regard to data on hospitalisations:

- **Some injuries result in more than one 'hospital separation', because of transfers between hospitals, because the treatment of some cases requires re-admission, and for some less important reasons. The NHMD contains a record for each separation. Hence, estimates of the incidence of injury resulting in hospitalisation that include all separations by injury cases will be overestimates. Currently available methods to correct for this (e.g. using the 'Mode of Separation' data item) are imperfect and have not been validated.**
- **The quality of data in the External Cause items, the completeness and quality of data in the 'Type of Place' and 'Type of Activity' items, as well as reliable discrimination of injury cases according to severity needs to be assessed and resolved. It is noteworthy that the data items of special relevance for injury surveillance (i.e. External Cause codes, Place, and Activity) are not used to derive Diagnosis Related Groups (DRGs), and their quality has not received the same close attention as items which do drive DRGs (notably diagnosis codes). Differences between jurisdictions in usage of external cause codes are apparent even in recent years for which data are available (NISU analysis).**
- **The *National Health Data Dictionary* definitions form the basis of the NHMD. However, actual definitions used may vary among data providers and from one year to another. Also, finer details of the scope of the data collections may vary between jurisdictions.**
- **Not all private hospital separations are included in the NHMD. Hence, even for recent years the counts may be slight underestimates of the actual counts (see Appendix A3).**
- **It should also be noted that, in ICD-10-AM, complications of obstetric procedures are classified within the Pregnancy, Childbirth, Puerperium chapter and not the Injury and Poisoning chapter (National Centre for Classification in Health 1998).**

More detailed information about hospital separations data for specific data years is provided in Appendix A3. Implications of these issues for specifying and reporting on indicators are discussed in Chapter 4.

Sources of data for remaining indicators

This section deals with the remaining indicators and discusses each indicator separately.

Table 2.3: List of indicators not currently based on deaths or hospitalisations data

4	Work-related injury
6.2	Non-hospital admitted sport and recreation-related injuries
8.2	Emergency department attendances resulting from product-related injury
9.3	The proportion of houses equipped with smoke detectors and earth leakage breakers
11.3	Number of States and Territories requiring separation of domestic pools from houses
11.4	The proportion of domestic pools with approved child-resistant fences, gates and barriers
11.5	The proportion of children and young people aged 10–16 years who have successfully completed a water safety and lifesaving course
12.1	Access of injured patients to optimal trauma care
13.1	Access of people with trauma injuries to comprehensive rehabilitation programs and appropriate long-term care and community support
14	Annual incidence rate of persistent spinal cord injury from traumatic cases
15	Brain injury

NHPA Injury Indicator 4—Work-related injury

As stated above, this indicator has not been defined to date, at least in part because no national data were available to monitor it.

Prior to the deaths registered in 1999, national deaths data from the ABS have not allowed for the identification of work-related cases. Inclusion of the ICD-10 Activity item in the latest data file at the time of writing opens the possibility of doing so, though data completeness and reliability remain uncertain. The NCIS also has potential to enable identification, subject to adequate data quality. Similarly, it was not possible to identify work-related injury in hospital morbidity until the recent introduction of ICD-10-AM. Work-related injury can also be identified in two major emergency department (ED) collections, but these collections do not provide reliable population-based case data, and substantial system development would be required to enable this.

Another source on work-related injury is workers' compensation data (National Occupational Health and Safety Commission 1998). However, these data do not cover all occurrences of fatal occupational injuries and diseases as it excludes self-employed people not covered by workers' compensation (e.g. farmers and contractors) and persons for whom no workers' compensation claim is made. Workers' compensation data also do not cover all work-related fatalities, e.g. motor vehicle crashes on public roads and most diseases. There are also some inconsistencies in reporting, e.g. bystander deaths due to work-related exposures are not included consistently. Another problem with the data is that it is difficult to collate and analyse as many records are kept on paper files (National Occupational Health and Safety Commission 1998).

Some surveillance systems are in place to monitor particular conditions, such as the National Mesothelioma Register managed by the National Occupational Health and Safety Commission, but these have little relevance for injury.

At this stage, hospital morbidity data provides the best option for defining and reporting on Indicator 4 as the introduction of the ICD-10-AM Activity code allows work-related injury cases to be identified. As stated above, the accuracy and completeness of these data do need to be validated before the indicator is reported.

In this report, the previously undefined indicator has been specified in terms of hospital separations data (Appendix A4).

The NCIS and national mortality data (or both, in combination) provide options for monitoring work-related deaths, given adequate data quality. The preliminary data available at the time of writing were not sufficient to support a specific recommendation.

NHPA Injury Indicator 6.2—Non-hospital admitted sport and recreation-related activities

Sports injuries are treated in a wide range of settings, including the scene of injury, at sports injury and sports medicine clinics, general practices, EDs and in hospitals. Reporting on sports injury resulting in hospital admission is defined in Indicator 6.1, but definition of Indicator 6.2 is more problematic. The main reason for this is that currently there is no comprehensive national data collection of sports injury that does not result in a hospital admission.

There are some data sources on sports injury, but they use different methods and do not provide national coverage. The sources include state-based ED data collections; the Sports Medicine Injury Surveillance project which is collecting data on new injuries presenting to five sports medicine centres in Melbourne; sporting organisation or competition collections such as the Australian Football League injury record; insurance records; and individual sport, club or practitioner collections.

The feasibility of a national sports injury data and information system was identified as a priority in 1997 by the Australian Sports Injury Prevention Taskforce. The Taskforce had recommended a standardised approach to the collection of injury data in a variety of sport settings. This led to the establishment of the Australian Sports Injury Data Working Party which has released the *Australian Sports Injury Data Dictionary*. Although this is a step towards the collection of national sports injury data, there is still no national data source to provide relevant information to report on or monitor this indicator.

Another possible source of sports injury data is the *Bettering the Evaluation and Care of Health* (BEACH) program developed by the AIHW General Practice Statistics and Classification Unit. BEACH has the potential to obtain nationally representative information about general practitioner (GP) encounters concerning injury, on a continuing or intermittent basis (Britt, Sayer et al. 1999).

The BEACH program began on 1 April 1998 and data collection involves a 'rolling' random sample of GPs across the country. Standard BEACH data can distinguish injury cases among all cases, but the circumstances or External Causes of injuries—i.e. the place of occurrence, activity at the time of injury, objects and substances involved, and the role of human intent, are not collected as part of the standard BEACH data set. Prospective collection of data on these issues is required to

overcome this limitation. This may be possible through the *Supplementary analysis of nominated data* (SAND), which involves the inclusion of specific questions on injury to the standard BEACH data collection form (Britt, Sayer et al. 1999). However, at the time of writing, there were no definite plans or funding for such a data collection.

Another issue relates to the relationship between cases seen in EDs and those presenting to a GP. The nature and extent of difference between injury cases attending EDs and those attending GPs is unclear. Key dimensions of difference are case severity and External Causes. Also, changes observed in rates of GP injury visits might reflect change in injury occurrence and/or change in the proportion of injury cases attending GPs and EDs. It will be difficult to separate these effects unless both ED and GP high quality data are available (Harrison Unpublished).

A viable option for monitoring non-admitted sports injury does not exist at present. An option warranting consideration is serial population surveys.

NHPA Injury Indicator 8.2—ED attendances resulting from product-related injury

Currently, there is no specific definition for this indicator. 'Product-related' does not have a widely accepted definition. People with injuries frequently attend GPs and other service providers, as well as EDs, and fractions attending various types of service providers may differ between places and over time. Hence, monitoring of ED attendances resulting from product-related injury may not provide a reliable basis for assessing trends in case occurrence in a population. There is currently no data source in Australia capable of monitoring national trends in ED attendances resulting from product-related injury.

Operational definition of product-related injury would require decisions concerning the types of object or substance to be regarded as 'consumer products' for this purpose, and on the meaning of '-related' (e.g. any mention of a product, or only where the product had some specific type of role in the occurrence of injury). The nature of the definition would affect the feasibility of reliable measurement by means of routine data collection.

Ongoing collection of ED injury case data is undertaken by systems in parts of Australia, notably the Victorian Injury Surveillance and Advanced Research System (VISAR) and the Queensland Injury Surveillance Unit (QISU). VISAR operates at 26 EDs of Victorian hospitals and comprises two main data collections, i.e. the Victorian Admitted Episodes Dataset (VAED) and the Victorian Emergency Department Minimum Dataset (VEMD). The data collection of QISU is done at 14 EDs at hospitals in Queensland. In South Australia, there is a more limited collection at two hospitals and in Tasmania data capture at three hospitals was commencing at the time of writing.

Meaningful monitoring of an indicator requires a data source that can provide sufficiently precise estimates, and one that can be expected to vary with the phenomenon of interest.

One concern in regard to available ED data is the quality of currently collected data. It remains to be demonstrated that current ED collections can provide sufficiently precise estimates for monitoring trends in injury incidence in populations.

A second important constraint on monitoring injury by means of case collection at EDs is that a large percentage of people sustaining new injuries seek care from a GP. An estimate derived from the most recent ABS National Health Survey is that 2.7 new injury cases attend a general practitioner for every one that attends an ED. Of all new injury cases that receive any medical attention, about 90 per cent attend a GP, an ED, or both (Harrison Unpublished). Consequently, variation in ED attendance rates might be due to variation in incidence or variation in the proportion of cases that attend EDs.

A minority of new injury cases present substantial threat to life, or are likely to be seen as severe and urgent. There are good reasons to expect that these dramatic cases usually attend an ED. However, most injury cases seen at EDs are not severe in this sense, and may not be very different from injury cases attending GPs. Those that are severe are likely to be admitted.

Injury Indicator 9.3—The proportion of houses equipped with smoke detectors and earth leakage circuit breakers

There is no specific definition for this indicator and no national data source has been found that would enable reporting.

Note that smoke detectors are properly described as smoke 'alarms'. Smoke alarms and earth leakage circuit breakers are distinct safety devices and should not be combined in a single indicator.

Legislation requiring smoke alarms in residential houses (new and, under certain circumstances, existing) has become widespread. Attention has tended to move from the simple presence of a smoke alarm to the presence of a functioning alarm (i.e. installed and with a functioning power supply).

In principal, one type of data source that would enable monitoring could be an administrative register of houses (or other dwellings) with information on the presence of these safety devices. Another type of source would be a series of sample surveys of samples of houses, including information on the safety devices. Surveys in which survey personnel inspect dwellings and safety devices is likely to provide more reliable information, but is more expensive and intrusive than one in which information is gathered by interviewing a householder, perhaps by telephone.

One possible option to collect data is to include appropriate questions in national sample surveys, such as the National Health Survey.

In Australia, several National Health Surveys have been conducted, with the aim of providing national benchmark information on health issues and to monitor trends in health over time. Surveys were conducted in 1977–78, 1983, 1989–90 and 1995, and the next is in the field in 2001. At the time of writing the future frequency of the survey was under review and the ABS had foreshadowed major changes to its program of health surveys. Indications are that the new approach, when finalised, will include more frequent though smaller population surveys.

Computer Assisted Telephone Interviews (CATI) are emerging as the basis for programs of health surveys in Australia. These are smaller, cheaper and quicker than the National Health Surveys. Given the likely prevalence of the safety devices, the typical sample sizes of CATI surveys (i.e. one to three thousand) would be sufficient to enable usefully precise information. However, questions used would need to be validated to ensure that CATI interview responses provided an

adequately reliable indication of the issues of interest (e.g. whether a functional smoke alarm is present).

Funding for development, testing and inclusion of relevant questions for this indicator in suitable surveys will be needed if this approach is taken.

NHPA Injury Indicator 11.3—Number of States and Territories requiring separation of domestic pools from houses

As with the other indicators discussed above, this indicator has not been defined specifically. Reporting on this indicator was problematic because legislation is dealt with differently in the various States and Territories and in the past there was no well defined process for identifying legislation.

The criterion stated in the indicator would require further specification (e.g. Is it met by a barrier partly formed by walls and doors of the house? Is it met by a requirement limited to new pools, or must existing ones be covered?)

The Department of Health and Ageing (DHA) has commissioned development of a database of legislation related to child injury prevention. This might provide a technical basis for identification of legislation, provided its currency is maintained. Additional investigation would need to be made concerning the dates of introduction of measures meeting the criterion, as the database does not hold a register of dates of introduction, especially where current regulatory measures are not the first to have met meet the criterion.

NHPA Injury Indicator 11.4—The proportion of domestic pools with approved child-resistant fences, gates and barriers

There is no specific definition for this indicator and no national data to report on it. Like Indicator 9.3, this indicator concerns the presence of a safety device in dwellings. Similar issues and prospects for obtaining data apply.

As for smoke alarms, a key issue for barriers to pool access is whether they are functional. Some aspects of the functional status of pool barriers may be difficult to determine reliably without direct inspection. Western Australia currently leads the way in regard to home pool inspections. In 1991, new legislation was introduced that required all local government areas to inspect all private swimming pool enclosures for compliance with local laws and codes for a minimum of once every 4 years. In 1998, more legislation allowed local municipalities to contract third parties (such as the Royal Life Saving Society of Australia (RLSSA)) to conduct the inspections. RLSSA currently provides home pool inspection and educational services for about 14 different municipalities in WA. Other jurisdictions are starting to follow the WA example: pool inspections are done in some municipalities of Victoria, ACT and NSW.[3]

Collating national statistics on the number of pool inspections done, the number of functional pool barriers, etc. remains problematic. Not all jurisdictions are currently conducting pool inspections and responsibility for such safety audits lie at different levels in the various States and Territories. For some, responsibility lie at State level, but for others the responsibility rests with local government. It is, therefore, unlikely that a relevant national data set will be available in the near future.

[3] Robert Bradley, Convenor of the Australian Water Safety Council (personal communication November 2001).

One possible option to collect data for this indicator is to include appropriate questions in national sample surveys, such as the National Health Survey. Validation of questions will be important.

NHPA Injury Indicator 11.5—The proportion of children and young people aged 10–16 who have successfully completed a water safety and lifesaving course

This indicator is not defined nor does a suitable data source exist that will allow for reporting on this indicator. A new data source would be required. As with Indicators 9.3 and 11.4, a sample-based population survey is one option for providing relevant data. Another option is a national register of people who have completed a relevant course. RLSSA keeps track of the number of young people who complete their water safety education courses, but establishment of a national register is not seen as being practicable.[3] Another possibility is that the Australian Water Safety Council might be in a position to collate information from all education departments, as well as their own members' programs. This is again problematic because the relevant courses are delivered through different State departments in the various jurisdictions. The Australian Water Safety Council is initiating a move to have the departments for sport and recreation in the various jurisdictions collate State-specific data from various departments and/or relevant organisations. This would allow for national collation, but clearly the outcome of this initiative is still years away.[3]

NHPA Injury Indicator 12.1—Access of injured patients to optimal trauma care

As currently worded, this indicator is more appropriately regarded as a partial statement of a goal concerning access to clinical services and the quality of the services. Further conceptual development at this level would be required before indicator specification and other aspects of technical review and documentation could be undertaken.

If restricted to high severity cases, some measures of quality of care might be based on special collections concerning major trauma cases, such as trauma registers. Development of regional and State trauma registers has occurred. While the principle of harmonisation of data standards has been considered in several contexts, it has not been achieved nationally yet. Efforts to achieve this are continuing, but at the time of writing systems still varied between centres. Moreover, technical and data access issues would need to be overcome before data from registers could be used as the basis for national indicators.

NHPA Injury Indicator 13.1—Access of people with injuries to comprehensive rehabilitation programs and appropriate long-term care and community support

As with the previous indicator, this indicator has not been defined operationally and is inadequate because it uses very broad terms to describe complex phenomena. There are questions about developing a single indicator for such an integrated concept.

A first step for this indicator would be to define the population for whom services are needed. A number of recent reports have addressed the definition of disability (Madden, Black et al. 1995; Madden and Hogan 1997; Fortune and Wen 1999; Wen and Fortune 1999). Moreover, the final draft of the *International Classification of Functioning, Disability and Health* was released in 2001. These documents assist better definition of the population served by this indicator.

One possible source of data on rehabilitation is private hospitals. There is an information agreement between DHAC and some private hospitals regarding their rehabilitation programs. The National Health Information Management Groups is involved.

NHPA Injury Indicator 14—Annual incidence rate of persistent SCI from traumatic cases

At the time of writing of the 1997 NHPA Report on Injury Prevention and Control, the Australian Spinal Cord Injury Register (ASCIR) had recently been established. The ASCIR is now in its sixth year of operation and has more than 9,500 registered incident cases. Of these, about 4,000 originated from a data collection that operated from 1986–1991.

The ASCIR is a cooperative arrangement of the six Australian spinal units and the AIHW National Injury Surveillance Unit of the Flinders University Research Centre for Injury Studies. It is a first in the world and enables the monitoring of patterns and trends in SCI (O'Connor 2000b).

The ASCIR currently collects data on incident cases from *traumatic* and *non-traumatic* causes, as well as on readmissions to the spinal units. Coverage of the adult population by the ASCIR was assessed to be complete (O'Connor 2000a).[4]

The case definition employed for registration of *traumatic* SCI cases reads: '… a case of spinal cord injury is defined as the occurrence of an acute, traumatic lesion of neural elements in the spinal canal (spinal cord and cauda equina) resulting in temporary or permanent sensory deficit, motor deficit, or bladder/bowel dysfunction' (Thurman, Kraus et al. 1995).

The ASCIR currently includes identifying information of the patient; sociodemographic items, e.g. sex, employment status; acute admission data, including reason for and ASIA score on admission; data on the injury event that resulted in the admission, e.g. External Cause, place; clinical management information, such as complications and procedures; and discharge data, including ASIA score on discharge and mode of separation. Data are coded to the National Data Standards for Injury Surveillance, Level 2.

[4] Coverage is incomplete for paediatric cases. Investigations show that the ASCIR covers about half of all paediatric cases that occur annually. However, the case numbers involved are small—about 5 cases per year nationally—and overall trends are not affected substantially.

NHPA Injury Indicator 15—Brain injury

This indicator had not been defined in previous documents on NHPA indicators. This was largely due to the lack of a practical definition of brain injury. Also, there was no way of identifying these types of injury in deaths data.

Recent developments in regard to this indicator now allows for the better specification of this indicator. The US Centers for Disease Control and Prevention (CDC) and the World Health Organization have designed a case definition of traumatic brain injury (TBI) for use with existing uniform data systems, e.g. with hospital separations data. The definition refers to both ICD-9-CM and ICD-10-AM diagnosis codes (O'Connor and Cripps 1999) (Table 2.4).

Table 2.4: Definition of TBI

CDC/WHO definition of TBI based on ICD-9-CM:
• 800.0 – 801.9 (Fracture of the vault or base of the skull)
• 803.0 – 804.9 (Other and unqualified as well as multiple fractures of the skull or face)
• 850.0 – 854.1 (Intracranial injury, including concussion, contusion, laceration and haemorrhage)
CDC/WHO definition of TBI based on ICD-10 (and presented according to ICD-10-AM):
• S02.0 – S02.1 (Fracture of the vault or base of the skull)
• S02.7 – S02.9 (Fracture of other and unspecified skull and facial bones and multiple fractures involving skull and facial bones)
• S06.0 – S06.9 (Intracranial injury)

A report on surveillance of brain injury recommended that the definitions outlined above be adopted as the case definition for TBI (O'Connor and Cripps 1999). The authors also recommended that hospital separations data be used to define a relevant NHPA indicator for TBI. This approach was applied and specifications for this indicator are given in Appendix A4. Consequently, Indicator 15 can now be regarded as a member of the set that can be reported on the basis of hospital separations data.

Special data issues

Sources of data on Indigenous Australians

Two injury indicators relate to Indigenous Australians, i.e. Indicator 2.1 (Death rate ratio comparing the injury status of Indigenous and non-Indigenous populations) and Indicator 2.5 (Hospital separations rate ratio comparing the injury status of Indigenous and non-Indigenous populations).

Relevant data to report on these indicators are problematic. The difficulties centre around two main issues, i.e. reliable identification of Indigenous status in national mortality and morbidity data; as well as the reliability of population data for Indigenous Australians.

This issue is the subject of a report titled *Information sources for Indigenous injury prevention: status and prospects for improvement* (Harrison, Miller et al. 2001).

Identification of Indigenous status

The usefulness of administrative data collections, such as the national mortality and morbidity data collections, is currently limited by the quality of identification of Indigenous status.

Mortality data

In Australia, identification of Indigenous status was first done in deaths data for NSW in 1980, with other jurisdictions introducing the indicator at various times thereafter. Current forms all use the standard concept of identifying Indigenous status (i.e. 'Was the deceased of Aboriginal or Torres Strait Islander origin?'), but there are variations in the way these questions are worded, e.g. in WA the word 'Aboriginal' with two options 'Yes' and 'No' appears on the notification form (Australian Bureau of Statistics and Australian Institute of Health and Welfare 1996).

Although the presence of an indicator enables identification of Indigenous status, it does not guarantee complete or reliable identification. Although empirical evidence on the completeness and reliability with which Indigenous status is identified is still limited for mortality data, it is quite probable that currently available data result in underestimation of true case counts.

A demonstration of the problems regarding identification of Indigenous status was reported by ABS and AIHW (1999). They estimated the level of under-reporting of all deaths among Indigenous people (i.e. not only deaths due to External Causes) by comparing the number of registered deaths recorded as Indigenous with the number of expected deaths based on experimental life tables derived by the ABS from census results. Two sets of estimates of completeness were calculated, i.e. a set based on 1991 Census and experimental life tables for 1986–91 and a second set based on 1996 Census and experimental life tables for 1991–96. These figures for Australia as a whole are shown in Table 2.5.

Table 2.5: Ratio of registered to expected deaths; Australia 1995–1997

	No. of registered deaths among Indigenous Australians [(a)]	Ratio of registered to expected deaths for:	
		1991 Census-based projections	1996 Census-based projections
1995	1,182	0.54	0.36
1996	1,306	0.59	0.39
1997	1,662	0.74	0.49

(a) Includes 'Other territories'.

Source: ABS and AIHW 1999.

Completeness of data for deaths among Indigenous Australians were quite low. Except for the 1997 estimate based on the 1991 Census-based projections, the estimates suggest that about 50% or less of Indigenous deaths were registered as such. However, things seem to be improving somewhat—both sets of figures indicate an increase in the proportion of estimated completeness over the years 1995–1997.

There are differences between States and Territories in regard to estimated completeness of Indigenous status identification. The ratio of registered to expected deaths as presented by ABS and AIHW (1999) shows the differences in completeness

between States and Territories and points to higher quality of data in SA, WA and NT. These three jurisdictions had the smallest discrepancies between registered and expected deaths. When projections based on the 1991 Census are considered, it is apparent that these three jurisdictions registered, on average, around 90% of the projected number of deaths for the years 1995–1997. These proportions seemed to remain fairly stable. When 1996 Census-based figures are considered, the proportion is lower, i.e. around 65% for SA, 75% for WA but higher for the NT. Other jurisdictions show lower proportions, especially Tasmania. For both the 1991 and 1996 Census-based figures, less than 10% of the projected deaths are registered per year in this State. ACT shows greater variation in numbers, but the completeness seems to be decreasing. Victoria was stable for 1995 and 1996, but showed a huge increase in completeness in 1997. NSW showed a decline in numbers, but the decline in the number of deaths registered in 1997 was the result of a technical issue (Australian Bureau of Statistics and Australian Institute of Health and Welfare 1996).

The Queensland Registrar for Births, Deaths and Marriages began collecting data on Indigenous status for births and deaths in 1996. For this year, coverage of Indigenous deaths for Queensland was 42% on 1991 Census-based expectancies and 29% on 1996 Census-based expectancies. For 1997, coverage figures were 85% and 58% on 1991 and 1996 benchmarks, respectively, but increased to 94% and 63% respectively for 1998 (ABS and AIHW 1999). The relatively low coverage in 1996 occurred because, despite the Queensland Registrar's concerted efforts to recover stocks of superseded forms and replace them with those containing the Indigenous status question, a substantial number of deaths were still reported on old forms and were, therefore, without information on Indigenous status. 1997 was the first full year for which births and deaths were consistently reported on forms containing the Indigenous question.

Indigenous identification will also be possible in the NCIS. The relevant data element in the NCIS will comply with the ABS standard question, but validation of this data item is needed.

The proportion of Indigenous deaths registered in a year after the year of occurrence varies by year and jurisdiction. Therefore, an analysis of Indigenous mortality by year of registration could be misleading and estimates should be based on year of occurrence. (As noted above, similar variation also affects other injury deaths.)

Morbidity data

Indigenous status is available in hospital morbidity data, but there are some problems in terms of accuracy of such data. A recent pilot project indicated that the quality of Indigenous identification varied widely in Australian hospitals—accuracy varied from 55% to 100% among 11 hospitals participating in the study (Gray 1999). Also, although other demographic data were recorded inaccurately or incompletely, the recording of Indigenous status showed the greatest variation between hospitals and had a lower level of accuracy than other variables. A major factor that seems to influence accuracy of recording is the proportion of Aboriginal and/or Torres Strait Islander people living in a hospital's catchment area.

Population data for Indigenous Australians

The reliability of indicators presented as (or derived from) population-based rates depends on the quality of population data as well as on the quality of case data.

There are several concerns about the population estimates for Indigenous Australians. These relate to deficiencies in the quality of Indigenous births, deaths, internal migration and base population data (Australian Bureau of Statistics 1996). Another major issue is the definition and membership of the Indigenous population.

The indicator used to identify Indigenous status in the various censuses has changed over time. A detailed discussion can be found in the report by ABS and AIHW (1999). The same question has been used in censuses from 1981 to the present (with the exception of the change in instructions to people of both Aboriginal and Torres Strait Islander origin introduced in 1996). However, there have been large changes in the counts of Indigenous Australians between the censuses and these cannot be explained fully by natural population increase (Australian Bureau of Statistics and Australian Institute of Health and Welfare 1996). This is not a unique phenomenon and similar patterns have been observed in other high-income countries where Indigenous populations are a minority.

Between 1991 and 1996, the number of people counted as Indigenous increased by 33%. Of this increase, just under half is attributable to natural population increase and changes in census editing procedures. For the total population the increase for the same time period was only 5% (Australian Bureau of Statistics and Australian Institute of Health and Welfare 1996).

The explanation for the increase, over and above the natural increase, is that some people answered the question on Indigenous status differently from one census to the next. This could reflect changes in self-identification among some people of Indigenous origin, or a change in willingness of people who already identify as Indigenous to indicate this on the census form, or a combination of both (Australian Bureau of Statistics and Australian Institute of Health and Welfare 1996). No quantitative empirical research on this has yet been done, although the ABS is planning a series of studies to explore these issues further.

Other sources of uncertainty with respect to the estimation of Indigenous population are:

- **The question on Indigenous status is sometimes not answered in Censuses. (For example, in the 1996 Census, information on Indigenous status was missing for more than 525,000 persons, which is more than the almost 353,000 people who indicated that they were of Indigenous origin (ABS and AIHW 1999).**
- **Satisfactory data on Indigenous births, deaths and migration are not available for the Indigenous population (Australian Bureau of Statistics 1996).**

Despite these difficulties, it is considered that the experimental estimates and projections based on the 1996 Census and produced by ABS, are the best currently available (Australian Bureau of Statistics and Australian Institute of Health and Welfare 1996).

The ABS produces 'experimental' estimates for the Indigenous population for the years 1991–1996 and projections for the years 1996–2006.

The ABS has published two series of population estimates for 1991–96, based on the 1996 Census. The 'low series' estimated resident population (ERP) figures are based on the propensity of people to identify as Indigenous at the time of the 1996 Census. They start with the estimated population in 1996. Estimates for prior years are then calculated by making adjustments for the assumed demographic changes only. The 'high series' ERP figures incorporate new and previously unpublished estimates for 1991–96, which in addition to demographic changes, include assumptions about changes in the propensity of people to identify as Indigenous over the period 1991–1996.

For population projections for 1996–2006, two series have been published by the ABS. The two series use different assumptions about future changes in the propensity of people to identify as Indigenous on the census form. In both series, it is assumed that fertility rates of Indigenous females will decline by 1% per year, that Indigenous paternity rates, mortality and net interstate migration will remain constant, and that zero overseas migration will occur for the projected period.

The low series assumes there will be no change in people's propensity to identify as Indigenous and that the Indigenous population will only change as a result of natural increase. The high series projections assume that there will be an increase over time in the propensity of people to identify as Indigenous. It is assumed that the rate of change will be the same as that which occurred between 1991 and 1996 (Australian Bureau of Statistics and Australian Institute of Health and Welfare 1996).

Another addition to these data was a set of estimates for the period 1986–1990, which supplements and is consistent with the 1991–96 series. These estimates were developed by the AIHW as indicated by Phil Trickett, AIHW, January 2000.

The ABS does not update Indigenous population estimates each year as it does for other population estimates. This is because of the poor quality of Indigenous births, deaths and migration data which are needed to regularly update a population.

We are not aware of strong evidence to support the choice of one of these sets of estimates and projections over the others. Moreover, the level of uncertainty about these estimates and projections puts into question the meaningfulness of changes over time in rates (and rate ratios) calculated using them, particularly given the uncertainties about case data. If, however, rates or rate ratios are calculated for more than one year, then the population estimates and projections used for each year should be based on consistent sources and assumptions. A reasonable option at present is to use high series projections and low series estimates, as both are based on the 1996 census. This approach is generally used by the AIHW (personal communication: Phil Trickett, AIHW, October 2001).

Rural, remote and metropolitan areas classification

Indicator 2.4 concerns the death rate ratio of the injury status of people living in rural and remote areas compared to the injury status of the general population. This reflects the increasing concern about the difficulties faced by Australians who live in rural and remote areas.

Two methods for grouping deaths and population data in ways that would allow reporting of this indicator are described below. Both methods depend on 'Place of residence' data in the source collections. Calculation of the indicator is complicated by frequent changes in the definition of small areas in population data and case data collections. Routine reporting is only feasible for years for which concordance tables are available for the method being used. Even then reporting is less straightforward than for most other indicators based on mortality and morbidity data.

A well-known system for classifying region into rural, remote and metropolitan areas is the RRMA classification, i.e. the Rural, Remote and Metropolitan Areas Classification. This classification has a natural hierarchy and provides a model for incremental health disadvantage with rurality and remoteness as risk factors. Based on population density, the following three zones and seven area categories are available (Table 2.6).

Table 2.6: Structure of the RRMA classification

Zone	Category
Metropolitan zone	Capital cities
	Other metropolitan centres
	(urban centres population ≥ 100,000)
Rural zone	Large rural centres
(index of remoteness < 10.5)	(urban centres population 25,000 – 99,000)
	Small rural centres
	(urban centres population 10,000 – 24,999)
	Other rural areas
	(urban centres population < 10,000)
Remote zone	Remote centres
(index of remoteness > 10.5)	(urban centres population ≥ 5,000)
	Other remote areas
	(urban centres < 5,000)

However, the RRMA classification has some limitations (Commonwealth Department of Health and Aged Care and National Key Centre for Social Applications of Geographical Information Systems 1999):

- **The use of statistical local areas (SLA), which formed the building block of the system, is problematic because of the large and varying size and heterogeneity of the units.**
- **The urban hierarchy categories group contain highly dissimilar centres.**
- **There are anomalies in the RRMA classification because of the technique used in deriving the system, largely arising from combination of population size with access measures.**
- **The personal distance measure used is problematic.**

- **The simple straight-line distance measure employed does not capture all dimensions of accessibility.**

In 1996–97 the ABS undertook a comprehensive review of its Australian Standard Geographical Classification (ASGC). This review suggested considerable change to the system. A major recommendation was that the SLA be abandoned as the basic unit of the system because it varies greatly in size and homogeneity, its boundaries change regularly and significantly, and in many cases it does not constitute a community of interest. Another recommendation from the National Key Centre for Social Applications of Geographical Information (GISCA, who assisted the ABS) was that Geographic Information Systems (GIS) technologies be used to investigate the definition of remoteness (Commonwealth Department of Health and Aged Care and National Key Centre for Social Applications of Geographical Information Systems 1999).

DHAC commissioned GISCA to work with them to develop a GIS methodology and to produce a remoteness index and classification. The result was the Accessibility/Remoteness Index for Australia (ARIA).

ARIA is a geographical approach to defining remoteness. Other factors such as socioeconomic considerations or population size are excluded. ARIA interprets remoteness as accessibility to 201 service centres. Remoteness values for 11,340 populated localities are derived from the road distance to service centres in four categories. A weighting is applied for islands (Commonwealth Department of Health and Aged Care and National Key Centre for Social Applications of Geographical Information Systems 1999). The calculated values are grouped into five categories as shown in Table 2.7.

Table 2.7: Structure of the ARIA classification

1.	**Highly accessible** (ARIA score 0–1.84)—relatively unrestricted accessibility to a wide range of goods and services and opportunities for social interaction.
2.	**Accessible** (ARIA score >1.84–3.51)—some restrictions to accessibility of some goods, services and opportunities for social interaction.
3.	**Moderately accessible** (ARIA score >3.51–5.80)—significantly restricted accessibility of goods, services and opportunities for social interaction.
4.	**Remote** (ARIA score >5.80–9.08)—very restricted accessibility of goods, services and opportunities for social interaction.
5.	**Very remote** (ARIA score >9.08–12)—Very little accessibility of goods, services and opportunities for social interaction.

In designing the ARIA classification, there was no attempt to 'force' the classification of individual areas to correspond to those under the RRMA. However, it was considered desirable that one or more of the categories correspond in size to the 'Remote zones' (i.e. the 'Remote Centres' and 'Other remote areas') of the RRMA. These categories correspond most closely to the 'Remote' and 'Very remote' ARIA categories shown above (Commonwealth Department of Health and Aged Care and National Key Centre for Social Applications of Geographical Information Systems 1999).

More recently, the ABS has worked with GISCA to develop a concept of remoteness based on the ARIA method (Australian Bureau of Statistics 2001).

RRMA was specified for the current NHPA injury indicator 2.4, because it was available at the time the indicators were written. We do not feel able to make a specific recommendation on changing the classification for type of area or remoteness for the NHPA injury indicators. If further experience with ARIA (broadly, not only in relation to injury) leads to its general adoption for indicators, then we see no reason why such a change should not be made to the injury indicators. Pending such change, we have retained the status quo: RRMA has been retained as the basis for calculating indicator 2.4. Reporting for years earlier than 1986 is unlikely to be practicable.

Socioeconomic status

Indicators 2.3 and 2.6 refer to the health differentials between males from different socioeconomic groups.

The most established method for calculating these indicators is the Socioeconomic Indexes for Areas (SEIFA). These have been derived by the ABS based on census data. The current set (SEIFA96) is based on the census conducted in 1996. SEIFA values apply to an area. Five indicators are included in the set: Urban Index of Relative Socioeconomic Advantage; Rural Index of Relative Socioeconomic Advantage; Index of Relative Socioeconomic Disadvantage; Index of Economic Resources; and Index of Education and Occupation.

The SEIFA indicators, like RRMA and ARIA, depend on aggregation of 'Place of residence' data for small geographic areas. The complications described above due to year to year changes in the specification of small areas also apply to these indicators.

SEIFA indices apply to a particular census year (1996 for the present set). However, it is possible to apply them to data for another year if the small area categories for that data set can be converted to match those used for the 1996 Census. This appears to be feasible for years 1991 to 1998, and so these indicators can probably be reported in terms of SEIFA values for this period. However, it should be noted that this is not straightforward, and might be complicated by unforseen factors.

SEIFA is the most used and probably the best currently available technique for analysing Australian mortality and morbidity in terms of socioeconomic status. However, the method has limitations and critics, one of whom has cautioned against 'heavy, often singular, reliance on the SEIFA indexes for representing areal socioeconomic condition' (McCracken 2001).

As noted above, the SEIFA based on the 1996 census comprises five constituent indicators. For reasons of practicality, one of these must be selected for use in reporting injury indicators 2.3 and 2.6. The Index of Relative Socioeconomic Disadvantage (IRSD) has been widely used at national level, e.g. (Mathers, Vos et al. 1999). It is less restricted in geographical scope than the Urban Index of Relative Advantage or the Rural Index of Relative Advantage, and is based on a wider range of dimensions than the remaining two indices.

We suggest that the IRSD should be used as the basis for reporting indicators 2.3 and 2.6, pending evidence for another method.

Australian population data

Population data for Australia are sourced from the ABS Demography section and are updated as revised/new estimates become available. All population estimates currently produced by the ABS are based on a usual residence concept, i.e. where people usually reside, and are referred to as estimated resident populations (ERPs).

ERPs are based on the 5-yearly Census of Population and Housing, to which adjustments are made (personal communication Phil Trickett, AIHW, January 2001):

- **All respondents in the census are placed in their State/Territory, SLA, and postcode of usual residence. Overseas visitors counted in the census are excluded.**
- **An adjustment is made for persons missed in the census (approximately 2%).**
- **Australians temporarily overseas on census night (these are not counted in the census) are added to the usual residence census count adjusted for undercount.**
- **ERPs are then updated each year from the census date using indicators of population change such as births, deaths and net migration and are subject to three revisions:**
- **Preliminary estimates based on preliminary counts of births, deaths or net migration are finalised once all of these components of population change are finalised.**
- **When preliminary results from the census become available, all ERPs are revised back to the previous census. These are labelled preliminary until final census counts become available.**
- **When final census counts become available ERPs are again finalised. These are not subject to any further revision.**

For hospitalisation data, data presented by State or Territory refer to the State or Territory of the hospital where a particular patient was admitted and not to the State or Territory of the usual residence of the patient (e.g. residents of NSW being admitted to hospital in the ACT). This is different from population data and sometimes creates problems.

The NHMD contains a variable called 'State of usual residence', i.e. the jurisdiction in which patients' usual residence is located, so it is theoretically possible to calculate separation rates by using patients' state of usual residence. However, in some jurisdictions in some years, these data are incomplete and this complicates comparison of rates over time.

Age-standardisation

Standardisation of population incidence rates used as indicators is normally desirable, to control for effects of differing or changing age structures. Direct age-standardisation should be applied to rates based on deaths and hospital case data.

The standard population used should be the one recommended from time to time for this purpose by the AIHW and the ABS. For nearly a decade, this has been the Australian population in at 30 June 1991 (Table 2.8). The recommended reference population will be updated to that on 30 June 2001 after results of the 2001 census become available. This should be reflected in NHPA indicator reporting, preferably

in a coordinated manner (e.g. a specified date after which standardisation will use the new reference population).

It should be noted that levels and trends in age-standardised rates estimated using this standard population may differ from those obtained by using another standard population.

Indirect age-standardisation should be used for computing standardised mortality ratios (SMR) between Indigenous and non-Indigenous populations.

The most rapid growth in the Australian population is for older age groups. The age composition within this group is also changing substantially. Consequently, treating all ages from 85 years as one group for purposes of age standardisation is becoming less satisfactory, especially for indicators which focus on older persons (e.g. death due to Accidental falls at ages 65 or older). The additional 5-year age groups 85–89 and 90–94 should be distinguished, restricting the oldest group to 95 years and older. This change could be made in conjunction with the introduction of the new reference population.

Table 2.8: Age composition of the Australian population by sex, 30 June 1991

Age group (years)	Males	Females	Total
0–4	652,302	619,401	1,271,703
5–9	652,418	619,790	1,272,208
10–14	638,311	603,308	1,241,619
15–19	698,773	665,301	1,364,074
20–24	707,124	689,640	1,396,764
25–29	702,728	696,935	1,399,663
30–34	713,784	711,951	1,425,735
35–39	664,228	664,159	1,328,387
40–44	655,138	639,133	1,294,271
45–49	526,498	502,647	1,029,145
50–54	433,762	413,172	846,934
55–59	367,302	358,648	725,950
60–64	366,779	370,089	736,868
65–69	320,142	351,248	671,390
70–74	228,494	282,261	510,755
75–79	158,993	225,502	384,495
80–84	84,413	145,415	229,828
85+	44,220	110,027	154,247
Total	**8,615,409**	**8,668,627**	**17,284,036**

Source: Australian Bureau of Statistics.

2.2 Status of injury indicators

Indicators using mortality data

The twelve injury indicators based on mortality data provide a measure of external causes of death and also provide comparative information on various sub-populations (e.g. males and females, Indigenous Australians, etc.).

Deaths data provided by the ABS remain the most comprehensive national data collection relating to health, but it does have limitations as outlined. In the main these relate to limited case information and poor timeliness, but uncertainty remains about some aspects of the identification of external causes of fatal injury.

Two important changes have occurred to ABS deaths data in recent years. These are the introduction of ICD-10 and multi-cause coding. On balance, both of these changes should strengthen this source for purposes of monitoring injury indicators. However, the changes also have effects that complicate monitoring, particularly in terms of comparability of indicator values before and after the change from ICD-9 to ICD-10.

Multiple cause coding opens the possibility of specifying 'injury' indicators in terms of injury (e.g. certain types of fracture) in addition to, or instead of, defining them in terms of External Causes.

One example is falls in the elderly where the indicator can be based on hip fractures instead of the relevant External Cause codes. This may be a necessity as the ICD-10 External Cause codes on falls are not equivalent to ICD-9 codes for the same group of injury. That is, ICD-10 does not have an equivalent to the ICD-9 code E887 (Fracture, cause unspecified). In Australian deaths data, a large proportion of cases included in the indicators of 'falls in the elderly' were coded to E887.

Another advantage of the introduction of multi-cause coding is that (in principle) data on factors that may relate to the injury event will be available, e.g. the presence of alcohol or osteoporosis. Multi-cause coding will also allow for indicators to be defined on a basis other than 'external cause', i.e. on nature of injury codes.

The ICD-10 External Causes chapter includes short code-lists for type of place at which injury occurred (e.g. 'home', 'street and highway') and for the type of activity being undertaken when injury occurred (e.g. 'working for income'; 'engaged in sport or leisure'). The ABS has included these items in the data file for deaths registered in 1999, opening the possibility of using these as the basis for injury indicators (e.g. of work-related injury mortality). This is an important advance, but the quality of this information should be established before it is relied upon for indicators.

Some progress has been made on improving the identification of Indigenous people. All States and Territories now have the capability to differentiate between Indigenous and other Australians in data sets on deaths and hospitalisations. Some investigations into the quality of the data have also been made. However, the application of this capability remains problematic, especially in jurisdictions other than SA, WA and NT (and, more recently, Queensland).

The new National Coroner's Information System (NCIS) will enhance the depth of information available on deaths. The most relevant to injury is the inclusion of data

elements that better describe the circumstances of the injury event that resulted in death, e.g. mechanism, object/substance, place and activity at the time of death. One major advantage is the ability to identify work-related injury—which was previously not possible in ABS mortality data. This may allow for further definition of work-related injury. The adequacy of the data from this source must be established before it should be used as the basis for quantitative indicators. In the mean time, there is potential to use it to complement data from the ABS collection.

Occupation is an item in the NCIS data set. This might be useful in identification of socioeconomic status (SES). If so this would have implications for Indicators 2.3 and 2.6. However, the identification of SES among fatalities remains problematic.

The particular scope of injury indicators, and the increased need for reliable estimates that comes with the requirement to monitor them, has given greater significance to certain aspects of mortality data sources and the processes of data collection and processing. Developments in the ABS mortality file have enabled some types of analysis that could not be done previously, and this raises further questions. Emerging issues are:

- **the effect on the information in the mortality file of whether a death is certified by a coroner or a medical practitioner;**
- **differences related to characteristics of the deceased person (e.g. age at death); and**
- **factors unrelated to the cause of death that result in changes in the 'underlying cause of death' code allocated (e.g. which word among near synonyms appears on a death certificate).**

Further work will be required to clarify these issues and possible responses to them.

