

# Appendix B: Technical appendix

This appendix covers:

- definitions and classifications used
- the presentation of data in this report
- analysis methods.

## Definitions and classifications

If not otherwise indicated, data elements were defined according to the definitions in the *National health data dictionary, version 16* (NHDD) (AIHW 2012b) (summarised in the Glossary).

Data element definitions for each National Minimum Data Set (NMDS) are also available online for the:

- Admitted patient care NMDS 2012–13 at <http://meteor.aihw.gov.au/content/index.phtml/itemId/466132>
- Non-admitted patient emergency department care NMDS 2012–13 at <http://meteor.aihw.gov.au/content/index.phtml/itemId/474371>
- Outpatient patient care NMDS 2012–13 at <http://meteor.aihw.gov.au/content/index.phtml/itemId/336862>
- Public hospital establishments NMDS 2012–13 at <http://meteor.aihw.gov.au/content/index.phtml/itemId/470656>
- Elective surgery waiting times (removals data) NMDS 2012–13 at <http://meteor.aihw.gov.au/content/index.phtml/itemId/472497>.

## Geographical classifications

### Remoteness areas

Data on geographical location of the patient's usual residence and of the hospital location are defined using the Australian Bureau of Statistics (ABS) Australian Statistical Geography Standard (ASGS). Data on remoteness area of usual residence are defined using the ABS's ASGS Remoteness Structure 2011 (ABS 2011c).

The ABS's ASGS Remoteness Structure 2011 categorises geographical areas in Australia into remoteness areas, described in detail on the ABS website [www.abs.gov.au](http://www.abs.gov.au). The classification is as follows:

- *Major cities*
- *Inner regional*
- *Outer regional*
- *Remote*
- *Very remote.*

## **Socioeconomic status**

Data on socioeconomic status groups are defined using the ABS's Socio-Economic Indexes For Areas 2011 (SEIFA 2011 [ABS 2013b]).

The SEIFA 2011 (ABS 2013b) are generated by the ABS using a combination of 2011 Census data such as income, education, health problems/disability, access to Internet, occupation/unemployment, wealth and living conditions, dwellings without motor vehicles, rent paid, mortgage repayments, and dwelling size. Composite scores are averaged across all people living in areas and defined for areas based on the Census collection districts. However, they are also compiled for higher levels of aggregation including SA2. The SEIFAs are described in detail on the ABS website <[www.abs.gov.au](http://www.abs.gov.au)>.

## **Classifications of clinical data**

### **ICD-10-AM/ACHI**

Diagnosis, procedure and external cause data for 2012–13 were reported to the NHMD by all states and territories using the 7th edition of the *International statistical classification of diseases and related health problems, 10th revision, Australian modification* (ICD-10-AM) (NCCH 2010), incorporating the *Australian classification of health interventions* (ACHI).

The tables and figures presented in chapters 6, 7, 8, 9 and 10 use the codes and abbreviated descriptions of the ICD-10-AM/ACHI classification. Full descriptions of the categories are available in the ICD-10-AM/ACHI publications (NCCH 2010).

### **Diagnoses**

The ICD-10-AM disease classification is hierarchical, with a small number of summary disease chapters that are divided into a large number of more specific disease groupings (represented by 3-character codes). Most of the 3-character disease groupings can be divided into an even larger number of very specific disease categories represented by 4-character and 5-character codes.

### **External causes**

The external cause classification (Chapter 20 of ICD-10-AM) is hierarchical, consisting of 377 three-character categories. Some of the information in Chapter 6 is presented by categorising the ICD-10-AM external cause codes into 16 groups to provide an overview of the reported external causes. Information on the 30 most common external causes reported for conditions arising during the episode of care are presented at the 3-character level.

Additional information on external causes of injury and poisoning, place of occurrence and activity when injured is available online at <[www.aihw.gov.au/hospitals/](http://www.aihw.gov.au/hospitals/)>.