There is also a need to connect deaths data with hospital separations data. This is to avoid the double counting of deaths among more severe cases.

The status of these indicators and associated data sources, and potential for improvement, are considered further in Chapter 4.

Indicators using hospital separations data

Eleven injury indicators are based on hospital separations data. Recent improvements in the availability and quality of hospital separations data, as well as the availability of a time-series of several years of national data, now allows indicators to be based on this data source.

For purposes related to injury prevention, indicators of population-based injury incidence are of particular interest. Rates calculated using numbers of 'injury' separations from hospitals are not necessarily a good guide to the population incidence of injury. Understanding of the factors involved, and of ways to improve the extent to which reliable indicators of injury incidence can be derived from hospital separations data have improved in recent years. However, aspects of this problem require further work. Some steps depend on changes in the way that available data are used to calculate indicators, while others depend on changes to the data sources.

A small fraction of all injury cases are admitted to a hospital. In general, the admitted cases are at least moderately serious. Given the availability of hospital services in Australia, it is likely that nearly all injuries that present serious threat to

life are admitted to a hospital (an exception is cases that are rapidly fatal). Hospital data are best able to provide reliable indicators of the types of injury for which this is true.

Factors other than injury incidence are likely to affect indicators based on injury separations data. These factors include:

- **The completeness of data collection (i.e. whether all separations from all hospitals are included).**
- **Multiple counting of some incident cases, because they result in more than one separation (e.g. due to transfer between hospitals, or re-admission for further treatment).**
- **Variations in policy and practice that affect whether certain types of injury are admitted (e.g. injuries that pose little or no threat to life).**
- **Changes in data standards, collection and processing (e.g. changes in the number of diagnoses recorded for cases; changes in quality assurance; the introduction of ICD-10-AM).**
- **Aspects of case definition for injury indicators. For example, this could be in terms of the presence of an injury diagnosis code (e.g. for a fracture or laceration) or in terms of presence of a code representing an External Cause of injury (e.g. a motor vehicle crash, or a fall), or both. As Australian separations data processing allows for inclusion of multiple diagnoses and external cause codes, indicators could be specified in terms of codes present in the Principle diagnosis field (or the equivalent external cause field), or in terms of all diagnosis or external cause fields.**

The present separations-based indicators are defined in terms of External Cause. It was advised in the appendix on data and statistical issues in the 1997 NHPA Injury report that the validity of indicators would be improved by recasting them first in terms of Principal Diagnosis (restricting attention to cases where this indicates injury or poisoning) and then in terms of the presence of External Cause codes relevant to the subject of each indicator. This is largely because Principal Diagnosis has been the subject of more attention to ensure its quality that has External Cause. Also, ICD coding rules require an External Cause code for an injury diagnosis, but allow coders latitude to decide whether to apply External Cause codes for other diagnoses. Another consideration was the likely effect of certain changes in the data. The revised specifications for indicators as presented in Appendix A4 have taken this approach.

One of the benefits of the introduction of ICD-10-AM is the provision of data on Activity at the time of injury. This should allow Indicator 6.1 (hospitalised injury due to sport or recreation) to be reported and for specification and reporting of Indicator 4 (work-related injury). This has been done in Appendix A4.

Indicator 6.1 was defined in terms of hospital separations, but it was not initially possible to report on this indicator, because sports-related injury could not be distinguished in hospital separations data coded to ICD-9-CM. A partial solution was introduced into the second Australian edition of ICD-9-CM, pending introduction of the Australian clinical modification of ICD-10 (ICD-10-AM). The Activity part of the External Causes chapter of the first edition of ICD-10-AM allows for the identification of sports injury and injury during leisure activities. The second edition of ICD-10-AM also allows for the identification of several specific sports,

e.g. rugby, hockey, basketball, etc. The third edition allows distinction of a much larger range of types of activity. The quality of Activity data warrants assessment.

The introduction of ICD-10-AM has brought problems as well as benefits. ICD-10-AM categories are not necessarily equivalent to ICD-9-CM at the level relevant to the NHPA injury indicators. This complicates the interpretation of time series for hospitalisations data, 'accidental falls' being a case in point. Also, a new classification may require a 'settling in' period during which data quality declines. A further complication is that in the data year 1998–99, four jurisdictions introduced ICD-10-AM while the other four continued to use ICD-9-CM. While data can be 'mapped' between ICD versions, the mapping introduces its own errors and loss of specificity.

As stated in Section 1.4, this report focuses on national level reporting of the NHPA injury indicators. Some indicators may be useful and appropriate for reporting at other levels, but there are likely to be problems for some jurisdictions. For example, the geography of the ACT sets up a situation in which 'State of Usual Residence' of a person admitted to hospital quite often differs from the jurisdiction in which the hospital is located. Queensland provides another example, as there is an influx of tourists for particular periods of the year. These issues may be problematic if the indicators are monitored at State or Territory level.

A more general problem is that some indicators refer to rather rare types of case (e.g. 7.2, 11.2). Meaningful monitoring of these indicators is likely to be difficult in jurisdictions having small populations, due to small case numbers.

The Australian hospital separations data collection is now of good quality and completeness. The introduction of ICD-10-AM has brought some benefits for monitoring injury indicators in the existing set and potential for specifying new indicators. The transition has also brought some complications, chiefly concerning comparability of estimates before and after the change.

The potential of this major national information asset to monitor indicators of injury incidence has not yet been fully tapped. The main steps still required are:

- **Restriction of scope to types of case for which probability of admission does not vary greatly between places or over time. A special instance of this is to identify of a sub-set cases that are always or nearly always admitted to a hospital (i.e. serious injuries).**
- **Better means to avoid multiple-counting of incident cases among separations, and to determine the outcome of cases (at least to the extent of identifying those which result in death).**
- **Better distinction of injury resulting from events prior to admission from those that occur after admission.**
- **Better means to avoid under-counting or multiple-counting cases which appear both in the hospital separations file and in the deaths data collection.**

These and related issues, and responses to them, are discussed further in Chapter 4.

Data sources for other indicators

The previous two sections contain a review of developments in capacity to monitor the NHPA injury indicators that are specified in terms of deaths data and hospital separations data.

Of the remaining eleven indicators, recent developments allow for definition of two indicators, i.e. Indicator 4 (work-related injury, as discussed above) and Indicator 15 (brain injury).

Indicator 15 can now also be defined in terms of hospital separations data. Although this development will lead to better definition of the indicator and reporting on it, the indicator will not provide insight into the residual consequences of TBI. O'Connor and Cripps (1999) suggested that such aspects be explored in further specific research studies. They also recommended that consideration be given to enhancement of hospital separations data, such as the inclusion of injury severity measures. This will improve the utility of the data which might lead to other and improved indicators for TBI.

The availability of multiple-cause deaths data raises the possibility of mortality-based reporting of Indicator 15, though this would require validation. The NCIS might provide another option for monitoring deaths due to TBI, but a case definition is lacking and the data source still needs to be validated.

More meaningful reporting of Indicator 14 (spinal cord injury; based on the Australian Spinal Cord Injury Register) is becoming possible as the period for which registration data are available increased.

Eight of the existing indicators remain undefined.

Prospects for specifying and monitoring Indicator 11.3 (number of jurisdictions requiring separation of domestic pools from houses) are good. This could be done in terms of the database of child injury prevention legislation commissioned by the DHAC, provided it is updated from time to time. However, a more specific criterion for the indicator is required (i.e. exactly what constitutes a requirement to separate domestic pools from houses, for the purposes of the indicator?).

As described in Section 2.1, population surveys might be capable of providing necessary data for three further Indicators (9.3, 11.4 and 11.5). However, the indicators warrant some refinement, and validation of questions in relation to intended survey methods would be necessary.

Two of the remaining four indicators pose problems related to specification and data sources.

Indicator 6.2 (non-hospital admitted sport and recreation-related injury) refers to a large and diverse class of injuries. Some of these attend services such as general practices and emergency departments. Others attend special sports injury clinics, and many more are self-treated. Ongoing special-purpose injury data collections have been established for elite levels of some sports, and temporary systems have been put in place for some sports events. Collection is undertaken at some sports medicine clinics, and sport-related case can also be identified among the cases included in the collections of data on injury attendances to some emergency departments. Sport-related injury has also been the subject of some population surveys. Quantitative population-based monitoring of an indicator specified with the breadth implied by the present wording would be very difficult and expensive to achieve. Population surveys offer better prospects, though sample sizes would have to be large (i.e. as in the National Health Surveys) to obtain estimates with useful precision. It may be useful to consider reviewing the scope of indicators of this topic. For example occasional and relatively approximate estimates of the overall level of sport-related injury might be based on National Health Surveys. Beyond this, attention might be focused on a small number of specific injury

diagnoses considered to be particularly important (e.g. because of the immediate or lifetime burden of morbidity attributable to them), or on particular circumstances of sports injury occurrence. It might be feasible to obtain data to monitor the incidence of these more specific types of case.

Difficulties concerning quantitative monitoring of Indicator 8.2 (ED attendances resulting from consumer product injury) were outlined in Section 2.1. These are: the lack of a widely recognised operational definition of 'consumer product injury'; the lack of a data source for quantitative estimates of ED injury attendance; and the fact that only some ambulatory injury cases attend an ED, the fraction doing so being likely to vary over time and between places.

The final two indicators are 12.1 (access of injured patients to optimal trauma care) and 13.1 (access of people with trauma injuries to comprehensive rehabilitation programs and appropriate long-term care and community support) remain problematic and prospects for reporting on these in the short term are not good. Both embody complex qualitative concepts (e.g. 'optimal'; 'appropriate').

Operationalisation of these indicators—especially the second—is likely to require such substantial changes that is they would reasonably be regarded as new indicators, rather than technically revised existing indicators. This falls outside the scope of the present project. Chapter 4 includes discussion of indicator development and specification.

3 Technical specifications

The third step in the Review of injury indicators resulted in technical specifications for most of the current NHPA injury indicators. The framework of the specifications is shown in Table 3.1. The complete set of specifications for all indicators appear in Appendix A4.

Process

Specifications were based on the Health Indicator Framework in the AIHW Knowledgebase (as at 4 October 2000), technical specifications for indicators in use in Queensland, as well as specifications for indicators used in the UK. The DHA project officer was consulted concerning requirements for the relevant specifications.

A set of technical specifications was proposed and circulated to the DHA project officer and relevant people within the AIHW. After comments and suggestions were incorporated, a final set of technical specifications were developed and used for this report.

Content

The specifications presented in Appendix A4 were based on the statements of current indicators in the 1997 NHPA report and other authoritative sources. The format and content of these specifications comply with the *National Health Data Dictionary* and with the developing Performance Indicators Module of the AIHW National Health Information Knowledgebase.

Several of the existing indicators are not well developed conceptually and/or lack data sources (e.g. Access of injured patients to optimal trauma care). Accordingly, complete specification cannot be provided for these indicators. However, they were documented to the extent possible.

The descriptions of the Specification items (Table 3.1) were largely based on the Format for data element definitions as detailed in the NHDD (Australian Institute of Health and Welfare 1999c).

Table 3.1: Framework for technical specifications

Identifying and descriptive attributes			
Data element ID:	A three or four digit number to identify the indicator		
Data element title:	The title assigned to the indicator		
Version number:	A version number for each indicator, beginning with 1 for the initial version of the indicator and 2, 3, etc. for each subsequent revision		
Type:	Indicators are derived data elements. A derived data element is an entity for which values are derived by calculation from the values of other data elements.		
Status:	The current status of the specific version of the indicator		
Definition:	A statement that expresses the essential nature of the indicator and its differentiation from other indicators.		
Context:	A designation or description of the application environment or discipline in which an indicator is applied or from which it originates.		
Relational and representational attributes			
Data type:	The type of symbol, character or other designation used to represent an indicator		
Representational form:	Name or description of the form of representation for an indicator	**Minimum size:**	The minimum number of storage units used to represent the indicator
Representational layout:	The layout of characters in the indicator values expressed by a character string representation	**Maximum size:**	The maximum number of storage units used to represent the indicator
Scope of indicator:	**Sex:**	The sex of interest for an indicator	
	Geographical area:	The geographical area of interest for an indicator	
	Lower age limit:	The minimum age of interest for an indicator	
	Upper age limit:	The maximum age of interest for an indicator	
	Other specification(s):	Other specifications relevant for an indicator	
Definition of formula variables:	**Numerator:**	Description of the data to be used as numerator	
	Denominator:	Description of the data to be used as denominator	
Formula:	The specified formula to calculate the relevant data type		
Guide for use:	Additional comments or advice on the application of the formula		
Related data references:	A reference between and indicator and another indicator or other data elements		
Administrative attributes			
Date of submission:	Data of submission to authorising body		
Source organisation:	The organisation responsible for the source document and/or the development of the indicator		
Source document for indicator:	The document from which definitional or representational attributes originate		
Date effective:	Date on which a specific version of an indicator becomes effective		
Date ineffective:	Date on which a specific version of the indicator was superseded by the next version		
Review of indicator:	**Planned review frequency:**	The proposed frequency with which the indicator should be reviewed	
	Base date:	The data on which the indicator originated	
	Planned review date:	The proposed date for the next review of the indicator	

Table 3.1 (continued): Framework for technical specifications

Sources of formula variables:	**Numerator:**	The document or source where numerator data originate
	Denominator:	The document or source where denominator data originate
Administrative attributes (continued)		
Reporting:	**Reporting required by:**	The authorities or organisations that require reporting of the indicator
	Indicators reported to:	The authorities or organisation to whom the indicators should be reported
	Reporting frequency:	The frequency with which the indicator should be reported
Interpretation:		
Comments:		
Data element links		
Related NHPA goal:	The specified NHPA goal an indicator related to.	
	Any additional explanatory or relevant remarks on the indicator.	
Information model entities linked to this data element:		
Indicator frameworks entities linked to this data element:		
Data set agreements which include this data element:		
Keywords relating to this data element:		

4 Towards more useful and valid injury indicators

4.1 Introduction

Previous chapters in this report provide an updated situation analysis concerning the current set of NHPA injury indicators (Chapter 2) and a documented review and revision of their technical specifications (Chapter 3 and Appendix A4).

This final chapter considers actions and processes required to achieve further improvements in indicators and data sources.

This topic is considered in relation to four themes:

- **Indicator purposes and topics**
- **Indicator specifications**
- **Data sources for reporting indicators**
- **Data quality**

The scope of the present report is technical review and documentation of the present set of indicators. Discussion concerning improvement of indicators has been framed with this scope in mind. Hence, the section on indicator topics focuses on principles and issues concerning selection of indicator topics, with special reference to those that will help to ensure technical adequacy of indicators.

We do not propose particular new indicators, as this task extends beyond the scope of technical review and documentation. The section on indicator specifications includes specific discussion and advice concerning technical aspects of the present indicators of injury occurrence. This includes changes that have been proposed in the current technical revision, and others that warrant consideration for possible implementation. Given the relative state of development of indicators and data sources, the focus is on indicators of injury incidence and the data sources on which they depend.

Appendix 2 of the 1997 NHPA report on Injury Prevention and Control surveyed numerous data and statistical issues relevant to the indicators (Commonwealth Department of Health and Family Services and Australian Institute of Health and Welfare 1998). An annotated list of these issues is provided in Appendix 6. Most of the issues are discussed in this report, and the list provides references to relevant sections.

The results of this technical review have been summarised into two sets of changes, described as the *Minimal Change* model and the *Technically Revised* model. These models are described in this chapter, and are applied to the NHPA injury indicators in Appendix A4.

The *Minimal Change* model

This model is designed to fully specify indicators which replicate those reported in the *NHPA Report: Injury Prevention and Control 1997*. We have not altered any aspect of their definition which had been specified at that time, except to allow for the replacement of ICD-9 (and ICD-9-CM) by ICD-10 (and ICD-10-AM). In specifying the many aspects of their definition which had not been specified at that time, we have sought to achieve minimum change in scope or methods, taking the data reported in the 1997 report as a guide.

The *Technically Revised* model

This model builds on the *Minimal Change* model by incorporating a set of specific changes to technical specification of the indicators based on deaths data and hospital separations data which are (1) designed to improve the performance of the indicators for the purpose of monitoring injury incidence rates; and (2) can be implemented without requiring changes to source data.

The *Technically Revised* model is proposed for consideration by relevant bodies, and for testing.

4.2 Indicator purposes and topics

As outlined in Section 1.2, the present set of indicators arose out of a series of processes during the decade to the mid-1990s. The particular topics included, and the way that the indicators were framed, reflected compromises. Constraints included limited knowledge of the extent and distribution of injury, limited available data sources, limited time for indicator development within each policy initiative, and lack of a well-defined technical framework within which particular indicators, or sets of indicators, could be developed. The rationale for the selection of the specific topics for which there are indicators in the current set is incompletely specified in relevant documents.

Broadly, the set includes indicators of injury occurrence selected to highlight categories of injury defined in terms of circumstances of occurrence (e.g. road crash, a fall, or exposure to fire, etc.). Where possible, selection took account of domains of administrative responsibility and authority for safety. The categories were selected on the basis of evidence that they were important, generally in terms of frequency and/or severity. Limited data sources restricted the extent to which specification of indicators could be based on measured injury occurrence in Australia. Consequently, some topics which were believed to warrant indicators (e.g. occupational injury, sports injury) could not be made the subject of reportable indicators at that time (Department of Human Services and Health 1994).

An indicator-based approach was then relatively new in the Australian health sector, and views on the potential roles and technical limitations of indicators were emerging and evolving.

Similar issues were the subject of much debate in the context of the 'social indicators movement', especially in the decade from the late 1960s (Rossi and Gilmartin 1980). Some themes in that debate have been echoed in the context of health indicators in Australia (e.g. whether, or under what circumstances, indicators can contribute to the evaluation of social policy and programs).

Several developments since the current injury indicators were written provide a conceptual framework and tools that can help to guide the selection of topics for indicators, and the way that they are framed. These include health information models, such as models for public health information, health information management mechanisms, particularly at national level, and the National Injury Prevention Plan (Australian Institute of Health and Welfare 1999b; Australian Institute of Health and Welfare 1999d; Australian Institute of Health and Welfare 2000; Commonwealth Department of Health and Aged Care 2001).

Indicators are part of a health information system. Increasingly, health information systems are assessed or designed in relation to an information model. Information models can take numerous forms. Fundamentally, however, information models are 'high level' and usually schematic representations of relationships between information uses, users and sources.

Scope, concepts, terms and definitions of information for public health have been the subject of several discussion papers and meetings in Australia in recent years. Most have been under the auspices of the National Public Health Partnership. This is still 'work in progress', and current thinking is likely to change. However, this work is highly relevant to public health injury prevention, and planning for injury information, including injury indicators, must take account of it.

The report of a workshop on performance indicators for public health, held in March 2000, contains convenient summaries of much of the relevant work, from Australia and elsewhere (National Public Health Partnership 2000). The report summarises requirements for public health performance indicators into five categories:

- **Health outcomes**
- **Determinants of health**
- **Health services performance and quality**
- **System infrastructure, and**
- **Community characteristics.**

This categorisation might warrant some refinement, especially to fit it to the circumstances of injury prevention and control (e.g. primary prevention of injury largely depends on interventions outside the scope of health services as usually conceived). Nevertheless, it indicates that the scope of public health information requirements goes well beyond health outcomes.

Growing experience in using injury indicators in Australia is helping to clarify what can and cannot be achieved by this approach, and improvements in certain data sources are gradually expanding this potential. Consequently, if a review of injury indicator purposes and topics was to be undertaken now there is potential for it to result in a more coherent and better defined set than was produced previously. Nevertheless, expectations for indicators should be realistic. Many potentially useful indicators would require new data sources or substantial changes to existing sources. Cost and other practical considerations are likely to prohibit many such

developments, even if they are technically feasible. Moreover, despite the progress that has been made, unresolved conceptual and definitional issues might still complicate the process.

The scope of this report is technical review and documentation of indicators. From a technical perspective, a necessary condition for developing good indicators is a clear statement of purpose. Only if the purpose is clear is it possible to design an indicator to achieve the purpose, or to evaluate whether an existing indicator is serving its purpose.

The purpose of an indicator should be stated in terms of the information requirements of intended users of the indicator.

Purposes of information for injury prevention and control programs can be categorised in many ways. The following simple categorisation is in terms of three key aspects of public health practice:

Table 4.1: Some types of information purpose

Type of purpose	Comment
Planning	This includes priority setting (e.g. which injuries to prevent), and choice of preventive methods.
Managing	This includes process measures concerning interventions that are being applied. For example, are they operating to specification and to budget?
Evaluating	Have programs brought about their declared aims? Aims may be framed in terms of health outcomes, program reach, efficiency, acceptability, etc.

A categorisation of information *purposes* does not specify the *attributes* that information must have if it is to be capable of serving a particular purpose. However, purposes (if adequately defined) imply necessary attributes. If the purposes of an indicator are to be served, then these attributes must be taken into account when designing or evaluating information infrastructure to support measurement of an indicator (e.g. indicator specifications, data sources, data quality).

Section 3 of this Chapter focuses on technical issues underlying translation of an indicator purpose into specifications for an indicator measure with the necessary attributes. The remainder of this section discusses considerations underlying formulation of indicator purposes.

Indicators provide one type of information among others. While there is no universally accepted definition of indicators (health indicators or social indicators), widely accepted characteristics are that they are summary measures, available and comparable over a period of time. Given finite resources for data collection reporting and interpretation, it is desirable to select as indicators measures that refer to essential aspects of an issue of interest, without being too numerous or expensive. However, it is not always clear which aspects are essential. Lack of practicable or affordable data for measuring preferred indicators may force reliance on less satisfactory proxy indicators. The risk in doing so is that the indicators may be misleading.

While technical factors are important (they are considered later in the Chapter), other considerations are at least as important in determining the adequacy of an indicator.

The following list includes some desirable characteristics that an indicator may have to a greater or lesser extent:

1. **It is designed to indicate something worth knowing**
2. **The chosen indicator measure truly indicates the topic of interest**
3. **Measurement is practicable (technically, ethically, financially, etc.)**
4. **Measured indicator values are useable (e.g. trends in indicator values are interpretable by decision-makers, or other users)**

As discussed above, effective technical review or development of indicators requires precise statement of purposes and topics to guide development and evaluation of indicators. A second and related reason for precise specification of purpose is that superficially similar information requirements can have very different implications for the attributes of data source required, and hence for cost and other practical matters.

The current set of injury indicators has lacked sufficiently specific statements of purpose, and this was reflected in ambiguity in the specification of some of the indicators. For example, about one-third of the indicators are based on hospital data. As stated originally, these could be intended to indicate the population incidence of serious injury, or the burden of injury on acute health care services, or possibly something else.

The 1997 NHPA Report on Injury Prevention and Control provided a more specific statement of purpose (p. 102): 'The main focus of the injury indicators is to monitor the occurrence of new cases of injury, as this is the measure that primary prevention efforts aim to reduce' (Commonwealth Department of Health and Family Services and Australian Institute of Health and Welfare 1998).

Most of the incidence indicators in the current set are based on deaths data or data on cases admitted to a hospital. As such, they refer to relatively serious injury cases.

A general statement of purpose (e.g. to monitor injury incidence in the population), provides part of the information needed to design or assess an appropriate indicator. However, it is also necessary to decide what precision, timeliness and other attributes are required to satisfy the particular purpose in mind. Of course, precise and prompt measurement would always be preferred over imprecise measurement, other things being equal. However, achieving greater precision or timeliness typically increases costs. For example, hospital data for recent years (together with deaths data and some relatively minor developments—see below) appear to be an adequate basis for indicators capable of detecting substantial trends in population incidence of serious injuries over a period of a few years, with a lag of one to two years. Such indicators can be provided at low marginal cost. If, alternatively, the specific purpose implies that indicator measures must have stringent and known precision, or much quicker information availability, or capacity to answer causal questions, then the cost of satisfying the purpose might well be much higher.

On this basis, we have interpreted the primary purpose of the current set of indicators as being:

> ***To measure and monitor change in the population incidence of serious injury in Australia.***

The list of indicators (see Table 1.1) provides guidance concerning case types and population segments of interest.

This is a descriptive purpose, and the indicators describe some aspects of population health status (Australian Institute of Health and Welfare 1999b). The purpose is not framed in terms that refer to a causal model for injury, or to a particular causal factor (such as an injury prevention policy or program). To do so would set a much more difficult aim for the indicators, whose feasibility is uncertain.

Adoption of this more precise statement of purpose for the indicators of injury occurrence (i.e. Indicators 1.1–11.2, 14 and 15) provides greater clarity concerning requirements for indicator specifications, data sources and data quality (see Sections 4.3 to 4.5).

Clarifying this purpose for injury indicators should help the process of considering and specifying other purposes for which indicators may be required.

The current set of indicators includes some which imply a purpose other than monitoring incidence of serious injury. Two refer to ambulatory cases (6.2 and 8.2). Five are indicators of the prevalence of factors believed to influence the risk of certain types of injury (i.e. Indicators 9.3, 11.3–11.5) and two refer to aspects of the availability and quality of services for people who have been injured (Indicators 12.1 and 13.1). The precise purposes that underlie these indicators—and particularly the last two—are less clear than is the case for the indicators of injury occurrence.

The purpose for the indicators concerning risk factors could be descriptive (as for the indicators of population incidence) or, to a greater or lesser extent, 'analytic' (i.e. related to and intended to evaluate the reach or impact of some particular program). The purpose might well differ between risk factors. Decisions on the precise purposes for these indicators have important implications for the necessary attributes of data with which to monitor them.

The items in the indicator set concerning service availability and quality (12.1 and 13.1) are better regarded as being partially developed statements of purpose, rather than as being indicators.

The first priority for indicators beyond the set on incidence should be to review their purposes, preferably in a strategic context. This goes beyond the scope of technical review and documentation and, hence, is not considered here. Technical specification of indicators, development of adequate data sources and reporting are subsequent steps.

Further actions and processes

- **Ensure continuity of collection and monitoring**

  Consistent monitoring over time is a fundamental characteristic of useful indicators. Hence, once an indicator is in place (i.e. purpose and topic decided, specified technically, and being measured to an adequate quality) it is important to maintain the process. The duration of monitoring necessary for usefulness of an indicator depends on the topic and data sources, and usually cannot be stated precisely. For indicators of the population incidence of serious injury, the period in mind should be decades rather than a few years. Hence, a key further action is maintenance of the processes associated with the indicators and their ongoing measurement.

  Maintenance of continuity is not inconsistent with improvement of indicators. For example, better understanding of a data source may enable an indicator measure to be re-specified in a way that improves its validity or reliability. This

is likely to be advantageous, particularly if the change is one that can be applied to historical data.

- **Systematic and strategic approach to developing indicators**
  Injury indicators should not be added or removed on an ad hoc basis. Preferably, any substantial change to the indicator set should be informed by a more general assessment of information requirements for injury prevention and control, of which requirements for indicators are a part. This should be done in the context of national health information processes, and should take account of interventions that are proposed or under way. Clearly stated purposes and topics should inform design of new indicators. Feasibility (technical, ethical and financial) of proposed indicators should be assessed before they are adopted.

  Most of the current set of injury indicators (and nearly all of those for which adequate data are available) focus on injury incidence. Contemporary conceptual frameworks for public health information and indicators describe the range of other domains for which indicators might be required (Australian Institute of Health and Welfare 1999d).

  Requirement for information on injury incidence is likely to continue during the implementation of public health intervention programs. However, additional indicators might be required during implementation of interventions on topics such as the reach, impact, acceptability, and cost of programs.

  For example, if an intervention such as falls risk assessment according to a certain protocol, were to be recommended for all persons aged 70+ years annually, then indicators of interest might be the fraction of the target population reached, and a measure of the proportion of assessments which are performed 'to specification'. Such indicators might be required at National level, at State and Territory level, or both. They might also be required for the target population as a whole, or for subgroups of it (e.g. according to language spoken, or SES group).

  Such indicators might well require new data sources (e.g. sample surveys), which will require resources.

Summary

Below is a summary about the progress and status of different types of injury indicators, as well as comments on further actions and processes needed (Table 4.2).

Table 4.2: Indicator Purposes and Topics

Indicators of injury occurrence (population incidence) (Indicators 1.1–11.2, 14 and 15)	
Progress and status	
Adequate specification of purpose	The purpose of the large group of current injury indicators dealing with injury occurrence was implied but not clearly stated to be measurement of injury incidence. Their purpose is specified in this report as being: to measure and monitor change in the population incidence of serious injury in Australia. Achievement of incidence measures appears to be technically feasible for deaths and serious injuries for nearly all of the topics specified in the current set of indicators of injury occurrence (details in sections 4.3 to 4.5).
Further action and processes	
Maintenance of continuity	Ensure continuity of collection and monitoring for chosen indicators.
Development	Changes to the indicator set (other than technical refinement) should be strategic, and consistent with maintenance of continuity.
Other current indicators (Indicators 9.3, 11.3–11.5, 12.1 and 13.1)	
Progress and status	
The purposes of the remaining items in the current set of indicators are not sufficiently well specified	Development of purposes and topics for these indicators is beyond the scope of technical review. Substantial data development would be required for most of these indicators. Precise statement of purposes is required before necessary data attributes can be inferred.
Further action and processes	
Review and specification of purpose and topics	Indicators in the current set which lack specification of purposes and/or topics data sources should be referred for consideration in the context of a process with scope broader than technical review.

4.3 Indicator specification

Technical specification translates the purpose and topic of an indicator into a set of definitions and instructions for a measure that is intended to correspond to the purpose and topic.

Indicator specification has two aspects:

- **Defining a measure that is a suitable indicator of a topic of interest; and**
- **Documenting definitions and instructions for doing the measurement.**

The main focus of this section is definition of measures of injury incidence, based on available sources of data. Documentation of measures for current indicators is provided elsewhere in this Report (chiefly in Appendix A4).

The specifications of an indicator should be sufficiently detailed and complete to enable a user to obtain values of the indicator measure without ambiguity (e.g. about data sources, the cases to include, or calculation methods). The specifications may also include other information to assist users (e.g. concerning known or suspected weaknesses of source data).

As discussed in the previous section, this process depends on starting with well-specified purposes and topics for indicators. These are available for indicators of injury incidence, but not for the other items in the current indicator list.

From a technical point of view, a health indicator is simply a measure, usually made periodically or continuously, of some aspect of population health status, health determinants, the health care system, or a related matter. Changes over time in the measured value of the indicator, or differences between values measured for different populations, etc. are interpreted as 'indicating' differences in some topic of interest with which the indicator measure is believed to vary. Known or estimated precision of a measure determines how large a change or difference in its value must be before this can be interpreted (with confidence) as representing a real change in the thing being measured.

Considered in these terms, a 'measure that is a suitable indicator of a topic of interest' is one that truly measures what it is thought to measure, and does so with attributes (such as precision, reliability, timeliness, cost and acceptability) that are sufficient to serve the purpose(s) for which the indicator is wanted.

Specification of a measure that meets its purpose depends on understanding the relevant data sources. This section includes assessments of several technical aspects of available data sources in relation to indicator specification.

Outcomes of this section are two types of foreshadowed technical changes to current indicator specifications.

- **The first type are changes which can be implemented now (i.e. they do not depend on changes to data sources, etc.). These have been included in the *Technically Revised* model presented in Appendix A4.**
- **The second type are changes which could improve the indicators, but which cannot be implemented until other actions or processes have occurred.**

Indicators of injury incidence

Technical criteria for indicators of injury incidence

For this technical review, the current indicators of injury occurrence are specified as having the purpose of *measuring, and monitoring change in, the population incidence of serious injury in Australia*. Furthermore, the purpose is regarded as being met by measures whose precision would be sufficient to detect substantial trends in incidence for reported types of injury over periods of several years (sensitivity will differ between indicators; lack of validation studies prevents more precise definition at present), and with a delay between the end of the latest reported year and reporting of between one and two years.

Formal consideration of how to specify satisfactory indicators of injury incidence has been developing recently, and the issue was a theme of the International Collaborative Effort on Injury Statistics (Injury ICE) working group meeting at Washington DC in April 2001. The initial outcome is a draft set of criteria for good indicators of injury incidence, based on a proposal by Dr Colin Cryer and Professor John Langley (unpublished).

The emphasis of this work is on technical issues, and as such the developing set of criteria does not encompass all of the issues that determine the adequacy of an indicator (see Section 4.2, above).

The Injury ICE criteria have not been finalised. However, there was general agreement at the Washington meeting on the following elements for indicators of injury occurrence:

1. **Case definition should be in terms of specified anatomical or physiological damage.**
2. **Cases included should be all of those that the indicator aims to reflect, or a well-defined sample of them.**
3. **Probability of case ascertainment should be independent of extraneous factors.**

The first of the Injury ICE criteria is intended to ensure that indicators of injury are framed in terms of the presence of injury. The criterion embodies a particular (though so far incompletely specified) definition of injury. As stated, the focus is on physical trauma, poisoning and related harm. Injury in other senses (such as 'psychological injury' or 'injured reputation') is excluded.

Some data collections define injury cases in terms of an exposure, or an institutional or personal response to an exposure that might have resulted in injury. For example, a traffic crash might be classified as resulting in injury if a person is removed from the scene by ambulance, and attendance by a person at an emergency department following a fall from a horse might be counted, even though no trauma was discovered on examination. These approaches to case definition would not satisfy the first Injury ICE criterion.

The second and third of the Injury ICE criteria are statements of principles with which any data collection process must comply if the cases collected are to be a good measure of the cases of interest. As such, these criteria might be considered to be self-evident. However, many 'injury indicators' breach one or both of these criteria and recognition of this prompted their formal inclusion in the list.

A situation in which the latter two criteria are often breached is when hospital cases are used as an indicator of injury incidence in a population. Only some injury cases arising in a population result in admission to a hospital. In large part this is because admission tends to be limited to more severe injuries (except cases rapidly resulting in death). Consequently, a measure of 'hospitalised injuries' has tended to be used as a proxy for 'serious injuries' or a similar concept. However, it is not necessarily a good proxy, because admission depends partly on the presence of (serious) injury, but also on other factors. These include the presence and accessibility of hospital facilities; the absence of large financial or social barriers to admission; whether modes of treatment are available that obviate need for admission; and clinical and administrative criteria and practice concerning the decision whether to admit. Simple measures based on hospitalised cases may breach these criteria in other ways (e.g. multiple episodes in hospital due to a single injury might be counted once, or once per admission).

Such factors weaken the extent to which a measure based on injury hospitalisations represents (i.e. 'indicates') injury cases arising in a population of interest (i.e. population-based incidence).

Assessment of current indicator specifications against specified criteria

This section contains an assessment of the specification of the current indicators of injury incidence in relation to the Injury ICE criteria. In view of the close relationship between indicator specification and the characteristics of the data sources on which they are based, this section includes discussion of several technical issues relevant to the status assessment and to improvement of the specifications.

For each criterion, we assess the current status of indicator specification, and actions and processes that would improve them.

Criterion 1: Case definition in terms of specified anatomical or physiological damage

As they are stated in the 1997 NHPA report, none of the current indicators of injury occurrence is specified in terms of anatomical or physiological damage. All of the indicators of injury occurrence based on mortality and hospital morbidity data are specified solely in terms of the presence of a range of ICD External Causes of injury codes, and not in terms of anatomical or physiological damage. This approach is retained in the *Minimal Change* model.

For example, Indicator 5.2, 'Hospital separation rate for falls among people aged 65 years and over' is specified in NHPA reports as including cases with ICD-9 External Cause codes in the range E880–E888 (Commonwealth Department of Health and Family Services and Australian Institute of Health and Welfare 1998). The specification does not require the presence of ICD-9 codes for any, or particular, physical injuries that may result from falling.

The framing of the current indicators of injury mortality reflects data availability when the immediate ancestors of the NHPA set of indicators were written. In the early 1990s, ABS mortality data was the only essentially complete source of injury occurrence at national level. The data files provided by the ABS included a field for 'Underlying Cause of Death' (UCoD). For most deaths, this field contained an ICD-9 code for the disease or condition which, following application of a set of coding rules, was considered to underlie the train of events that lead to death. However, if that condition was injury or poisoning, then the ICD rules, as applied by the ABS, specified that an External Cause of the injury or poisoning should be coded as the UCoD, and not the injury condition. For example, a case in which a person died as a result of brain injury sustained in a car crash would be coded as 'car crash' (the External Cause) and not as 'brain injury'.

Thus, the only aspect of 'cause of death' that could be used to group cases for the purpose of specifying an indicator was External Cause.

This situation has now changed. The ABS continues to code the Underlying Cause of Death essentially as before (the main recent change being the replacement of ICD-9 by ICD-10, the consequences of which are discussed below). However, beginning with deaths registered in 1997, the ABS also codes other causes of death that are mentioned in the sources of information available to the Bureau. Both injury diagnoses and External Cause codes are available in hospital separations data.

'Injury and poisoning' is commonly specified in a way that assumes that it has the same scope as the ICD chapters with this title in the 9th and 10th revisions. While this is a convenient approach, it is not necessarily ideal. There is not necessarily a good match between the scope of this ICD chapter and the scope of 'injury and poisoning' as relevant to contemporary theory and practice of injury prevention and

control, or for the particular purpose of specifying indicators of injury incidence. For example, the relevant chapter of ICD-10 (Chapter XIX) includes categories for complications of surgical and medical care, many of which do not involve traumatic injury or poisoning. It also includes categories for sequelae (late effects) of injury, the presence of which is not relevant to indicators of injury incidence. Conversely, the ICD codes for some conditions that might be seen as falling within the scope of traumatic injury or poisoning are placed elsewhere in the classification (e.g. birth trauma; certain conditions due exposure to heavy metals or drugs).

Discussion of this issue is developing among injury prevention researchers (e.g. through the International Collaborative Effort on Injury Statistics). A focus of discussion is how best to treat 'medical injury' (i.e. medical misadventure, adverse events, etc.).

For purposes of the *Technically Revised* model, 'injury' has been defined as presence of an ICD-10 (or ICD-10-AM) code in the range of S00–T89. This includes all of Chapter XIX (Injury and Poisoning) except the codes for 'sequelae' (i.e. late effects) of injury (T90–T98 *Sequelae of injuries, of poisoning and of other consequences of external causes*). Sequelae are omitted here because the purpose of this revision is to improve validity of the indicators as measures for monitoring the population incidence of injury. Inclusion of cases attributed to sequelae of injuries which were incident at some (unknown and potentially long) previous time would be contrary to this aim. Relatively few cases have been coded to Sequelae.

Note that this definition of injury includes cases that have Principal Diagnosis codes in the ICD-10-AM range of T80–T89, which refer to 'medical injury' (i.e. T80–T88 *Complications of surgical and medical care, not elsewhere classified*, and *T89 Other complications of trauma nor elsewhere classified*). However, this will have little effect on the scope of the cases included in the NHPA injury indicators under the *Technically Revised* model. This is because we have retained the existing NHPA indicator definitions, which are specified (solely) in terms of External Cause codes. The ranges for the NHPA indicators that have the widest scope (i.e. 1.1 and 1.2) were specified in terms of ICD-9 External Cause codes as E800–E869, E880–E929, and E950–E999, thus excluding 'medical' external causes. We have retained the same restriction, the only change being translation of the original code range to its equivalent ranges in terms ICD-10 and ICD-10-AM External Cause codes.

Hence, the *Technically Revised* model presented in Appendix A4 implements Criterion 1 for all of the indicators of injury incidence, to the extent allowed by source data. 'Injury cases' are defined in terms that require the presence of an ICD code in the range commonly regarded as representing 'injury or poisoning', omitting admissions due to 'sequelae' of previous injuries.

Additional comments

Deaths

Multiple cause of death data enables a test for the presence of a code in the range S00-T89 (ICD-10) for deaths registered since 1997. Addition of this criterion to the existing criteria for NHPA injury indicators which are framed in terms of the presence of particular ranges of External Cause codes in the Underlying Cause of Death field turns out to make little difference to indicator values (1% for deaths registered in 1999). Given the small impact of this further restriction, and the fact that it can only be applied to deaths registered since 1997, for purposes of the *Minimal Change* model it is probably adequate to regard Criterion 1 as being met (implicitly) by criteria framed in terms of External Causes.

However, definition of 'all injury and poisoning deaths' based solely on the presence of an ICD-10 code in the specified range (i.e. S00–T89) would include many more deaths than are within the scope of NHPA indicator 1.1. This is so whether NHPA indicator 1.1 is specified according to the *Minimal Change* model or the *Technically Revised* model.

This raises the question of whether a more inclusive 'all injury and poisoning' mortality indicator should be specified. We think that a case can be made to do so, but the way in which it would best be defined is not yet clear. For example, inclusion of all deaths having a code in the range S00-T89 would include several thousand additional deaths per year. Many of these additional cases have a code in the range representing *Complications of Medical and Surgical Care* (T80-T89). As noted above, it is arguable whether these should be included in an indicator of injury occurrence, as the nature and circumstances of occurrence of many of these deaths is distinct (i.e. harm arising in the context of treatment of disease or injury). Many other additional deaths included by this definition fit more centrally within the crystallising definition of injury (e.g.the large groups of deaths with a code representing a fracture, or poisoning by narcotics).

A more inclusive 'all injury and poisoning' mortality indicator can only be derived for deaths registered from 1997, because Multiple Cause of Death data are not available for earlier years.

Hospital separations

Specification of the NHPA indicators based on hospital separations data has been altered in the *Technically Revised* model by restricting inclusion to cases which have an 'injury or poisoning' diagnosis code. This is in keeping with a recommendation of the 1997 NHPA Injury Prevention and Control report (technical appendix), and enables compliance with Criterion 1.

This restriction has been applied on the basis of the Principal Diagnosis data item.

Australian hospital records allow a large number of diagnosis codes to be recorded (the number has been increased several times). Consequently, this restriction could be applied in a way that includes records in which any diagnosis field contains an 'injury or poisoning' code. This would have the effect of selecting a larger number of cases. We have not recommended this approach because (1) Principal Diagnosis has the special meaning of being the condition to which the episode in hospital is most attributable; and (2) variation over time, or between places, in the number of diagnoses recorded per case might affect the number of injury cases selected if all

diagnoses are considered (this would contribute to biased ascertainment—see Criterion 3).

General

Most of the indicators are presently specified in terms of injury (in the sense described above) and a type of External Cause. Some of the external causes imply the nature of resulting injury (e.g. 'poisoning', and perhaps 'fire, burns and exposure to fire'). There may be advantages in re-specifying some of these to make greater use of diagnosis information. Reasons to consider doing so are presented below, in relation to Criterion 3.

Note that some of the indicators of injury incidence are defined in terms of the presence of codes for particular injury diagnoses, without mention of external cause (i.e. the indicators for brain injury and spinal cord injury).

Criterion 2: Cases included should be all of those that the indicator aims to reflect, or a well-defined sample of them

This criterion is considered separately for injury deaths and for injury cases admitted to a hospital. Neither of these sources currently sample cases, though this was formerly the practice for hospital separations in New South Wales. Hence the issue is whether these sources collect all of the cases that the indicators of injury incidence aim to reflect.

Deaths

All registered deaths are supposed to be included in the ABS files of mortality data. We are not aware of formal evaluations of the completeness of this process, nor of the completeness of death registration in Australia. A few injury deaths are registered long after they occur and presumably some are never registered. We are not aware of any evidence to suggest that the number of such deaths is large, or that the proportion is changing. Similarly, while it is possible that errors could result in more than one record for some deaths, we are not aware of evidence to suggest that this is a significant problem.

Hospital separations

The Australian Hospital Statistics collection has included records for all separations from nearly all acute hospitals for years since about 1993–94. The small number of hospitals whose data have not been included are listed in the annual statistical reports of the collection (see Appendix A3). While estimates of ascertainment fraction for injury cases are not available, overall ascertainment has been high in recent years. Ascertainment for private hospitals in 1998–99 was estimated to be 94.4% (Australian Institute of Health and Welfare 2001). Ascertainment for public hospitals operated by States and Territories is almost complete, as indicated by Jenny Hargreaves, AIHW, November 2001).

Complete ascertainment of admitted injury cases is far from being equivalent to complete ascertainment of all incident injury cases, as the great majority of injury cases are not admitted. The main implication of this for indicators of injury incidence is that they must be specified in a way that takes account of the proportion of incident injuries of various types that result in hospital admission. This issue is considered in relation to Criterion 3, below.

Status

Indicators based on deaths data and hospital data appear to be adequately specified at present in terms of completeness of ascertainment. Quality assurance is the major issue (see Section 4.5).

It is not presently practicable to specify indicators of injury incidence (or other aspects of occurrence) other than deaths and hospitalised cases because relevant data sources are not available.

Further actions and processes

None at present.

Criterion 3: Probability of case ascertainment should be independent of extraneous factors.

This means that the cases selected for inclusion when calculating measures of injury incidence should not be influenced (biased) by factors not related to injury incidence.

Given the nature and current stage of development of the indicators of injury incidence and the information sources on which they are based, this criterion is the one that poses the greatest challenges. Consequently this section is longer and more detailed than those on the other two criteria.

This criterion is considered separately for injury deaths and for injury cases admitted to a hospital. The issue of comparability between selected case data from these sources and the population data used as denominators for calculating rates is also considered.

Deaths

Potential for biased ascertainment arises because, although a selection criterion for 'injury deaths' (or a particular set of them) might be framed in a constant way (i.e. the presence of particular ICD codes for Underlying Cause of Death), the cases thus selected might not include all and only the cases of interest. Such differences might vary over time, or between subgroups of the population.

Ascertainment can change for reasons unrelated (or indirectly related) to case selection specifications. The potential for this is illustrated by recent Australian deaths data.

- **Age-related variation in querying of external cause of injury**

  The Underlying Cause of Death recorded for deaths due to injury is normally the External Cause of the injury. Information sufficient to enable specific coding of External Cause is often not available in the information initially supplied to the ABS. Queries are normally made by the ABS to seek the information necessary for coding. However, relatively few queries are made where the deceased person is old, particularly if the person was aged 75 years or older. In the absence of more specific information that might be revealed by a query, external cause is likely to be coded to a residual category such as X59 (Exposure to unspecified factor). Consequently, the proportion of injury cases correctly allocated to indicator-specific external cause code categories is likely to decline with age. The impact of this is greatest for indicators of types of injury death that are common at older ages, notably fall-related injury.

- **Change in proportion of deaths with mention of poisoning by drugs that are allocated an External Cause code as the Underlying Cause of Death**

  Some deaths for which a drug is mentioned on the death certificate are given an Underlying Cause of Death code in the External Causes range (e.g. X40–X44). Others are given codes from other parts of the ICD, particularly from a range entitled 'Mental and behavioural disorders due to psychoactive substance use' (F10–F19). It has not been clear whether the cases given an External Cause code differ in important respects from other deaths with mention of a drug. 'Multiple cause of death' data, available for deaths registered in 1997 and subsequently, enable further investigation of this issue. Analysis of deaths registered in 1997, 1998 and 1999 in which poisoning by drugs etc. was mentioned as a 'multiple cause' shows a marked increase in the fraction of such cases given an external cause code, and a decrease in those coded to F10–F19. While this could represent a real change in patterns of mortality, evidence including the size of the effect and the fact that it coincides with the change from ICD-9 to ICD-10 suggests that data system factors are involved. This phenomenon could seriously affect an indicator of poisoning mortality based on a particular range of Underlying Cause codes. The current set of injury indicators does not include a mortality indicator for this topic. However, the indicators of total injury mortality (i.e. 1.1 and 2.1–2.4) are affected to some degree.

Further assessment might reveal other issues of this type, and other aspects to these ones (e.g. the differences in case information between injury deaths certified by coroners and by doctors).

These issues can be seen as aspects of data quality, and they underscore the need for quality assurance of data used as a basis for quantitative indicators (Section 4.5). They can also be seen as issues for indicator specification.

For example, the impact of the first of these problems on current indicators of injury due to falls by older persons, could be reduced by changing the specification of the indicators in a way that used information on the presence of relevant trauma (fractures, in this instance) in combination with incomplete information about external cause.

The second might be managed by re-specifying 'injury' to include some or all death records that include trauma or poisoning as a Multiple Cause, though their Underlying Cause is not recorded as being an external cause.

Such refinement of indicator specification would preferably be validated before being implemented and, in general, we have not made changes of this type as part of this technical review. However, we have recommended use of a change based on this approach as being the best currently available way of providing an indicator with scope similar to that of existing Indicator 5.1, ('death rate from falls among people aged 65 years and older'). We have done so in this instance because the interaction of a change in the ICD (i.e. the lack of an equivalent to E887 in ICD-10) with an aspect of information collection practice (i.e. the age-related querying described above) and the previous specification of the indicator resulted in very great discontinuity, which could not be resolved by minor changes.

The scope of ICD-9 E887 ('fracture, cause not specified') led to the possibility that Indicator 5.1, as originally specified, would include some deaths that were due to a fracture that did not result from a fall. Hence the indicator might over-estimate the 'death rate from falls'. However, omission of cases coded to E887 would probably

result in great underestimation. No ICD-10 external cause code has a scope equivalent to ICD-9 E887. However, cases that would be coded to E887 under ICD-9 should be among the cases coded to X59 under ICD-10. By definition, E887 cases must involve a fracture. Consequently, cases in which the Underlying Cause of Death is coded to X59 and Multiple Causes of Death include one or more codes indicating the presence of a fracture should be a similar group to the cases coded to E887. Dual coded Australian deaths data for 1997 and 1998 show that a revision of the specification for Indicator 5.1 results in similar values under ICD-9 and ICD-10 (NISU, unpublished).

This approach has been implemented in the *Technically Revised* model.

Measurement of population incidence of injury mortality requires specification of a date for each death, to enable a rate to be calculated for each chosen period. Rates for the current indicators have usually been calculated in terms of rates of deaths registered in a particular calendar year. From the point of view of injury prevention, the most relevant date is date of injury. Data on this date is not provided in the ABS mortality collection. However date of death is available, and this is a better basis for reporting indicators of injury incidence than date of registration.

Deaths data are presently released by the ABS in annual files, each including the deaths registered in a particular calendar year. As consequence of this, and the fact that death registration often follows death by a small number of months, the revised specification also includes an alteration of recommended reporting periods from calendar years to financial years to June 30. An advantage of this change is that it brings the reporting periods for indicators of injury mortality into line with those based on hospitalisations.

The *Technically Revised* model specifies indicators of injury mortality incidence in terms of date of death and in years running from July to June.

A related issue is a criterion for deciding which deaths occurring after injury are to be attributed to injury, for the purposes of indicators of incidence. Time-based restrictions are sometimes imposed. For example, a death might be attributed to injury only if it follows within, say, 30 or 60 days. Current data does not enable assessment of the potential impact and feasibility of altering present de facto practice on this matter. Consequently, we have not made any technical changes or recommendations on this issue.

Hospital separations

As originally specified, cases included are simply all separations in a particular year which include an external cause code in a particular range.

The sets of cases selected in this way do not provide a good basis for an indicator of injury incidence for several reasons, most of which are likely to result in biased case selection. Hence, the specification of current indicators of injury incidence based on hospital separations does not satisfy the criterion of unbiased case selection.

Aspects of the data that could contribute to biased case selection for indicators of injury incidence are:

1. **Cases from some hospitals are not included in the national collection (and this changes over time).**
2. **Possible variation in the fraction of cases to which external cause codes are applied (especially for cases whose diagnosis codes are not among those for which coding of an external cause code is mandatory under coding standards—i.e. not ICD 10 Chapter XIX or a few other codes).**
3. **Some incident cases result in more than one separation record.**
4. **The likelihood of admission varies over time and between places, especially for certain types of injury cases.**
5. **Reporting is presently in terms of the date of separation from hospital, rather than date of admission or date of injury.**
6. **Some injury cases appear in the deaths data collection as well as in the hospital separations collection.**
7. **Some incident injury cases arise during episodes in hospital.**

The potential for biased ascertainment of data from hospital data sources has some features in common with deaths data. Notably, as the fraction of all acute hospital separations included in the Australian Hospital Statistics collection is close to 100%, the primary issue for indicator measurement is to ensure that the right subset of records is selected.

As with deaths, it is possible that underlying variations in data collection, coding and processing might have the effect of biasing ascertainment of cases relevant to an indicator, even though cases are selected from the data collection according to uniform criteria. An example of this type of problem was found in hospital data for several years in the mid-1990s. Patterns of use of external cause code ranges for 'accidental poisoning' and 'suicide (attempt)' by means of opiates and related substances suggested the use of different criteria to decide when to use these two code ranges (J Harrison, NISU. Unpublished conference presentation, Sept 1995). The impact of this particular problem would have been greatest for indicators at State level, and for indicators of intentional self-harm, both of which are beyond the scope of the current set of national injury indicators. Nevertheless, similar problems could affect the current indicators more directly. As with deaths, this issue can be seen as being one of data quality, but solutions may involve indicator specification (e.g. if reliable collection according to a criterion involving an external cause is not feasible, then the best practicable indicator may be one based on a criterion referring only to diagnoses).

Hospital separations data also have characteristics which present types of challenge for unbiased case selection that are not presented by deaths data. There are two main problems: (1) only some injuries result in admission to a hospital; and (2) some admitted injury cases result in more than one 'separation' record.

1. **Only some injuries result in admission to a hospital.**

The several hundred thousand injury cases admitted to a hospital in Australia each year are much more numerous than injury deaths, but they comprise only a small proportion of all incident injury cases. Limited available data suggest that something like ten times as many injury cases attend an emergency department as are admitted, and two or three cases attend a general practitioner for each one that is seen at an emergency department. Beyond this are the still more numerous injuries that do not result in medical consultation (Harrison Unpublished).

The special characteristics of hospital cases, for purposes of surveillance of injury incidence in Australia, are that severe injuries normally result in admission (unless they cause death rapidly), and that a national data collection system exists and is now of good quality. Hence, this source offers potential to measure the incidence of severe injury.

While the cases admitted to hospitals in Australia probably include nearly all severe injuries, hospital admission *per se* does not provide a satisfactory case selection criterion for an indicator of injury incidence. The main reason for this is that injury severity (however defined) is not the only factor determining whether an injury case is admitted. Other likely factors include availability of beds, admission policies, distance to a hospital, patient characteristics (e.g. very young or very old), and associated factors (e.g. patient being assessed as being 'at risk', co-morbidity, homelessness). Such factors may vary over time and between hospitals.

Variation in the fraction of incident cases admitted to hospital is likely to affect severe injury cases less than non-severe cases because of greater room for discretion whether to admit non-severe cases. This can be used as the basis for methods to improve the quality of indicators of incidence by omitting cases of types likely to be particularly subject to such variation, or by limiting attention to types of case for which such variation is small.

- **Omitting case types particularly subject to variation in probability of admission**

  Duration of stay in hospital is sometimes seen as an indicator of case severity. While it is far from being a perfect indicator, there is some basis for the view. Cases with the shortest length of stay (i.e. discharged on the day of admission) have lower severity than those with longer duration. This is especially so for the great majority of 'same day' cases, which do not end with death or transfer to another hospital. These short-stay cases also show more variation in estimated incidence rates (e.g. between States and over time) than do cases with longer duration. On this basis, same day cases (other than those ending in death or transfer) are best excluded from the specification of cases to be used for calculating indicators of incidence.

  This approach is implemented in the *Technically Revised* model. It results in indicator values which are lower, but likely to provide a more reliable basis for comparisons over time (i.e. monitoring), or between places.

- **Restriction to case types for which probability of admission is high**

  Some types of injury case are very likely to result in admission to a hospital, irrespective of such factors. While classes of injury types for which this is true are not yet well-defined, they are likely to include types of injuries recognised as presenting significant immediate threat to life. Such injuries can be characterised on the basis of clinical experience and practice, or on the basis of validated criteria such as the Abbreviated Injury Scale (AIS) and scores derived from it (e.g. the Injury Severity Score, ISS and the Modified Anatomical Profile, MAP) (Association for the Advancement of Automotive Medicine 1990; Osler, Baker et al. 1997; Sacco, MacKenzie et al. 1999).

  A case criterion that is restricted to types of injury which normally result in hospital admission has potential to provide the basis for an indicator of the population incidence of severe injury. For completeness, such an indicator should also include deaths due to injury, added in a way that avoids double-counting.

  An ideal criterion of this type cannot be specified at present. The main reason is that further work is required to characterise the injury cases for which admission almost always occurs in the Australian setting. However, criteria can be proposed for which this is likely to be true, and which might be relaxed later on the basis of further information.

  An example of such a criterion would be injury cases for which the ISS is 16 or higher, or (less certainly) 9 or higher. Note that this specification depends on the ICDMAP algorithm, presently directly applicable only to records coded according to ICD-9-CM. An alternative approach exists that is not restricted to ICD-9-CM (Osler, Rutledge et al. 1996).

  Criteria like these would restrict inclusion to a small fraction of admitted injury cases (i.e. about 1% of injury separations using a threshold of ISS of 16 or more and about 10% using a criterion of ISS equals 9 or more). Nevertheless the cases included are important, and a reliable incidence indicator for serious injuries would be a step forward. Further investigation may reveal a larger class of injuries for which the fraction admitted is high or measurable and stable, enabling the scope of indicators of serious injury to be broadened.

2. Some admitted injury cases result in more than one 'separation' record.

The previous section discussed options for selecting a subset of types of injury case for which the number of separations events per incident case is at least one. This section is about avoiding multiple counting due to some cases resulting in more than one separation record.

Each record in the Australian Hospital Statistics collection corresponds to an event called a 'hospital separation', which occurs at the end of an episode as an admitted patient in a hospital. Most separations are to the patient's usual residence. Some are to another hospital, a nursing home or other residential institution. In a small proportion of cases separation follows the death of the patient. A final type are 'statistical separations', which mark certain changes in the status of a patient, though he or she may in fact remain at (or return to) the same hospital.

An incident resulting in injury may be followed by zero, one, or more episodes in hospital, and hence may generate zero, one, or more hospital separation records. For

the purpose of estimating incidence, each new injury case should be counted once and only once.

If the extent of 'multiple counting' of incident injury cases in a data collection based on separations was constant over time and between places, then this issue would have relatively minor impact on the validity and reliability of indicators. However, factors such as the introduction of casemix funding and other changes to the hospital system are likely to have produced changes in the extent of 'multiple counting'. Internal evidence of the data confirms this.

The most straightforward ways to avoid multiple counting of cases would use a personal identifier to link separations for a person and apply criteria to assess which of them relate to a single injurious event. The NHMD collection is not designed to enable this, though such linkage can be done within single hospitals and in some regions (e.g. the Perth region).

Other methods that would enable reduction of multiple counting include:

- **Flagging 'first episodes': A flag item could be added to the separation records of injury cases to indicate whether the episode in hospital was the first (in any hospital) due to the injury or injuries that accounted for it. (Such a flag could also serve the related purpose of distinguishing injuries present before admission from injuries incident during the course of an episode in hospital.)**
- **Duration since injury: The period between the date of injury occurrence and admission would provide a useful indication of whether the current episode is likely to have been the first episode in hospital due to that event. Date of injury is not generally provided in current Australian hospital records (though it has been available in New Zealand).**

Multiple counting can be reduced by the use of less direct methods, using data available in the Australian Hospital Statistics collection, provided that assumptions on which these methods depend are valid. Several available data items may be useful for this purpose:

Mode of admission: This item is designed to identify cases 'where a new episode of care is commenced within the same hospital stay' (i.e. 'Statistical admission—episode type change') and admitted patients transferred from another hospital. In its present form, this item is only available from the 1999–2000 data year. *Necessary assumption*: First episodes of hospital care for newly incident cases of injury will not arrive as transfers or statistical admissions.

Type of episode of care: This enables attention to be restricted to 'acute care' cases. *Necessary assumption*: Acute care is the only type of care applicable to newly incident cases of injury. However, there is no reason to expect that this restriction would exclude all multiple-counting, because second and subsequent episodes of care for an injury may well be for further acute care.

Mode of separation: This item enables identification of injury cases whose destination on separation was another acute hospital, or which were 'statistical separations'. These cases should result in at least one subsequent episode in hospital and (when that episode finishes) in another record, which should also appear in the Australian Hospital Statistics collection, potentially resulting in multiple counting. Omission of the reference separation could reduce this. *Necessary assumption*: This method achieves the intended outcome only if the presumed record of the subsequent separation also meets the relevant case definition of 'injury,' and this assumption cannot presently be tested. The method also rests on the assumption

that separations omitted from the data collection for a reporting period whose presumed subsequent separations occurred after the end of the period are balanced by second or subsequent separations in the same reporting period whose prior separations occurred before the start of the period.

Having considered these methods we have opted to include the one based *on Mode of Admission* as part of the *Technically Revised* model. It will, however, be several years until a useful time series can be reported according to this definition. Pending this, use of the *Mode of Separation* item is the best available option.

Population data

Scope: Valid measures of population incidence of injury require that the scope of the cases included as the numerator in the calculation matches the scope of the population estimates used as denominators.

The official and most generally available population data for Australia are estimates of the 'usually resident' population at certain dates. As the term suggests, these estimates include people who usually reside in Australia. Hence, the population estimate for a particular date does not include visitors and other people in Australia on that date, but usually resident elsewhere. Conversely, the estimates include Australian residents who were temporarily out of Australia on that date (Australian Bureau of Statistics 1995).

If these population estimates are used in calculating injury incidence, then case definitions should be constructed to match their scope.

The scope of inclusion of deaths and hospital appears to match the scope of 'usually resident' population well, though not perfectly. The main types of mismatch are:

- **Persons injured while visiting Australia (potentially in numerator; not in denominator).**
- **Usual residents injured while absent from Australia (not normally in numerator; in denominator).**

Some mismatch also results from the absence from the NHMD collection of cases from some hospitals (i.e. Department of Defence hospitals, some prison hospitals, and hospitals in off-shore territories (Australian Institute of Health and Welfare 2001)).

Strictly, new injury cases among visitors to Australia should be omitted, and new cases among Australian residents while outside of Australia should be included from estimates of injury incidence in the usually resident population. Deaths and hospital data collections include items that purport to indicate country of usual residence, though their reliability is not clear. Hence it is technically possible to omit this group of cases. However, there is presently no comparable source of information on injuries sustained by Australians temporarily absent. The effects of these incompatibilities of case data and population data are not likely to be large and no changes to indicator specification are recommended.

This type of problem (i.e. mismatch in the scope of numerator and denominator data) could be large enough to distort indicators significantly in some circumstances. The most likely example is State-specific reporting of hospital cases where substantial numbers of people hospitalised in one jurisdiction usually reside in another (e.g. NSW residents admitted to a hospital in the ACT). In these circumstances, case definitions for indicators of population incidence of injury

should preferably be defined in terms of the jurisdiction of usual residence of the person, rather than in terms of the jurisdiction in which the hospital is located.

Time periods: Estimates of the usually resident population refer to a particular date (e.g. 30 June 1999), while the cases included in calculating a population-based incidence rate are those occurring (however this is defined) during a period, usually one year. The true size and composition of the population vary during the period of interest. However, the exact variation is not known, and is usually relatively small. It is usual practice to calculate rates on the basis of a single point estimate of population, most often for the mid-point of the period of interest and this is assumed to apply to the whole year. That practice is followed in specifying populations for the indicators of injury incidence in the *Technically Revised* model. The reporting periods for the revised indicators are years from 1 July to 30 June. Accordingly, population estimates for 31 December should be used as the denominators.

Status

Several of the issues described in this section are reflected in the *Technically Revised* model presented in Appendix A4, but not in the *Minimal Change* model. These are:

- **Restriction of cases to those where principal diagnosis is injury: This allows for variation in the fraction of cases to which external cause codes are applied, and related matters.**
- **Exclusion of 'same day' episodes in hospital (unless episode ends with transfer to another hospital or with death): Comparability of estimates is probably improved by omitting these low severity cases.**
- **Reporting injury deaths according to date of death: Time between death and death registration varies over time, between jurisdictions and between groups of cases. The change in reporting basis removes this source of irrelevant variation.**
- **Reporting indicators based on deaths data and on hospital data for the same time periods: According to the revised indicator specifications, both injury death rates and injury hospitalisation rates will be reported for years to 30 June.**
- **Allowing for consequences of update from ICD-9 to ICD-10: An additional, one-off factor with implications for indicator specification is the break in time series due to the change from ICD-9-CM to ICD-10-AM. The revised specifications allow for selection in terms of ICD-10 (and ICD-10-AM) as well as ICD-9 and ICD-9-CM. For most indicators, re-specification was straightforward. The main exception is accidental falls. A solution based on use of Multiple Cause of Death data has been developed.**
- **Omit hospital separations where 'mode of admission' is inward hospital transfer or statistical: This restriction should markedly reduce multiple counting of incident injury cases among hospital records. It is likely to be more reliable than, and to lack other disadvantages of, a related method based on 'mode of separation'. Note that this method does not allow for multiple episodes in hospital due to a single episode of injury but separated in time—see below. Limitation: Necessary data are only available from 1999–2000. Feasible without change to data collection.**

Further actions and processes

Further changes to the specification of indicators of injury incidence are likely to improve the quality of indicator measures. These changes have not been made to the indicator specifications presented in Appendix A4 of this report for reasons summarised in relation to each topic.

- **Include cases on the basis of date of injury: This would improve the validity of estimates, generally by a small degree. *Reason not implemented now:* Data not available. Would require a change to data collection.**
- **Indicators of severe injury: These would complement indicators based on death and those based on a large fraction of hospitalised cases. They have potential to enable more precise and valid monitoring of the most severe types of injury case than is feasible for serious injuries more generally. Specifications would restrict these to types of injury case all (or nearly all) of which result in admission or death. They would also allow for multiple counting of separations and for appearance of cases both in the deaths data and the hospital data. *Reason not implemented now:* Further investigation is needed to confirm the validity of suggested criteria. Likely to be feasible without changes to data collection.**
- **Omit hospital separations where available data suggest multiple episodes by the same person in the same hospital due to the same episode of injury: In principle, available data could be used to search for cases meeting specifications suggesting multiple counting of this type. *Reason not implemented now:* Permission to undertake this type of analysis would have to be obtained, then testing would be required to conform that it is technically feasible to obtain valid results. Likely to be feasible without changes to data collection.**
- **Initiate addition to hospital separations data of a 'first episode' flag: If multiple counting of incident injury cases among hospital separations cannot be solved by the methods outlined in the previous three points, then a direct solution should be considered based on a change to the data collected under the NMDS (Institutional Care). The most promising change (in terms of conceptual and technical simplicity) is the addition of a flag item to indicate whether an episode in hospital due to an injury is the first episode in any hospital for injury sustained in a particular event. *Reason not implemented now:* May not be necessary. Would require additional data items to be collected.**
- **Add capability to identify injury incidents while in hospital: Some injury cases occur while a person is an admitted patient of a hospital. This type of case is of special importance to the health sector, given areas of responsibility and authority. In addition, ability to distinguish injury present at the time of an admission from injury that arises during an admission cases would enable better specification of indicators of injury incidence. It may be possible to make this distinction on the basis of the more detailed classification of 'place of injury' included in versions 2 and 3 of the ICD-10-AM. *Reason not implemented now:* The more detailed 'Place' data will only be available from data year 2000–01. Initial data should be assessed before deciding whether it is adequate for this purpose.**
- **Report injury hospitalisation according to date of admission: Reasons for this change are similar to those prompting a change from date of death registration to date of death as the reporting basis for indicators of injury mortality. The main advantage is that date of admission is a better proxy for date of injury than is**

date of separation. This is particularly so for more severe cases, as these tend to result in longer periods in hospital. However, length of stay is short for the great majority of injury cases (i.e. longer than a week for fewer than 20% of injury cases). Hence the potential improvement in validity for the current indicators of hospital cases is smaller than for deaths. Australian Hospital Statistics are presently released in files containing all separations in a year to 30 June. Full specification of injury indicators in terms of date of admission would require a method to allow for cases admitted during that year, but not yet separated. *Reason not implemented now:* Relatively small likely benefit for current indicators is outweighed by the complications of dealing with incomplete episodes in separations-based data files. Reporting based on date of admission (or injury) will be more important for indicators of severe injury (i.e. bigger effect due to longer mean length of stay; greater potential precision of indicators warrants attention to smaller sources of error), and should be considered for inclusion in specifications for these indicators.

- **Allow for fatal injuries that are recorded in both the deaths data and the hospitals data: An unknown number of injury cases are represented in current indicators of the population incidence of injury mortality and indicate the incidence of hospitalised injury. The extent of this overlap is likely to vary between types of injury, and might vary over time and between jurisdictions. This potential source of bias in indicators does not matter greatly at present, mainly because the total numbers of hospital separations within scope for most of the indicators is very much larger than the number that do (or might) result in death. Consequently, even quite large changes in the ascertainment of injury deaths in the hospitals data collection can have little impact on the values of the indicators of hospitalised injury. Exceptions to this are indicators of types of injury for which the number of deaths is large in relation to the number of admissions. Drowning and near drowning is the only clear example of this among the present set of indicators. The issue would be more important for a set of indicators of severe injury. Resolution of the issue requires capacity to identify cases that appear in both deaths and hospital data. Given necessary approvals, this could be done by means of probablistic matching (e.g. based on data in both sources, such as age, sex and date of death). More precise matching would require personal identifiers, and might be done by means of the National Deaths Register. *Reason not implemented now:* Requires development of arrangements for data use and methods for link matching. Not a major problem for most current indicators. Should be developed along with indicators of severe injury incidence.**
- **Comparability of populations with cases: The 'Usually resident' population does not exactly match the scope of cases included (n.b. visitors to Australia and temporarily absent usual residents). Some improvement of match might be feasible. The impact of the mismatch on national indicators is probably small. *Reason not implemented now:* Probable small size of problem, combined with lack of data to enable easy and reliable improvement. (NB: the related issue of cross-border hospitalisation warrants consideration when specifying jurisdiction-specific indicators.)**

Documenting indicator measures

Status

Chapter 3 describes the process used to review the technical specifications of the current injury indicators, and presents the framework that was developed for the purpose. Appendix 4 provides the most complete technical documentation of these indicators that was achievable at the time of writing. This greatly reduces potential ambiguity concerning matters such as data sources, criteria for case inclusion, specification of populations for the calculation of rates, formulae for calculations (including age standardisation), etc.

The titles of the indicators documented in Appendix 4 have not been altered. They generally remain appropriate for reporting according to the *Minimal Change* model. Reformulation of some titles will be required when they are reported according to the *Technically Revised* model. For example, the title of Indicator 1.2 is 'Hospital separation rate for injury and poisoning in the total population.' A more accurate title for the *Technically Revised* version would be something like 'Indicator of trends in hospitalised injury and poisoning rates, Australia.'

Further actions and processes

The indicator documentation will require updating from time to time. Data sources and knowledge about them will change, preferences may change about some of the specifications (e.g. the reference population for standardisation) and any errors or omissions should be corrected. However, the basic task of documentation should not need to be repeated while these or similar indicators remain current.

Summary

A range of issues concerning indicator specification were considered, and potential improvements were identified. Those assessed to be of potential value and as being capable of implementation on the basis of existing data sources have been included in the *Technically Revised* model. Others have been proposed for further consideration or investigation. Table 4.3 provides a summary.

Other indicators

Full specification of the indicators other than the incidence indicators must await more complete specification of purposes and topics, which fall beyond the scope of this technical review. The indicators have been documented as far as possible given this constraint (Appendix 4).

Further actions and processes

None identified that depend primarily on indicator specification.

Table 4.3: Specification of indicators of population incidence of injury

Progress and status	
Adopt technical criteria for incidence indicators	Technical criteria adopted: Criterion 1: Restrict scope to specified anatomical or physiological damage Criterion 2: Include all relevant cases or a well-defined sample Criterion 3: Extraneous factors should not affect probability of case selection.
Apply criteria for specification of indicators of injury mortality incidence	**Criterion 1**: 'Injury death': presence of any Multiple Cause of Death Code in range S00–T89 (and an External Cause code in the range(s) specific to each indicator). **Criterion 2**: Probably met by including all deaths meeting Criterion 1 from ABS mortality file. **Criterion 3**: Broadly met as previously specified. Main enhancements of indicator specification in current technical revision: occurrence specified in terms of date of death (and for periods matching morbidity indicators); re-specification to allow for transition to ICD-10.
Apply criteria for specification of indicators of incidence of hospitalised injury	**Criterion 1**: 'Injury separation': Principal diagnosis = S00–T89 (and an External Cause code in the range(s) specific to each indicator). **Criterion 2**: Records meeting Criterion 1 in Australian Hospital Statistics collections for recent years probably include nearly all hospitalised injury cases in Australia. This set requires further specification to achieve a well-defined relationship to a well-defined subset of incident injury cases (see Criterion 3). **Criterion 3**: Re-specification to allow for transition to ICD-10; restriction to exclude 'same day' cases (unless mode of separation is death or transfer to an acute hospital). Omit cases where mode of admission is inward transfer or statistical type change. Also test value for incidence measurement of restricting indicator specification to cases where 'type of episode' is acute care.
Further action and processes	
Specify and adopt a set of indicators of the incidence of severe injury	Base these on technical criteria for indicators as above and the topics of the present set of indicators. Include all incident injury cases resulting in death or hospitalisation, the latter specified in a way that includes all or nearly all of a well-defined class of incident injury cases (e.g. severity above a defined threshold). Specification should: – Restrict inclusion of hospital cases to case types of injury for which death or hospital admission are universal or nearly so. This is likely to be based on diagnosis information processed to provide a severity index (most likely ICISS), and possibly patient characteristics. – Improve current methods for avoiding multiple counting of incident cases (within hospitals data, and between hospitals data and deaths data).
Improve compliance with criteria: indicators of injury mortality incidence	Apply additional changes to indicator specifications to further improve compliance with criteria, in line with data source developments and findings of investigations: – Report on basis of date of injury (investigate value of NCIS as data source) Review and if necessary refine inclusion of cases which have injury or poisoning codes in multiple cause fields but do not have an external cause code in the Underlying Cause of Death field. – Investigate the pros and cons of reporting based on date of injury.
Improve compliance with criteria: indicators of injury morbidity incidence	Apply additional changes to indicator specifications to further improve compliance with criteria, in line with data source developments and findings of investigations: – Develop a definition of separations that are probably second or subsequent episodes in the same hospital due to the same injury. Omit cases matching it. – If the preceding two methods prove to be an inadequate basis for avoiding multiple counting recommend another solution (e.g a 'first admission for this injury' flag). – Test adequacy of new 'type of place' classification as a basis for distinguishing injuries incident during in-patient care. Recommend other solution if necessary. – Investigate the pros and cons of reporting based on date of injury.

4.4 Data sources for reporting indicators

This section covers the data sources necessary for reporting current injury indicators. This includes the availability of sources, and the availability of particular necessary data items within data sources. In line with the previous sections, the focus is placed on data sources for indicators of the population incidence of injury.

In overview, the data sources required for the indicators of injury incidence exist, though they could be improved in several respects. Data sources are not available for most other indicators, and development of new sources would be substantial tasks (see Chapter 2).

Indicators of the population incidence of fatal and admitted injury, as specified in Section 4.3 and Appendix A4 require three main types of data:

- **Data on all deaths meeting a definition of being due to injury.**
- **Data on cases admitted to a hospital meeting a definition of being due to injury.**
- **Data on the population in which the cases arise.**

The topics of the indicators in the current set require that each of these sources must contain data items that permit comparable subdivision of cases according to:

- **Age group**
- **Gender**
- **Whether Aboriginal or Torres Strait Islander**
- **Urban/rural remote place of usual residence**
- **Socioeconomic status (in terms of SEIFA of place of usual residence)**

In addition, the deaths data and hospital case data must be capable of being divided according to External Cause of injury (including Type of Activity at the time of injury) and injury diagnosis. This must be comparable for the two data sources.

Data items must be available to support the aspects of indicator specification that are intended to ensure that each incident injury case is counted once and only once (n.b. Mode of Admission).

Data items must also be available to support the aspects of indicator specification that are intended to restrict the scope of hospital separation records included in a subset for which the probability of admission is not severely affected by extraneous factors (n.b. 'same day' cases).

Finally, population estimates must be available which have appropriate scope, and can be specified for the time periods and population segments to which indicators apply.

Status

Table 4.4 summarises the status of the availability of data necessary for reporting the current indicators of injury incidence. Note that this table describes the existence and availability of data. It makes no statement about the quality or adequacy of the data (see Section 4.5).

Deaths data, broadly adequate for the purpose, are available for many years. Unit record data in electronic form and coded to ICD-9 are available for deaths registered

from 1979 until 1998. The addition of multiple causes of death data for cases registered since the start of 1997 adds significantly to the utility of this source. The introduction of ICD-10 (in 1999; also available for the two previous years in dual coded files) has limited direct impact on data availability, but the associated changes in ascertainment for some indicator-specific categories are such that it may turn out to be necessary to regard the change as producing a break in series.

The National Coronial Information System is designed to record information on deaths referred to a coroner. It should thus contain records for most injury deaths. The source should provide additional case information, enabling currently available deaths data to be tested and perhaps extending the range of topics that can be made the subject of indicators (e.g. using information on circumstances of injury, and with information on date of injury to complement existing information on date of death). Extensive case registration commenced in 2000.

National hospital separations data files providing the data items needed for reporting the indicators of injury incidence are available for a shorter period than deaths. While national aggregations of State and Territory separations data began to be made in the 1980s, only in the mid-1990s did increasing compliance with a common data specification and increasing completeness of collection produce a collection that is a plausible basis for estimates of incidence (Australian Institute of Health and Welfare 2001). While there is no sharp point at which quality can be said to be adequate for this purpose, we regard data for 1993–94 as the first set for which this is a reasonable expectation. System improvements have continued, and we place more reliance on more recent estimates. A new data item, 'Mode of Admission', first available for data year 1999–2000, appears to have great potential for reducing the extent of multiple counting of incident injury cases.

Population estimates of types necessary for calculating most of the indicators of injury incidence are available for the periods for which relevant deaths and hospital data are available. Exceptions are that population estimates for the Aboriginal and Torres Strait Islander population remain problematic (largely because of changing propensity of people to identify as belonging to these groups), and populations specific to RRMA and SEIFA groups are not available for earlier periods.

Most of the current indicators of injury incidence were initially framed so as to be reportable in terms of deaths data and hospital separations data. Consequently, there is a generally good match between the information items necessary for reporting of the indicators and information available from the data sources.

The re-specification of the indicators detailed in this report (notably in Section 4.3) places additional requirements on the data sources. These have been specified on the basis of knowledge about current data items, and data availability (as distinct from quality) does not appear to be a problem for any of the new items.

However, further investigation will be required to confirm whether items currently available in the data sources provide an adequate basis for several aspects of the re-specified indicators. The main issues of this type are capacity to:

- **allow for multiple counting of incident cases in the hospital data;**
- **identify and omit classes of hospital case subject to variable sampling; and**
- **identify and allow for cases recorded in deaths data and in hospital data.**

The NCIS collection may prove to be a useful complementary data source for the injury deaths registered by coroners.

Mechanisms have developed to enable development of the classification of external cause of injury both for hospital cases (i.e. the periodic process for revision of ICD-10-AM) and deaths (ABS processes). This new flexibility is welcome, but it does open the possibility of incompatible developments in classification in these two sources. An example of this has occurred (concerning types of firearms), but it does not affect any of the current set of injury indicators.

Table 4.4: Availability of data items required for reporting current indicators of injury incidence

Information required	Data items supporting specification	Status and comments
Injury Deaths		
Deaths meeting definition of 'injury'	Underlying Cause of Death (also Multiple Causes of Death for 5.1)	Quality tests might suggest further use of Multiple Causes data.
Date of death	Dates of death and death registration.	Probably OK.
External cause of injury	Underlying Cause of Death, Activity.	Quality tests might suggest further use of Multiple Causes data.
Nature of injury	Multiple Causes of Death	Might be improved by using additional information from death certificates. Could compare with NCIS.
Age at death	Age	Probably OK.
Sex	Sex	Probably OK.
Metropolitan, rural, remote	Place of usual residence (SLA)	Basis for RRMA and ARIA.
Socioeconomic quintile	Place of usual residence (SLA)	Basis for SEIFA. Inherent limitations (i.e. population proxy for personal SES).
Whether Aboriginal or Torres Strait Islander	Indigenous status identifier.	Completeness and reliability doubtful.
Information to prevent double counting of cases also in hospital records	Not yet defined.	Likely to rely on items such as age, sex, place of usual residence, date of death and causes of death.
Injury Separations		
Separations meeting definition of 'injury'	Principal diagnosis	Probably OK.
Date of separation	Date of separation	Probably OK.
External cause of injury	External cause, Activity.	If more than one external cause is reported then normally the one related to the principal diagnosis.
Nature of injury	Principal diagnosis	Probably OK.
Age	Age at admission	Probably OK.
Sex	Sex	Probably OK.
Metropolitan, rural, remote	Place of usual residence	Basis for RRMA and ARIA.
Socioeconomic quintile	Place of usual residence	Basis for SEIFA. Inherent limitations (i.e. population proxy for personal SES).
Whether Aboriginal or Torres Strait Islander	Indigenous status identifier.	Completeness and reliability doubtful.
Information to enable exclusion of case types with variable sampling fraction	'Same day' flag	May be improved by severity threshold based on diagnoses (possibly also age).
Information to prevent multiple counting of incident cases in hospital data	Mode of admission	Only available in current form from data year 1999–2000. Might be improved by also using 'type of episode' item.
Information to prevent double counting of cases also in death records	Not yet defined.	Likely to rely on items such as age, sex, place of usual residence, date of separation, diagnoses, external causes.
Information to distinguish cases incident while in hospital	Type of place	Extended version in 2nd and 3rd editions of ICD-10-AM may be adequate
Population		
Populations for segments specified in indicators.	Age groups, sex, RRMA groups, SEIFA groups, Aboriginal and Torres Strait Islander.	Aboriginal and Torres Strait Islander estimates are doubtful. Populations for RRMA and SEIFA groups available for limited periods.
Populations for mid-points of reporting periods for indicators.	Estimates for 31 December of each year	31 December Aboriginal and Torres Strait Islander population not found. Can be estimated by interpolating between 30 June estimates.

Further actions and processes

Co-ordination of classification development for injury deaths and injury hospitalisations

The Expert Group on Health Classification includes members representing organisations responsible for coding injury deaths (ABS), for the ICD-10-AM (National Centre for Classification in Health), and for injury surveillance (AIHW National Injury Surveillance Unit). In 2001 the Expert Group invited these groups to look into needs and opportunities for co-ordination of development of classifications used for coding deaths and hospital separations.

Avoidance of multiple counting of incident cases in hospital data

A 'first episode' flag may be required if methods based on available data are not adequate (see Section 4.3).

Improving information acquisition on medically certified injury deaths

There are signs that External Cause data on the minority of injury deaths certified by medical practitioners (rather than by coroners) is relatively weak. This may be seen as an issue of data quality (see Section 4.5). However, it can also be seen in terms of data sources. In particular, implementation of a standard death certification form in all jurisdictions (e.g. based on the one developed by the ABS for use in Tasmania), combined with further education of medical practitioners concerning the special information required for proper certification of injury deaths (i.e. information on external causes) would comprise useful enhancements to information on injury deaths.

Date of injury

Investigate potential benefits and feasibility of obtaining data that would enable reporting of injury deaths and hospitalised cases according to date of injury.

Timeliness

Investigate potential for improving timeliness reporting of indicator values. Reporting is constrained by the release schedules for source data. Of particular interest are: the feasibility of mortality data being released by the ABS on a date of occurrence basis; the feasibility of earlier preliminary reporting of injury deaths based on the NCIS, and the potential for earlier preliminary reporting of hospital separations data.

4.5 Data quality

Indicators capable of serving the purpose of measuring and monitoring injury incidence (Section 4.2) can be specified (Section 4.3) in a way that should be measurable using presently available data sources and data items (Section 4.4).

A remaining question for these indicators is whether the quality of the data is adequate to provide sufficiently valid and reliable indicator measurements.

Status

The quality of most relevant aspects of recent Australian data on injury deaths and injury cases admitted to hospital is probably adequate for the calculation of meaningful indicators of injury incidence. However, formal validation of the quality has been uncommon, and this conclusion rests on qualitative assessment of data sources combined with internal evidence from the available data. A more reliable assessment of data quality would require formal tests.

Several issues stand out as candidates for testing, either because they are fundamental to the reliability of the injury indicators, or because there is evidence to suggest that problems exist. These are summarised here:

- **Consistency of relationship between multiple cause of death information and allocated Underlying Cause of Death, with particular reference to categories relevant to the indicators.**
- **Reliability and completeness of external cause coding (as required for indicators) of hospital cases and deaths. This includes the coding of Activity and Place.**
- **The consequences for the quality of injury indicators of age-specific variation in the extent of investigation of external causes of injury death for purposes of determining 'Underlying Cause'.**
- **The consequences for the quality of injury indicators of differences in information obtained on injury deaths related to whether they are certified by a coroner or by a medical practitioner.**
- **The effectiveness of the proposed criterion for reducing multiple counting of incident injury cases among hospital separations (i.e. restriction to cases for which Mode of Admission = 3, 'other'). (Also, if necessary, tests of alternative or additional means to achieve the same aim.)**
- **The adequacy of estimates of injury case numbers and populations for Aboriginal and Torres Strait Islander Australians**

Further actions and processes

This section presents discussion concerning responses to the data quality issues listed above.

Consistency of relationship between multiple cause of death information and allocated Underlying Cause of Death, with particular reference to categories relevant to indicators.

> **Initial analysis of deaths data for the years in which Multiple Cause of Death data is available (1997–1999 at the time of writing) shows some signs of year to year variation in the Underlying Cause of Death code allocated given the presence of particular condition codes. If so, this has implications for indicator specification and interpretation. Further analysis is required, preferably on the basis of source data and including an additional data year.**

Reliability and completeness of external cause coding (as required for indicators) of hospital cases and deaths. This includes the coding of Activity and Place.

> **Little formal quality assurance testing of external cause coding (including Activity—with special reference to the categories *working for income* and *sport*) has been reported. The reliability of injury indicators depends on the quality of this coding. A program of testing would be desirable, focusing on the distinctions necessary for the indicators. Results should be published. Consistency between jurisdictions should be examined, especially for hospital separations. NCIS may provide a basis for comparison with routine deaths data.**

The quality of the proposed criterion for reducing multiple counting of incident injury cases among hospital separations (i.e. cases for which Mode of Admission = 3, i.e. 'other'). (Also, if necessary, tests of alternative or additional means to achieve the same aim.)