### **Procedures**

One or more procedures can be reported for each separation, but procedures are not undertaken for all hospital admissions, so only some of the separation records include procedure data.

The procedure classification is divided into chapters by anatomical site, and within each chapter by a 'superior' to 'inferior' (head to toe) approach. These subchapters are further divided into more specific procedure blocks, beginning with the least invasive procedure through to the most invasive. The blocks, which are numbered sequentially, group the very specific procedure codes.

## Australian Refined Diagnosis Related Groups

AR-DRG is an Australian admitted patient classification system which provides a clinically meaningful way of relating the number and type of patients treated in a hospital (that is, its casemix) to the resources expected to be used by the hospital. This system categorises acute admitted patient episodes of care into groups with similar conditions and similar expected use of hospital resources, based on information in the hospital morbidity record such as the diagnoses, procedures and demographic characteristics of the patient. This report uses AR-DRG version 6.0x (DoHA 2010) to classify separations.

The AR-DRG classification is partly hierarchical, with 23 Major Diagnostic Categories (MDCs), divided into *Surgical*, *Medical* and *Other* partitions, and then into 698 individual AR-DRGs.

The MDCs are mostly defined by body system or disease type, and correspond with particular medical specialties. In general, episodes are assigned to MDCs on the basis of the principal diagnosis. Some episodes involving procedures that are particularly resource intensive may be assigned to the *Pre-MDC* category (AR-DRGs A01Z to A41B), irrespective of the principal diagnosis (including most organ and bone marrow transplants). Episodes that contain clinically atypical or invalid information are assigned *Error DRGs* (AR-DRGs 801A–801C and 960Z–963Z), even if they were assigned to an MDC (*Error DRGs* are included within the *Other* DRG in the *Surgical/ Medical/ Other* DRG partition).

Episodes are assigned to AR-DRGs within MDCs, mainly on the basis of the procedure codes (in the *Surgical* DRG partition) or the diagnosis codes (in the *Medical* DRG partition). Additional variables including the patient's age, complicating diagnoses/procedures and/or patient clinical complexity level, the length of stay, and the mode of separation are also used for AR-DRG assignment.

## Estimated resident populations

All populations, except those used for analyses by Indigenous status, are based on the estimated resident population as at 30 June (at the beginning of the reporting period), based on the 2011 Census data. For more information, see 'Methods'.

For analyses by Indigenous status, the population projections based on the 2011 Census were not available at the time of the release of this report. Therefore, the ABS's Indigenous experimental estimates and projections (2001 Census-based) were used.

## Presentation of data

For the majority of tables in this report, data are presented by the state or territory of the hospital, not by the state or territory of usual residence of the patient. The exceptions are for tables presenting information on potentially preventable hospitalisations and selected procedures, which are based on data on the state or territory of usual residence. In addition, the state or territory of usual residence of the patient is reported against the state or territory of hospitalisation in Chapter 6.

For tables presented by the state or territory of usual residence of the patient, the totals include unknown residence area (within a known state), overseas residents and unknown state of residence.

Except as noted below, the totals in tables include data only for those states and territories for which data were available, as indicated in the tables.

Throughout the publication, percentages may not add up to 100.0 because of rounding. Percentages and population rates printed as 0.0 or 0 may denote less than 0.05 or 0.5, respectively.

## **Suppression of data**

The AIHW operates under a strict privacy regime which has its basis in Section 29 of the *Australian Institute of Health and Welfare Act 1987* (AIHW Act). Section 29 of the AIHW Act requires that confidentiality of data relating to persons (living and deceased) and organisations be maintained. The Privacy Act governs confidentiality of information about living individuals.

The AIHW is committed to reporting that maximises the value of information released for users while being statistically reliable and meeting legislative requirements described above.

Data (cells) in tables may be suppressed in order to maintain the privacy or confidentiality of a person or organisation, or because a proportion or other measure related to a small number of events and may therefore not be reliable.