> **In recent years, the single most significant barrier to reporting indicators of injury incidence based on Australian hospital data has been the lack of an adequate means to allow for the multiple counting that results from some incident injury cases resulting in more than one episode in hospital. The 'Mode of admission' item available for hospital separations from data year 1999–2000 appears to have great potential as a means to allow for multiple counting where one episode in hospital follows another one immediately (i.e. transfers and statistical type change cases). The performance of the criterion should be tested. Testing should assess the quality of the criterion as a means to counter multiple counting due to transfers and statistical type changes, and the extent of residual multiple counting (i.e. due to episodes that do not follow one another immediately).**

The consequences for the quality of injury indicators of age-specific variation in investigation of external causes of injury death.

> **Information in the deaths data collection suggests that the extent of investigation to seek information that would enable coding of specific external causes of death reduces with increasing age of the deceased person (See further discussion in Section 4.3). This has potential to affect indicators of injury mortality. Further investigation would be required to determine the extent of the effect, and ways to overcome or allow for them.**

The consequences for the quality of injury indicators of differences in information obtained on injury deaths related to whether they are certified by a coroner or by a medical practitioner.

> **Most injury deaths are certified by a coroner. Some are certified by a medical practitioner. Medically certified injury deaths are likely to be at advanced age, and to involve falls and fractures. These different sources of information may perform differently in ways that affect the injury indicators. There are some signs in the mortality data that this is so. Further investigation would be required to determine the extent and propose solutions.**

Adequacy of estimates of injury case numbers and populations for Aboriginal and Torres Strait Islander Australians.

> **Case counts and population estimates depend on identification (or self-identification) of some of the people counted as being Aboriginal or Torres Strait Islander. Identification probably differs between data sources and places and over time. The approximate level of injury rates calculated using these data provides a general indication of burden of injury (i.e. it is high compared with rates for the whole population). However, trends in rates and comparisons between places are not reliable. This problem applies to measurement of Aboriginal and Torres Strait Islander mortality and morbidity generally. An aspect of this issue that warrants attention from the perspective of the measurement of injury incidence is the identification of indigenous status of people whose deaths are certified by a coroner. Efforts have been made to improve this (e.g. as part of general efforts to improve identification among deaths, and in a proposal to standardise inclusion of a relevant question in police death report forms). Validation of the quality of identification among coroner cases following these initiatives would be useful.**

4.6 Summary and development path

Summary

The NHPA injury indicators have been subjected to thorough technical review and documentation.

Chapter 1 provides background to the project and the current indicators. Chapter 2 provides a situation analysis concerning the current indicators and the data sources on which reporting depends.

As originally stated, the NHPA injury indicators were not completely specified. Technical aspects left unstated could result in reporting of inconsistent indicator values. Chapter 3 presents a framework for more complete technical specification of the indicators. The framework, an extension of other work, is intended to include all information about each indicator that is necessary to ensure consistent reporting.

Chapter 4 reviews the indicators in terms of their purposes, technical specification, data sources and data quality. Precise statement of indicator purposes provides the necessary basis for assessing whether indicator specifications are capable of serving the purpose and, in turn, for assessing whether available data are adequate.

Appendix A4 presents the results of this process, in two distinct ways, described as the *Minimal Change* model and as the *Technically Revised* model.

The *Minimal Change* model is designed to fully specify and document the existing NHPA injury indicators. This is done with the aim of replicating the sources and methods used in the *NHPA Report: Injury Prevention and Control 1997* (Commonwealth Department of Health and Family Services and Australian Institute of Health and Welfare 1998). We have not altered any aspect of indicator definition which had been specified at that time. In documenting the many aspects of the indicators which had not been specified at that time, we have sought to minimise change in scope or methods, taking the data reported in the 1997 report as a guide. The only substantial change is the replacement of ICD-9(-CM) code ranges with ICD-10(-AM) code ranges.

The *Technically Revised* model builds on the *Minimal Change* model by incorporating a set of specific changes to technical specification of the indicators based on deaths data and hospital separations data which are (1) designed to improve the performance of the indicators for the purpose of monitoring injury incidence rates; and (2) can be implemented without requiring changes to source data. The changes do not alter the subject matter of the indicators.

The *Technically Revised* model is proposed for consideration by relevant bodies, and to provide a basis for tests and comparisons.

The changes included in the *Technically Revised* model are based on our assessment of purposes of the indicators, followed by specification of the indicators in a way designed to improve the capacity of measures based on the indicators to serve declared purposes. This process took careful account of the availability of data sources.

We were able to apply this process fully for 24 (71%) of the current NHPA injury indicators. These are the indicators that are based on deaths data or hospital separations data and are indicators of injury occurrence. The components of the *Technically Revised* model for injury indicators based on deaths and hospital separations data are summarised in Table 4.1, in comparison with the *Minimal Change* model.

Constraints preventing complete application of the process for the remaining indicators were lack of relevant data sources, and insufficient statement of indicator purpose and topic (see Table 4.6).

Table 4.5. *Minimal Change* model and *Technically Revised* model: NHPA injury indicators based on deaths and hospital separations data

	***Minimal Change* model**	***Technically Revised* model**
Indicators based on national deaths data		
General case inclusion criterion (applies to **all** mortality indicators)	None	A 'multiple cause of death' field contains an injury or poisoning code.
General case inclusion code ranges (applies to all mortality indicators)	Not applicable	ICD-9: 800–904, 910–999 ICD-10: S00–T89
Specific case inclusion criteria (specific to each indicator)	'Underlying cause of death' is an external cause code in the specified range	'Underlying cause of death' is an external cause code in the specified range
Specific case inclusion code ranges (specific to each indicator)	**ICD-9**: external cause code ranges as specified in 'NHPA Report: Injury Prevention & Control **ICD-10**: closest equivalent to the ICD-9 ranges [(a)]	As for *Minimal Change* model [(b)]
Basis for reporting periods	Date of death registration	Date of death
Reporting periods	1 January to 31 December (i.e. calendar year)	1 July to 30 June (i.e. financial year, cases registered by the end of the calendar year beginning during the period are included)
Population for age-standardisation	Australia, 1991 [(c)] 5-year groups to ages 85+	Australia, 1991 [(c)] 5-year groups to ages 95+
Denominator for rates (mid-point of reporting periods)	Usually resident population at 30 June	Usually resident population at 31 December
Indicators based on national hospital separations data		
General case inclusion criterion (applies to all mortality indicators)	None	Principal Diagnosis is injury or poisoning.
General case inclusion code ranges (applies to all mortality indicators)	Not applicable	ICD-9: 800–904, 910–999 ICD-10: S00–T89
Specific case inclusion criteria (specific to each indicator)	First (left-most) external cause code in the specified range	First (left-most) external cause code in the specified range
Specific case inclusion code ranges (specific to each indicator)	**ICD-9-CM**: external cause code ranges as specified in 'NHPA Report: Injury Prevention & Control **ICD-10-AM**: closest equivalent to the ICD-9 ranges [(a)]	As for *Minimal Change* model [(b)]
Basis for reporting periods	Date of separation	Date of separation
Reporting periods	1 July to 30 June	1 July to 30 June
Population for age-standardisation	Australia, 1991 [(c)] 5-year groups to ages 85+	Australia, 1991 [(c)] 5-year groups to ages 95+
Denominator for rates (mid-point of reporting periods)	Usually resident population at 31 December	Usually resident population at 31 December
Restriction to avoid counting multiple separations per incident case	None	Omit cases where admission is statistical, or from another acute care hospital [(d)]
Restriction to omit variably-ascertained case types	None	Omit 'same-day' separations. [(e)]

(a) ICD-10(-AM) equivalents for Injury Indicator external cause ranges were specified by NISU on the basis of best available evidence. See also Harrison & Steenkamp (in press) Appendix A4.

(b) Except indicators of falls (5.1, 5.1, 5.5) which have been re-defined to provide an equivalent in ICD-10(-AM) to ICD-9(-CM) code E887, and the indicator of hospitalised injury due to fire, scalds etc (9.2) for which an equivalent in ICD-10-AM is not available.

(c) At the time of writing the Australian June 1991 persons population was to be replaced by the 30 June 2001 persons population as soon as the ABS released the final population figures.

(d) Based on 'Separation Mode'. The 'Admission Mode' item appears to provide a better basis but is not yet available in the current form for a sufficiently long period (available from 1999–00).

(e) Except 'Same day' separations because of death. The general restriction of case inclusion to separation records having an injury diagnosis as the Principal Diagnosis omits another class of variably-ascertained cases: those for which addition of an external cause code was optional under prevailing coding rules.

Multiple counting of incident cases could be eliminated or greatly reduced in several ways (see Section 4.3). Direct methods would require collection of additional case data. The indirect method based on data currently collected (i.e. 'Mode of Admission') that is included in the *Technically Revised* model may be adequate. However, it is desirable for this to be tested empirically. In particular, this method does not allow for readmissions due to an injury following discharge to the patient's usual residence.

Variation in the admitted fraction of injury cases is a somewhat more complex problem. One approach to a solution is to omit from the scope of an indicator types of cases known or suspected to be subject to highly variable ascertainment. Omission of same day cases (other than those ending with death or transfer to another acute care hospital) is an example of this approach (it is applied as part of the *Technically Revised* model). It may be possible to identify other classes of case whose omission would reduce the impact of factors other than injury incidence on the values of the indicator measure.

Another approach is to restrict attention to types of case for which there is evidence that the admission fraction is very high or stable. An example is those types of injury that present high threat to life. Given the availability of hospital services in Australia, it is likely that the great majority of obviously life-threatening injuries will result in admission to a hospital, unless early intervention before admission occurs. As injuries admitted to a hospital and injury deaths both appear to be ascertained more or less completely, the two existing data sources appear to be capable of supporting quantitative monitoring of indicators of severe injury.

A set of indicators of severe injuries should be developed, based on a subset of the hospital separations included in the current indicators for which severity is above a defined threshold (selected to ensure high probability of ascertainment), combined with deaths data (linked to minimise multiple counting).

Data sources and data items necessary for monitoring current indicators of injury incidence generally exist.

The quality of the data available from these sources is probably adequate in most respects. However, confirmation of this with quality assurance tests is desirable, and several issues suggesting quality problems warrant investigation.

The other members of the current list of NHPA injury indicators are much less developed. In some cases their purpose remains uncertain, and this must be clarified before technical development is feasible. Relevant data sources are generally lacking. As the precise purposes adopted for indicators may have fundamental implications for the necessary attributes of data sources, the purposes should be clarified before data sources are developed.

Table 4.6: Summary of status of the 34 injury indicators presented in Table 1.1

Topic/purpose	Item	Status
Injury incidence		
Incidence of severe injury	1.1 Death rate for injury and poisoning in the total population	These indicators were defined, and where necessary refined.
	1.2 Hospital separation rate for injury and poisoning in the total population	
	2.1 Death rate ratio comparing the injury status of Indigenous and non-Indigenous populations	They are measurable with existing data sources.
	2.2 Death rate ratio comparing the injury status of males and females	
	2.3 Death rate ratio comparing the injury status among males aged 25–54 years from low SES groups with males from high SES groups	The *Minimal Change* model enable replication of previous reporting of the indicators.
	2.4 Death rate ratio comparing the injury status among people living in rural and remote areas and the general population	
	2.5 Hospital separation rate ratio comparing the injury status among Indigenous and non-Indigenous populations	
	2.6 Hospital separation rate ratio comparing the injury status among males aged 25–54 years from low SES groups with males from high SES groups	The *Technically Revised* model provides a basis for more valid monitoring of population incidence.
	3.1 Death rate for road transport-related injury in the total population	
	3.2 Death rate for road transport-related injury among males aged 15–24 years	
	3.3 Hospital separation rate for road transport-related injury in the total population	
	3.4 Hospital separation rate for road transport-related injury among males aged 15–24 years	
	4 Work-related injury	
	5.1 Death rate for falls among people aged 65 years and over	
	5.2 Hospital separation rate for falls among people aged 65 years and over	
	5.5 Hospital separation rate for falls among children aged 0–4 and 5–9 yrs	
	6.1 Hospital separation rate for sport and recreation-related injuries	
	7.1 Death rate for homicide among people aged 20–39 years	
	7.2 Death rate for homicide among children aged 0–9 years	
	9.1 Death rate for injury resulting from fire, burns and scalds among people aged 55 years and over	
	9.2 Hospital separation rate for injury resulting from fire, burns and scalds among children aged 0–4 years	
	10.1 Hospital separation rate due to poisoning among children aged 0–4 years	
	11.1 Death rate for drowning in the total population and among children aged 0–4 years	
	11.2 Hospital separation rate for near drowning among children aged 0–4 years	
	14 Annual incidence rate of persistent spinal cord injury from traumatic cases	
	15 Brain injury	
Incidence of less severe injury	6.2 Non-hospital admitted sport and recreation-related injuries	Not currently measurable, mainly because of lack of appropriate data sources.
	8.2 ED attendances resulting from product-related injury	

Table 4.6 (continued): Summary of status of the 34 injury indicators presented in Table 1.1

Other indicators		
Incidence of risk factors	9.3 The proportion of houses equipped with smoke detectors and earth leakage breakers 11.3 Number of States and Territories requiring separation of domestic pools from houses 11.4 The proportion of domestic pools with approved child-resistant fences, gates and barriers 11.5 The proportion of children and young people aged 10–16 years who have successfully completed a water safety and lifesaving course	Not currently measurable, mainly because of lack of appropriate data sources and because further conceptual development are required for some.
Incidence relating to services	12.1 Access of injured patients to optimal trauma care 13.1 Access of people with trauma injuries to comprehensive rehabilitation programs and appropriate long-term care and community support	Not currently measurable because conceptual development are needed and data sources are lacking.

Further actions and processes

Further actions and processes to develop injury indicators are presented in terms of the four themes covered in Chapter 4: purposes and topics for indicators; specifications; data sources; and data quality. Considered together, these provide a development path for injury indicators.

Purposes and topics for indicators

Indicators of injury incidence

- **Maintain consistency of indicators and associated data sources.**
- **A likely area of interest is indicators of the incidence of types of injury which do not normally result in death or admission to a hospital. Technical feasibility and cost are likely to be the main constraints in the near future.**

Other indicators

- **Likely areas of development are: (1) monitoring exposure to factors known to influence risk, including preventive interventions (nb CATI surveys); and (2) monitoring service access and quality.**

Specifications

Indicators of injury incidence

- **Mortality and hospitalised injury: the statement of specifications stated in Table 3.1 (and implemeted in Appendix A4) will require review and refinement over time.**
- **Indicators of severe injury: the value and feasibility of development should be assessed.**

- **Specifications should be reviewed periodically to ensure that they remain well matched to their purpose and to the properties of the data sources to which they are applied. Developments in data sources or in knowledge about their properties may enable improvements to be made to the indicators specifications.**
- **Biostatistical methods and specific criteria for deciding on the presence of 'change' 'difference' and 'trend' should be specified for the NHPA injury indicators.**

Other indicators

- **Largely depends on development of purposes.**

Data sources

Indicators of injury incidence

- **In principle, the current indicators of injury incidence (including the proposed set of indicators of severe injury) can be measured without requiring changes to information systems. However, investigations of data quality and related matters may reveal problems whose solution will require changes to the sources.**

Other indicators

- **Largely depends on development of purposes for indicators. Substantial data system developments would be required if quantitative indicators of injury incidence were to be extended beyond deaths and hospitalised cases.**
- **A likely area of development is periodic population-based surveys (possibly based on CATI methods) to support indicators of exposure to factors known to influence risk, including preventive interventions.**

Data quality

Indicators of injury incidence

- **Quality assurance mechanisms are required if reliance is to be placed on the indicators.**
- **Investigation of the several specific issues described in Section 4.5.**

Other indicators

- **Largely depends on development of purposes. If purposes for indicators require capability to detect trends reliably, then data quality will have to be quite high. Quality requirements would typically be very high for indicators which are intended to serve etiological purposes.**

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Appendix A1: Multi-cause mortality coding

Example indicating benefits of multi-cause coding ABS mortality data

Below is an example of the information on a death certificate concerning a death that resulted from a collision between two motor vehicles (Harrison and Alexander 1999). The conditions leading to *death*, the antecedent causes (in this case there is only one), and other significant conditions contributing to the death can all be seen. The information shows that the person died from multiple injuries, caused by the motor vehicle collision which was complicated by the fact that the person was under the influence of alcohol at the time of the collision.

Example of Death Certificate:

	CAUSE OF DEATH	
Disease or condition directly leading to death	***(a)*** **Severe brain injury & haemorrhage; lacerated & bruised lungs; tear in aorta with bilateral hemothorax; ruptured liver & spleen; # of pelvis; # of sternum and ribs**	***Approximate interval between onset and death***
	due to (or as consequence of)	
Antecedent causes **Morbid conditions, if any, giving rise to the above cause, stating the underlying condition last**	***(b)*** **Motor vehicle traffic accident, driver of car in collision with another motor vehicle**	**10-15 minutes**
	due to (or as a consequence of)	
	(c) **…… ……**	
	due to (or as a consequence of)	
	(d) **…… ……..**	
Other significant conditions **contributing to the death, but not related to the disease or condition causing it**	**Excessive alcohol consumption**	

Previously manually coded to:	**With multi-cause coding, now coded to**
Underlying cause: **E8120 (Motor vehicle traffic accident involving collision with another vehicle)**	***Underlying cause:*** **E8120 (Motor vehicle traffic accident involving collision with another vehicle)**
	Nature of injury: **8540 (Inter cranial injury of other and unspecified nature)** **8530 (Other and unspecified intercranial haemorrhage following injury)** **8612 (Injury to lung without mention of open wound into thorax)** **9010 (Injury to thoracic aorta)** **8602 (Haemothorax without mention of open wound into thorax)** **8640 (Injury to liver without mention of open wound into cavity)** **8650 (Injury to spleen without mention of open wound into cavity)** **8088 (Fracture of pelvis, unspecified, closed)** **8072 (Fracture of sternum, closed)** **8070 (Fracture of rib(s), closed)**
	Multi-cause codes: **3050 (Non dependent use of drugs, alcohol)**

In Australia, before 1997, the only available data were the one External Cause code (as shown in the column with the heading 'Previously manually coded to'). However, for deaths registered from 1997, the information in the right hand column is now available. That is, the External Cause code defining the type of incident is now supplemented by nature of injury codes describing all reported injuries, and multi-cause codes for any other condition (e.g. alcohol use). This greatly enhances the data available for research and analysis purposes. The example of multiple cause coding shown above uses ICD-9 codes. This classification has been superseded by ICD-10, but multiple cause coding continues, in essentially the same way.

Appendix A2: Year of registration *vs* year of occurrence for mortality reporting

Deaths data reporting based on year of registration compared with reporting according to year of occurrence

Source: (Steenkamp and Harrison 2000)

Deaths data have traditionally been presented by calendar year of death registration. An assumption is often made that the number of registrations in a particular period provides a good estimate of the number of death occurrences. This holds true often enough to be useful, but it works best if the true incidence of a cause of death does not fluctuate greatly over short periods of time and if the time between occurrence and registration of death is not long or variable.

In the *Causes of Death* publication by the ABS for deaths registered in 1997 (Australian Bureau of Statistics 1999), it was noted that the number of deaths registered as suicide during 1997 was substantially (14%) higher than in the previous year. Such a large increase warranted scrutiny.

One consideration was that the ABS had introduced automated coding methods and multiple cause coding for mortality data, beginning with the 1997 registrations. Therefore, case numbers were examined by month of registration and a large peak in suicide registrations was evident in December 1997. Further assessment and discussion with ABS officers confirmed that a particularly large number of suicide deaths were registered in December 1997 and that this peak was largely restricted to Victoria and NSW. The registrations in December 1997 did not appear to have an unusual composition (in terms of age, sex, means of suicide, etc.). Unusually high numbers of other types of external cause deaths were also registered in December 1997, and this was restricted to Victoria. The December 1997 peak in suicide registrations was so large and sharp that a problem with data seemed to be the most likely explanation.

Further analysis was done on deaths registered in 1998 when data on these became available in December 1999. This indicated that the peak of suicide registrations in late 1997 had two components, i.e. a large peak of registrations in Victoria in December 1997, which was not limited to suicide cases; as well as a smaller, though substantial, peak in suicide occurrence in the last quarter of 1997.

Appendix A3: Notes on data in the AIHW National Hospital Morbidity Database

Data	1993–94	1994–95	1995–96	1996–97	1997–98	1998–99
Relevant reference	AIHW 1997. Australian hospital statistics 1993–95. AIHW cat. no. HSE 2. Canberra: AIHW (Health Services Series).		AIHW 1997. Australian hospital statistics 1995–96. AIHW cat. no. HSE 3. Canberra: AIHW (Health Services Series).	AIHW 1998. Australian hospital statistics 1996–97. AIHW cat. no. HSE 5. Canberra: AIHW (Health Services Series).	AIHW 1999. Australian hospital statistics 1997–98. AIHW cat. no. HSE 6. Canberra: AIHW (Health Services Series).	AIHW 2000. Australian hospital statistics 1998–98. AIHW cat. no. HSE 11. Canberra: AIHW (Health Services Series).
Version of ICD that applied to data	ICD-9-CM (Version 1)		ICD-9-CM (Version 1)	ICD-9-CM (Version 2)	ICD-9-CM (Version 2)	In WA, SA, Tasmania and Queensland: ICD-9-CM (Version 2) In NSW, Victoria, ACT and NT: ICD-10-AM (Version 1)
Errors, omissions or additions known to affect the data	Not all variables were supplied by all data providers. In NSW, the type of admitted patient episode data should be treated with caution because of data quality issues (particularly for 1993–94). The morbidity data for Victorian private hospitals are incomplete. The Department of Human Services estimated that about 81% of private hospital separations were supplied to NHMD for 1993–94. The relatively high percentage (2.2%) of these separations without diagnoses is a reflection of an arrangement for phasing in of private hospitals. In 1994–95, virtually all private hospital separations were reported, but 0.6% did not have diagnoses. Department of Veterans' Affairs: Information on diagnoses was not able to be included for a high proportion of the records supplied to NHMD for the hospital located in Victoria. In NT, the data have not been provided for the only private hospital in NT due to confidentiality restrictions.				Not all States and Territories were able to provide information on the area of usual residence in the form of an SLA code, using the 1997 edition of the ASGC. Please refer to AIHW 1999. Australian hospital statistics 1997–98. AIHW cat. no. HSE 6. Canberra: AIHW (Health Services Series), p 216 for more detail.	Not all States and Territories were able to provide information on the area of usual residence in the form of an SLA code, using the 1997 edition of the ASGC. Please refer to AIHW 2000. Australian hospital statistics 1998–98. AIHW cat. no. HSE 11. Canberra: AIHW (Health Services Series, p 221 for more detail.

Data	1993–94	1994–95	1995–96	1996–97	1997–98	1998–99
				Fall codes 880–888 have an extra fourth digit to identify specific objects, etc. For example, 8800 is fall on escalator.		
	In order to overcome the lack of specificity inherent in the sports related codes, NSW Health developed a unique coding system to enable identification of sports injuries. A new code was implemented and some NSW hospitals coded sports related injuries to the improvised codes. This resulted in no data being available for the official ICD codes (E886.0 and E917.0) for some hospitals for the years 1993–94 to 1995–96. With the release of the revised ICD-9-CM in 1996 some hospitals adopted the new coding system. Analysis of the data for the year 1996–97 indicated that NSW sporting injuries have appeared in the previously unused codes E886.0 and E917.0. The increase in overall numbers for sports related injuries over the previous years is, therefore, an artefact of this change in coding practice and not a real increase in actual numbers of sporting related hospital admissions.					
	Data presented by State or Territory refer to the State or Territory of the hospital, not to the State or Territory of the usual residence of the patient. (This is different from population data, as mentioned in Section 2.1.4.)					
Public hospitals not included	Public hospitals not within the jurisdiction of State and Territory health authorities.[(a)] Public psychiatric hospitals.		Public hospitals not within the jurisdiction of State and Territory health authorities. Public psychiatric hospitals for Queensland (these data for other jurisdictions were included for the first time).	Public hospitals not within the jurisdiction of State and Territory health authorities. Data were incomplete for three small district hospitals in Tasmania.	Public hospitals not within the jurisdiction of State and Territory health authorities. One small outpatient clinic in Queensland. A mothercraft hospital in ACT. Also data were not provided for: • Some lodges attached to public hospitals in WA. • Most separations for three small district hospitals in Tasmania.	Public hospitals not within the jurisdiction of State and Territory health authorities. One small outpatient clinic in Queensland. A forensic hospital in Tasmania. A mothercraft hospital in ACT.

(a) Hospitals operated by the Department of Defence and hospitals located off-shore territories.

Data	1993–94	1994–95	1995–96	1996–97	1997–98	1998–99
Private hospitals not included	The only private hospital in NT. Some private day hospital facilities in ACT. About 19% of separations from Victorian private hospitals.		The only private hospital in NT. Some private day hospital facilities in ACT.	The only private hospital in NT. Some private day hospital facilities in ACT. Two private free-standing day hospital facilities in Tasmania.	The only private hospital in NT. Some private day hospital facilities in ACT. Two private free-standing day hospital facilities in Tasmania, as well as one small former public hospital which had been privatised. About 4,500 NSW private hospitals separations were also excluded.	12 private freestanding day hospital facilities an one other private hospital in Victoria. Three private free-standing day hospital facilities in SA. One private free-standing day hospital facility and four other private hospitals in Tasmania. Six private free-standing day hospital facilities and one private hospital in ACT. The one private hospital in NT. As at 31 December 1999, 5.6% of private hospital separations for WA were not included.

Appendix A4: Revised specifications for NHPA Injury Indicators

This appendix includes an entry for each of the current NHPA injury indicators. The entries are based on the framework for technical specifications presented in Table 3.1.

Application of this framework is most complete for the 24 (71%) current NHPA injury indicators that are based on deaths, hospital separations and spinal cord injury register data.

Constraints preventing complete application of the framework for the remaining indicators were lack of relevant data sources and insufficient statement of indicator purpose and topic.

The entries for the indicators based on deaths data and on hospital separations data include a table specifying two versions of the specification. These are the *Minimal Change* model and the *Technically Revised* model.

The *Minimal Change* model is designed to fully specify and document the existing NHPA injury indicators. This is done with the aim of replicating the sources and methods used in the *NHPA Report: Injury Prevention and Control 1997* (Commonwealth Department of Health and Family Services and Australian Institute of Health and Welfare 1998).

We have not altered any aspect of indicator definition which had been specified at that time. In documenting the many aspects of the indicators which had not been specified at that time, we have sought to minimise change in scope or methods, taking the data reported in the 1997 report as a guide. The only substantial change is the replacement of ICD-9(-CM) code ranges with ICD-10(-AM) code ranges.

The *Technically Revised* model builds on the *Minimal Change* model by incorporating a set of specific changes to technical specification of the indicators based on deaths data and hospital separations data which are:

(1) designed to improve the performance of the indicators for the purpose of monitoring injury incidence rates; and

(2) can be implemented without requiring changes to source data.

The changes do not alter the subject matter of the indicators. See Chapter 4 for details.

NHPA injury prevention and control indicator 1.1

Identifying and descriptive attributes			
Data element ID:	NHPA Indicator (Injury Prevention and Control) 1.1		
Data element title:	Death rate for injury and poisoning in the total population		
Version number:	1		
Type:	Derived Data Element		
Status:	Draft		
Definition:	Number of injury and poisoning death occurrences per 100,000 population per specified year, age-standardised using the standard Australian population.		
Context:	Injury remains a leading cause of death, illness and disability in Australia. Injury prevention and control has been recognised as a NHPA since 1986. In 1997–98 there were 7,826 deaths due to injury, yielding an age-standardised death rate of 40.9 per 100,000 persons.		
Relational and representational attributes			
Data type:	Numeric		
Representational form:	Rate	**Minimum size:**	3
Representational layout:	N,NNN.N	**Maximum size:**	7
Scope of indicator:	**Sex:**	All persons	
	Geographical area of interest:	Australia	
	Lower age limit:	All ages	
	Upper age limit:	All ages	
	Other specification(s) of interest:	None	
Definition of formula variables:	**Numerator:**	**For deaths coded to ICD-9:** Number of death occurrences in Australia assigned to relevant ICD-9 codes for a particular year **For deaths coded to ICD-10:** Total number of death occurrences in Australia assigned to relevant ICD-10 codes for a particular year	
	Denominator:	Mid-year total for Australian population for the same year as the numerator	
Formula:	(Total number of death occurrences coded to relevant ICD codes*100,000) / Mid-year population for relevant year; age standardised using the direct method and the standard Australian population **Complete formula for direct method:** $SR = \Sigma(r_i P_i) / \Sigma(P_i)$ *where* SR is the age-standardised rate for the population being studied r_i is the age-group specific rate for age group i in the population being studied P_i is the population of age group i in the standard population		
Guide for use:	Five-year age groups (in years) to be used are: 0–4, 5–9, 10–14, 15–19, 20–24, 25–29, 30–34, 35–39, 40–44, 45–49, 50–54, 55–59, 60–64, 65–69, 70–74, 75–79, 80–84, 85+ years. Given the expansion of the size of the population for elderly Australians, notably those aged 85 years and older, consideration should be given to adding the five-year age groups 85–89, 90–94 and 95+ years. For purposes of comparison of population rates for Australia over time, and/or population within Australia, the standard population to be used is the final 30 June estimated Australian resident population (males plus females) for the most recent year ending in 1.		

Related data references:	**Related indicators:**	
	Indicator 1.2 Hospital separation rate for injury and poisoning in the total population	
	Indicator 2.1 Death rate ratio comparing the injury status of Indigenous and non-Indigenous populations	
	Indicator 2.2 Death rate ratio comparing the injury status of males and females	
	Indicator 2.3 Death rate ratio comparing the injury status among males aged 25–54 years from low socioeconomic groups with males from high socioeconomic groups	
	Indicator 2.4 Death rate ratio comparing the injury status among people living in rural and remote areas and the general population	
	Indicator 3.1 Death rate for road transport-related injury in the total population	
	Indicator 3.2 Death rate for road transport-related injury among males aged 15–24 years	
	Indicator 5.1 Death rate for falls among people aged 65 years and over	
	Indicator 7.1 Death rate for homicide among people aged 20–39 years	
	Indicator 7.2 Death rate for homicide among children aged 0–9 years	
	Indicator 9.1 Death rate for injury resulting from fire, burns and scalds among people aged 55 years and over	
	Indicator 11.1 Death rate for drowning in the total population and among children aged 0–4 years	
Administrative attributes		
Date of submission:		
Source organisation:	National Health Priority Action Council	
Source document for indicator:	Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS	
Date effective:		
Date ineffective:		
Review of indicator:	**Planned review frequency:**	
	Base date:	
	Planned review date:	
Sources of formula variables:	**Numerator:**	ABS. National mortality database 1979 to latest available
	Denominator:	ABS. Australian Demographic Statistics Cat. no. 3101.0
Reporting:	**Reporting required by:**	Australian Health Ministers
	Indicators reported to:	Australian Institute of Health and Welfare Department of Health and Ageing
	Reporting frequency:	Every two years
Interpretation:	This indicator should have a downward trend. A downward trend was observed up to about 1993, but the rates have reached a plateau and may even be rising.	
Comments:	Please see Table 1.1 for the *Minimal Change* and *Technically Revised* models for reporting on this indicator.	
	Consider developing a more comprehensive 'all injury and poisoning' indicator, which includes deaths that meet a case definition based on Multiple Cause data, whether or not they have an 'external cause' as the underlying cause of death. This development would also affect ratio indicators 2.1– 2.4.	
Data element links		
Related NHPA goal:	NHPA primary goal (Injury Prevention and Control) 1.1	
Information model entities linked to this data element:		
Indicator frameworks entities linked to this data element:		
Data set agreements which include this data element:		
Keywords relating to this data element:		

Table A1.1: *Minimal Change* and *Technically Revised* models for reporting on Indicator 1.1

	***Minimal Change* model**	***Technically Revised* Model**
General case inclusion criterion (applies to **all** mortality indicators)	None	A 'multiple cause of death' field that contains an injury or poisoning code
General case inclusion code ranges (apply to **all** mortality indicators)	None	ICD-9: 800–904, 910–999 ICD-10: S00–T89 Included in these ranges are all injury cases, except *Sequelae (late effects) of injury & poisoning*
Specific case inclusion criteria (apply to **this** indicator)	'Underlying cause of death' is an external cause code in the specified range	As for *Minimal Change* model
Specific case inclusion code ranges (apply to **this** indicator)	ICD-9: E800–E869, E880–E929, E950–E999 ICD-10: V01–Y36, Y85–Y89	As for *Minimal Change* model
Basis for reporting periods	Date of death registration	Date of death occurrence
Reporting periods	1 January to 31 December (i.e. calendar year)	1 July to 30 June (i.e. financial year; cases registered by the end of the calendar year beginning during the period are included)
Population for age-standardisation	Australian 30 June 1991 persons population is the standard population [(a)] Five-year age groups to ages '85+ years' are used in standardisation	Australian 30 June 1991 persons population is the standard population [(a)] Five-year age groups to ages '95+ years' are used in standardisation
Denominator for rates (mid-point of reporting periods)	Estimated resident population (ERP) at 30 June	ERP at 31 December

(a) At the time of writing the Australian 30 June 1991 persons population was the standard population. This was to be changed to the 30 June 2001 Australian persons population when the ABS released the final population figures.

NHPA injury prevention and control indicator 1.2

Identifying and descriptive attributes			
Data element ID:	NHPA Indicator (Injury Prevention and Control) 1.2		
Data element title:	Hospital separation rate for injury and poisoning in the total population		
Version number:	1		
Type:	Derived Data Element		
Status:	Draft		
Definition:	Number of hospital separations due to injury and poisoning per 100,000 population for a particular year, age-standardised using the standard Australian population.		
Context:	About 40 hospital separations occur for every death due to injury and poisoning. In 1997–98 there were 398,707 hospitalisations due to injury and poisoning. These cases accounted for about 7% of all separations (Australian Institute of Health and Welfare 1999a). The age-standardised hospital separations rate was 2,119.9 per 100 000 population for 1997–98.		
Relational and representational attributes			
Data type:	Numeric		
Representational form:	Rate	**Minimum size:**	3
Representational layout:	N,NNN.N	**Maximum size:**	7
Scope of indicator:	**Sex:**	All persons	
	Geographical area of interest:	Australia	
	Lower age limit:	All ages	
	Upper age limit:	All ages	
	Other specification(s) of interest:	None	
Definition of formula variables:	**Numerator:**	**For hospital separations coded to ICD-9-CM:** Total number of hospital separations in Australia assigned to relevant ICD-9-CM codes for a particular year **For hospital separations coded to ICD-10-AM:** Total number of hospital separations in Australia assigned to relevant ICD-10-AM codes for a particular year	
	Denominator:	Mid-year total for Australian population for the same year as the numerator	
Formula:	(Total number of hospital separations coded to relevant ICD codes *100,000)/Mid-year population for relevant year; age standardised using the direct method and the standard Australian population. **Complete formula for direct method:** $SR = \Sigma(r_i P_i) / \Sigma(P_i)$ *where* SR is the age-standardised rate for the population being studied r_i is the age-group specific rate for age group i in the population being studied P_i is the population of age group i in the standard population		
Guide for use:	Five-year age groups (in years) to be used are: 0–4, 5–9, 10–14, 15–19, 20–24, 25–29, 30–34, 35–39, 40–44, 45–49, 50–54, 55–59, 60–64, 65–69, 70–74, 75–79, 80–84, 85+ years. Given the expansion of the size of the population for elderly Australians, notably those aged 85 years and older, consideration should be given to adding the five-year age groups 85–89, 90–94 and 95+ years. For purposes of comparison of population rates for Australia over time, and/or population within Australia, the standard population to be used is the final 30 June estimated Australian resident population (males plus females) for the most recent year ending in 1.		

Related data references:	**Related indicators:**	
	Indicator 1.1 Deaths rate for injury and poisoning in the total population	
	Indicator 2.5 Hospital separation rate ratio comparing the injury status among Indigenous and non-Indigenous populations	
	Indicator 2.6 Hospital separation rate ratio comparing the injury status among males aged 25–54 years from low socioeconomic groups with males from high socioeconomic groups	
	Indicator 3.3 Hospital separation rate for road transport-related injury in the total population	
	Indicator 3.4 Hospital separation rate for road transport-related injury among males aged 15–24 years	
	Indicator 5.2 Hospital separation rate for falls among people aged 65 years and over	
	Indicator 5.5 Hospital separation rate for falls among children aged 0–4 and 5–9 years	
	Indicator 6.1 Hospital separation rate for sport and recreation-related injuries	
	Indicator 9.2 Hospital separation rate for injury resulting from fire, burns and scalds among children aged 0–4 years	
	Indicator 10.1 Hospital separation rate due to poisoning among children aged 0–4 years	
	Indicator 11.2 Hospital separation rate for near drowning among children aged 0–4 years	
Administrative attributes		
Date of submission:		
Source organisation:	National Health Priority Action Council	
Source document for indicator:	Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS	
Date effective:		
Date ineffective:		
Review of indicator:	**Planned review frequency:**	
	Base date:	
	Planned review date:	
Sources of formula variables:	**Numerator:**	AIHW. National Hospital Morbidity Database
	Denominator:	ABS. Australian Demographic Statistics Cat. no. 3101.0
Reporting:	**Reporting required by:**	Australian Health Ministers
	Indicators reported to:	Australian Institute of Health and Welfare
		Department of Health and Ageing
	Reporting frequency:	Every two years
Interpretation:	Trends in hospital separations having an External Cause code are difficult to interpret due to 1. potential variation in the sub-group of separations to which External Cause codes are applied; and 2. potential variation in admission practice, especially for lower severity cases.	
Comments:	Please see Table A1.2 for the *Minimal Change* and *Technically Revised* models for reporting on this indicator. Consideration should be given to developing a more comprehensive 'all injury and poisoning' indicator, which includes cases that meet a case definition based on Principal Diagnosis, and not further restricted to cases having an external cause code in a particular range. This development would also affect ratio indicators 2.5 and 2.6.	
Data element links		
Related NHPA goal:	NHPA primary goal (Injury Prevention and Control) 1.2	
Information model entities linked to this data element:		
Indicator frameworks entities linked to this data element:		
Data set agreements which include this data element:		
Keywords relating to this data element:		

Table A1.2: *Minimal Change* and *Technically Revised* models for reporting on Indicator 1.2

	***Minimal Change* model**	***Technically Revised* Model**
General case inclusion criterion (applies to **all** mortality indicators)	None	Principal Diagnosis is an injury or poisoning
General case inclusion code ranges (apply to **all** mortality indicators)	None	ICD-9-CM: 800–904, 910–999 ICD-10-AM: S00–T89 Included in these ranges are all injury cases, except *Sequelae (late effects) of injury & poisoning*
Specific case inclusion criteria (apply to **this** indicator)	First (left-most) external cause code in the specified range [(a)]	As for *Minimal Change* model
Specific case inclusion code ranges (apply to **this** indicator)	ICD-9-CM: E800–E869, E880–E929, E950–E999 ICD-10-AM: V01–Y36, Y85–Y89	As for *Minimal Change* model
Basis for reporting periods	Date of separation	Date of separation
Reporting periods	1 July to 30 June (i.e. financial year)	1 July to 30 June (i.e. financial year)
Population for age-standardisation	Australian 30 June 1991 persons population is the standard population [(a)] Five-year age groups to ages '85+ years' are used in standardisation	Australian 30 June 1991 persons population is the standard population [(a)] Five-year age groups to ages '95+ years' are used in standardisation
Denominator for rates (mid-point of reporting periods)	ERP as at 31 December	ERP as at 31 December
Restriction to avoid counting multiple separations per incident case	None	Omit cases where admission is statistical, or from another acute care hospital
Restriction to omit variably-ascertained case types	None	Omit 'same-day' separations

(a) There are up to 31 fields where external cause data can be recorded in the NHMD. Selection criteria can be based on external cause codes recorded in the first external cause field (this is sometimes called the 'main' external cause code field). The selection criteria can be extended to include those cases where an external cause code did not appear in the 'main' external cause field, but appeared in one of the other external cause code fields, i.e. the 'first appearing' external cause code. This is approach is especially useful for some data years where some jurisdictions did not record external cause codes in the 'main' external cause code field for significant numbers of cases.

(b) At the time of writing the Australian 30 June 1991 persons population was the standard population. This was to be changed to the 30 June 2001 Australian persons population when the ABS released the final population figures.

NHPA injury prevention and control indicator 2.1

Identifying and descriptive attributes			
Data element ID:	NHPA Indicator (Injury Prevention and Control) 2.1		
Data element title:	Death rate ratio comparing the injury status of Indigenous and non-Indigenous populations		
Version number:	1		
Type:	Derived Data Element		
Status:	Draft		
Definition:	Rate ratio comparing the age-standardised injury death rate for Indigenous Australians with the age-standardised injury death rate for non-Indigenous Australians.		
Context:	Injury is one of the leading causes of death among Indigenous people. In 1997–98, 293 injury death occurrences were reported as being to Indigenous Australians, i.e. 3.7% of the total 7,826 injury deaths. Death rates for injury are much higher among the Indigenous population than in the non-Indigenous population.		
Relational and representational attributes			
Data type:	Numeric		
Representational form:	Rate Ratio	**Minimum size:**	1
Representational layout:	N.N	**Maximum size:**	3
Scope of indicator:	**Sex:**	All persons	
	Geographical area of interest:	Australia	
	Lower age limit:	All ages	
	Upper age limit:	All ages	
	Other specification(s) of interest:	Indigenous and non-Indigenous status	
Definition of formula variables:	**Numerator:**	**For deaths coded to ICD-9:**	
		Not specified	
		For deaths coded to ICD-10:	
		Not specified	
	Denominator:	**For deaths coded to ICD-9:**	
		Not specified	
		For deaths coded to ICD-10:	
		Not specified	
Formula:	Not specified		
Guide for use:	Not specified		
Related data references:	**Related indicator:**		
	Indicator 2.5 Hospital separations rate ratio comparing the injury status among Indigenous and non-Indigenous populations		

Administrative attributes		
Date of submission:		
Source organisation:	National Health Priority Action Council	
Source document for indicator:	Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS	
Date effective:		
Date ineffective:		
Review of indicator:	**Planned review frequency:**	
	Base date:	
	Planned review date:	
Sources of formula variables:	**Numerator:**	**For Indigenous Australians:**
		Not specified
	Denominator:	**For non-Indigenous Australians:**
		Not specified
Reporting:	**Reporting required by:**	Australian Health Ministers
	Indicators reported to:	Australian Institute of Health and Welfare
		Department of Health and Ageing
	Reporting frequency:	Every two years
Interpretation:	Not specified	
Comments:	We did not provide specifications for this indicator and suggest that it not be reported, as currently defined. This is due to the doubtful and probably changing quality identification of Aboriginal and Torres Strait Islander cases for both the numerator and denominator data (Harrison, Miller et al. 2001). Trends in the rate ratio will be essentially uninterpretable while this doubt about the data remains. Consideration should be given to replacing the current indicator with one or more simpler measures (e.g. the number of identified cases, perhaps limited in scope to parts of Australia and years for which there is evidence that case ascertainment has been fairly complete). Consider revising this indicator so that it is based on a more comprehensive definition of 'all injury and poisoning', which includes deaths that meet a case definition based on Multiple Cause data, whether or not they have an 'external cause' as the underlying cause of death.	
Data element links		
Related NHPA goal:	NHPA primary goal (Injury Prevention and Control) 2.1	
Information model entities linked to this data element:		
Indicator frameworks entities linked to this data element:		
Data set agreements which include this data element:		
Keywords relating to this data element:		

NHPA injury prevention and control indicator 2.2

Identifying and descriptive attributes	
Data element ID:	NHPA Indicator (Injury Prevention and Control) 2.2
Data element title:	Death rate ratio comparing the injury status of males and females
Version number:	1
Type:	Derived Data Element
Status:	Draft
Definition:	Rate ratio comparing the age-standardised injury death rate for males with the injury death rate for females.
Context:	Death rates for injury have historically been much higher among males than females. In 1997–98, there were 5,469 male injury death occurrences and 2,357 female death occurrences. These case counts resulted in an age-standardised death rate ratio of 2.7. The male to female rate ratio has fluctuated between 2.6 and 2.8 in recent years. Differences in male to female suicide rates are a large contributor to this high death rate ratio. Significant differences also exist in the rate ratios for transport-related injuries and homicides. Differences in injury mortality between males and females are greatest in the age group 15–29 years, with males experiencing more than four times the injury mortality of young females.

Relational and representational attributes			
Data type:	Numeric		
Representational form:	Rate	**Minimum size:**	1
Representational layout:	N.N	**Maximum size:**	3
Scope of indicator:	**Sex**	Males vs Females	
	Geographical area of interest	Australia	
	Lower age limit	All ages	
	Upper age limit	All ages	
	Other specification(s) of interest:	None	

Definition of formula variables:

Numerator:

For deaths coded to ICD-9:

(Total number of death occurrences among male Australians assigned to relevant ICD-9 codes for a particular year) / Mid-year population total for male population for the same year as in numerator

For deaths coded to ICD-10:

(Total number of death occurrences among male Australians assigned to relevant ICD-10 codes for a particular year) / Mid-year population total for male population for the same year as in numerator

Denominator:

For deaths coded to ICD-9:

(Total number of death occurrences among female Australians assigned to relevant ICD-9 codes for a particular year) / Mid-year population total for female population for the same year as in numerator

For deaths coded to ICD-10:

(Total number of death occurrences among female Australians assigned to relevant ICD-10 codes for a particular year) / Mid-year population total for female population for the same year as in numerator

Formula:

(Age standardised injury death rate for males for a particular year) ÷ (Age-standardised injury death rate for females for the same year)

Complete formula for direct method:

$$DRR = \underline{SR_i = \Sigma(r_i P_i) / \Sigma(P_i)}$$

$$SR_j = \Sigma(r_j P_j) / \Sigma(P_j) \quad \text{where}$$

DRR is the Death Rate Ratio

SR_i is the age-standardised rate for population *i* being studied

r_i is the age-group specific rate for age group *i* in the population being studied

P_i is the population of age group *i* in the standard population

SR_j is the age-standardised rate for population *j* being studied

r_j is the age-group specific rate for age group *j* in the population being studied

P_j is the population of age group *j* in the standard population

Guide for use:

Five-year age groups (in years) to be used are: 0–4, 5–9, 10–14, 15–19, 20–24, 25–29, 30–34, 35–39, 40–44, 45–49, 50–54, 55–59, 60–64, 65–69, 70–74, 75–79, 80–84, 85+ years.

Given the expansion of the size of the population for elderly Australians, notably those aged 85 years and older, consideration should be given to adding the five-year age groups 85–89, 90–94 and 95+ years.

For purposes of comparison of population rates for Australia over time, and/or population within Australia, the standard population to be used is the final 30 June estimated Australian resident total population (males plus females) for the most recent year ending in 1.

Related data references:

Administrative attributes

Date of submission:

Source organisation: National Health Priority Action Council

Source document for indicator: Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS

Date of submission:

Date effective:

Date ineffective:

Review of indicator:

Planned review frequency:

Base date:

Planned review date:

Sources of formula variables:

Numerator: ABS. National mortality database 1979–latest available

ABS. Australian Demographic Statistics Cat.no. 3101.0

Denominator: ABS. National mortality database 1979–latest available

ABS. Australian Demographic Statistics Cat.no. 3101.0

Reporting:

Reporting required by: Australian Health Ministers

Indicators reported to: Australian Institute of Health and Welfare

Department of Health and Ageing

Reporting frequency: Every two years

Interpretation:

The desired trend is a reduction of rates for males towards rates for females, resulting in reduction of the ratio towards 1.

Comments:

Please see Table A2.2 for the *Minimal Change* and *Technically Revised* models for reporting on this indicator.

Consider revising this indicator so that it is based on a more comprehensive definition of 'all injury and poisoning', which includes deaths that meet a case definition based on Multiple Cause data, whether or not they have an 'external cause' as the underlying cause of death.

Data element links	
Related NHPA goal:	NHPA primary goal (Injury Prevention and Control) 2.2
Information model entities linked to this data element:	
Indicator frameworks entities linked to this data element:	
Data set agreements which include this data element:	
Keywords relating to this data element:	

Table A2.2: *Minimal Change* and *Technically Revised* models for reporting on Indicator 2.2

	***Minimal Change* model**	***Technically Revised* Model**
General case inclusion criterion (applies to **all** mortality indicators)	None	A 'multiple cause of death' field that contains an injury or poisoning code
General case inclusion code ranges (apply to **all** mortality indicators)	None	ICD-9: 800–904, 910–999 ICD-10: S00–T89 Included in these ranges are all injury cases, except *Sequelae (late effects) of injury & poisoning*
Specific case inclusion criteria (apply to **this** indicator)	'Underlying cause of death' is an external cause code in the specified range	As for *Minimal Change* model
Specific case inclusion code ranges (apply to **this** indicator)	ICD-9: E800–E869, E880–E929, E950–E999 ICD-10: V01–Y36, Y85–Y89	As for *Minimal Change* model
Basis for reporting periods	Date of death registration	Date of death occurrence
Reporting periods	1 January to 31 December (i.e. calendar year)	1 July to 30 June (i.e. financial year; cases registered by the end of the calendar year beginning during the period are included)
Population for age-standardisation	Australian 30 June 1991 persons population is the standard population [(a)] Five-year age groups to ages '85+ years' are used in standardisation	Australian 30 June 1991 persons population is the standard population [(a)] Five-year age groups to ages '95+ years' are used in standardisation
Denominator for rates (mid-point of reporting periods)	Estimated resident population at 30 June	ERP at 31 December

(a) At the time of writing the Australian 30 June 1991 persons population was the standard population. This was to be changed to the 30 June 2001 Australian persons population when the ABS released the final population figures.

NHPA injury prevention and control indicator 2.3

Identifying and descriptive attributes	
Data element ID:	NHPA Indicator (Injury Prevention and Control) 2.3
Data element title:	Death rate ratio comparing the injury status among males aged 25–54 years from low socioeconomic groups with the injury status among males aged 25–54 years from high socioeconomic groups
Version number:	1
Type:	Derived Data Element
Status:	Draft
Definition:	Rate ratio comparing the age-standardised injury death rate for males aged 25–54 years from low socioeconomic groups with the age-standardised injury death rate for males aged 25–54 years from high socioeconomic groups. The groups to be compared are the most and least disadvantaged population quintiles according to the ABS SEIFA Index of Relative Socioeconomic Disadvantage (IRSD)
Context:	Injury rates are particularly high among males. Moreover, there is evidence that those who occupy positions at lower levels of the socioeconomic hierarchy fare significantly worse in terms of health. Research also shows that people with a low socioeconomic status (SES) have relatively high mortality rates for many types of injuries (Turrell, Oldenburg et al. 1999).

Relational and representational attributes			
Data type:	Numeric		
Representational form:	Rate ratio	**Minimum size:**	1
Representational layout:	N.N	**Maximum size:**	3
Scope of indicator:	**Sex**	Males	
	Geographical area of interest	Australia	
	Lower age limit	25	
	Upper age limit	54	
	Other specification(s) of interest:	Socioeconomic status	
Definition of formula variables:	**Numerator:**	**For deaths coded to ICD-9:** (Total number of death occurrences among 25–54 year old males from a low socioeconomic status assigned to relevant ICD-9 codes for a particular year) / Mid-year population total for 25–54 year old males from a low socioeconomic status for the same year as in numerator **For deaths coded to ICD-10:** (Total number of death occurrences among 25–54 year old males from a low socioeconomic status assigned to relevant ICD-10 codes for a particular year) / Mid-year population total for 25–54 year old males from a low socioeconomic status for the same year as in numerator	
	Denominator:	*As above, for* high socioeconomic status males aged 25–54 years.	

Formula:

(Age standardised injury death rate for 25–54 year old males from a low socioeconomic status for a particular year) ÷ (Age-standardised injury death rate for 25–54 year old males from a high socioeconomic status for the same year as in numerator)

Complete formula for direct method:

$$DRR = \underline{SR_j = \Sigma(r_i P_j) / \Sigma(P_j)}$$

$$SR_j = \Sigma(r_j P_j) / \Sigma(P_j) \quad \text{where}$$

DRR is the Death Rate Ratio

SR_i is the age-standardised rate for population *i* being studied

r_i is the age-group specific rate for age group *i* in the population being studied

P_i is the population of age group *i* in the standard population

SR_j is the age-standardised rate for population *j* being studied

r_j is the age-group specific rate for age group *j* in the population being studied

P_j is the population of age group *j* in the standard population

Guide for use:

Currently it is substantially more difficult to calculate this rate ratio than to calculate most of the other indicators in this set. This is because direct measures of SES are not included in the mortality data collection. The usual method for estimating SES depends on deriving aggregate values for small areas from Census data and applying these to cases on the basis of usual area of residence. The method is further complicated by variation over time in the specification of the small areas, and differences in their specification in deaths and population data. The project required to calculate this indicator could in principle be done for the years 1991–1998.

Five-year age groups (in years) to be used are: 25–29, 30–34, 35–39, 40–44, 45–49, 50–54.

Related data references:

Related indicator:
Indicator 2.6 Hospital separation rate ratio comparing the injury status among males aged 25–54 years from low socioeconomic groups with males from high socioeconomic groups

Administrative attributes

Date of submission:

Source organisation: National Health Priority Action Council

Source document for indicator: Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS

Date effective:

Date ineffective:

Review of indicator:

Planned review frequency:

Base date:

Planned review date:

Sources of formula variables:

Numerator: Age adjusted rate calculated as for Indicator 1.1 in which the numerator includes male deaths at ages 25–54 years in Australia assigned to relevant ICD-9 or ICD-10 codes for a particular year, and denominator values are from the mid-year total for Australian population for the same year as the numerator.

Inclusion of both death data and population data is restricted to the Statistical Local Areas ranked as most disadvantaged according to IRSD, and which include approximately 20 % of the relevant population.

Denominator: As above, for the least disadvantaged IRSD quintile.

Reporting:

Reporting required by: Australian Health Ministers

Indicators reported to: Australian Institute of Health and Welfare
Department of Health and Ageing

Reporting frequency: Every two years

Interpretation:

Comments:	Please see Table A2.3 for the *Minimal Change* and *Technically Revised* models for reporting on this indicator. The rationale for restricting the scope to males and to some ages is not clear. Consider revising this indicator so that it is based on a more comprehensive definition of 'all injury and poisoning', which includes deaths that meet a case definition based on Multiple Cause data, whether or not they have an 'external cause' as the underlying cause of death. The rationale for restricting the scope of this indicator to males and to some ages is not clear and warrants reconsideration.
Data element links	
Related NHPA goal:	NHPA primary goal (Injury Prevention and Control) 2.3
Information model entities linked to this data element:	
Indicator frameworks entities linked to this data element:	
Data set agreements which include this data element:	
Keywords relating to this data element:	

Table A2.3: *Minimal Change* and *Technically Revised* models for reporting on Indicator 2.3

	***Minimal Change* model**	***Technically Revised* Model**
General case inclusion criterion (applies to **all** mortality indicators)	None	A 'multiple cause of death' field that contains an injury or poisoning code
General case inclusion code ranges (apply to **all** mortality indicators)	None	ICD-9: 800–904, 910–999 ICD-10: S00–T89 Included in these ranges are all injury cases, except *Sequelae (late effects) of injury & poisoning*
Specific case inclusion criteria (apply to **this** indicator)	'Underlying cause of death' is an external cause code in the specified range	As for *Minimal Change* model
Specific case inclusion code ranges (apply to **this** indicator)	ICD-9: E800–E869, E880–E929, E950–E999 ICD-10: V01–Y36, Y85–Y89	As for *Minimal Change* model
Basis for reporting periods	Date of death registration	Date of death occurrence
Reporting periods	1 January to 31 December (i.e. calendar year)	1 July to 30 June (i.e. financial year; cases registered by the end of the calendar year beginning during the period are included)
Population for age-standardisation	Australian 30 June 1991 persons population is the standard population [(a)] Five-year age groups to ages '85+ years' are used in standardisation	Australian 30 June 1991 persons population is the standard population [(a)] Five-year age groups to ages '95+ years' are used in standardisation
Denominator for rates (mid-point of reporting periods)	Estimated resident population at 30 June	ERP at 31 December

(a) At the time of writing the Australian 30 June 1991 persons population was the standard population. This was to be changed to the 30 June 2001 Australian persons population when the ABS released the final population figures.

NHPA injury prevention and control indicator 2.4

Identifying and descriptive attributes	
Data element ID:	NHPA Indicator (Injury Prevention and Control) 2.4
Data element title:	Death rate ratio comparing the injury status among people living in rural and remote areas and the general population
Version number:	1
Type:	Derived Data Element
Status:	Draft
Definition:	Rate ratio comparing the age-standardised injury death rate for people living in rural and remote areas with the age-standardised injury death for the general population. The groups to be compared are the combined 'Rural and Remote' zones according to the Rural, Remote and Metropolitan Areas (RRMA) classification with all Australia.
Context:	The health disadvantage of rural and remote Australians is well described by differentials in death rates for injury and poisoning. Death rates from all cause of injury are twice as high in 'other remote areas' compared with 'capital cities'. Overall, the rates increase with increasing remoteness, suggesting that those living in rural and remote zones are at greater risk of death from injury than are those living in the metropolitan zone (Strong, Trickett et al. 1998).

Relational and representational attributes			
Data type:	Numeric		
Representational form:	Rate	**Minimum size:**	1
Representational layout:	N.N	**Maximum size:**	3
Scope of indicator:	**Sex**	All persons	
	Geographical area of interest	Rural and remote areas vs general population	
	Lower age limit	All ages	
	Upper age limit	All ages	
	Other specification(s) of interest:	None	
Definition of formula variables:	**Numerator:**	**For deaths coded to ICD-9:** (Total number of death occurrences among people living in rural and remote areas assigned to relevant ICD-9 codes for a particular year) / Mid-year population total for people living in rural and remote areas for the same year as the numerator **For deaths coded to ICD-10:** (Total number of death occurrences people living in rural and remote areas assigned to relevant ICD-10 codes for a particular year) / Mid-year population total for people living in rural and remote areas for the same year as the numerator	
	Denominator:	**For deaths coded to ICD-9:** (Total number of death occurrences among general population assigned to relevant ICD-9 codes for a particular year) / Mid-year population total for general population for the same year as in numerator **For deaths coded to ICD-10:** (Total number of death occurrences among general population assigned to relevant ICD-10 codes for a particular year) / Mid-year population total for people general population for the same year as in numerator	

Formula:

(Age standardised injury death rate for people living in rural and remote areas for a particular year) ÷ (Age-standardised injury death rate for general population for the same year as in numerator)

Complete formula for direct method:

$$DRR = \frac{SR_i = \Sigma(r_i P_i) / \Sigma(P_i)}{}$$

$$SR_j = \Sigma(r_j P_j) / \Sigma(P_j) \quad \text{where}$$

DRR is the Death Rate Ratio

SR_i is the age-standardised rate for population *i* being studied

r_i is the age-group specific rate for age group *i* in the population being studied

P_i is the population of age group *i* in the standard population

SR_j is the age-standardised rate for population *j* being studied

r_j is the age-group specific rate for age group *j* in the population being studied

P_j is the population of age group *j* in the standard population

Guide for use:

Five-year age groups (in years) to be used are: 0–4, 5–9, 10–14, 15–19, 20–24, 25–29, 30–34, 35–39, 40–44, 45–49, 50–54, 55–59, 60–64, 65–69, 70–74, 75–79, 80–84, 85+ years.

Given the expansion of the size of the population for elderly Australians, notably those aged 85 years and older, consideration should be given to adding the five-year age groups 85–89, 90–94 and 95+ years.

For purposes of comparison of population rates for Australia over time, and/or population within Australia, the standard population to be used is the final 30 June estimated Australian resident total population (males plus females) for the most recent year ending in 1.

Reporting for years earlier than 1986 is unlikely to be practicable.

Two classification systems are now available to identify rural and remoteness, i.e. the RRMA and the ARIA classifications (see Comments). This indicator was originally specified in terms of RRMA. While we have not changed the existing specification, a move to ARIA warrants consideration.

Related data references:

Administrative attributes

Date of submission:

Source organisation: National Health Priority Action Council

Source document for indicator: Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS

Date effective:

Date ineffective:

Review of indicator:

Planned review frequency:

Base date:

Planned review date:

Sources of formula variables:

Numerator: Adjusted rate calculated according to Indicator 1.1, with inclusion of case data and population data restricted to those for Statistical Local Areas classified according to RRMA as being in the Rural or Remote zones.

Denominator: Adjusted rate calculated according to Indicator 1.1

Reporting:

Reporting required by: Australian Health Ministers

Indicators reported to: Australian Institute of Health and Welfare

Department of Health and Ageing

Reporting frequency: Every two years

Interpretation:

The desired trend is a reduction of rates for persons living in rural and remote areas towards rates for general population, resulting in reduction of the ratio towards 1.

Comments:	Please see Table A2.4 for the *Minimal Change* and *Technically Revised* models for reporting on this indicator. The rationale for comparing 'Rural and Remote' with 'all Australia', rather than with 'non Rural and Remote', warrants reconsideration. The Accessibility/Remoteness Index for Australia (ARIA), particularly in its revised form, should be considered as a replacement for RRMA for this indicator.
Data element links	
Related NHPA goal:	NHPA primary goal (Injury Prevention and Control) 2.4
Information model entities linked to this data element:	
Indicator frameworks entities linked to this data element:	
Data set agreements which include this data element:	
Keywords relating to this data element:	

Table A2.4: *Minimal Change* and *Technically Revised* models for reporting on Indicator 2.4

	***Minimal Change* model**	***Technically Revised* Model**
General case inclusion criterion (applies to **all** mortality indicators)	None	A 'multiple cause of death' field that contains an injury or poisoning code
General case inclusion code ranges (apply to **all** mortality indicators)	None	ICD-9: 800–904, 910–999 ICD-10: S00–T89 Included in these ranges are all injury cases, except *Sequelae (late effects) of injury & poisoning*
Specific case inclusion criteria (apply to **this** indicator)	'Underlying cause of death' is an external cause code in the specified range	As for *Minimal Change* model
Specific case inclusion code ranges (apply to **this** indicator)	ICD-9: E800–E869, E880–E929, E950–E999 ICD-10: V01–Y36, Y85–Y89	As for *Minimal Change* model
Basis for reporting periods	Date of death registration	Date of death occurrence
Reporting periods	1 January to 31 December (i.e. calendar year)	1 July to 30 June (i.e. financial year; cases registered by the end of the calendar year beginning during the period are included)
Population for age-standardisation	Australian 30 June 1991 persons population is the standard population [(a)] Five-year age groups to ages '85+ years' are used in standardisation	Australian 30 June 1991 persons population is the standard population [(a)] Five-year age groups to ages '95+ years' are used in standardisation
Denominator for rates (mid-point of reporting periods)	Estimated resident population at 30 June	ERP at 31 December

(a) At the time of writing the Australian 30 June 1991 persons population was the standard population. This was to be changed to the 30 June 2001 Australian persons population when the ABS released the final population figures.

NHPA injury prevention and control indicator 2.5

Identifying and descriptive attributes			
Data element ID:	NHPA Indicator (Injury Prevention and Control) 2.5		
Data element title:	Hospital separation rate ratio comparing the injury status among Indigenous and non-Indigenous populations		
Version number:	1		
Type:	Derived Data Element		
Status:	Draft		
Definition:	Rate ratio comparing the age-standardised injury hospital separation rate for Indigenous Australians with the age-standardised injury hospital separation rate for non-Indigenous Australians.		
Context:	Injury is an important cause of hospitalisation among Indigenous people. Hospitalisation rates for injury are much higher among the Indigenous population than in the non-Indigenous population.		
Relational and representational attributes			
Data type:	Numeric		
Representational form:	Rate Ratio	**Minimum size:**	1
Representational layout:	N.N	**Maximum size:**	3
Scope of indicator:	**Sex:**	All persons	
	Geographical area of interest:	Australia	
	Lower age limit:	All ages	
	Upper age limit:	All ages	
	Other specification(s) of interest:	Indigenous status	
Definition of formula variables:	**Numerator:**	**For hospital separations coded to ICD-9-CM:**	
		Not specified	
		For hospital separations coded to ICD-10-AM:	
		Not specified	
	Denominator:	**For hospital separations coded to ICD-9-CM:**	
		Not specified	
		For hospital separations coded to ICD-10-AM:	
		Not specified	
Formula:	Not specified		
Guide for use:	Not specified		
Related data references:	**Related indicator:**		
	Indicator 2.1 Death rate ratio comparing the injury status among Indigenous and non-Indigenous populations		

Administrative attributes		
Date of submission:		
Source organisation:	National Health Priority Action Council	
Source document for indicator:	Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS	
Date effective:		
Date ineffective:		
Review of indicator:	**Planned review frequency:**	
	Base date:	
	Planned review date:	
Sources of formula variables:	**Numerator:**	AIHW. National Hospital Morbidity Database
		ABS. Experimental Estimates of the Aboriginal and Torres Strait Islander Population, June 1991–June 1996. Cat. no. 3230.0
		ABS. Experimental projections of the Aboriginal and Torres Strait Islander Population, 30 June 1996–30 June 2006. Cat. no. 3231.0
	Denominator:	AIHW. National Hospital Morbidity Database
		ABS. Australian Demographic Statistics Cat.no. 3101.0
Reporting:	**Reporting required by:**	Australian Health Ministers
	Indicators reported to:	Australian Institute of Health and Welfare
		Department of Health and Ageing
	Reporting frequency:	Every two years
Interpretation:	Not specified	
Comments:	We did not provide specifications for this indicator and suggest that it not be reported, as currently defined. This is due to the doubtful and probably changing quality identification of Aboriginal and Torres Strait Islander cases for both the numerator and denominator data (Harrison, Miller et al. 2001). Trends in the rate ratio will be essentially uninterpretable while this doubt about the data remains.	
	Consideration should be given to replacing the current indicator with one or more simpler measure (e.g. the number of identified cases, perhaps limited in scope to parts of Australia and years for which there is evidence that case ascertainment has been fairly complete).	
	Consider revising this indicator so that it is based on a more comprehensive definition of 'all injury and poisoning', which includes cases that meet a case definition based on Principal Diagnosis data, irrespective of 'external cause' code value.	
Data element links		
Related NHPA goal:	NHPA primary goal (Injury Prevention and Control) 2.1	
Information model entities linked to this data element:		
Indicator frameworks entities linked to this data element:		
Data set agreements which include this data element:		
Keywords relating to this data element:		

NHPA injury prevention and control indicator 2.6

Identifying and descriptive attributes			
Data element ID:	NHPA Indicator (Injury Prevention and Control) 2.6		
Data element title:	Hospital separation rate ratio comparing the injury status among males aged 25–54 years from low socioeconomic groups with males from high socioeconomic groups		
Version number:	1		
Type:	Derived Data Element		
Status:	Draft		
Definition:	Rate ratio comparing the age-standardised injury hospital separation rate for males aged 25–54 years from low socioeconomic groups with the injury hospital separation rate for males aged 25–54 years from high socioeconomic groups. The groups to be compared are the most and least disadvantaged population quintiles according to the ABS SEIFA Index of Relative Socioeconomic Disadvantage (IRSD)		
Context:	Injury rates are particularly high among males. Moreover, there is evidence that those who occupy positions at lower levels of the socioeconomic hierarchy fare significantly worse in terms of health. Research also shows that people with a low SES have relatively high mortality rates for many types of injuries (Turrell, Oldenburg et al. 1999).		
Relational and representational attributes			
Data type:	Numeric		
Representational form:	Rate ratio	**Minimum size:**	1
Representational layout:	N.N	**Maximum size:**	3
Scope of indicator:	**Sex**	Males	
	Geographical area of interest	Australia	
	Lower age limit	25	
	Upper age limit	54	
	Other specification(s) of interest:	Socioeconomic status	
Definition of formula variables:	**Numerator:**	**For hospital separations coded to ICD-9-CM:** (Total number of hospital separations among 25–54 year old males from a low socioeconomic status assigned to relevant ICD-9-CM codes for a particular year) / Population total for 25–54 year old males from a low socioeconomic status as at 30 December for relevant year **For hospital separations coded to ICD-10-AM:** (Total number of hospital separations among 25–54 year old males from a low socioeconomic status assigned to relevant codes ICD-10-AM for a particular year) / Population total for 25–54 year old males from a low socioeconomic status as at 30 December for relevant year	
	Denominator:	*As above, for* high socioeconomic status males aged 25–54 years.	

Formula:

(Age standardised injury hospital separations rate for 25–54 year old males from a low socioeconomic status for a particular year) ÷ (Age-standardised injury hospital separations rate for 25–54 year old males from a high socioeconomic status for the same year as in numerator)

Complete formula for direct method:

$$DRR = \underline{SR_j = \Sigma(r_i P_j) / \Sigma(P_j)}$$

$$SR_j = \Sigma(r_j P_j) / \Sigma(P_j) \quad \text{where}$$

DRR is the Death Rate Ratio

SR_i is the age-standardised rate for population *i* being studied

r_i is the age-group specific rate for age group *i* in the population being studied

P_i is the population of age group *i* in the standard population

SR_j is the age-standardised rate for population *j* being studied

r_j is the age-group specific rate for age group *j* in the population being studied

P_j is the population of age group *j* in the standard population

Guide for use:

Currently it is substantially more difficult to calculate this rate ratio than to calculate most of the other indicators in this set. This is because direct measures of socioeconomic status (SES) are not included in the morbidity data collection. The usual method for estimating SES depends on deriving aggregate values for small areas from Census data and applying these to cases on the basis of usual area of residence. The method is further complicated by variation over time in the specification of the small areas.

Five-year age groups (in years) to be used are: 25–29, 30–34, 35–39, 40–44, 45–49, 50–54.

For purposes of comparison of population rates for Australia over time, and/or population within Australia, the standard population to be used is the final 30 June estimated Australian resident total population (males plus females) for the most recent year ending in 1.

Related data references:

Related indicator:

Indicator 2.3 Death rate ratio comparing the injury status among males aged 25–54 years from low socioeconomic groups with males from high socioeconomic groups

Administrative attributes

Date of submission:

Source organisation: National Health Priority Action Council

Source document for indicator: Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS

Date effective:

Date ineffective:

Review of indicator:

Planned review frequency:

Base date:

Planned review date:

Sources of formula variables:

Numerator: Age adjusted rate calculated as for Indicator 1.1 in which the numerator includes male deaths at ages 25–54 years in Australia assigned to relevant ICD-9 or ICD-10 codes for a particular year, and denominator values are from the mid-year total for Australian population for the same year as the numerator.

Inclusion of both death data and population data is restricted to the Statistical Local Areas ranked as most disadvantaged according to IRSD, and which include approximately 20 % of the relevant population.

Denominator: As above, for the least disadvantaged IRSD quintile.

Reporting:

Reporting required by: Australian Health Ministers

Indicators reported to: Australian Institute of Health and Welfare

Department of Health and Ageing

Reporting frequency: Every two years

Interpretation:	Trends in hospital separations having an External Cause code are difficult to interpret due to (1) potential variation in the sub-group of separations to which External Cause codes are applied; and (2) potential variation in admission practice, especially for lower severity cases.
Comments:	Please see Table A2.6 for the *Minimal Change* and *Technically Revised* models for reporting on this indicator. The rationale for restricting the scope of this indicator to males and to some ages is not clear and warrants reconsideration.
Data element links	
Related NHPA goal:	NHPA primary goal (Injury Prevention and Control) 2.3
Information model entities linked to this data element:	
Indicator frameworks entities linked to this data element:	
Data set agreements which include this data element:	
Keywords relating to this data element:	

Table A2.6: *Minimal Change* and *Technically Revised* models for reporting on Indicator 2.6

	***Minimal Change* model**	***Technically Revised* Model**
General case inclusion criterion (applies to **all** mortality indicators)	None	Principal Diagnosis is an injury or poisoning.
General case inclusion code ranges (apply to **all** mortality indicators)	None	ICD-9-CM: 800–904, 910–999 ICD-10-AM: S00–T89 Included in these ranges are all injury cases, except *Sequelae (late effects) of injury & poisoning*
Specific case inclusion criteria (apply to **this** indicator)	First (left-most) external cause code in the specified range[(a)]	As for *Minimal Change* model
Specific case inclusion code ranges (apply to **this** indicator)	ICD-9-CM: E800–E869, E880–E929, E950– E999 ICD-10-AM: V01–Y36, Y85–Y89	As for *Minimal Change* model
Basis for reporting periods	Date of separation	Date of separation
Reporting periods	1 July to 30 June (i.e. financial year)	1 July to 30 June (i.e. financial year)
Population for age-standardisation	Australian 30 June 1991 persons population is the standard population [(b)] Five-year age groups to ages '85+ years' are used in standardisation	Australian 30 June 1991 persons population is the standard population [(b)] Five-year age groups to ages '95+ years' are used in standardisation
Denominator for rates (mid-point of reporting periods)	ERP as at 31 December	ERP as at 31 December
Restriction to avoid counting multiple separations per incident case	None	Omit cases where admission is statistical, or from another acute care hospital
Restriction to omit variably-ascertained case types	None	Omit 'same-day' separations

(a) There are up to 31 fields where external cause data can be recorded in the NHMD. Selection criteria can be based on external cause codes recorded in the first external cause field (this is sometimes called the 'main' external cause code field). The selection criteria can be extended to include those cases where an external cause code did not appear in the 'main' external cause field, but appeared in one of the other external cause code fields, i.e. the 'first appearing' external cause code. This is approach is especially useful for some data years where some jurisdictions did not record external cause codes in the 'main' external cause code field for significant numbers of cases.

(b) At the time of writing the Australian 30 June 1991 persons population was the standard population. This was to be changed to the 30 June 2001 Australian persons population when the ABS released the final population figures.

NHPA injury prevention and control indicator 3.1

Identifying and descriptive attributes			
Data element ID:	NHPA Indicator (Injury Prevention and Control) 3.1		
Data element title:	Death rate for road transport-related injury in the total population		
Version number:	1		
Type:	Derived Data Element		
Status:	Draft		
Definition:	Number of deaths due to road transport crashes per 100,000 population, age-standardised.		
Context:	Road transport-related accidents are a major cause of injury deaths. In 1997–98, as many as 1,758 deaths (1,225 males and 533 females) occurred as a result of road transport-related crashes on Australian roads. This yielded an overall age-standardised rate of 9.6 per 100,000 deaths. Fatal injuries following road accidents have consistently declined in Australia over the last few decades.		
Relational and representational attributes			
Data type:	Numeric		
Representational form:	Rate	**Minimum size:**	3
Representational layout:	N,NNN.N	**Maximum size:**	7
Scope of indicator:	**Sex:**	All persons	
	Geographical area of interest:	Australia	
	Lower age limit:	All ages	
	Upper age limit:	All ages	
	Other specification(s) of interest:	Road transport-related injury	
Definition of formula variables:	**Numerator:**	**For deaths coded to ICD-9:** Number of death occurrences in Australia assigned to relevant ICD-9 codes for a particular year **For deaths coded to ICD-10:** Total number of death occurrences in Australia assigned to relevant ICD-10 codes for a particular year	
	Denominator:	Mid-year total for Australian population for the same year as the numerator	
Formula:	(Total number of road transport-related death occurrences*100,000)/ Mid-year population for relevant year; age standardised using the direct method and the standard Australian population **Complete formula for direct method:** $SR = \Sigma(r_i P_i) / \Sigma(P_i)$ *where* *SR* is the age-standardised rate for the population being studied r_i is the age-group specific rate for age group *i* in the population being studied P_i is the population of age group *i* in the standard population		
Guide for use:	Five-year age groups (in years) to be used are: 0–4, 5–9, 10–14, 15–19, 20–24, 25–29, 30–34, 35–39, 40–44, 45–49, 50–54, 55–59, 60–64, 65–69, 70–74, 75–79, 80–84, 85+ years. Given the expansion of the size of the population for elderly Australians, notably those aged 85 years and older, consideration should be given to adding the five-year age groups 85–89, 90–94 and 95+ years. For purposes of comparison of population rates for Australia over time, and/or population within Australia, the standard population to be used is the final 30 June estimated Australian resident total population (males plus females) for the most recent year ending in 1.		

Related data references:	**Related Indicators:**	
	3.2 Death rate for road transport related injury among males aged 15–24 years	
	3.3 Hospital separations rate for road transport related injury in the total population	
	3.4 Hospital separations rate for road transport related injury among males aged 15–24 years	
Administrative attributes		
Date of submission:		
Source organisation:	National Health Priority Action Council	
Source document for indicator:	Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS	
Date effective:		
Date ineffective:		
Review of indicator:	**Planned review frequency:**	
	Base date:	
	Planned review date:	
Sources of formula variables:	**Numerator:**	ABS. National mortality database 1979–latest available
	Denominator:	ABS. Australian Demographic Statistics Cat.no. 3101.0
Reporting:	**Reporting required by:**	Australian Health Ministers
	Indicators reported to:	Australian Institute of Health and Welfare
		Department of Health and Ageing
	Reporting frequency:	Every two years
Interpretation:	This indicator should have a downward trend. A downward trend was observed up to about 1993, after which the decline was less steep.	
Comments:	Please see Table A3.1 for the *Minimal Change* and *Technically Revised* models for reporting on this indicator.	
	Consideration should be given to respecifying the scope of the indicator(s) of land transport injury. 'Road transport related injury' refers to ranges of ICD-9 External Cause codes that are easy to state (E901–E919 and E926–E929). However, it is conceptually complex (some off-road cases are included, but not if a motor vehicle is involved), requires complex specification in terms of ICD-10, and is not commonly reported elsewhere (unlike, for example *Motor Vehicle Traffic Accident* – see below).	
	Motor Vehicle Traffic. **ICD-9**: E810–E819 (.0–.9) **ICD-10**: V02–04 (.1,.9); V09.2; V12–V14 (.3–.9); V19 (.4–.9); V20–28 (.3–.9); V29 (.4–.9); V30–V39 (.4–.9); V40–49 (.4–.9); V50–59 (.4–.9); V60–69 (.4–.9); V70–79 (.4–.9); V80 (.3–.5); V81.1, V82.1; V83–V86 (.0–.3); V87 (.0–.8); V89 (.2)	
Data element links		
Related NHPA goal:	NHPA primary goal (Injury Prevention and Control) 3.1	
Information model entities linked to this data element:		
Indicator frameworks entities linked to this data element:		
Data set agreements which include this data element:		
Keywords relating to this data element:		

Table A3.1: *Minimal Change* and *Technically Revised* models for reporting on Indicator 3.1

	***Minimal Change* model**	***Technically Revised* Model**
General case inclusion criterion (applies to **all** mortality indicators)	None	A 'multiple cause of death' field that contains an injury or poisoning code
General case inclusion code ranges (apply to **all** mortality indicators)	None	ICD-9: 800–904, 910–999 ICD-10: S00–T89 Included in these ranges are all injury cases, except *Sequelae (late effects) of injury & poisoning*
Specific case inclusion criteria (apply to **this** indicator)	'Underlying cause of death' is an external cause code in the specified range	As for *Minimal Change* model
Specific case inclusion code ranges (apply to **this** indicator)	ICD-9: E810–E819, E826–E829 ICD-10: V02–04 (.1,.9); V09.2; V12–V14 (.3–.9); V19 (.4–.9); V20–28 (.3–.9); V29 (.4–.9); V30–V39 (.4–.9); V40–49 (.4–.9); V50–59 (.4–.9); V60–69 (.4–.9); V70–79 (.4–.9); V80 (.3–.5); V81.1, V82.1; V83–V86 (.0–.3); V87 (.0–.8); V89 (.2); V01 (.0,.1,.9); V06 (.0,.1,.9); V09 (.1,.3,.9); V10–V11 (.0–.5,.9); V16–V18 (.0–.5,.9); V19 (.3,.8,.9); V80 (.0–.2,.7–.9); V82 (.2–.7,.9); V87.9; V88.9, V89 (.1,.3,.9)	As for *Minimal Change model*.
Basis for reporting periods	Date of death registration	Date of death occurrence
Reporting periods	1 January to 31 December (i.e. calendar year)	1 July to 30 June (i.e. financial year; cases registered by the end of the calendar year beginning during the period are included)
Population for age-standardisation	Australian 30 June 1991 persons population is the standard population [(a)] Five-year age groups to ages '85+ years' are used in standardisation	Australian 30 June 1991 persons population is the standard population [(a)] Five-year age groups to ages '95+ years' are used in standardisation
Denominator for rates (mid-point of reporting periods)	ERP at 30 June	ERP at 31 December

(a) At the time of writing the Australian 30 June 1991 persons population was the standard population. This was to be changed to the 30 June 2001 Australian persons population when the ABS released the final population figures.

NHPA injury prevention and control indicator 3.2

Identifying and descriptive attributes			
Data element ID:	NHPA Indicator (Injury Prevention and Control) 3.2		
Data element title:	Death rate for road transport-related injury among males aged 15–24 years		
Version number:	1		
Type:	Derived Data Element		
Status:	Draft		
Definition:	Number of deaths among males aged 15–24 years due to road transport crashes per 100,000 population, age-standardised.		
Context:	The death rate due to road transport-related injury has always been particularly high among 15–24 year old males. In 1997–98, 385 young males aged 15–24 years died because of road transport-related injury, i.e. a rate of 28.3 per 100,000 population. This rate was about double the rate for males of all ages. The death rate for road transport-related injury among young males decreased substantially between 1979 and 1993. Thereafter the rate has been more stable.		
Relational and representational attributes			
Data type:	Numeric		
Representational form:	Rate	**Minimum size:**	3
Representational layout:	N,NNN.N	**Maximum size:**	7
Scope of indicator:	**Sex:**	Males	
	Geographical area of interest:	Australia	
	Lower age limit:	15	
	Upper age limit:	24	
	Other specification(s) of interest:	Road transport-related injury	
Definition of formula variables:	**Numerator:**	**For deaths coded to ICD-9:** Number of death occurrences in Australia assigned to relevant ICD-9 codes for a particular year **For deaths coded to ICD-10:** Total number of death occurrences in Australia assigned to relevant ICD-10 codes for a particular year	
	Denominator:	Mid-year total for Australian population for the same year as the numerator	
Formula:	(Total number of road transport-related death occurrences among males aged 15–24 years*100,000)/Mid-year population for males aged 15–24 years for a particular year; age standardised using the direct method and the standard Australian population **Complete formula for direct method:** $SR = \Sigma(r_i P_i) / \Sigma(P_i)$ *where* SR is the age-standardised rate for the population being studied r_i is the age-group specific rate for age group i in the population being studied P_i is the population of age group i in the standard population		
Guide for use:	Five-year age groups (in years) to be used are: 15–19 and 20–24 For purposes of comparison of population rates for Australia over time, and/or population within Australia, the standard population to be used is the final 30 June estimated Australian resident total population (males plus females) for the most recent year ending in 1.		

Related data references:	**Related Indicators:**	
	3.1 Death rate for road transport related injury among total population	
	3.3 Hospital separations rate for road transport related injury in the total population	
	3.4 Hospital separations rate for road transport related injury among males aged 15–24 years	
Administrative attributes		
Date of submission:		
Source organisation:	National Health Priority Action Council	
Source document for indicator:	Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS	
Date effective:		
Date ineffective:		
Review of indicator:	**Planned review frequency:**	
	Base date:	
	Planned review date:	
Sources of formula variables:	**Numerator:**	ABS. National mortality database 1979–latest available
	Denominator:	ABS. Australian Demographic Statistics Cat.no. 3101.0
Reporting:	**Reporting required by:**	Australian Health Ministers
	Indicators reported to:	Australian Institute of Health and Welfare
		Department of Health and Ageing
	Reporting frequency:	Every two years
Interpretation:	This indicator should have a downward trend. A downward trend was observed up to about 1993, after which the decline was less steep.	
Comments:	Please see Table A3.2 for the *Minimal Change* and *Technically Revised* models for reporting on this indicator.	
	The age range for this indicator is warrants review to ensure that it continues to be useful to group older teenagers with an older group. (Rates and trends differ greatly within this age range for some other conditions – e.g. suicide).	
	Consideration should be given to respecifying the scope of the indicator(s) of land transport injury. 'Road transport related injury' refers to ranges of ICD-9 External Cause codes that are easy to state (E901–E919 and E926–E929). However, it is conceptually complex (some off-road cases are included, but not if a motor vehicle is involved), requires complex specification in terms of ICD-10, and is not commonly reported elsewhere (unlike, for example *Motor Vehicle Traffic Accident* – see below).	
	Motor Vehicle Traffic. **ICD-9**: E810–E819 (.0–.9) **ICD-10**: V02–04 (.1,.9); V09.2; V12–V14 (.3–.9); V19 (.4–.9); V20–28 (.3–.9); V29 (.4–.9); V30–V39 (.4–.9); V40–49 (.4–.9); V50–59 (.4–.9); V60–69 (.4–.9); V70–79 (.4–.9); V80 (.3–.5); V81.1, V82.1; V83–V86 (.0–.3); V87 (.0–.8); V89 (.2)	
Data element links		
Related NHPA goal:	NHPA primary goal (Injury Prevention and Control) 3.2	
Information model entities linked to this data element:		
Indicator frameworks entities linked to this data element:		
Data set agreements which include this data element:		
Keywords relating to this data element:		

Table A3.2: *Minimal Change* and *Technically Revised* models for reporting on Indicator 3.2

	***Minimal Change* model**	***Technically Revised* Model**
General case inclusion criterion (applies to **all** mortality indicators)	None	A 'multiple cause of death' field that contains an injury or poisoning code
General case inclusion code ranges (apply to **all** mortality indicators)	None	ICD-9: 800–904, 910–999 ICD-10: S00–T89 Included in these ranges are all injury cases, except *Sequelae (late effects) of injury & poisoning*
Specific case inclusion criteria (apply to **this** indicator)	'Underlying cause of death' is an external cause code in the specified range	As for *Minimal Change* model
Specific case inclusion code ranges (apply to **this** indicator)	ICD-9: E810–E819, E826–E829 ICD-10: V02–04 (.1,.9); V09.2; V12–V14 (.3–.9); V19 (.4–.9); V20–28 (.3–.9); V29 (.4–.9); V30–V39 (.4–.9); V40–49 (.4–.9); V50–59 (.4–.9); V60–69 (.4–.9); V70–79 (.4–.9); V80 (.3–.5); V81.1, V82.1; V83–V86 (.0–.3); V87 (.0–.8); V89 (.2); V01 (.0,.1,.9); V06 (.0,.1,.9); V09 (.1,.3,.9); V10–V11 (.0–.5,.9); V16–V18 (.0–.5,.9); V19 (.3,.8,.9); V80 (.0–.2,.7–.9); V82 (.2–.7,.9); V87.9; V88.9, V89 (.1,.3,.9)	As for *Minimal Change* model
Basis for reporting periods	Date of death registration	Date of death occurrence
Reporting periods	1 January to 31 December (i.e. calendar year)	1 July to 30 June (i.e. financial year; cases registered by the end of the calendar year beginning during the period are included)
Population for age-standardisation	Australian 30 June 1991 persons population is the standard population[(a)] Five-year age groups to ages '85+ years' are used in standardisation	Australian 30 June 1991 persons population is the standard population[(a)] Five-year age groups to ages '95+ years' are used in standardisation
Denominator for rates (mid-point of reporting periods)	ERP at 30 June	ERP at 31 December

(a) At the time of writing the Australian 30 June 1991 persons population was the standard population. This was to be changed to the 30 June 2001 Australian persons population when the ABS released the final population figures.

NHPA injury prevention and control indicator 3.3

Identifying and descriptive attributes			
Data element ID:	NHPA Indicator (Injury Prevention and Control) 3.3		
Data element title:	Hospital separation rate for road transport-related injury in the total population		
Version number:	1		
Type:	Derived Data Element		
Status:	Draft		
Definition:	Number of hospital separations due to road transport per 100,000 population, age-standardised.		
Context:	Road transport-related accidents are a major cause of injury hospital separations. In 1997–98, as many as 42,301 hospital separations (27,477 males and 14,824 females) occurred as a result of accidents on Australian roads. This yielded an overall rate of 232.8 per 100,000 hospital separations.		
Relational and representational attributes			
Data type:	Numeric		
Representational form:	Rate	**Minimum size:**	3
Representational layout:	N,NNN.N	**Maximum size:**	7
Scope of indicator:	**Sex:**	All persons	
	Geographical area of interest:	Australia	
	Lower age limit:	All ages	
	Upper age limit:	All ages	
	Other specification(s) of interest:	Road transport-related injury	
Definition of formula variables:	**Numerator:**	**For hospital separations coded to ICD-9-CM:** Number of hospital separations in Australia assigned to relevant ICD-9-CM for a particular year **For hospital separations coded to ICD-10-AM:** Total number of hospital separations in Australia assigned to relevant ICD-10-AM codes for a particular year	
	Denominator:	Mid-year total for Australian population for the same year as the numerator	
Formula:	(Total number of road transport-related hospital separations*100,000) /Mid-year population for relevant year; age standardised using direct method and the standard Australian population		
	Complete formula for direct method:		
	$SR = \Sigma(r_i P_i) / \Sigma(P_i)$ *where*		
	SR is the age-standardised rate for the population being studied		
	r_i is the age-group specific rate for age group i in the population being studied		
	P_i is the population of age group i in the standard population		
Guide for use:	Five-year age groups (in years) to be used are: 0–4, 5–9, 10–14, 15–19, 20–24, 25–29, 30–34, 35–39, 40–44, 45–49, 50–54, 55–59, 60–64, 65–69, 70–74, 75–79, 80–84, 85+ years.		
	Given the expansion of the size of the population for elderly Australians, notably those aged 85 years and older, consideration should be given to adding the five-year age groups 85–89, 90–94 and 95+ years.		
	For purposes of comparison of population rates for Australia over time, and/or population within Australia, the standard population to be used is the final 30 June estimated Australian resident total population (males plus females) for the most recent year ending in 1.		

Related data references:	**Related Indicators:**	
	3.1 Death rate for road transport-related injury in the total population	
	3.2 Death rate for road transport related injury among males aged 15–24 years	
	3.4 Hospital separations rate for road transport related injury among males aged 15–24 years	
Administrative attributes		
Date of submission:		
Source organisation:	National Health Priority Action Council	
Source document for indicator:	Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS	
Date effective:		
Date ineffective:		
Review of indicator:	**Planned review frequency:**	
	Base date:	
	Planned review date:	
Sources of formula variables:	**Numerator:**	AIHW. National Hospital Morbidity Database
	Denominator:	ABS. Australian Demographic Statistics Cat.no. 3101.0
Reporting:	**Reporting required by:**	Australian Health Ministers
	Indicators reported to:	Australian Institute of Health and Welfare
		Department of Health and Ageing
	Reporting frequency:	Every two years
Interpretation:	Trends in hospital separations having an External Cause code are difficult to interpret due to (1) potential variation in the sub-group of separations to which External Cause codes are applied; and (2) potential variation in admission practice, especially for lower severity cases.	
Comments:	Please see Table A3.3 for the *Minimal Change* and *Technically Revised* models for reporting on this indicator.	
	Consideration should be given to respecifying the scope of the indicator(s) of land transport injury. 'Road transport related injury' refers to ranges of ICD-9 External Cause codes that are easy to state (E901–E919 & E926–E929). However, it is conceptually complex (some off-road cases are included, but not if a motor vehicle is involved), requires complex specification in terms of ICD-10, and is not commonly reported elsewhere (unlike, for example *Motor Vehicle Traffic Accident* – see below).	
	Motor Vehicle Traffic. **ICD-9**: E810–E819 (.0–.9) **ICD-10**: V02–04 (.1,.9); V09.2; V12–V14 (.3–.9); V19 (.4–.9); V20–28 (.3–.9); V29 (.4–.9); V30–V39 (.4–.9); V40–49 (.4–.9); V50–59 (.4–.9); V60–69 (.4–.9); V70–79 (.4–.9); V80 (.3–.5); V81.1, V82.1; V83–V86 (.0–.3); V87 (.0–.8); V89 (.2)	
Data element links		
Related NHPA goal:	NHPA primary goal (Injury Prevention and Control) 3.1	
Information model entities linked to this data element:		
Indicator frameworks entities linked to this data element:		
Data set agreements which include this data element:		
Keywords relating to this data element:		

Table A3.3: *Minimal Change* and *Technically Revised* models for reporting on Indicator 3.3

	***Minimal Change* model**	***Technically Revised* Model**
General case inclusion criterion (applies to **all** mortality indicators)	None	Principal Diagnosis is an injury or poisoning.
General case inclusion code ranges (apply to **all** mortality indicators)	None	ICD-9-CM: 800–904, 910–999 ICD-10-AM: S00–T89 Included in these ranges are all injury cases, except *Sequelae (late effects) of injury & poisoning*
Specific case inclusion criteria (apply to **this** indicator)	First (left-most) external cause code in the specified range[(a)]	As for *Minimal Change* model
Specific case inclusion code ranges (apply to **this** indicator)	ICD-9: E810–E819, E826–E829 ICD-10: V02–04 (.1,.9); V09.2; V12–V14 (.3–.9); V19 (.4–.9); V20–28 (.3–.9); V29 (.4–.9); V30–V39 (.4–.9); V40–49 (.4–.9); V50–59 (.4–.9); V60–69 (.4–.9); V70–79 (.4–.9); V80 (.3–.5); V81.1, V82.1; V83–V86 (.0–.3); V87 (.0–.8); V89 (.2); V01 (.0,.1,.9); V06 (.0,.1,.9); V09 (.1,.3,.9); V10–V11 (.0–.5,.9); V16–V18 (.0–.5,.9); V19 (.3,.8,.9); V80 (.0–.2,.7–.9); V82 (.2–.7,.9); V87.9; V88.9, V89 (.1,.3,.9)	As for *Minimal Change* model
Basis for reporting periods	Date of separation	Date of separation
Reporting periods	1 July to 30 June (i.e. financial year)	1 July to 30 June (i.e. financial year)
Population for age-standardisation	Australian 30 June 1991 persons population is the standard population[(b)] Five-year age groups to ages '85+ years' are used in standardisation	Australian 30 June 1991 persons population is the standard population[(b)] Five-year age groups to ages '95+ years' are used in standardisation
Denominator for rates (mid-point of reporting periods)	ERP as at 31 December	ERP as at 31 December
Restriction to avoid counting multiple separations per incident case	None	Omit cases where admission is statistical, or from another acute care hospital
Restriction to omit variably-ascertained case types	None	Omit 'same-day' separations

(a) There are up to 31 fields where external cause data can be recorded in the NHMD. Selection criteria can be based on external cause codes recorded in the first external cause field (this is sometimes called the 'main' external cause code field). The selection criteria can be extended to include those cases where an external cause code did not appear in the 'main' external cause field, but appeared in one of the other external cause code fields, i.e. the 'first appearing' external cause code. This is approach is especially useful for some data years where some jurisdictions did not record external cause codes in the 'main' external cause code field for significant numbers of cases.

(b) At the time of writing the Australian 30 June 1991 persons population was the standard population. This was to be changed to the 30 June 2001 Australian persons population when the ABS released the final population figures.

NHPA injury prevention and control indicator 3.4

Identifying and descriptive attributes			
Data element ID:	NHPA Indicator (Injury Prevention and Control) 3.4		
Data element title:	Hospital separation rate for road transport-related injury among males aged 15–24 years		
Version number:	1		
Type:	Derived Data Element		
Status:	Draft		
Definition:	Number of hospital separations among males aged 15–24 years due to road transport crashes per 100,000 population, age-standardised.		
Context:	The hospital separation rate due to road transport-related injury is particularly high among 15–24 year old males, i.e. almost three times that for the total population. In 1999, 8,328 young males aged 15–24 years were separated because of road transport-related injury, i.e. a rate of 609.9 per 100,000.		
Relational and representational attributes			
Data type:	Numeric		
Representational form:	Rate	**Minimum size:**	3
Representational layout:	N,NNN.N	**Maximum size:**	7
Scope of indicator:	**Sex:**	Males	
	Geographical area of interest:	Australia	
	Lower age limit:	15	
	Upper age limit:	24	
	Other specification(s) of interest:	Road transport-related injury	
Definition of formula variables:	**Numerator:**	**For hospital separations coded to ICD-9-CM:** Number of hospital separations in Australia assigned to relevant ICD-9-CM among males aged 15–24 years for a particular year **For hospital separations coded to ICD-10-AM:** Total number of death occurrences in Australia assigned to relevant ICD-10-AM External Cause codes among males aged 15–24 years for a particular year	
	Denominator:	Mid-year total for Australian population for the same year as the numerator	
Formula:	(Total number of road transport-related hospital separations among males aged 15–24 years*100,000)/Population total for males aged 15–24 years as at 30 December for relevant year; age standardised using direct method and 1991 Australian population as reference population **Complete formula for direct method:** $SR = \Sigma(r_i P_i) / \Sigma(P_i)$ *where* SR is the age-standardised rate for the population being studied r_i is the age-group specific rate for age group i in the population being studied P_i is the population of age group i in the standard population		
Guide for use:	Five-year age groups (in years) to be used are: 15–19 and 20–24 Given the expansion of the size of the population for elderly Australians, notably those aged 85 years and older, consideration should be given to adding the five-year age groups 85–89, 90–94 and 95+ years. For purposes of comparison of population rates for Australia over time, and/or population within Australia, the standard population to be used is the final 30 June estimated Australian resident total population (males plus females) for the most recent year ending in 1.		

Related data references:	**Related Indicators:**	
	3.1 Death rate for road transport-related injury in the total population	
	3.2 Death rate for road transport related injury among males aged 15–24 years	
	3.3 Hospital separations rate for road transport related injury in the total population	
Administrative attributes		
Date of submission:		
Source organisation:	National Health Priority Action Council	
Source document for indicator:	Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS	
Date effective:		
Date ineffective:		
Review of indicator:	**Planned review frequency:**	
	Base date:	
	Planned review date:	
Sources of formula variables:	**Numerator:**	AIHW. National Hospital Morbidity Database
	Denominator:	ABS. Australian Demographic Statistics Cat. no. 3101.0
Reporting:	**Reporting required by:**	Australian Health Ministers
	Indicators reported to:	Australian Institute of Health and Welfare
		Department of Health and Ageing
	Reporting frequency:	Every two years
Interpretation:	Trends in hospital separations having an External Cause code are difficult to interpret due to (1) potential variation in the sub-group of separations to which External Cause codes are applied; and (2) potential variation in admission practice, especially for lower severity cases.	
Comments:	Please see Table A3.4 for the *Minimal Change* and *Technically Revised* models for reporting on this indicator.	
	The age range for this indicator is warrants review to ensure that it continues to be useful to group older teenagers with an older group. (Rates and trends differ greatly within this age range for some other conditions – e.g.suicide).	
	Consideration should be given to respecifying the scope of the indicator(s) of land transport injury. 'Road transport related injury' refers to ranges of ICD-9 External Cause codes that are easy to state (E901–E919 & E926–E929). However, it is conceptually complex (some off-road cases are included, but not if a motor vehicle is involved), requires complex specification in terms of ICD-10, and is not commonly reported elsewhere (unlike, for example *Motor Vehicle Traffic Accident* – see below).	
	Motor Vehicle Traffic. **ICD-9**: E810–E819 (.0–.9) **ICD-10**: V02–04 (.1,.9); V09.2; V12–V14 (.3–.9); V19 (.4–.9); V20–28 (.3–.9); V29 (.4–.9); V30–V39 (.4–.9); V40–49 (.4–.9); V50–59 (.4–.9); V60–69 (.4–.9); V70–79 (.4–.9); V80 (.3–.5); V81.1, V82.1; V83–V86 (.0–.3); V87 (.0–.8); V89 (.2)	
Data element links		
Related NHPA goal:	NHPA primary goal (Injury Prevention and Control) 3.2	
Information model entities linked to this data element:		
Indicator frameworks entities linked to this data element:		
Data set agreements which include this data element:		
Keywords relating to this data element:		

Table A3.4: *Minimal Change* and *Technically Revised* models for reporting on Indicator 3.4

	***Minimal Change* model**	***Technically Revised* Model**
General case inclusion criterion (applies to **all** mortality indicators)	None	Principal Diagnosis is an injury or poisoning.
General case inclusion code ranges (apply to **all** mortality indicators)	None	ICD-9-CM: 800–904, 910–999 ICD-10-AM: S00–T89 Included in these ranges are all injury cases, except *Sequelae (late effects) of injury & poisoning*
Specific case inclusion criteria (apply to **this** indicator)	First (left-most) external cause code in the specified range[(a)]	As for *Minimal Change* model
Specific case inclusion code ranges (apply to **this** indicator)	ICD-9: E810–E819, E826–E829 ICD-10: V02–04 (.1,.9); V09.2; V12–V14 (.3–.9); V19 (.4–.9); V20–28 (.3–.9); V29 (.4–.9); V30–V39 (.4–.9); V40–49 (.4–.9); V50–59 (.4–.9); V60–69 (.4–.9); V70–79 (.4–.9); V80 (.3–.5); V81.1, V82.1; V83–V86 (.0–.3); V87 (.0–.8); V89 (.2); V01 (.0,.1,.9); V06 (.0,.1,.9); V09 (.1,.3,.9); V10–V11 (.0–.5,.9); V16–V18 (.0–.5,.9); V19 (.3,.8,.9); V80 (.0–.2,.7–.9); V82 (.2–.7,.9); V87.9; V88.9, V89 (.1,.3,.9)	As for *Minimal Change* model
Basis for reporting periods	Date of separation	Date of separation
Reporting periods	1 July to 30 June (i.e. financial year)	1 July to 30 June (i.e. financial year)
Population for age-standardisation	Australian 30 June 1991 persons population is the standard population[(b)] Five-year age groups to ages '85+ years' are used in standardisation	Australian 30 June 1991 persons population is the standard population[(b)] Five-year age groups to ages '95+ years' are used in standardisation
Denominator for rates (mid-point of reporting periods)	ERP as at 31 December	ERP as at 31 December
Restriction to avoid counting multiple separations per incident case	None	Omit cases where admission is statistical, or from another acute care hospital
Restriction to omit variably-ascertained case types	None	Omit 'same-day' separations

(a) There are up to 31 fields where external cause data can be recorded in the NHMD. Selection criteria can be based on external cause codes recorded in the first external cause field (this is sometimes called the 'main' external cause code field). The selection criteria can be extended to include those cases where an external cause code did not appear in the 'main' external cause field, but appeared in one of the other external cause code fields, i.e. the 'first appearing' external cause code. This is approach is especially useful for some data years where some jurisdictions did not record external cause codes in the 'main' external cause code field for significant numbers of cases.

(b) At the time of writing the Australian 30 June 1991 persons population was the standard population. This was to be changed to the 30 June 2001 Australian persons population when the ABS released the final population figures.

NHPA injury prevention and control indicator 4

Identifying and descriptive attributes			
Data element ID:	NHPA Indicator (Injury Prevention and Control) 4		
Data element title:	Work-related injury		
Suggested title:	Hospital separation rate for work-related injury in the total population		
Version number:	1		
Type:	Derived Data Element		
Status:	Draft		
Proposed Definition:	Number of hospital separations due to work-related injury per 100,000 population for a particular year, age-standardised. 'Work-related' cases are those having an ICD-10-AM Activity code indicating that the injury occurred 'while working for income.'		
Context:	Many Australians are killed in the course of their work or the work of others each year (National Occupational Health and Safety Commission 1998). Many more are injured in work-related activities. No national data on non-fatal work-related injury were available until recently. In principle, the introduction of ICD-10-AM allows for work-related injury to be identified in hospital separations data by means of the 'Activity' code.		
Relational and representational attributes			
Data type:	**Suggested data type:** Numeric		
Representational form:	**Suggested form:** Rate	**Minimum size:**	**Suggested size:** 3
Representational layout:	**Suggested layout**: N,NNN.N	**Maximum size:**	**Suggested size:** 7
Scope of indicator:	**Sex:**	All persons	
	Geographical area of interest:	Australia	
	Lower age limit:	All ages	
	Upper age limit:	All ages	
	Other specification(s) of interest:	Work-related hospital separations	
Definition of formula variables:	**Numerator: Suggested definition of numerator:**	**For hospital separations coded to ICD-9-CM:** Not possible—no activity code available. **For hospital separations coded to ICD-10-AM:** Total number of registered hospital separations in Australia assigned to relevant ICD-10-AM Activity codes for a particular year	
	Denominator: Suggested definition of denominator:	Mid-year total for Australian population for the same year as the numerator	
Formula:	(Total number of hospital separations coded to relevant ICD-10-AM Activity codes *100,000)/Mid year population total for same year as in numerator **Complete formula for direct method:** $SR = \Sigma(r_i P_i) / \Sigma(P_i)$ *where* *SR* is the age-standardised rate for the population being studied r_i is the age-group specific rate for age group *i* in the population being studied P_i is the population of age group *i* in the standard population		
Guide for use:	This indicator cannot be calculated for data coded to ICD-9-CM as it was not possible to identify relevant cases because of the absence of an activity code in the classification system. ICD-10-AM allows for the identification of work-related injury. For purposes of comparison of population rates for Australia over time, and/or population within Australia, the standard population to be used is the final 30 June estimated Australian resident total population (males plus females) for the most recent year ending in 1.		
Related data references:			

Administrative attributes		
Date of submission:		
Source organisation:	National Health Priority Action Council	
Source document for indicator:	Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS	
Date effective:		
Date ineffective:		
Review of indicator:	**Planned review frequency:**	
	Base date:	
	Planned review date:	
Sources of formula variables:	**Numerator:**	AIHW. National Hospital Morbidity Database
	Denominator:	ABS. Australian Demographic Statistics Cat. no. 3101.0
Reporting:	**Reporting required by:**	Australian Health Ministers
	Indicators reported to:	Australian Institute of Health and Welfare Department of Health and Ageing
	Reporting frequency:	Every two years
Interpretation:	Trends in hospital separations having an External Cause code are difficult to interpret due to (1) potential variation in the sub-group of separations to which External Cause codes are applied; and (2) potential variation in admission practice, especially for lower severity cases.	
Comments:	Please see Table A4 for the *Minimal Change* and *Technically Revised* models for reporting on this indicator. To date, it has not been possible to identify work-related injury in both national deaths and hospital separations data. In principle, the introduction of ICD-10-AM allows for work-related injury to be identified in hospital separations data by means of the ICD-10-AM Activity code. However, the reliability of this item is not yet known and this warrants study. An important aspect of this will be to assess the scope of inclusion in relation to definitions of work-related injury used by occupational health and safety agencies. The new National Coroners Information System also has the potential of identifying work-related deaths. At the time of writing, the NCIS would be able to identify work-related deaths in seven of the eight Australian jurisdictions. The reliability of these data also needs to be validated.	
Data element links		
Related NHPA goal:	Not defined	
Information model entities linked to this data element:		
Indicator frameworks entities linked to this data element:		
Data set agreements which include this data element:		
Keywords relating to this data element:		

Table A4: *Minimal Change* and *Technically Revised* models for reporting on Indicator 4

	***Minimal Change* model**	***Technically Revised* Model**
General case inclusion criterion (applies to **all** mortality indicators)	None	Principal Diagnosis is an injury or poisoning.
General case inclusion code ranges (apply to **all** mortality indicators)	None	ICD-9-CM: 800–904, 910–999 ICD-10-AM: S00–T89 Included in these ranges are all injury cases, except *Sequelae (late effects) of injury & poisoning*
Specific case inclusion criteria (apply to **this** indicator)	Cases coded to relevant Activity code for external cause categories V01–Y34	As for *Minimal Change* model
Specific case inclusion code ranges (apply to **this** indicator)	ICD-10-AM, 1st Edition: Activity=2 ICD-10-AM, 2nd Edition: Activity=Y93.2 ICD-10-AM, 3rd Edition: Activity=U73.00-U73.09	As for *Minimal Change* model
Basis for reporting periods	Date of separation	Date of separation
Reporting periods	1 July to 30 June (i.e. financial year)	1 July to 30 June (i.e. financial year)
Population for age-standardisation	Australian 30 June 1991 persons population is the standard population[(a)] Five-year age groups to ages '85+ years' are used in standardisation	Australian 30 June 1991 persons population is the standard population[(a)] Five-year age groups to ages '95+ years' are used in standardisation
Denominator for rates (mid-point of reporting periods)	ERP as at 31 December	ERP as at 31 December
Restriction to avoid counting multiple separations per incident case	None	Omit cases where admission is statistical, or from another acute care hospital
Restriction to omit variably-ascertained case types	None	Omit 'same-day' separations

(a) At the time of writing the Australian 30 June 1991 persons population was the standard population. This was to be changed to the 30 June 2001 Australian persons population when the ABS released the final population figures.

NHPA injury prevention and control indicator 5.1

Identifying and descriptive attributes	
Data element ID:	NHPA Indicator (Injury Prevention and Control) 5.1
Data element title:	Death rate for falls among people aged 65 years and over
Version number:	1
Type:	Derived Data Element
Status:	Draft
Definition:	Number of death occurrences due to falls among people aged 65 years and over per 100,000 population per financial year, age-standardised.
Context:	Falls are the leading cause of injury-related death in older people. Deaths data for 1997–98 include 1,178 deaths in persons aged 65+ years where an 'accidental fall' was recorded as the underlying cause of death (484 males and 694 females). This yielded an overall age-standardised rate of 37.7 per 100,000 population. There appears to be a decrease in the rate between 1979 and 1993, but the rate has remained stable in more recent years.

Relational and representational attributes			
Data type:	Numeric		
Representational form:	Rate	**Minimum size:**	3
Representational layout:	N,NNN.N	**Maximum size:**	7
Scope of indicator:	**Sex:**	All persons	
	Geographical area of interest:	Australia	
	Lower age limit:	65	
	Upper age limit:	None	
	Other specification(s) of interest:	Death occurrences due to falls	
Definition of formula variables:	**Numerator:**	**For deaths coded to ICD-9:** Number of death occurrences in Australia among persons aged 65+ years assigned to relevant ICD-9 codes for a particular year **For deaths coded to ICD-10:** Total number of death occurrences in Australia among persons aged 65+ years assigned to relevant ICD-10 codes for a particular year	
	Denominator:	Mid-year total for Australian population aged 65+ years for the same year as the numerator	
Formula:	(Total number of death occurrences among those aged 65+ years coded to relevant External Cause codes*100,000) / Mid-year population for a particular year; age standardised using direct method and the standard Australian population		
	Complete formula for direct method:		
	$SR = \Sigma(r_i P_i) / \Sigma(P_i)$ *where*		
	SR is the age-standardised rate for the population being studied		
	r_i is the age-group specific rate for age group i in the population being studied		
	P_i is the population of age group i in the standard population		
Guide for use:	Five-year age groups (in years) to be used are: 65–69, 70–74, 75–79, 80–84, 85+ years.		
	Given the expansion of the size of the population for elderly Australians, notably those aged 85 years and older, consideration should be given to adding the five-year age groups 85–89, 90–94 and 95+ years.		
	For purposes of comparisons of populations rates for Australia over time, and/or populations within Australia, the standard population to be used is the final 30 June estimated Australian resident total population (males plus females) for the most recent year ending in 1.		

Related data references:	**Related indicators:**	
	5.2 Hospital separation rate for falls among people aged 65 years and over	
	5.5 Hospital separation rate for falls among children aged 0–4 and 5–9 years	
Administrative attributes		
Date of submission:		
Source organisation:	National Health Priority Action Council	
Source document for indicator:	Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS	
Date effective:		
Date ineffective:		
Review of indicator:	**Planned review frequency:**	
	Base date:	
	Planned review date:	
Sources of formula variables:	**Numerator:**	ABS national mortality database
	Denominator:	ABS. Australian Demographic Statistics Cat. no. 3101.0
Reporting:	**Reporting required by:**	Australian Health Ministers
	Indicators reported to:	Australian Institute of Health and Welfare
		Department of Health and Ageing
	Reporting frequency:	Every two years
Interpretation:	This indicator should have a downward trend.	
Comments:	Please see Table A5.1 for the *Minimal Change* and *Technically Revised* models for reporting on this indicator.	
	The ICD-10 External Cause codes that refer to accidental falls are W00–W19. This range is not equivalent to the ICD-9 range for accidental falls (E880–888) because ICD-10 has no equivalent to the ICD-9 code E887 ('fracture cause unspecified'). The E887 code was applied by the ABS to a very high proportion of all deaths coming within the scope of the existing indicator. This reflects administrative guidelines which have the effect that few queries into the external cause of death were made where the deceased person was old, particularly if the person was aged 75 years or older. This resulted in frequent use of the E887 code for coding the underlying cause of deaths of elderly persons for which a fracture was mentioned. Cases that would have been coded to E887 under ICD-9 are among the cases coded to residual category X59 (Exposure to unspecified factor) under ICD-10. More complete ascertainment of specific external causes is desirable.	
	A revised indicator definition can be constructed that provides reasonable comparability across the change from ICD-9-CM to ICD-10-AM (see table A 5.1).	
	Consideration should be given to supplementing or replacing this indicator with one based on the presence of relevant diagnosis codes (e.g. for hip fracture). The necessity for reporting indicators for age group 65–74 years as well as for ages 75 and older warrants review.	
Data element links		
Related NHPA goal:	NHPA primary goal (Injury Prevention and Control) 5.1	
Information model entities linked to this data element:		
Indicator frameworks entities linked to this data element:		
Data set agreements which include this data element:		
Keywords relating to this data element:		

Table A5.1: *Minimal Change* and *Technically Revised* models for reporting on Indicator 5.1

	***Minimal Change* model**	***Technically Revised* Model**
General case inclusion criterion (applies to **all** mortality indicators)	None	A 'multiple cause of death' field that contains an injury or poisoning code
General case inclusion code ranges (apply to **all** mortality indicators)	None	ICD-9: 800–904, 910–999 ICD-10: S00–T89 Included in these ranges are all injury cases, except *Sequelae (late effects) of injury & poisoning*
Specific case inclusion criteria (apply to **this** indicator)	'Underlying cause of death' is an external cause code in the specified range	As below
Specific case inclusion code ranges (apply to **this** indicator)	ICD-9: E880–E888 ICD-10: W00–W19	ICD-9: E880–E888 ICD-10: Good comparability with the ICD-9 'accidental falls' code range (i.e. UCoD=E880–E888) has been found to be achieved by the following case selection criterion: • Underlying Cause of Death in the range W00–W19; OR • Underlying Cause of Death =X59 AND at least one Multiple Cause of Death code with one of the following values: S02, S12, S22, S32, S42, S52, S62, S72, S82, S92, T14.2 or T02 (i.e. 'fractures').
Basis for reporting periods	Date of death registration	Date of death occurrence
Reporting periods	1 January to 31 December (i.e. calendar year)	1 July to 30 June (i.e. financial year; cases registered by the end of the calendar year beginning during the period are included)
Population for age-standardisation	Australian 30 June 1991 persons population is the standard population[(a)] Five-year age groups to ages '85+ years' are used in standardisation	Australian 30 June 1991 persons population is the standard population[(a)] Five-year age groups to ages '95+ years' are used in standardisation
Denominator for rates (mid-point of reporting periods)	ERP at 30 June	ERP at 31 December

(a) At the time of writing the Australian 30 June 1991 persons population was the standard population. This was to be changed to the 30 June 2001 Australian persons population when the ABS released the final population figures.

NHPA injury prevention and control indicator 5.2

Identifying and descriptive attributes	
Data element ID:	NHPA Indicator (Injury Prevention and Control) 5.2
Data element title:	Hospital separation rate for falls among people aged 65 years and over
Version number:	1
Type:	Derived Data Element
Status:	Draft
Definition:	Number of hospital separations due to falls among people aged 65 years and over per 100,000 population per financial year by sex, age-standardised.
Context:	Falls are the leading cause of injury-related morbidity in older people. In 1997–98 there were 45,069 hospitalisations due to falls among persons aged 65 years or more. Of these, 11,315 were to males and 33,754 to females. The overall age-standardised rate was 1,848.7 per 100,000 population with the rate for males being 1,201.9 and the rate for females 2,271.7 per 100,000 population (Cripps and Carman 2001). Such cases cost the health sector about $406 million in 1993–94, of which $212 million was for hospital in-patient care (Mathers, Penm et al. 1999). 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. This research also shows that most of the demand will stem from women aged 75 year or more (Kreisfeld 2000).

Relational and representational attributes			
Data type:	Numeric		
Representational form:	Rate	**Minimum size:**	3
Representational layout:	N,NNN.N	**Maximum size:**	7
Scope of indicator:	**Sex:**	Display data by sex	
	Geographical area of interest:	Australia	
	Lower age limit:	65 years	
	Upper age limit:	None	
	Other specification(s) of interest:	Falls	
Definition of formula variables:	**Numerator:**	**For hospital separations coded to ICD-9-CM:** Total number of registered hospital separations in Australia assigned to relevant ICD-9-CM codes, for a particular year among cases aged 65 years or more **For hospital separations coded to ICD-10-AM:** Total number of registered hospital separations in Australia assigned to relevant ICD-10-AM External Cause codes for a particular year among cases aged 65 years or more	
	Denominator:	Mid-year total for Australian population aged 65+ years for the same year as the numerator	
Formula:	(Total number of hospital separations coded to relevant ICD codes among those aged 65 years or more*100,000)/Mid-year population total for the same year as in numerator; age standardised using direct method and the standard Australian population **Complete formula for direct method:** $SR = \Sigma(r_i P_i) / \Sigma(P_i)$ *where* *SR* is the age-standardised rate for the population being studied r_i is the age-group specific rate for age group *i* in the population being studied P_i is the population of age group *i* in the standard population		

Guide for use:	Five-year age groups (in years) to be used are: 65–69, 70–74, 75–79, 80–84, 85+ years. Given the expansion of the size of the population for elderly Australians, notably those aged 85 years and older, consideration should be given to adding the five-year age groups 85–89, 90–94 and 95+ years. For purposes of comparison of population rates for Australia over time, and/or population within Australia, the standard population to be used is the final 30 June estimated Australian resident total population (males plus females) for the most recent year ending in 1. Data are usually presented separately for males and females.	
Related data references:	**Related indicators:** 5.1 Death rate for falls among people aged 65 years and over 5.5 Hospital separation rate for falls among children aged 0–4 and 5–9 years	
Administrative attributes		
Date of submission:		
Source organisation:	National Health Priority Action Council	
Source document for indicator:	Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS	
Date effective:		
Date ineffective:		
Review of indicator:	**Planned review frequency:**	
	Base date:	
	Planned review date:	
Sources of formula variables:	**Numerator:**	AIHW. National Hospital Morbidity Database
	Denominator:	ABS. Australian Demographic Statistics Cat. no. 3101.0
Reporting:	**Reporting required by:**	Australian Health Ministers
	Indicators reported to:	Australian Institute of Health and Welfare Department of Health and Ageing
	Reporting frequency:	Every two years
Interpretation:	Trends in hospital separations having an External Cause code are difficult to interpret due to (1) potential variation in the sub-group of separations to which External Cause codes are applied; and (2) potential variation in admission practice, especially for lower severity cases.	
Comments:	Please see Table A5.2 for the *Minimal Change* and *Technically Revised* models for reporting on this indicator. The ICD-10-AM External Cause codes that refer to falls are W00–W19. However, this range is not equivalent to the ICD-9-CM E880–E888 range for falls. The reason is that there is no equivalent to the ICD-9-CM code E887. This creates a break in the series that cannot be corrected if the current indicator specification is retained. The fraction of cases in the scope of this indicator that have been coded to E887 is much lower for hospital separations than for Australian mortality data. A revised indicator definition can be constructed that provides reasonable comparability across the change from ICD-9-CM to ICD-10-AM (see table A 5.2). Consideration should be given to supplementing or replacing this indicator with one based on the presence of relevant diagnosis codes (e.g. for hip fracture). The necessity for reporting indicators for age group 65–74 years as well as for ages 75 and older warrants review.	
Data element links		
Related NHPA goal:	NHPA primary goal (Injury Prevention and Control) 5.2	
Information model entities linked to this data element:		
Indicator frameworks entities linked to this data element:		
Data set agreements which include this data element:		
Keywords relating to this data element:		

Table A5.2: *Minimal Change* and *Technically Revised* models for reporting on Indicator 5.2

	***Minimal Change* model**	***Technically Revised* Model**
General case inclusion criterion (applies to **all** mortality indicators)	None	Principal Diagnosis is an injury or poisoning.
General case inclusion code ranges (apply to **all** mortality indicators)	None	ICD-9-CM: 800–904, 910–999 ICD-10-AM: S00–T89 Included in these ranges are all injury cases, except *Sequelae (late effects) of injury & poisoning*
Specific case inclusion criteria (apply to **this** indicator)	First (left-most) external cause code in the specified range[(a)]	As below.
Specific case inclusion code ranges (apply to **this** indicator)	ICD-9-CM: E880–E888 ICD-10-AM: W00–W19	ICD-9-CM: E880–E888 ICD-10-AM: Good comparability with the ICD-9-CM 'accidental falls' code range (i.e. E880–E888) has been found to be achieved by the following case selection criterion: • First (left-most) external cause code in the specified range W00–W19; OR • First (left-most) external cause code =X59 AND any diagnosis code with one of the following values: S02, S12, S22, S32, S42, S52, S62, S72, S82, S92, T14.2 or T02 (i.e. 'fractures').
Basis for reporting periods	Date of separation	Date of separation
Reporting periods	1 July to 30 June (i.e. financial year)	1 July to 30 June (i.e. financial year)
Population for age-standardisation	Australian 30 June 1991 persons population is the standard population[(b)] Five-year age groups to ages '85+ years' are used in standardisation	Australian 30 June 1991 persons population is the standard population[(b)] Five-year age groups to ages '95+ years' are used in standardisation
Denominator for rates (mid-point of reporting periods)	ERP as at 31 December	ERP as at 31 December
Restriction to avoid counting multiple separations per incident case	None	Omit cases where admission is statistical, or from another acute care hospital
Restriction to omit variably-ascertained case types	None	Omit 'same-day' separations

(a) There are up to 31 fields where external cause data can be recorded in the NHMD. Selection criteria can be based on external cause codes recorded in the first external cause field (this is sometimes called the 'main' external cause code field). The selection criteria can be extended to include those cases where an external cause code did not appear in the 'main' external cause field, but appeared in one of the other external cause code fields, i.e. the 'first appearing' external cause code. This is approach is especially useful for some data years where some jurisdictions did not record external cause codes in the 'main' external cause code field for significant numbers of cases.

(b) At the time of writing the Australian 30 June 1991 persons population was the standard population. This was to be changed to the 30 June 2001 Australian persons population when the ABS released the final population figures.

NHPA injury prevention and control indicator 5.5

Identifying and descriptive attributes			
Data element ID:	NHPA Indicator (Injury Prevention and Control) 5.5		
Data element title:	Hospital separation rate for falls among children aged 0–4 and 5–9 years		
Version number:	1		
Type:	Derived Data Element		
Status:	Draft		
Definition:	Numbers of hospital separations due to falls among children aged 0–4 (1) and 5–9 years (2) per 100,000 population per financial year.		
Context:	Falls are a leading cause of hospitalisation in children. In 1997–98, there were 7,244 hospital separations for children aged 0–4 years, yielding a age-specific rate of 561.9 per 100,000. A total of 10,328 children aged 5–9 years were recorded for the same data year, i.e. a rate of 782.9 per 100,000 population (Steenkamp and Cripps 2001).		
Relational and representational attributes			
Data type:	Numeric		
Representational form:	Rate	**Minimum size:**	3
Representational layout:	N,NNN.N	**Maximum size:**	7
Scope of indicator:	**Sex:**	All persons	
	Geographical area of interest:	Australia	
	Lower age limit:	0 years and 5 years	
	Upper age limit:	4 years and 9 years	
	Other specification(s) of interest:	None	
Definition of formula variables:	**Numerator:**	**For hospital separations coded to ICD-9-CM:** (1) Total number of registered hospital separations in Australia assigned to relevant ICD-9-CM codes, for a particular year among cases aged 0–4 years (2) Total number of registered hospital separations in Australia assigned to relevant ICD-9-CM, for a particular year among cases aged 5–9 years **For hospital separations coded to ICD-10-AM:** (1) Total number of registered hospital separations in Australia assigned to relevant ICD-10-AM codes for a particular year among cases aged 0–4 years (2) Total number of registered hospital separations in Australia assigned to relevant ICD-10-AM codes for a particular year among cases aged 5–9 years	
	Denominator:	(1) Mid-year total for Australian population aged 0–4 years for the same year as the numerator (2) Mid-year total for Australian population aged 5–9 years for the same year as the numerator	

Formula:	(Total number of hospital separations coded to relevant ICD codes among children aged 0–4 years *100,000) / Mid-year population total for children aged 0–4 years for relevant year **(1) Complete formula for direct method for children aged 0–4 years:** *R = (d*100,000/n) where* *R* is the age-specific rate for the population being studied *d* is the number of events for that population group *n* is the total population for that population group (Total number of hospital separations coded to E880–E888 among children aged 5–9 years *100,000)/Population figures for children aged 5–9 years **(2) Complete formula for direct method for children aged 5–9 years:** *R = (d*100,000/n) where* *R* is the age-specific rate for the population being studied *d* is the number of events for that population group *n* is the total population for that population group
Guide for use:	For purposes of comparison of population rates for Australia over time, and/or population within Australia, the standard population to be used is the final 30 June estimated Australian resident total population (males plus females) for the most recent year ending in 1.
Related data references:	Indicators related to falls: 5.1 Death rate for falls among people aged 65 years and over 5.2 Hospital separation rate for falls among people aged 65 years and over Indicators related to childhood injury: 7.2 Death rate for homicide among children aged 0–9 years 9.2 Hospital separation rate for injury resulting from fire, burns and scalds among children aged 0–4 years 10.1 Hospital separation rate due to poisoning among children aged 0–4 years 11.2 Hospital separation rate for near drowning among children 0–4 years
Administrative attributes	
Date of submission:	
Source organisation:	National Health Priority Action Council
Source document for indicator:	Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS
Date of submission:	
Date effective:	
Date ineffective:	
Review of indicator:	**Planned review frequency:** **Base date:** **Planned review date:**
Sources of formula variables:	**Numerator:** AIHW. National Hospital Morbidity Database **Denominator:** ABS. Australian Demographic Statistics Cat. no. 3101.0
Reporting:	**Reporting required by:** Australian Health Ministers **Indicators reported to:** Australian Institute of Health and Welfare Department of Health and Ageing **Reporting frequency:** Every two years
Interpretation:	Trends in hospital separations having an External Cause code are difficult to interpret due to (1) potential variation in the sub-group of separations to which External Cause codes are applied; and (2) potential variation in admission practice, especially for lower severity cases.

Comments:	Please see Table A5.5 for the *Minimal Change* and *Technically Revised* models for reporting on this indicator. The choice of age range(s) for indicator(s) of fall injury among children warrants review. (Should ages 10–14 be included? Are separate indicators for older and younger children necessary?) The ICD-10-AM External Cause codes that refer to falls are W00–W19. However, this range is not equivalent to the ICD-9-CM E880–E888 range for falls. The reason is that there is no equivalent to the ICD-9-CM code E887. The fraction of cases in the scope of this indicator that have been coded to E887 is lower in hospital separations than in Australian mortality data. A revised indicator definition can be constructed that provides reasonable comparability across the change from ICD-9-CM to ICD-10-AM. See table 5.5 below.
Data element links	
Related NHPA goal:	NHPA primary goal (Injury Prevention and Control) 5.5
Information model entities linked to this data element:	
Indicator frameworks entities linked to this data element:	
Data set agreements which include this data element:	
Keywords relating to this data element:	

Table A5.5: *Minimal Change* and *Technically Revised* models for reporting on Indicator 5.5

	***Minimal Change* model**	***Technically Revised* Model**
General case inclusion criterion (applies to **all** mortality indicators)	None	Principal Diagnosis is an injury or poisoning.
General case inclusion code ranges (apply to **all** mortality indicators)	None	ICD-9-CM: 800–904, 910–999 ICD-10-AM: S00–T89 Included in these ranges are all injury cases, except *Sequelae (late effects) of injury & poisoning*
Specific case inclusion criteria (apply to **this** indicator)	First (left-most) external cause code in the specified range[(a)]	As below
Specific case inclusion code ranges (apply to **this** indicator)	ICD-9-CM: E880–E888 ICD-10-AM: W00–W19	ICD-9-CM: E880–E888 ICD-10-AM: Good comparability with the ICD-9-CM 'accidental falls' code range (i.e. E880–E888) has been found to be achieved by the following case selection criterion: • First (left-most) external cause code in the specified range W00–W19; OR • First (left-most) external cause code =X59 AND any diagnosis code with one of the following values: S02, S12, S22, S32, S42, S52, S62, S72, S82, S92, T14.2 or T02 (i.e. 'fractures').
Basis for reporting periods	Date of separation	Date of separation
Reporting periods	1 July to 30 June (i.e. financial year)	1 July to 30 June (i.e. financial year)
Population for age-standardisation	Australian 30 June 1991 persons population is the standard population[(b)] Five-year age groups to ages '85+ years' are used in standardisation	Australian 30 June 1991 persons population is the standard population[(b)] Five-year age groups to ages '95+ years' are used in standardisation
Denominator for rates (mid-point of reporting periods)	ERP as at 31 December	ERP as at 31 December
Restriction to avoid counting multiple separations per incident case	None	Omit cases where admission is statistical, or from another acute care hospital
Restriction to omit variably-ascertained case types	None	Omit 'same-day' separations

(a) There are up to 31 fields where external cause data can be recorded in the NHMD. Selection criteria can be based on external cause codes recorded in the first external cause field (this is sometimes called the 'main' external cause code field). The selection criteria can be extended to include those cases where an external cause code did not appear in the 'main' external cause field, but appeared in one of the other external cause code fields, i.e. the 'first appearing' external cause code. This is approach is especially useful for some data years where some jurisdictions did not record external cause codes in the 'main' external cause code field for significant numbers of cases.

(b) At the time of writing the Australian 30 June 1991 persons population was the standard population. This was to be changed to the 30 June 2001 Australian persons population when the ABS released the final population figures.

NHPA injury prevention and control indicator 6.1

Identifying and descriptive attributes			
Data element ID:	NHPA Indicator (Injury Prevention and Control) 6.1		
Data element title:	Hospital separation rate for sport and recreation-related injuries		
Version number:	1		
Type:	Derived Data Element		
Status:	Draft		
Proposed definition:	Number of hospital separations occurring while engaged in sports per 100,000 population per financial year, age standardised. 'Sport and recreation-related' injuries are defined as cases given an ICD-10-AM code indicating that injury occurred while the person was engaged in a sport or leisure activity.		
Context:	Reliable and comprehensive data the national extent and impact of injury related to sport and recreation has been very limited, due partly to lack, until recently, of relevant coding of deaths and hospital separations data.		
Relational and representational attributes			
Data type:	Numeric		
Representational form:	Rate	**Minimum size:**	3
Representational layout:	N,NNN.N	**Maximum size:**	7
Scope of indicator:	**Sex:**	All persons	
	Geographical area of interest:	Australia	
	Lower age limit:	None	
	Upper age limit:	None	
	Other specification(s) of interest:	None	
Definition of formula variables:	**Numerator:**	**For hospital separations coded to ICD-9-CM:** Not possible—no activity code available. **For hospital separations coded to ICD-10-AM:** Total number of registered hospital separations in Australia assigned to relevant ICD-10-AM Activity codes for a particular year	
	Denominator:	Mid-year total for Australian population for the same year as the numerator	
Formula:	(Total number of hospital separations coded to relevant ICD-10-AM Activity codes*100,000)/Mid-year population total; age-standardised by using the direct method and the standard Australian population **Complete formula for direct method:** $SR = \Sigma(r_i P_i) / \Sigma(P_i)$ *where* *SR* is the age-standardised rate for the population being studied r_i is the age-group specific rate for age group *i* in the population being studied P_i is the population of age group *i* in the standard population		
Guide for use:	This indicator cannot be calculated for data coded to ICD-9-CM as it was not possible to identify relevant cases because of the absence of an activity code in the classification system. ICD-10-AM allows for the identification of sports-related injury. For purposes of comparison of population rates for Australia over time, and/or population within Australia, the standard population to be used is the final 30 June estimated Australian resident total population (males plus females) for the most recent year ending in 1.		
Related data references:	**Related indicator:** 6.2 Non-hospital admitted sport and recreation-related injuries		

Administrative attributes		
Date of submission:		
Source organisation:	National Health Priority Action Council	
Source document for indicator:	Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS	
Date effective:		
Date ineffective:		
Review of indicator:	**Planned review frequency:**	
	Base date:	
	Planned review date:	
Sources of formula variables:	**Numerator:**	AIHW. National Hospital Morbidity Database
	Denominator:	ABS. Australian Demographic Statistics Cat. no. 3101.0
Reporting:	**Reporting required by:**	Australian Health Ministers
	Indicators reported to:	Australian Institute of Health and Welfare
		Department of Health and Ageing
	Reporting frequency:	Every two years
Interpretation:	Trends in hospital separations having an External Cause code are difficult to interpret due to (1) potential variation in the sub-group of separations to which External Cause codes are applied; and (2) potential variation in admission practice, especially for lower severity cases.	
Comments:	Please see Table A6.1 for the *Minimal Change* and *Technically Revised* models for reporting on this indicator. This indicator could not be specified in a nationally consistent way for separations before ICD-10-AM came into general use in July1999. The case definition and quality of case collection warrant investigation, if trends in this indicator are to be interpretable This should take account of the development of the Activity item in ICD-10-AM from the first to the third edition. The title of the indicator refers to a class of injuries ('sport and recreation-related injuries') that is not inherently well defined, and does not correspond exactly to Activity code titles available in ICD-10-AM. We have specified the indicator in terms of values of the ICD-10-AM Activity code for injury 'while engaged in sports' and 'while engaged in leisure'. Note that the code values for these categories have changed between editions of ICD-10-AM (see Table A 6.1, below). More meaningful monitoring of trends might prove to be possible if this scope is altered (e.g. by restricting scope to some of the more specific types of sports and leisure activities for which categories are provided in the 3rd edition of ICD-10-AM). However, data necessary to make this assessment were not available at the time of writing.	
Data element links		
Related NHPA goal:	None specified	
Information model entities linked to this data element:		
Indicator frameworks entities linked to this data element:		
Data set agreements which include this data element:		
Keywords relating to this data element:		

Table A6.1: *Minimal Change* and *Technically Revised* models for reporting on Indicator 6.1

	***Minimal Change* model**	***Technically Revised* Model**
General case inclusion criterion (applies to **all** mortality indicators)	None	Principal Diagnosis is an injury or poisoning.
General case inclusion code ranges (apply to **all** mortality indicators)	None	ICD-9-CM: 800–904, 910–999 ICD-10-AM: S00–T89 Included in these ranges are all injury cases, except *Sequelae (late effects) of injury & poisoning*
Specific case inclusion criteria (apply to **this** indicator)	Cases coded to relevant Activity code for external cause categories V01–Y34	As for *Minimal Change* model
Specific case inclusion code ranges (apply to **this** indicator)	ICD-10-AM, 1st Edition: Activity=0 or 1 ICD-10-AM, 2nd Edition: Activity=Y93.00-Y93.09, Y93.1 ICD-10-AM, 3rd Edition: Activity=U50–U72	As for *Minimal Change* model
Basis for reporting periods	Date of separation	Date of separation
Reporting periods	1 July to 30 June (i.e. financial year)	1 July to 30 June (i.e. financial year)
Population for age-standardisation	Australian 30 June 1991 persons population is the standard population [(b)] Five-year age groups to ages '85+ years' are used in standardisation	Australian 30 June 1991 persons population is the standard population [(b)] Five-year age groups to ages '95+ years' are used in standardisation
Denominator for rates (mid-point of reporting periods)	ERP as at 31 December	ERP as at 31 December
Restriction to avoid counting multiple separations per incident case	None	Omit cases where admission is statistical, or from another acute care hospital
Restriction to omit variably-ascertained case types	None	Omit 'same-day' separations

(a) There are up to 31 fields where external cause data can be recorded in the NHMD. Selection criteria can be based on external cause codes recorded in the first external cause field (this is sometimes called the 'main' external cause code field). The selection criteria can be extended to include those cases where an external cause code did not appear in the 'main' external cause field, but appeared in one of the other external cause code fields, i.e. the 'first appearing' external cause code. This is approach is especially useful for some data years where some jurisdictions did not record external cause codes in the 'main' external cause code field for significant numbers of cases.

(b) At the time of writing the Australian 30 June 1991 persons population was the standard population. This was to be changed to the 30 June 2001 Australian persons population when the ABS released the final population figures.

NHPA injury prevention and control indicator 6.2

Identifying and descriptive attributes		
Data element ID:	NHPA Indicator (Injury Prevention and Control) 6.2	
Data element title:	Non-hospital admitted sport and recreation-related injuries	
Version number:	1	
Type:	Derived Data Element	
Status:	Draft	
Definition:	Not defined	
Context:		
Relational and representational attributes		
Data type:		
Representational form:		**Minimum size:**
Representational layout:		**Maximum size:**
Scope of indicator:	**Sex:**	
	Geographical area of interest:	
	Lower age limit:	
	Upper age limit:	
	Other specification(s) of interest:	
Definition of formula variables:	**Numerator:**	
	Denominator:	
Formula:		
Guide for use:		
Related data references:		
Administrative attributes		
Date of submission:		
Source organisation:	National Health Priority Action Council	
Source document for indicator:	Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS	
Date effective:		
Date ineffective:		
Review of indicator:	**Planned review frequency:**	
	Base date:	
	Planned review date:	
Sources of formula variables:	**Numerator:**	
	Denominator:	
Reporting:	**Reporting required by:**	
	Indicators reported to:	
	Reporting frequency:	
Interpretation:		
Comments:	No national data are available to allow the definition or monitoring of this indicator. Serial population surveys may be the most feasible method to obtain data for this indicator. The 2001 National Health Survey is likely to provide an estimate.	

Data element links	
Related NHPA goal:	
Information model entities linked to this data element:	
Indicator frameworks entities linked to this data element:	
Data set agreements which include this data element:	
Keywords relating to this data element:	

NHPA injury prevention and control indicator 7.1

Identifying and descriptive attributes			
Data element ID:	NHPA Indicator (Injury Prevention and Control) 7.1		
Data element title:	Death rate for homicide among people aged 20–39 years		
Version number:	1		
Type:	Derived Data Element		
Status:	Draft		
Definition:	Number of death occurrences due to homicide among people aged 20–39 years per 100,000 population per financial year by sex, age-standardised.		
Context:	Fatal outcomes from intentional injuries or homicide provide a practical indicator of the nature and extent of interpersonal violence in the population. However, homicides are not distributed evenly throughout the population, being more prevalent among young and Indigenous peoples. In 1997–98, 94 males and 6 females aged 20–39 years died as a result of interpersonal violence. This yielded a rate of 3.0 per 100,000 population for males and 0.2 for females. There is little sign of an overall trend in death rates from this cause during the period since 1979, though rates for females have decreased a little.		
Relational and representational attributes			
Data type:	Numeric		
Representational form:	Rate	**Minimum size:**	3
Representational layout:	N,NNN.N	**Maximum size:**	7
Scope of indicator:	**Sex:**	Males and females	
	Geographical area of interest:	Australia	
	Lower age limit:	20	
	Upper age limit:	39	
	Other specification(s) of interest:	None	
Definition of formula variables:	**Numerator:**	**For deaths coded to ICD-9:** Number of death occurrences in Australia among persons aged 20–39 years assigned to relevant ICD-9 codes for a particular year **For deaths coded to ICD-10:** Total number of death occurrences in Australia among persons aged 20–39 years assigned to relevant ICD-10 codes for a particular year	
	Denominator:	Mid-year total for Australian population for the same year as the numerator	
Formula:	(Total number of death occurrences coded to relevant External Cause codes among people aged 20–39 years *100,000)/Mid-year population total for relevant year; age standardised using direct method and the standard Australian population **Complete formula for direct method:** $SR = \Sigma(r_i P_i) / \Sigma(P_i)$ *where* *SR* is the age-standardised rate for the population being studied r_i is the age-group specific rate for age group *i* in the population being studied P_i is the population of age group *i* in the standard population		
Guide for use:	Five-year age groups (in years) to be used are: 20–24, 25–29, 30–34, 35–39. Rates are calculated for males and females and displayed by sex. For purposes of comparison of population rates for Australia over time, and/or population within Australia, the standard population to be used is the final 30 June estimated Australian resident total population (males plus females) for the most recent year ending in 1.		

Related data references:	**Related indicator:**	
	7.2 Death rate for homicide among children aged 0–9 years	
Administrative attributes		
Date of submission:		
Source organisation:	National Health Priority Action Council	
Source document for indicator:	Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS	
Date effective:		
Date ineffective:		
Review of indicator:	**Planned review frequency:**	
	Base date:	
	Planned review date:	
Sources of formula variables:	**Numerator:**	ABS. National mortality database 1979 to latest available
	Denominator:	ABS. Australian Demographic Statistics Cat. no. 3101.0
Reporting:	**Reporting required by:**	Australian Health Ministers
	Indicators reported to:	Australian Institute of Health and Welfare
		Department of Health and Ageing
	Reporting frequency:	Every two years
Interpretation:	This indicator should have a downward trend.	
Comments:	Please see Table A7.1 for the *Minimal Change* and *Technically Revised* models for reporting on this indicator.	
	Rates continue to be relatively high for males in the age range specified for this indicator. However, given the relatively small homicide case numbers, and the substantial proportion of the deaths that are outside the present scope of this indicator, consideration could be given to reviewing the age restriction.	
Data element links		
Related NHPA goal:	NHPA primary goal (Injury Prevention and Control) 7.1	
Information model entities linked to this data element:		
Indicator frameworks entities linked to this data element:		
Data set agreements which include this data element:		
Keywords relating to this data element:		

Table A7.1: *Minimal Change* and *Technically Revised* models for reporting on Indicator 7.1

	***Minimal Change* model**	***Technically Revised* Model**
General case inclusion criterion (applies to **all** mortality indicators)	None	A 'multiple cause of death' field that contains an injury or poisoning code
General case inclusion code ranges (apply to **all** mortality indicators)	None	ICD-9: 800–904, 910–999 ICD-10: S00–T89 Included in these ranges are all injury cases, except *Sequelae (late effects) of injury & poisoning*
Specific case inclusion criteria (apply to **this** indicator)	'Underlying cause of death' is an external cause code in the specified range	As for *Minimal Change* model
Specific case inclusion code ranges (apply to **this** indicator)	ICD-9: E960–E978, E990–999 ICD-10: X85–Y09, Y87.1,Y35–Y36, Y89.0, Y89.1	As for *Minimal Change* model
Basis for reporting periods	Date of death registration	Date of death occurrence
Reporting periods	1 January to 31 December (i.e. calendar year)	1 July to 30 June (i.e. financial year; cases registered by the end of the calendar year beginning during the period are included)
Population for age-standardisation	Australian 30 June 1991 persons population is the standard population [(a)] Five-year age groups to ages '85+ years' are used in standardisation	Australian 30 June 1991 persons population is the standard population [(a)] Five-year age groups to ages '95+ years' are used in standardisation
Denominator for rates (mid-point of reporting periods)	Estimated resident population at 30 June	ERP at 31 December

(a) At the time of writing the Australian 30 June 1991 persons population was the standard population. This was to be changed to the 30 June 2001 Australian persons population when the ABS released the final population figures.

NHPA injury prevention and control indicator 7.2

Identifying and descriptive attributes	
Data element ID:	NHPA Indicator (Injury Prevention and Control) 7.2
Data element title:	Death rate for homicide among children aged 0–9 years
Version number:	1
Type:	Derived Data Element
Status:	Draft
Definition:	Number of death occurrences due to homicide among people aged 0–9 years per 100,000 population per financial year by sex, age-standardised.
Context:	A number of structural, cultural and psychosocial factors contribute to child battering and maltreatment. Injury deaths inflicted by others on children have been specifically targeted under the NHPA initiative. Babies and toddlers are at greater risk from death due to abuse and violence than are older children. Children aged 0–4 years accounted for 4.7% of all homicide deaths in the period 1979–80 to 1997–98, whereas children aged 5–9 years constituted an additional 1.4% of all homicides. The homicide rate for children aged 0–9 years was 0.7 per 100,000 population in 1997–98. The rate has been fairly stable since the early 1980s.

Relational and representational attributes			
Data type:	Numeric		
Representational form:	Rate	**Minimum size:**	3
Representational layout:	N,NNN.N	**Maximum size:**	7
Scope of indicator:	**Sex:**	All persons	
	Geographical area of interest:	Australia	
	Lower age limit:	0	
	Upper age limit:	9	
	Other specification(s) of interest:	None	
Definition of formula variables:	**Numerator:**	**For deaths coded to ICD-9:** Number of death occurrences in Australia among children aged 0–9 years assigned to relevant ICD-9 codes for a particular year **For deaths coded to ICD-10:** Total number of death occurrences in Australia among children aged 0–9 years assigned to relevant ICD-10 codes for a particular year	
	Denominator:	Mid-year total for Australian population for children aged 0–9 years for the same year as the numerator	
Formula:	(Total number of death occurrences coded to relevant External Cause codes among people aged 0–9 years *100,000)/Mid-year population total for relevant age group for the same year as in numerator; age standardised using direct method and the standard Australian population **Complete formula for direct method:** $SR = \Sigma(r_i P_i) / \Sigma(P_i)$ *where* SR is the age-standardised rate for the population being studied r_i is the age-group specific rate for age group i in the population being studied P_i is the population of age group i in the standard population		

Guide for use:	Five-year age groups (in years) to be used are: 0–4, 5–9.	
	Data can be presented for age groups 0–4 years and 5–9 years separately.	
	For purposes of comparison of population rates for Australia over time, and/or population within Australia, the standard population to be used is the final 30 June estimated Australian resident total population (males plus females) for the most recent year ending in 1.	
Related data references:	**Other Indicators related to homicide:**	
	7.1 Death rate for homicide among people aged 0–9 years	
	Other Indicators related to child injury:	
	5.5 Hospital separation rate for falls among children aged 0–4 and 5–9 years	
	9.2 Hospital separations rate for injury resulting from fire, burns and scalds among children aged 0–4 years	
	11.1 Death rate among drowning in the total population and among children aged 0–4 years	
	11.2 Hospital separation rate for near drowning among children aged 0–4 years	
Administrative attributes		
Date of submission:		
Source organisation:	National Health Priority Action Council	
Source document for indicator:	Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS	
Date effective:		
Date ineffective:		
Review of indicator:	**Planned review frequency:**	
	Base date:	
	Planned review date:	
Sources of formula variables:	**Numerator:**	ABS. National mortality database 1979–latest available
	Denominator:	ABS. Australian Demographic Statistics Cat. no. 3101.0
Reporting:	**Reporting required by:**	Australian Health Ministers
	Indicators reported to:	Australian Institute of Health and Welfare
		Department of Health and Ageing
	Reporting frequency:	Every two years
Interpretation:	This indicator should have a downward trend.	
Comments:	Please see Table A7.2 for the *Minimal Change* and *Technically Revised* models for reporting on this indicator.	
	Rates of child homicide are considerably higher at ages 0 to 4 years than at 5 to 9 years. Consideration should be given to revising the age range included to 0 to 4 years, despite the smaller number of cases and greater year to year variation in rates that would result.	
Data element links		
Related NHPA goal:	NHPA primary goal (Injury Prevention and Control) 7.2	
Information model entities linked to this data element:		
Indicator frameworks entities linked to this data element:		
Data set agreements which include this data element:		
Keywords relating to this data element:		

Table A7.2: *Minimal Change* and *Technically Revised* models for reporting on Indicator 7.2

	***Minimal Change* model**	***Technically Revised* Model**
General case inclusion criterion (applies to **all** mortality indicators)	None	A 'multiple cause of death' field that contains an injury or poisoning code
General case inclusion code ranges (apply to **all** mortality indicators)	None	ICD-9: 800–904, 910–999 ICD-10: S00–T89 Included in these ranges are all injury cases, except *Sequelae (late effects) of injury & poisoning*
Specific case inclusion criteria (apply to **this** indicator)	'Underlying cause of death' is an external cause code in the specified range	As for *Minimal Change* model
Specific case inclusion code ranges (apply to **this** indicator)	ICD-9: E960–E978, E990–999 ICD-10: X85–Y09, Y87.1,Y35–Y36, Y89.0, Y89.1	As for *Minimal Change* model
Basis for reporting periods	Date of death registration	Date of death occurrence
Reporting periods	1 January to 31 December (i.e. calendar year)	1 July to 30 June (i.e. financial year; cases registered by the end of the calendar year beginning during the period are included)
Population for age-standardisation	Australian 30 June 1991 persons population is the standard population [(a)] Five-year age groups to ages '85+ years' are used in standardisation	Australian 30 June 1991 persons population is the standard population [(a)] Five-year age groups to ages '95+ years' are used in standardisation
Denominator for rates (mid-point of reporting periods)	Estimated resident population at 30 June	ERP at 31 December

(a) At the time of writing the Australian 30 June 1991 persons population was the standard population. This was to be changed to the 30 June 2001 Australian persons population when the ABS released the final population figures.

NHPA injury prevention and control indicator 8.2

Identifying and descriptive attributes		
Data element ID:	NHPA Indicator (Injury Prevention and Control) 8.2	
Data element title:	Emergency department attendances resulting from product-related injury	
Version number:	1	
Type:	Derived Data Element	
Status:	Draft	
Definition:	Not defined	
Context:	Products contribute to a large proportion of all injuries. Increasing the safety of products is possible as evidenced by improvements in making motor vehicles safer for occupants, reducing child poisoning by pharmaceutical substances, and decreasing burns due to flammable clothing. Product safety is receiving more attention and there are moves to a more coordinated approach to address this problem. Monitoring of deaths and injuries involving products needs to be an important issue in this.	
Relational and representational attributes		
Data type:		
Representational form:		**Minimum size:**
Representational layout:		**Maximum size:**
Scope of indicator:	**Sex:**	
	Geographical area of interest:	
	Lower age limit:	
	Upper age limit:	
	Other specification(s) of interest:	
Definition of formula variables:	**Numerator:**	
	Denominator:	
Formula:		
Guide for use:		
Related data references:		
Administrative attributes		
Date of submission:		
Source organisation:	National Health Priority Action Council	
Source document for indicator:	Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS	
Date effective:		
Date ineffective:		
Review of indicator:	**Planned review frequency:**	
	Base date:	
	Planned review date:	
Sources of formula variables:	**Numerator:**	
	Denominator:	
Reporting:	**Reporting required by:**	
	Indicators reported to:	
	Reporting frequency:	
Interpretation:		

Comments:	'Product–related injury' is not well defined. Operational definition might be achieved by specifying a subset of ICD-10 or ICECI external cause codes as being 'product-related'. Product-related injuries would be those having any of the specified codes.

Data element links	
Related NHPA goal:	
Information model entities linked to this data element:	
Indicator frameworks entities linked to this data element:	
Data set agreements which include this data element:	
Keywords relating to this data element:	

NHPA injury prevention and control indicator 9.1

Identifying and descriptive attributes			
Data element ID:	NHPA Indicator (Injury Prevention and Control) 9.1		
Data element title:	Death rate for injury resulting from fire, burns and scalds among people aged 55 years and over		
Version number:	1		
Type:	Derived Data Element		
Status:	Draft		
Definition:	Number of death occurrences due to fire, burns and scalds among people aged 55 years or more per 100,000 population per financial year, age-standardised.		
Context:	Accidents due to fire, burns and scalds account for a relatively small proportion of injury incidents. However, the economic and long-term physical and psychosocial implications of serious burns and scalds injury are enormous and highlight the need for more extensive preventive action. In 1997–98, 58 people aged 55 years or more died because of injuries related to fire, burns and scalds. The age-standardised death rate for fire, burns and scalds among people aged 55 years and older were 1.4 per 100,000 in 1997–98. The rate has decreased from 2.9 per 100,000 population in 1991–92.		
Relational and representational attributes			
Data type:	Numeric		
Representational form:	Rate	**Minimum size:**	3
Representational layout:	N,NNN.N	**Maximum size:**	7
Scope of indicator:	**Sex:**	All persons	
	Geographical area of interest:	Australia	
	Lower age limit:	55	
	Upper age limit:	None	
	Other specification(s) of interest:	None	
Definition of formula variables:	**Numerator:**	**For deaths coded to ICD-9:** Number of death occurrences in Australia among persons aged 55+ years assigned to relevant ICD-9 codes for a particular year **For deaths coded to ICD-10:** Total number of death occurrences in Australia among persons aged 55+ years assigned to relevant ICD-10 codes for a particular year	
	Denominator:	Mid-year total for Australian population relevant age group for the same year as the numerator	
Formula:	(Total number of death occurrences coded to relevant External Cause codes among people aged 55+ years *100,000)/Mid-year population total for relevant age group for the same year as in numerator; age standardised using direct method and the standard Australian population **Complete formula for direct method:** $SR = \Sigma(r_i P_i) / \Sigma(P_i)$ *where* SR is the age-standardised rate for the population being studied r_i is the age-group specific rate for age group i in the population being studied P_i is the population of age group i in the standard population		

Guide for use:	Five-year age groups (in years) to be used are: 55–59, 60–64, 65–69, 70–74, 75–79, 80–84, 85+ years. Given the expansion of the size of the population for elderly Australians, notably those aged 85 years and older, consideration should be given to adding the five-year age groups 85–89, 90–94 and 95+ years. For purposes of comparison of population rates for Australia over time, and/or population within Australia, the standard population to be used is the final 30 June estimated Australian resident total population (males plus females) for the most recent year ending in 1.	
Related data references:	**Related indicator:** 9.2 Hospital separations due to fire, burns and scalds among children aged 0–4 years	
Administrative attributes		
Date of submission:		
Source organisation:	National Health Priority Action Council	
Source document for indicator:	Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS	
Date effective:		
Date ineffective:		
Review of indicator:	**Planned review frequency:**	
	Base date:	
	Planned review date:	
Sources of formula variables:	**Numerator:**	ABS. National mortality database 1979–latest available
	Denominator:	ABS. Australian Demographic Statistics Cat. no. 3101.0
Reporting:	**Reporting required by:**	Australian Health Ministers
	Indicators reported to:	Australian Institute of Health and Welfare Department of Health and Ageing
	Reporting frequency:	Every two years
Interpretation:	This indicator should have a downward trend. The rate has decreased between 1979 and 1998.	
Comments:	Please see Table A9.1 for the *Minimal Change* and *Technically Revised* models for reporting on this indicator. Although the intended conceptual scope of the ICD-9 and ICD-10 ranges of external cause codes specified for this indicator is similar (i.e.unintentional thermal injury) it is not identical and the difference is difficult to remove. However, the effect of the difference on this indicator is small because most cases are of types that are within the scope of each range. The ICD-10 code range (X00-X19) is conceptually simpler and more inclusive than that for ICD-9 (E890–E899, E924.0). If adjustment of inclusion is required to achieve adequate comparability between ICD-9 data and ICD-10 data for this indicator, then the change should preferably be made to the ICD-9 code range.	
Data element links		
Related NHPA goal:	NHPA primary goal (Injury Prevention and Control) 9.1	
Information model entities linked to this data element:		
Indicator frameworks entities linked to this data element:		
Data set agreements which include this data element:		
Keywords relating to this data element:		

Table A9.1: *Minimal Change* and *Technically Revised* models for reporting on Indicator 9.1

	***Minimal Change* model**	***Technically Revised* Model**
General case inclusion criterion (applies to **all** mortality indicators)	None	A 'multiple cause of death' field that contains an injury or poisoning code
General case inclusion code ranges (apply to **all** mortality indicators)	None	ICD-9: 800–904, 910–999 ICD-10: S00–T89 Included in these ranges are all injury cases, except *Sequelae (late effects) of injury & poisoning*
Specific case inclusion criteria (apply to **this** indicator)	'Underlying cause of death' is an external cause code in the specified range	As for *Minimal Change* model
Specific case inclusion code ranges (apply to **this** indicator)	ICD-9: E890–E899, E924.0 ICD-10: X00–X19	As for *Minimal Change* model[(a)]
Basis for reporting periods	Date of death registration	Date of death occurrence
Reporting periods	1 January to 31 December (i.e. calendar year)	1 July to 30 June (i.e. financial year; cases registered by the end of the calendar year beginning during the period are included)
Population for age-standardisation	Australian 30 June 1991 persons population is the standard population[(b)] Five-year age groups to ages '85+ years' are used in standardisation	Australian 30 June 1991 persons population is the standard population[(b)] Five-year age groups to ages '95+ years' are used in standardisation
Denominator for rates (mid-point of reporting periods)	Estimated resident population at 30 June	ERP at 31 December

(a) Although the intended conceptual scope of the ICD-9 and ICD-10 ranges of external cause codes is similar (i.e.unintentional thermal injury) it is not identical and the difference is difficult to remove. However, the effect of the difference on this indicator is small because most cases are of types that are within the scope of each range.

(b) At the time of writing the Australian 30 June 1991 persons population was the standard population. This was to be changed to the 30 June 2001 Australian persons population when the ABS released the final population figures.

NHPA injury prevention and control indicator 9.2

Identifying and descriptive attributes	
Data element ID:	NHPA Indicator (Injury Prevention and Control) 9.2
Data element title:	Hospital separation rate for injury resulting from fire, burns and scalds among children aged 0–4 years
Version number:	1
Type:	Derived Data Element
Definition:	Number of hospital separations due to fire, burns and scalds among children aged 0–4 years per 100,000 population per financial year.
Status:	Draft
Context:	Accidents due to fire, burns and scalds account for a relatively small proportion of injury incidents. However, the economic and long-term physical and psychosocial implications of serious burns and scalds injury are enormous and highlight the need for more extensive preventive action. Children aged 0–4 year are particularly at risk of serious injury due to fire, burn and scalds. In 1997–98, the age-standardised separations rate for all ages was 23.2 per 100,000 population, whereas the rate for children aged 0–4 years, the rate was 71.6 per 100,000 population.

Relational and representational attributes			
Data type:	Numeric		
Representational form:	Rate	**Minimum size:**	3
Representational layout:	N,NNN.N	**Maximum size:**	7
Scope of indicator:	**Sex:**	All persons	
	Geographical area of interest:	Australia	
	Lower age limit:	0	
	Upper age limit:	4	
	Other specification(s) of interest:	None	
Definition of formula variables:	**Numerator:**	**For hospital separations coded to ICD-9-CM:** Total number of hospital separations in Australia assigned to relevant ICD-9-CM codes among children aged 0–4 years or more for a particular year **For hospital separations coded to ICD-10-AM:** Total number of hospital separations in Australia assigned to relevant ICD-10-AM External Cause codes among children aged 0–4 years for a particular year	
	Denominator:	Mid-year total for Australian population for the relevant age group for the same year as the numerator	
Formula:	(Total number of hospital separations coded to relevant ICD codes among children aged 0–4 years*100,000)/Mid-year population total for children aged 0–4 years for the same year as in numerator **Complete formula for direct method:** $R = (d*100,000/n)$ *where* R is the age-specific rate for the population being studied d is the number of events for that population group n is the total population for that population group		
Guide for use:	Five-year age group (in years) to be used are: 0–4 years. For purposes of comparison of population rates for Australia over time, and/or population within Australia, the standard population to be used is the final 30 June estimated Australian resident total population (males plus females) for the most recent year ending in 1.		

Related data references:	**Indicator related to burns and scalds:**	
	9.1 Death rate for injury resulting from fire, burns and scalds among people aged 55 years and over	
	Other indicators related to childhood injury:	
	5.5 Hospital separation rate for falls among children aged 0–4 and 5–9 years	
	7.2 Death rate for homicide among children aged 0–9 years	
	10.1 Hospital separation rate due to poisoning among children aged 0–4 years	
	11.1 Death rate for drowning in the total population and among children aged 0–4 years	
	11.2 Hospital separation rate for near drowning among children 0–4 years	
	11.5 The proportion of children and young people aged 10–16 years who have successfully completed a water safety and lifesaving course	
Administrative attributes		
Date of submission:		
Source organisation:	National Health Priority Action Council	
Source document for indicator:	Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS	
Date effective:		
Date ineffective:		
Review of indicator:	**Planned review frequency:**	
	Base date:	
	Planned review date:	
Sources of formula variables:	**Numerator:**	AIHW. National Hospital Morbidity Database
	Denominator:	ABS. Australian Demographic Statistics Cat.no. 3101.0
Reporting:	**Reporting required by:**	Australian Health Ministers
	Indicators reported to:	Australian Institute of Health and Welfare
		Department of Health and Ageing
	Reporting frequency:	Every two years
Interpretation:		
Comments:	Please see Table A9.2 for the *Minimal Change* and *Technically Revised* models for reporting on this indicator.	
	Although the intended conceptual scope of the ICD-9-CM and ICD-10-AM ranges of external cause codes specified for this indicator is similar (i.e.unintentional thermal injury) it is not identical and the difference is difficult to remove. The effect of the difference on this indicator is fairly large because many cases are of types that appear to be treated differently by the two code ranges. There is, therefore, a break in series for this indicator as currently specified.	
	The ICD-10-AM code range (X00-X19) is conceptually simpler and more inclusive than that for ICD-9-CM (E890–E899, E924.0). If adjustment of inclusion criteria is required to achieve adequate comparability between ICD-9-CM data and ICD-10-AM data for this indicator, then the change should preferably be made to the ICD-9 code range.	
	Changes to the ICD-9-CM code range that would improve comparability with the ICD-10-AM range are inclusion of E924.2, E924.8 and E924.9. Inclusion of further cases is required to achieve good comparability. Investigation of ways to achieve this was in progress at the time of writing.	
Data element links		
Related NHPA goal:	NHPA primary goal (Injury Prevention and Control) 9.2	
Information model entities linked to this data element:		
Indicator frameworks entities linked to this data element:		
Data set agreements which include this data element:		
Keywords relating to this data element:		

Table A9.2: *Minimal Change* and *Technically Revised* models for reporting on Indicator 9.2

	***Minimal Change* model**	***Technically Revised* Model**
General case inclusion criterion (applies to **all** mortality indicators)	None	Principal Diagnosis is an injury or poisoning.
General case inclusion code ranges (apply to **all** mortality indicators)	None	ICD-9-CM: 800–904, 910–999 ICD-10-AM: S00–T89 Included in these ranges are all injury cases, except *Sequelae (late effects) of injury & poisoning*
Specific case inclusion criteria (apply to **this** indicator)	First (left-most) external cause code in the specified range [(a)]	As for *Minimal Change* model
Specific case inclusion code ranges (apply to **this** indicator)	ICD-9: E890–E899, E924.0 ICD-10: X00–X19	As for *Minimal Change* model [(b)]
Basis for reporting periods	Date of separation	Date of separation
Reporting periods	1 July to 30 June (i.e. financial year)	1 July to 30 June (i.e. financial year)
Population for age-standardisation	Australian 30 June 1991 persons population is the standard population [(c)] Five-year age groups to ages '85+ years' are used in standardisation	Australian 30 June 1991 persons population is the standard population [(c)] Five-year age groups to ages '95+ years' are used in standardisation
Denominator for rates (mid-point of reporting periods)	ERP as at 31 December	ERP as at 31 December
Restriction to avoid counting multiple separations per incident case	None	Omit cases where admission is statistical, or from another acute care hospital
Restriction to omit variably-ascertained case types	None	Omit 'same-day' separations

(a) There are up to 31 fields where external cause data can be recorded in the NHMD. Selection criteria can be based on external cause codes recorded in the first external cause field (this is sometimes called the 'main' external cause code field). The selection criteria can be extended to include those cases where an external cause code did not appear in the 'main' external cause field, but appeared in one of the other external cause code fields, i.e. the 'first appearing' external cause code. This is approach is especially useful for some data years where some jurisdictions did not record external cause codes in the 'main' external cause code field for significant numbers of cases.

(b) Although the intended conceptual scope of the ICD-9-CM and ICD-10-AM ranges of external cause codes specified for this indicator is similar (i.e.unintentional thermal injury) it is not identical and the difference is difficult to remove. The effect of the difference on this indicator is fairly large because many cases are of types that appear to be treated differently by the two code ranges. There is, therefore, a break in series for this indicator as specified here. (See also Comments, above)

(c) At the time of writing the Australian 30 June 1991 persons population was the standard population. This was to be changed to the 30 June 2001 Australian persons population when the ABS released the final population figures.

NHPA injury prevention and control indicator 9.3

Identifying and descriptive attributes		
Data element ID:	NHPA Indicator (Injury Prevention and Control) 9.3	
Data element title:	The proportion of houses equipped with smoke detectors and earth leakage breakers	
Version number:	1	
Type:	Derived Data Element	
Status:	Draft	
Definition:	Not defined	
Context:		
Relational and representational attributes		
Data type:		
Representational form:		**Minimum size:**
Representational layout:		**Maximum size:**
Scope of indicator:	**Sex:**	
	Geographical area of interest:	
	Lower age limit:	
	Upper age limit:	
	Other specification(s) of interest:	
Definition of formula variables:	**Numerator:**	
	Denominator:	
Formula:		
Guide for use:		
Related data references:		
Administrative attributes		
Date of submission:		
Source organisation:		
Source document for indicator:	Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS	
Date effective:		
Date ineffective:		
Review of indicator:	**Planned review frequency:**	
	Base date:	
	Planned review date:	
Sources of formula variables:	**Numerator:**	
	Denominator:	
Reporting:	**Reporting required by:**	
	Indicators reported to:	
	Reporting frequency:	
Interpretation:		
Comments:	National data necessary to define and monitor this indicator are not available. A useable indicator will require more precise specification and operational definition of terms and concepts. Smoke alarms and earth leakage circuit breakers are distinct issues, which should not be included in a single indicator. Note that the correct term for smoke detectors is smoke ‘alarms’.	

Data element links	
Related NHPA goal:	
Information model entities linked to this data element:	
Indicator frameworks entities linked to this data element:	
Data set agreements which include this data element:	
Keywords relating to this data element:	

NHPA injury prevention and control indicator 10.1

Identifying and descriptive attributes			
Data element ID:	NHPA Indicator (Injury Prevention and Control) 10.1		
Data element title:	Hospital separation rate due to poisoning among children aged 0–4 years		
Version number:	1		
Type:	Derived Data Element		
Status:	Draft		
Definition:	Number of hospital separations due to poisoning among children aged 0–4 years or more per 100,000 population per financial year.		
Context:	Accidental poisoning due to drugs and medications or by domestic chemicals and other substances is a significant cause of hospital admission for children aged 0–4 years. In 1997–98, there were 3,621 hospital separations due to accidental poisoning at a rate of 280.9 per 100,000 population.		
Relational and representational attributes			
Data type:	Numeric		
Representational form:	Rate	**Minimum size:**	3
Representational layout:	N,NNN.N	**Maximum size:**	7
Scope of indicator:	**Sex:**	All persons	
	Geographical area of interest:	Australia	
	Lower age limit:	0	
	Upper age limit:	4	
	Other specification(s) of interest:	None	
Definition of formula variables:	**Numerator:**	**For hospital separations coded to ICD-9-CM:** Total number of hospital separations in Australia assigned to relevant ICD-9-CM among children aged 0–4 years or more for a particular year **For hospital separations coded to ICD-10-AM:** Total number of hospital separations in Australia assigned to relevant ICD-10-AM codes among children aged 0–4 years for a particular year	
	Denominator:	Mid-year total for Australian population for relevant age group for the same year as the numerator	
Formula:	(Total number of hospital separations coded to relevant ICD codes among children aged 0–4 years*100,000)/Mid-year population total for children aged 0–4 years for same year as in numerator **Complete formula for direct method:** $R = (d*100,000/n)$ *where* R is the age-specific rate for the population being studied d is the number of events for that population group n is the total population for that population group		
Guide for use:	Five-year age group (in years) to be used are: 0–4. For purposes of comparison of population rates for Australia over time, and/or population within Australia, the standard population to be used is the final 30 June estimated Australian resident total population (males plus females) for the most recent year ending in 1.		

Related data references:	**Other indicators related to childhood injury:**	
	5.5 Hospital separation rate for falls among children aged 0–4 and 5–9 years	
	7.2 Death rate for homicide among children aged 0–9 years	
	9.2 Hospital separation rate for injury resulting from fire, burns and scalds among children aged 0–4 years	
	11.1 Death rate for drowning in the total population and among children aged 0–4 years	
	11.2 Hospital separation rate for near drowning among children 0–4 years	
	11.5 The proportion of children and young people aged 10–16 years who have successfully completed a water safety and lifesaving course	
Administrative attributes		
Date of submission:		
Source organisation:	National Health Priority Action Council	
Source document for indicator:	Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS	
Date effective:		
Date ineffective:		
Review of indicator:	**Planned review frequency:**	
	Base date:	
	Planned review date:	
Sources of formula variables:	**Numerator:**	AIHW. National Hospital Morbidity Database
	Denominator:	ABS. Australian Demographic Statistics Cat. no. 3101.0
Reporting:	**Reporting required by:**	Australian Health Ministers
	Indicators reported to:	Australian Institute of Health and Welfare
		Department of Health and Ageing
	Reporting frequency:	Every two years
Interpretation:	Trends in hospital separations having an External Cause code are difficult to interpret due to (1) potential variation in the sub-group of separations to which External Cause codes are applied; and (2) potential variation in admission practice, especially for lower severity cases.	
Comments:	Please see Table A10.1 for the *Minimal Change* and *Technically Revised* models for reporting on this indicator.	
	Preliminary analysis of hospital separations data suggests that the effective case inclusion of the ICD-10-AM code range for this indicator may be slightly lower than the conceptually equivalent ICD-9-CM code range. Hence, particular care should be taken in interpretation of values for this indicator for the period covering the change in classification, and will be safer to assume a break in series until there is evidence to the contrary.	
Data element links		
Related NHPA goal:	NHPA primary goal (Injury Prevention and Control) 10.1	
Information model entities linked to this data element:		
Indicator frameworks entities linked to this data element:		
Data set agreements which include this data element:		
Keywords relating to this data element:		

Table A10.1: *Minimal Change* and *Technically Revised* models for reporting on Indicator 10.1

	***Minimal Change* model**	***Technically Revised* Model**
General case inclusion criterion (applies to **all** mortality indicators)	None	Principal Diagnosis is an injury or poisoning.
General case inclusion code ranges (apply to **all** mortality indicators)	None	ICD-9-CM: 800–904, 910–999 ICD-10-AM: S00–T89 Included in these ranges are all injury cases, except *Sequelae (late effects) of injury & poisoning*
Specific case inclusion criteria (apply to **this** indicator)	First (left-most) external cause code in the specified range[(a)]	As for *Minimal Change* model
Specific case inclusion code ranges (apply to **this** indicator)	ICD-9: E850–E858, E860–E869 ICD-10: X40–X44, X45–X49	As for *Minimal Change* model
Basis for reporting periods	Date of separation	Date of separation
Reporting periods	1 July to 30 June (i.e. financial year)	1 July to 30 June (i.e. financial year)
Population for age-standardisation	Australian 30 June 1991 persons population is the standard population [(b)] Five-year age groups to ages '85+ years' are used in standardisation	Australian 30 June 1991 persons population is the standard population [(b)] Five-year age groups to ages '95+ years' are used in standardisation
Denominator for rates (mid-point of reporting periods)	ERP as at 31 December	ERP as at 31 December
Restriction to avoid counting multiple separations per incident case	None	Omit cases where admission is statistical, or from another acute care hospital
Restriction to omit variably-ascertained case types	None	Omit 'same-day' separations

(a) There are up to 31 fields where external cause data can be recorded in the NHMD. Selection criteria can be based on external cause codes recorded in the first external cause field (this is sometimes called the 'main' external cause code field). The selection criteria can be extended to include those cases where an external cause code did not appear in the 'main' external cause field, but appeared in one of the other external cause code fields, i.e. the 'first appearing' external cause code. This is approach is especially useful for some data years where some jurisdictions did not record external cause codes in the 'main' external cause code field for significant numbers of cases.

(b) At the time of writing the Australian 30 June 1991 persons population was the standard population. This was to be changed to the 30 June 2001 Australian persons population when the ABS released the final population figures.

NHPA injury prevention and control indicator 11.1

Identifying and descriptive attributes	
Data element ID:	NHPA Indicator (Injury Prevention and Control) 11.1
Data element title:	Death rate for drowning in the total population **and** among children aged 0–4 years
Version number:	1
Type:	Derived Data Element
Status:	Draft
Definition:	Number of death occurrences due to drowning in the total population and among children aged 0–4 years or more per 100,000 population per financial year.
Context:	Drowning and near-drowning is one of the four target areas in the National Injury Prevention Plan (Department of Health and Aged Care 2001). In 1997–98, 255 people died because of drowning, i.e. 3.3% of all injury deaths. Of these, 60 cases (23.5%) were aged 0–4 years. The age-specific rate for the 0–4 year age group is, on average, about three times higher than the age-specific rates for other age groups.

Relational and representational attributes			
Data type:	Numeric		
Representational form:	Rate	**Minimum size:**	3
Representational layout:	N,NNN.N	**Maximum size:**	7
Scope of indicator:	**Sex:**	All persons	
	Geographical area of interest:	Australia	
	Lower age limit:	All ages and 0 years	
	Upper age limit:	All ages and 4 years	
	Other specification(s) of interest:	None	
Definition of formula variables:	**Numerator:**	**For deaths coded to ICD-9:** (1) Total number of death occurrences in Australia assigned to relevant ICD-9 codes among the total population for a particular year (2) Total number of death occurrences in Australia assigned to relevant ICD-9 codes among children aged 0–4 years for a particular year **For deaths coded to ICD-10:** (1) Total number of death occurrences in Australia assigned to relevant ICD-10 codes among the total population for a particular year (2) Total number of death occurrences in Australia assigned to relevant ICD-10 codes among children aged 0–4 years for a particular year	
	Denominator:	(1) Mid-year total for Australian population for the same year as the numerator (2) Mid-year total for Australian population aged 0–4 years for the same year as the numerator	
Formula:	(Total number of death occurrences coded to relevant ICD codes among total population*100,000)/Mid-year population for all Australians for the same year as in the numerator; age standardised using the direct method and the standard Australian population		

Formula (continued):

(1) Complete formula for direct method for total population:

$$SR = \Sigma(r_i P_i) / \Sigma(P_i) \quad where$$

SR is the age-standardised rate for the population being studied

r_i is the age-group specific rate for age group i in the population being studied

P_i is the population of age group i in the standard population

(Total number of death occurrences coded to relevant ICD codes among children aged 0–4 years*100,000)/Mid-year population total for children aged 0–4 years

(2) Complete formula for direct method for children 0–4 years:

$$R = (d*100{,}000/n) \quad where$$

R is the age-specific rate for the population being studied

d is the number of events for that population group

n is the total population for that population group

Guide for use:

Five-year age groups (in years) to be used are: 0–4 and 0–4, 5–9, 10–14, 15–19, 20–24, 25–29, 30–34, 35–39, 40–44, 45–49, 50–54, 55–59, 60–64, 65–69, 70–74, 75–79, 80–84, 85+ years.

Given the expansion of the size of the population for elderly Australians, notably those aged 85 years and older, consideration should be given to adding the five-year age groups 85–89, 90–94 and 95+ years.

For purposes of comparison of population rates for Australia over time, and/or population within Australia, the standard population to be used is the final 30 June estimated Australian resident total population (males plus females) for the most recent year ending in 1.

Related data references:

Indicators related to drowning:

11.2 Hospital separation rate for near drowning among children aged 0–4 years

11.3 Number of States and Territories requiring separation of domestic pools from houses

11.4 The proportion of domestic pools with approved child-resistant fences, gates and barriers

11.5 The proportion of children and young people aged 10–16 years who have successfully completed a water safety and lifesaving course

Other indicators related to child injury:

5.5 Hospital separations rate for falls among children aged 0–4 and 5–9 years

7.2 Death rate for homicide among children aged 0–9 years

9.2 Hospital separation rate for injury resulting from fire, burns and scalds among children aged 0–4 years

10.1 Hospital separation rate due to poisoning among children aged 0–4 years

Administrative attributes

Date of submission:

Source organisation: National Health Priority Action Council

Source document for indicator: Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS

Date effective:

Date ineffective:

Review of indicator:

Planned review frequency:

Base date:

Planned review date:

Sources of formula variables:

Numerator: ABS. National mortality database 1979–latest available

Denominator: ABS. Australian Demographic Statistics Cat. no. 3101.0

Reporting:

Reporting required by: Australian Health Ministers

Indicators reported to: Australian Institute of Health and Welfare

Department of Health and Ageing

Reporting frequency: Every two years

Interpretation:	The rate should have a downward trend.
Comments:	Please see Table A11.1 for the *Minimal Change* and *Technically Revised* models for reporting on this indicator. The National Injury Prevention Plan specifies young males aged 15–34 years as a target population for prevention of drowning and near drowning. Consider reviewing this indicator and the Plan with a view to reconciling this difference. Consider separating the two distinct indicators within this one (i.e.all ages and ages 0-4 years). The external code ranges that define case inclusion for this indicator exclude about one-third of the deaths by drowning that can be identified in recent Australian deaths data (e.g. drowning related to water transport). Consider revising the scope of the indicator to include a larger proportion of drowning. Note that this change would have little effect on the indicator of drowning at ages 0 to 4 years, as nearly all cases are included by the current definition.
Data element links	
Related NHPA goal:	NHPA primary goal (Injury Prevention and Control) 11.1
Information model entities linked to this data element:	
Indicator frameworks entities linked to this data element:	
Data set agreements which include this data element:	
Keywords relating to this data element:	

Table A11.1: *Minimal Change* and *Technically Revised* models for reporting on Indicator 11.1

	Minimal Change model	***Technically Revised* Model**
General case inclusion criterion (applies to **all** mortality indicators)	None	A 'multiple cause of death' field that contains an injury or poisoning code
General case inclusion code ranges (apply to **all** mortality indicators)	None	ICD-9: 800–904, 910–999 ICD-10: S00–T89 Included in these ranges are all injury cases, except *Sequelae (late effects) of injury & poisoning*
Specific case inclusion criteria (apply to **this** indicator)	'Underlying cause of death' is an external cause code in the specified range	As for *Minimal Change* model
Specific case inclusion code ranges (apply to **this** indicator)	ICD-9: E910 ICD-10: W65–W74	As for *Minimal Change* model
Basis for reporting periods	Date of death registration	Date of death occurrence
Reporting periods	1 January to 31 December (i.e. calendar year)	1 July to 30 June (i.e. financial year; cases registered by the end of the calendar year beginning during the period are included)
Population for age-standardisation	Australian 30 June 1991 persons population is the standard population [(a)] Five-year age groups to ages '85+ years' are used in standardisation	Australian 30 June 1991 persons population is the standard population [(a)] Five-year age groups to ages '95+ years' are used in standardisation
Denominator for rates (mid-point of reporting periods)	Estimated resident population at 30 June	ERP at 31 December

(a) At the time of writing the Australian 30 June 1991 persons population was the standard population. This was to be changed to the 30 June 2001 Australian persons population when the ABS released the final population figures.

NHPA injury prevention and control indicator 11.2

Identifying and descriptive attributes			
Data element ID:	NHPA Indicator (Injury Prevention and Control) 11.2		
Data element title:	Hospital separation rate for near drowning among children aged 0–4 years		
Version number:	1		
Type:	Derived Data Element		
Status:	Draft		
Definition:	Number of hospital separations due to near drowning in the total population and among children aged 0–4 years per 100,000 population per financial year.		
Context:	Drowning and near-drowning is one of the four target areas in the National Injury Prevention Plan (Department of Health and Aged Care 2001). In 1997–98, 60 children aged 0–4 years died because of drowning, i.e. 23.5% of all the drowning deaths. It is estimated that as many people near drown as drown.		
Relational and representational attributes			
Data type:	Numeric		
Representational form:	Rate	**Minimum size:**	3
Representational layout:	N,NNN.N	**Maximum size:**	7
Scope of indicator:	**Sex:**	All persons	
	Geographical area of interest:	Australia	
	Lower age limit:	0	
	Upper age limit:	4	
	Other specification(s) of interest:	None	
Definition of formula variables:	**Numerator:**	**For hospital separations coded to ICD-9-CM:** Total number of hospital separations in Australia assigned to relevant ICD-9-CM codes among children aged 0–4 years for a particular year **For hospital separations coded to ICD-10-AM:** Total number of hospital separations in Australia assigned to relevant ICD-10-AM codes among children aged 0–4 years for a particular year	
	Denominator:	Mid-year total for Australian population aged 0–4 years for the same year as the numerator	
Formula:	(Total number of hospital separations coded to relevant ICD codes among children aged 0–4 years*100,000)/Mid-point population total for children aged 0–4 years for relevant year **Complete formula for direct method:** $R = (d*100,000/n)$ *where* R is the age-specific rate for the population being studied d is the number of events for that population group n is the total population for that population group		
Guide for use:	Five-year age group (in years) to be used are: 0–4. For purposes of comparison of population rates for Australia over time, and/or population within Australia, the standard population to be used is the final 30 June estimated Australian resident total population (males plus females) for the most recent year ending in 1.		

Related data references:	**Indicators related to near drowning:**	
	11.1 Death rate for drowning in the total population and among children aged 0–4 years	
	11.3 Number of States and Territories requiring separation of domestic pools from houses	
	11.4 The proportion of domestic pools with approved child-resistant fences, gates and barriers	
	11.5 The proportion of children and young people aged 10–16 years who have successfully completed a water safety and lifesaving course	
	Other indicators related to child injury:	
	5.5 Hospital separations rate for falls among children aged 0–4 and 5–9 years	
	7.2 Death rate for homicide among children aged 0–9 years	
	9.2 Hospital separation rate for injury resulting from fire, burns and scalds among children aged 0–4 years	
	10.1 Hospital separation rate due to poisoning among children aged 0–4 years	
Administrative attributes		
Date of submission:		
Source organisation:	National Health Priority Action Council	
Source document for indicator:	Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS	
Date effective:		
Date ineffective:		
Review of indicator:	**Planned review frequency:**	
	Base date:	
	Planned review date:	
Sources of formula variables:	**Numerator:**	AIHW. National Hospital Morbidity Database
	Denominator:	ABS. Australian Demographic Statistics Cat. no. 3101.0
Reporting:	**Reporting required by:**	Australian Health Ministers
	Indicators reported to:	Australian Institute of Health and Welfare
		Department of Health and Ageing
	Reporting frequency:	Every two years
Interpretation:	Trends in hospital separations having an External Cause code are difficult to interpret due to (1) potential variation in the sub-group of separations to which External Cause codes are applied; and (2) potential variation in admission practice, especially for lower severity cases.	
Comments:	Please see Table A11.2 for the *Minimal Change* and *Technically Revised* models for reporting on this indicator.	
	The age group 0-4 years remains an important one for an indicator on this topic.	
	We note that the National Injury Prevention Plan specifies young males aged 15–34 years as a target population for prevention of drowning and near drowning. Consideration should be given as to whether a corresponding indicator is necessary.	
	Expansion of the case definition for this indicator to include water-related cases, etc. should be considered.	
Data element links		
Related NHPA goal:	NHPA primary goal (Injury Prevention and Control) 11.2	
Information model entities linked to this data element:		
Indicator frameworks entities linked to this data element:		
Data set agreements which include this data element:		
Keywords relating to this data element:		

Table A11.2: *Minimal Change* and *Technically Revised* models for reporting on Indicator 11.2

	Minimal Change model	***Technically Revised* Model**
General case inclusion criterion (applies to **all** mortality indicators)	None	Principal Diagnosis is an injury or poisoning.
General case inclusion code ranges (apply to **all** mortality indicators)	None	ICD-9-CM: 800–904, 910–999 ICD-10-AM: S00–T89 Included in these ranges are all injury cases, except *Sequelae (late effects) of injury & poisoning*
Specific case inclusion criteria (apply to **this** indicator)	First (left-most) external cause code in the specified range [(a)]	As for *Minimal Change* model
Specific case inclusion code ranges (apply to **this** indicator)	ICD-9-CM: E910 ICD-10-AM: W65–W74	As for *Minimal Change* model[(b)]
Basis for reporting periods	Date of separation	Date of separation
Reporting periods	1 July to 30 June (i.e. financial year)	1 July to 30 June (i.e. financial year)
Population for age-standardisation	Australian 30 June 1991 persons population is the standard population [(c)] Five-year age groups to ages '85+ years' are used in standardisation	Australian 30 June 1991 persons population is the standard population [(c)] Five-year age groups to ages '95+ years' are used in standardisation
Denominator for rates (mid-point of reporting periods)	ERP as at 31 December	ERP as at 31 December
Restriction to avoid counting multiple separations per incident case	None	Omit cases where admission is statistical, or from another acute care hospital
Restriction to omit variably-ascertained case types	None	Omit 'same-day' separations

(a) There are up to 31 fields where external cause data can be recorded in the NHMD. Selection criteria can be based on external cause codes recorded in the first external cause field (this is sometimes called the 'main' external cause code field). The selection criteria can be extended to include those cases where an external cause code did not appear in the 'main' external cause field, but appeared in one of the other external cause code fields, i.e. the 'first appearing' external cause code. This is approach is especially useful for some data years where some jurisdictions did not record external cause codes in the 'main' external cause code field for significant numbers of cases.

(b) Consideration should be given to expanding this definition to include other codes related to drowning, e.g. boating-related events (ICD-9 E830, E832 and ICD10 V90 and V92).

(c) At the time of writing the Australian 30 June 1991 persons population was the standard population. This was to be changed to the 30 June 2001 Australian persons population when the ABS released the final population figures.

NHPA injury prevention and control indicator 11.3

Identifying and descriptive attributes		
Data element ID:	NHPA Indicator (Injury Prevention and Control) 11.3	
Data element title:	Number of States and Territories requiring separation of domestic pools from houses	
Version number:	1	
Type:	Derived Data Element	
Status:	Draft	
Definition:	Not defined	
Context:		
Relational and representational attributes		
Data type:		
Representational form:		**Minimum size:**
Representational layout:		**Maximum size:**
Scope of indicator:	**Sex:**	
	Geographical area of interest:	
	Lower age limit:	
	Upper age limit:	
	Other specification(s) of interest:	
Definition of formula variables:	**Numerator:**	
	Denominator:	
Formula:		
Guide for use:		
Related data references:	**Indicators related to drowning:**	
	11.1 Death rate for drowning in the total population and among children aged 0–4 years	
	11.2 Hospital separation rate for near drowning among children aged 0–4 years	
	11.4 The proportion of domestic pools with approved child-resistant fences, gates and barriers	
	11.5 The proportion of children and young people aged 10–16 years who have successfully completed a water safety and lifesaving course	
Administrative attributes		
Date of submission:		
Source organisation:	National Health Priority Action Council	
Source document for indicator:	Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS	
Date effective:		
Date ineffective:		
Review of indicator:	**Planned review frequency:**	
	Base date:	
	Planned review date:	

Sources of formula variables:	**Numerator:**
	Denominator:
Reporting:	**Reporting required by:**
	Indicators reported to:
	Reporting frequency:
Interpretation:	
Comments:	National data necessary to define and monitor this indicator are not available.
	A useable indicator will require more precise specification and operational definition of terms and concepts.
Data element links	
Related NHPA goal:	
Information model entities linked to this data element:	
Indicator frameworks entities linked to this data element:	
Data set agreements which include this data element:	
Keywords relating to this data element:	

NHPA injury prevention and control indicator 11.4

Identifying and descriptive attributes		
Data element ID:	NHPA Indicator (Injury Prevention and Control) 11.4	
Data element title:	The proportion of domestic pools with approved child-resistant fences, gates and barriers	
Version number:	1	
Type:	Derived Data Element	
Status:	Draft	
Definition:	Not defined	
Context:		
Relational and representational attributes		
Data type:		
Representational form:		**Minimum size:**
Representational layout:		**Maximum size:**
Scope of indicator:	**Sex:**	
	Geographical area of interest:	
	Lower age limit:	
	Upper age limit:	
	Other specification(s) of interest:	
Definition of formula variables:	**Numerator:**	
	Denominator:	
Formula:		
Guide for use:		
Related data references:	**Indicators related to drowning:**	
	11.1 Death rate for drowning in the total population and among children aged 0–4 years	
	11.2 Hospital separation rate for near drowning among children aged 0–4 years	
	11.3 Number of States or Territories requiring separation of domestic pools from house	
	11.5 The proportion of children and young people aged 10–16 years who have successfully completed a water safety and lifesaving course	
Administrative attributes		
Date of submission:		
Source organisation:	National Health Priority Action Council	
Source document for indicator:	Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS	
Date effective:		
Date ineffective:		
Review of indicator:	**Planned review frequency:**	
	Base date:	
	Planned review date:	

Sources of formula variables:	**Numerator:**
	Denominator:
Reporting:	**Reporting required by:**
	Indicators reported to:
	Reporting frequency:
Interpretation:	
Comments:	National data necessary to define and monitor this indicator are not available.
	A useable indicator will require more precise specification and operational definition of terms and concepts.
Data element links	
Related NHPA goal:	
Information model entities linked to this data element:	
Indicator frameworks entities linked to this data element:	
Data set agreements which include this data element:	
Keywords relating to this data element:	

NHPA injury prevention and control indicator 11.5

Identifying and descriptive attributes		
Data element ID:	NHPA Indicator (Injury Prevention and Control) 11.5	
Data element title:	The proportion of children and young people aged 10–16 who have successfully completed a water safety and lifesaving course	
Version number:	1	
Type:	Derived Data Element	
Status:	Draft	
Definition:	Not defined	
Context:		
Relational and representational attributes		
Data type:		
Representational form:		**Minimum size:**
Representational layout:		**Maximum size:**
Scope of indicator:	**Sex:**	
	Geographical area of interest:	
	Lower age limit:	
	Upper age limit:	
	Other specification(s) of interest:	
Definition of formula variables:	**Numerator:**	
	Denominator:	
Formula:		
Guide for use:		
Related data references:		
Administrative attributes		
Date of submission:		
Source organisation:	National Health Priority Action Council	
Source document for indicator:	Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS	
Date effective:		
Date ineffective:		
Review of indicator:	**Planned review frequency:**	
	Base date:	
	Planned review date:	
Sources of formula variables:	**Numerator:**	
	Denominator:	
Reporting:	**Reporting required by:**	
	Indicators reported to:	
	Reporting frequency:	
Interpretation:		
Comments:	National data necessary to define and monitor this indicator are not available. A useable indicator will require more precise specification and operational definition of terms and concepts.	

Data element links	
Related NHPA goal:	
Information model entities linked to this data element:	
Indicator frameworks entities linked to this data element:	
Data set agreements which include this data element:	
Keywords relating to this data element:	

NHPA injury prevention and control indicator 12.1

Identifying and descriptive attributes		
Data element ID:	NHPA Indicator (Injury Prevention and Control) 12.1	
Data element title:	Access of injured patients to optimal trauma care	
Version number:	1	
Type:	Derived Data Element	
Status:	Draft	
Definition:	Not defined	
Context:		
Relational and representational attributes		
Data type:		
Representational form:		**Minimum size:**
Representational layout:		**Maximum size:**
Scope of indicator:	**Sex:**	
	Geographical area of interest:	
	Lower age limit:	
	Upper age limit:	
	Other specification(s) of interest:	
Definition of formula variables:	**Numerator:**	
	Denominator:	
Formula:		
Guide for use:		
Related data references:		
Administrative attributes		
Date of submission:		
Source organisation:	National Health Priority Action Council	
Source document for indicator:	Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS	
Date effective:		
Date ineffective:		
Review of indicator:	**Planned review frequency:**	
	Base date:	
	Planned review date:	
Sources of formula variables:	**Numerator:**	
	Denominator:	
Reporting:	**Reporting required by:**	
	Indicators reported to:	
	Reporting frequency:	
Interpretation:		
Comments:	More complete statement of purpose and indicator specification are required.	

Data element links	
Related NHPA goal:	
Information model entities linked to this data element:	
Indicator frameworks entities linked to this data element:	
Data set agreements which include this data element:	
Keywords relating to this data element:	

NHPA injury prevention and control indicator 13.1

Identifying and descriptive attributes		
Data element ID:	NHPA Indicator (Injury Prevention and Control) 13.1	
Data element title:	Access of people with trauma injuries to comprehensive rehabilitation programs and appropriate long-term care and community support	
Version number:	1	
Type:	Derived Data Element	
Status:	Draft	
Definition:	Not defined	
Context:		
Relational and representational attributes		
Data type:		
Representational form:		**Minimum size:**
Representational layout:		**Maximum size:**
Scope of indicator:	**Sex:**	
	Geographical area of interest:	
	Lower age limit:	
	Upper age limit:	
	Other specification(s) of interest:	
Definition of formula variables:	**Numerator:**	
	Denominator:	
Formula:		
Guide for use:		
Related data references:		
Administrative attributes		
Date of submission:		
Source organisation:	National Health Priority Action Council	
Source document for indicator:	Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: IHW and DHFS	
Date effective:		
Date ineffective:		
Review of indicator:	**Planned review frequency:**	
	Base date:	
	Planned review date:	
Sources of formula variables:	**Numerator:**	
	Denominator:	
Reporting:	**Reporting required by:**	
	Indicators reported to:	
	Reporting frequency:	
Interpretation:		
Comments:	More complete statement of purpose and indicator specification are required.	

Data element links	
Related NHPA goal:	
Information model entities linked to this data element:	
Indicator frameworks entities linked to this data element:	
Data set agreements which include this data element:	
Keywords relating to this data element:	

NHPA injury prevention and control indicator 14

Identifying and descriptive attributes	
Data element ID:	NHPA Indicator (Injury Prevention and Control) 14
Data element title:	Annual incidence rate of persistent spinal cord injury (SCI) from traumatic causes
Version number:	1
Type:	Derived Data Element
Status:	Draft
Definition:	Number of new cases per 100,000 population with persistent spinal cord injury from traumatic causes, age-standardised.
Context:	The age-adjusted incidence rate of SCI in 1998–99 was estimated to be 1.45 per 100,000 population. The case count (n=265) was the second highest recorded over the nine-year period for which reliable annual data are available (O'Connor 2000b). There is no discernible trend in the incidence of SCI due to traumatic causes.

Relational and representational attributes			
Data type:	Numeric		
Representational form:	Rate	**Minimum size:**	3
Representational layout:	N,NNN.N	**Maximum size:**	7
Scope of indicator:	**Sex:**	All persons	
	Geographical area of interest:	Australia	
	Lower age limit:	All ages	
	Upper age limit:	All ages	
	Other specification(s) of interest:	None	
Definition of formula variables:	**Numerator:**	Total number of new cases with persistent spinal cord injury due to External Causes as identified by using the Center for Disease Control and Prevention (CDC) definition of SCI for a particular year	
	Denominator:	Mid-year total for Australian population for the same year as the numerator	
Formula:	(Total number of new persisting spinal cord injury cases*100,000) / Population total for Australia; age standardised using direct method and the standard Australian population		

Complete formula for direct method:

$$SR = \Sigma(r_i P_i) / \Sigma(P_i) \quad where$$

SR is the age-standardised rate for the population being studied

r_i is the age-group specific rate for age group i in the population being studied

P_i is the population of age group i in the standard population

Guide for use:	Persisting spinal cord injury refer to those new cases with persisting neurological loss following an occurrence of an acute traumatic lesion of neural elements in the spinal canal, resulting in sensory deficit, motor deficit or autonomic dysfunction (Thurman, Kraus et al. 1995). 'Traumatic' refers to causes classifiable to ICD-9 or ICD-10 External Cause codes. Cases in the Australian Spinal Cord Injury Register are, however, coded according to the National Data Standards for Injury Surveillance, Level 2. Five-year age groups (in years) to be used are: 0–4, 5–9, 10–14, 15–19, 20–24, 25–29, 30–34, 35–39, 40–44, 45–49, 50–54, 55–59, 60–64, 65–69, 70–74, 75–79, 80–84, 85+ years. Given the expansion of the size of the population for elderly Australians, notably those aged 85 years and older, consideration should be given to adding the five-year age groups 85–89, 90–94 and 95+ years. For purposes of comparison of population rates for Australia over time, and/or population within Australia, the standard population to be used is the final 30 June estimated Australian resident total population (males plus females) for the most recent year ending in 1. Rates are usually expressed as *per 100,000 population*, but it may be more useful or convenient to present SCI rates as *per million population*. Currently, data are presented for financial years.
Related data references:	
Administrative attributes	
Date of submission:	
Source organisation:	National Health Priority Action Council
Source document for indicator:	Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS
Date effective:	
Date ineffective:	
Review of indicator:	**Planned review frequency:** **Base date:** **Planned review date:**
Sources of formula variables:	**Numerator:** NISU. Australian Spinal Cord Injury Register **Denominator:** ABS. Australian Demographic Statistics Cat. no. 3101.0
Reporting:	**Reporting required by:** Australian Health Ministers **Indicators reported to:** Australian Institute of Health and Welfare Department of Health and Ageing **Reporting frequency:** Every two years
Interpretation:	The incidence rate for SCI from traumatic causes is an indicator related to primary prevention of this condition. However, practical difficulties prevent meaningful measurement of SCI cases that result in early or immediate death. Furthermore, permanence of injury cannot be determined immediately after the injury event. The incidence rate of 'persistent SCI' is a more suitable indicator.
Comments:	The ASCIR is housed in the AIHW National Injury Surveillance Unit, but is a cooperative arrangement with the six Australian spinal units. Coverage of new incident cases in the register is complete for adults and data quality is deemed to be high from 1995 onwards (O'Connor 2000a). Investigations to assess coverage and data quality prior to 1995 are currently underway. The ASCIR covers about half of paediatric SCI cases. However, because of small numbers involved, this does not have a significant effect on incidence rates (O'Connor 2000a). The ASCIR includes cases other than new incident cases and care should be taken with case selection. SCI resulting from disease conditions (e.g. metastatic malignancy) is not covered by this indicator, as the causal factors and possibilities for prevention are markedly different.

Data element links	
Related NHPA goal:	NHPA primary goal (Injury Prevention and Control) 14
Information model entities linked to this data element:	
Indicator frameworks entities linked to this data element:	
Data set agreements which include this data element:	
Keywords relating to this data element:	

NHPA injury prevention and control indicator 15

This indicator has not been defined previously, but Specifications are suggested based on developments in regard to the definition of traumatic brain injury. (See *Comments*).

Identifying and descriptive attributes

Data element ID:	NHPA Indicator (Injury Prevention and Control) 15
Data element title:	Brain injury
Suggested title:	Hospital separation rate for traumatic brain injury (TBI) in the total population
Version number:	1
Type:	Derived Data Element
Status:	Draft
Proposed Definition:	Number of hospital separations due to TBI per 100,000 population for a particular year, age-standardised.
Context:	Thousands of Australians are affected by brain injury annually. These cases are mostly due to falls, road crashes and being crushed or struck by objects. Severe traumatic brain injury (TBI) has a high mortality rate. Survivors of severe and moderate TBI often require health, welfare and social services for their entire lifetime. Psychological disorders (such as mood swings) are common. Also, family life and economic prospects for individuals and families are often dramatically disrupted. Even mild TBI can have dramatic effects for some individuals, affecting their capacity to return to work or studies (O'Connor and Cripps 1999).

Relational and representational attributes

Data type:	**Suggested data type:** Numeric		
Representational form:	**Suggested form:** Rate	**Minimum size:**	**Suggested size:** 3
Representational layout:	**Suggested layout**: N,NNN.N	**Maximum size:**	**Suggested size:** 7
Scope of indicator:	**Sex:**	All persons	
	Geographical area of interest:	Australia	
	Lower age limit:	All ages	
	Upper age limit:	All ages	
	Other specification(s) of interest:	None	
Definition of formula variables:	**Numerator: Suggested definition of numerator:**	**For hospital separations coded to ICD-9-CM:** Total number of hospital separations in Australia assigned to relevant ICD-9-CM Nature of Injury codes for a particular year **For hospital separations coded to ICD-10-AM:** Total number of hospital separations in Australia assigned to relevant ICD-10-AM Nature of injury codes for a particular year	
	Denominator: Suggested definition of denominator:	Total Australian population for the same year as the numerator	
Formula:	(Total number of hospital separations coded to relevant ICD Nature of Injury codes*100,000)/Mid-year population total for relevant year; age standardised using direct method and the standard Australian population		
Suggested formula:	**Complete formula for direct method:**		

$$SR = \Sigma(r_i P_i) / \Sigma(P_i) \quad \text{where}$$

SR is the age-standardised rate for the population being studied

r_i is the age-group specific rate for age group i in the population being studied

P_i is the population of age group i in the standard population

Guide for use:	Please see Table A15 for the *Minimal Change* and *Technically Revised* models for reporting on this indicator.	
Suggested Guide for use:	Five-year age groups (in years) to be used are: 0–4, 5–9, 10–14, 15–19, 20–24, 25–29, 30–34, 35–39, 40–44, 45–49, 50–54, 55–59, 60–64, 65–69, 70–74, 75–79, 80–84, 85+ years. Given the expansion of the size of the population for elderly Australians, notably those aged 85 years and older, consideration should be given to adding the five-year age groups 85–89, 90–94 and 95+ years. For purposes of comparison of population rates for Australia over time, and/or population within Australia, the standard population to be used is the final 30 June estimated Australian resident total population (males plus females) for the most recent year ending in 1.	
Related data references:		
Administrative attributes		
Date of submission:		
Source organisation:	National Health Priority Action Council	
Source document for indicator:	Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services 1997. First Report on National Health Priority Areas 1996. AIHW Cat. no. PHE 1. Canberra: AIHW and DHFS	
Date effective:		
Date ineffective:		
Review of indicator:	**Planned review frequency:**	
	Base date:	
	Planned review date:	
Sources of formula variables:	**Numerator:**	AIHW. National Hospital Morbidity Database
	Denominator:	ABS. Australian Demographic Statistics Cat. no. 3101.0
Reporting:	**Reporting required by:**	Australian Health Ministers
	Indicators reported to:	Australian Institute of Health and Welfare Department of Health and Ageing
	Reporting frequency:	Every two years
Interpretation:		
Comments:	There is no universally agreed definition of traumatic brain injury (TBI), but a case definition designed for use with existing uniform data systems (e.g. hospital separations data) has been specified by CDC and WHO. The definition refers to both ICD-9-CM and ICD-10 diagnosis codes (O'Connor and Cripps 1999). The suggested selection criteria for cases of TBI for this model are based on the CDC/WHO definition of TBI based on ICD-9-CM diagnosis codes and on ICD-10 diagnosis codes (and presented according to ICD-10-AM). A report by O'Connor and Cripps (1999) recommended that the definitions outlined above be adopted as the case definition for TBI. They also recommended that hospital separations data be used to define a relevant NHPA Indicator for TBI. Note that the ICD-10 code range does not include a complete equivalent to ICD-9-CM code 804. However, this has little impact in practice, as the 804 was the Principle Diagnosis for a very small proportion of in-range cases.	
Data element links		
Related NHPA goal:	Not defined.	
Information model entities linked to this data element:		
Indicator frameworks entities linked to this data element:		
Data set agreements which include this data element:		
Keywords relating to this data element:		

Table A15: *Minimal Change* and *Technically Revised* models for reporting on Indicator 15

	Minimal Change model	***Technically Revised* Model**
General case inclusion criterion (applies to **all** mortality indicators)	None	Principal Diagnosis is an injury or poisoning.
General case inclusion code ranges (apply to **all** mortality indicators)	None	ICD-9-CM: 800–904, 910–999 ICD-10-AM: S00–T89 Included in these ranges are all injury cases, except *Sequelae (late effects) of injury & poisoning*
Specific case inclusion criteria (apply to **this** indicator)	Presence of a diagnosis in the specified range	As for *Minimal Change* model
Specific case inclusion code ranges (apply to **this** indicator)	ICD-9-CM: • 800.0 – 801.9 (Fracture of the vault or base of the skull), • 803.0 – 804.9 (Other and unqualified and multiple fractures of the skull), • 850.0 – 854.1 (Intracranial injury, including concussion, contusion, laceration and haemorrhage) ICD-10-AM: • S02.0 – S02.1 (Fracture of the vault or base of the skull) • S02.7 – S02.9 (Fracture of other and unspecified skull and facial bones and multiple fractures involving skull and facial bones) • S06.0 – S06.9 (Intracranial injury)	As for *Minimal Change* model
Basis for reporting periods	Date of separation	Date of separation
Reporting periods	1 July to 30 June (i.e. financial year)	1 July to 30 June (i.e. financial year)
Population for age-standardisation	Australian 30 June 1991 persons population is the standard population[(a)] Five-year age groups to ages '85+ years' are used in standardisation	Australian 30 June 1991 persons population is the standard population[(a)] Five-year age groups to ages '95+ years' are used in standardisation
Denominator for rates (mid-point of reporting periods)	ERP as at 31 December	ERP as at 31 December
Restriction to avoid counting multiple separations per incident case	None	Omit cases where admission is statistical, or from another acute care hospital
Restriction to omit variably-ascertained case types	None	Omit 'same-day' separations

(a) At the time of writing the Australian 30 June 1991 persons population was the standard population. This was to be changed to the 30 June 2001 Australian persons population when the ABS released the final population figures.

Appendix A5: Primary goals for current NHPA injury indicators

1.1	Reduce the incidence, and impact on health, of injury in the Australian population
1.2	Reduce the incidence, and impact on health, of injury in the Australian population
2.1	Reduce injury-related health inequalities among priority populations and the whole community
2.2	Reduce injury-related health inequalities among priority populations and the whole community
3.1	Reduce transport-related mortality
3.2	Reduce transport-related mortality
3.3	Reduce transport-related mortality
3.4	Reduce transport-related mortality
5.1	Reduce mortality associated with falls among older people
5.2	Reduce mortality associated with falls among older people
5.5	Reduce mortality and morbidity associated with falls among children
7.1	Reduce mortality due to interpersonal violence
7.2	Reduce mortality due to interpersonal violence
9.1	Reduce mortality and morbidity associated with burns and scalds
9.2	Reduce mortality and morbidity associated with burns and scalds
10.1	Reduce the mortality in children due to poisoning
11.1	Reduce the rate of drowning
11.2	Reduce the rate of near-drowning and associated morbidity

Appendix A6: Summary and status of data issues

Table A16: Summary and status of data issues mentioned in Appendix 2, NHPA 1997 Injury Report

Issue	Comments and recommendations (1997 report)	Status (and reference to relevant sections of this report)
Jurisdiction-specific differences in hospital data systems.	Differences in the implementation of External Cause coding complicated comparisons.	Differences have lessened but have not been eliminated. QA testing is desirable. (4.5).
Gaps in Australian Hospital Statistics collection holdings related to injury and external causes.	External Cause codes were not available for some years and jurisdictions, or were available in truncated form (i.e first 3 digits only).	Some of these gaps have been overcome by obtaining replacement data from source jurisdictions. It is not practicable to correct gaps that reflect limitations of original data collection and coding. Data for recent years have fewer gaps. (A3).
Only some conditions mentioned on death certificates are reflected in Cause of Death Coding. In particular, no information is available on trauma.	Multiple-cause coding, anticipated to occur with the introduction of automated coding, was expected to reduce this problem.	Automated coding has been applied to deaths registered since the start of 1997. Codes for injury and poisoning are included in 'multiple cause of death' fields. Hence, it is now possible to specify 'injury' indicators in a way that requires the presence of 'injury' codes. The quality of the source data remains uncertain. (2.1, 4.3).
Poor identification of Indigenous status.	Noted to be an important problem except in NT, SA and WA.	Now better defined, but remains a major problem. (2.1, 4.5).
Completeness of Australian Hospital Statistics collection.	Various gaps in the collection were noted. No overall estimate of completeness was available. Case-mix had recently been introduced, and was suspected to have influenced collection and coding.	Has improved and is reported to be nearly complete for recent years. The lower completeness of earlier years is still an obstacle to meaningful national trends over longer periods. (4.3).
Changes in values of indicators based on 'hospital separations' can be due to changes in injury incidence or to other factors (e.g. admission practices; data system factors).	Largely on this basis: 'despite recent improvements in the availability and quality of hospital separations data, reliable monitoring of injuries requiring hospitalisation cannot yet be based on this source.' Related to this is the recommendation to revise the specification of indicators based on hospital data to better allow for data limitations.	Data quality has improved as has understanding of the source and its limitations. Prospects are now better for achieving adequate monitoring by restricting indicators to subsets of case types for which probability of admission is fairly constant. (4.3).
Absence of quantitative indicators on important topics because of 'blind spots' in classification.	Existing classification could not distinguish (e.g.): work-related deaths and deaths due to sporting injury (Indicators 4 and 6.1). The related recommendation was to 'add certain new categories for the Australian ICD-10' for morbidity coding.	Relevant changes have flowed from introduction of the 10th revision of the ICD, the development of the Australian edition of ICD-10, and some supplementary items added to the ABS mortality file. The completeness and validity of case ascertainment has not been established. (2.1, 2.2).
Comparability of data on deaths certified by doctors with those certified by coroners.	Most deaths are certified by medical practitioners, but most injury deaths are certified by a coroner. An exception is deaths of older persons attributed to a fall, which are mainly certified by a doctor. Differences exist in the way that information is collected, checked and processed for these two types of case. These differences might affect the quality of data.	Analysis making use of recently available information ('multiple cause'; dual-coded data) suggest that comparability may not be adequate for deaths attributed to falls. Further investigation is warranted. (4.4).

Issue	Comments and recommendations (1997 report)	Status (and reference to relevant sections of this report)
Quality assurance of cause of external cause coding.	Too little formal validation has been undertaken to enable confident interpretation of these data. This applies to deaths and hospitalisation data. The 1997 Appendix recommended more attention to testing and improving the quality and consistency of external cause coding.	This situation remains largely unchanged. Developments in the data set (e.g. multiple cause coding) have increased potential for internal analysis. Several potentially important issues have been identified. (4.3, 4.5).
ICD 'External Causes' codes provide inadequate information about factors associated with injury occurrence. 'Place' and 'Activity' sections of ICD-10 external causes classification should be used.	Examples given in the Appendix where place of occurrence (was not provided for deaths), blood alcohol level, presence of osteoporosis (for falls). Introduction of ICD-10 was anticipated (and recommended) to provide 'Place' and 'Activity' data for injury deaths.	The External Causes chapter in ICD-10-AM has been revised, especially for the third version. The International Classification of External Causes of Injury (ICECI) has been developed. It is expected to be adopted as a Related Classification of the ICD. (2.1, 4.3).
Some incident cases of injury result in more than one record in the Australian Hospital Statistics collection, and there is no good way to allow for this over-counting when estimating case incidence. A data item distinguishing the first from any other admissions due to an injury might be required.	The Appendix includes a recommendation to add a data item to hospital separations collections to indicate this. Pending this solution, it also recommended adjustment based on use of the Mode of Separation data item.	Trial use of the method based on Mode of Separation led to the conclusion that this method is likely to overcorrect the problem of multiple counting. This is because coding of relevant data items for 'subsequent episodes' will not always match the coding of 'initial episodes'. A new data item. 'Mode of admission' offers better prospects (4.3).
Update the external causes classification applied to deaths to parallel developments in ICD-10-AM.	Mechanisms to develop External Cause coding exist or will exist for deaths and hospital data. Potential for lack of co-ordination was noted.	A process to encourage a co-ordination has been initiated by the Expert Group on Health Classification. (4.4).
Time lag between data system changes and availability of improved data.	Generally, several years pass before changes to hospital and deaths data systems and classifications flow through to data available at national level.	Most of the lag is inherent in basic characteristics of present data systems. The national coroner information system has potential to provide more timely and flexible deaths data, though this capability has yet to be demonstrated. (4.4).
'Injury' indicators based on the presence of External Cause codes and not requiring presence of an injury code.	There was no practical alternative to this for mortality indicators prior to the introduction of multiple cause coding. Hospitalisation based indicators were originally framed in the same way as mortality indicators, prior to the availability of a mature Australian Hospital Statistics collection.	The availability of multiple cause codes for deaths registered since 1997 makes it possible to extend to mortality indicators the principle recommended in the Appendix for morbidity indicators. (4.3).
	The Appendix includes a recommendation to add to the definition of indicators based on hospital morbidity the constraint that the Principal Diagnosis code must be from the 'injury or poisoning' chapter of the ICD. A caveat is that further investigation might show that certain other cases should also be included.	A diagnosis-based criterion has been implemented (4.3).

Issue	Comments and recommendation	Status (and reference to relevant sections of this report)
Identification of 'medical injury' and 'community injury'.	Medical injury accounts for a much larger proportion of hospitalised external cause cases than of deaths (assessed in terms of 'underlying cause'). The appendix includes a recommendation for clearer specification of these classes of case.	Attention to 'medical injury' has increased greatly in recent years. Terminology is being clarified (e.g. 'Shared Meanings' consultation of the Safety and Quality Council). Some relevant categories have been added to the second edition of ICD-10-AM. Specific issues for injury indicators are: the definition and scope of 'injury' (4.3), and identification of injury incident during hospital admissions (4.4).
Absence of quantitative indicators on important topics because of lack of relevant data collections.	Data sources sufficient to enable quantitative monitoring of incidence indicators are only available for the minority of injuries resulting in death or admission to a hospital. Other injuries include many that are significant in terms of morbidity, disability and cost. This issue was reflected in recommendations to continue development of ED-based surveillance based on a nationally representative sample of cases, to investigate the potential of other sources of ambulatory case data, to develop national sports injury data collections and reporting systems, and to introduce a series of national sample surveys of injury risk factors.	Limited developments, reflecting the cost and difficulty of developing data sources with necessary attributes. Extension of quantitative surveillance of injury incidence to other cases is technically feasible but would be costly. Good quality surveillance based on ambulatory service utilisation would need to take account of cases attending emergency departments, general practices and probably other services (e.g. sports injury clinics). Surveillance of incident injury based on population surveys would require large samples. A sports injury data program produced a data dictionary and model data collection instruments. Interest in CATI-based injury surveillance has increased lately. This has potential, especially for indicators of exposure to risk factors (including some interventions) (2.1, 2.2).
Certain injury topics might warrant special information systems.	Possible candidate topics were severe brain injury, severe burns, severe trauma generally, and deaths registered by coroners. The Australian Spinal Cord Injury Register is an example of such a system. Trauma registers exist in certain hospitals and regions. Needs and opportunities for coordination, national reporting etc. warrant assessment.	The National Coronial Information System is now in place (data quality is being tested). Some progress on other areas, including needs and opportunities assessments concerning brain trauma and severe burns. (2.1, 2.2).
Age adjustment.	'All ages' indicators were adjusted by the direct method using the 1991 Australia population as the reference.	Consider standardising all indicators referring to age ranges of 10 years or wider. Distinguish 5-year groups up to 90–94 years. (These points are particularly important for age ranges 65+, in which substantial growth and changes in age structure are occurring.) Adopt Australia 2001 as the reference population from the date recommended by AIHW and ABS. (2.1).
Reporting of mortality indicators based on date of registration rather than date of occurrence.	Used and advised occurrence-basis for Indigenous mortality; otherwise registration-basis, on the grounds that difference were not important except for Indigenous.	Disadvantages of registration-based reporting have wider impact than was recognised (e.g. misleading suicide trends). Hence, a case is made for occurrence-based reporting of all indicators of injury mortality. (4.3, A4).

INJURY RESEARCH & STATISTICS

This report provides an improved technical basis for reporting indicators of injury occurrence in Australia. The current set of National Health Priority Areas (NHPA) injury indicators has been documented thoroughly to enable them to be reported without ambiguity concerning which cases should be included, calculation methods, or other technical considerations. In addition, the precise purposes of the indicators have been reviewed, and a set of revisions to the technical specification of the indicators has been proposed, in order to improve the capacity of the indicators to serve these purposes. The technically revised specification is designed to provide more valid monitoring of trends in the population incidence of serious injury in Australia.

Technical review and documentation of current NHPA injury indicators and data sources