Data have been suppressed to avoid attribute disclosure. Some measures have been suppressed if there were fewer than 100 separations in the category being presented (for example, for length of stay, separations rates and elective surgery waiting times). The abbreviation 'n.p.' has been used in tables to denote these suppressions. For these tables, the totals include the suppressed information.

The data for private hospitals in Tasmania, the Australian Capital Territory and the Northern Territory were not published for confidentiality reasons.

In addition, private hospital data are suppressed for a particular diagnosis, procedure or AR-DRG where:

- there are fewer than three reporting units
- there are three or more reporting units and one contributed more than 85% of the total separations, or
- there are three or more reporting units and two contributed more than 90% of the total separations.

## **Analysis methods**

### **Admitted patient care data analyses**

Records for 2012–13 are for hospital separations (discharges, transfers, deaths or changes in care type) in the period 1 July 2012 to 30 June 2013. Data on patients who were admitted on any date before 1 July 2012 are included, provided that they also separated between 1 July 2012 and 30 June 2013. A record is included for each separation, not for each patient, so patients who separated more than once in the year have more than one record in the NHMD.

Patient day statistics can be used to provide information on hospital activity that, unlike separation statistics, account for differences in length of stay. As the database contains records for patients separating from hospital during the reporting period (1 July 2012 to 30 June 2013), this means that not all patient days reported will have occurred in that year. It is expected, however, that patient days for patients who separated in 2012–13, but who were admitted before 1 July 2012, will be counterbalanced overall by the patient days for patients in hospital on 30 June 2013 who will separate in future reporting periods.

The numbers of separations and patient days can be a less accurate measure of the activity for establishments such as public psychiatric hospitals, and for patients receiving care other than acute care, for which more variable lengths of stay are reported. Information on some aspects of the quality and comparability of the data are presented in Appendix A.

The notes above and those in Box 6.1 should be used to guide interpretation of the data.

### **Newborn episodes of care**

Newborn care episodes can include ‘qualified days’ which are considered to be the equivalent of acute care days. In this report, *Newborn* episodes with at least one qualified day have been included in all tables reporting separations. Records for *Newborn* episodes with no qualified days do not meet admission criteria for all purposes, so they have been excluded from this report, except as specified in Chapter 6.

The number of patient days reported in this publication for *Newborn* episodes is equal to the number of qualified days, so for newborns with a mixture of qualified and unqualified days the number of patient days reported is less than the actual length of stay for the episode.

### **Standardised separation rate**

Unless noted otherwise, population rates (separation rates) presented in this report are age-standardised, calculated using the direct standardisation method and 5-year age groups.

The crude population rates presented in some tables (for example, average available beds per 1,000 population) were calculated using the population estimates for 30 June 2012.

All populations, except those used for analyses by Indigenous status, are based on the 2011 Census data. For time series tables in this report, the age-standardised separations rates (per 1,000 population) presented for the years 2008–09 to 2011–12 have been calculated using estimated resident populations based on the 2011 Census data. Therefore, the separation rates reported for 2008–09 to 2011–12 in this report are not comparable to the separation rates presented in earlier *Australian hospital statistics* reports which were based on the 2006 Census data.

The total Australian population for 30 June 2001 was used as the standard population against which expected rates were calculated. The Australian Bureau of Statistics’ population estimates for 30 June at the beginning of the reporting period (see tables B.S1 to B.S3 accompanying this report online) were used for the observed rates as detailed below:

- Separation rates (by hospital state, residence state, remoteness areas and by quintiles of socioeconomic advantage/disadvantage) were directly age-standardised, using the estimated resident populations as at 30 June 2012. The estimated resident populations use a highest age group of 85 and over.
- Separation rates by Indigenous status were directly age-standardised, using the projected Indigenous population (low series) as at 30 June 2012, based on the 2006

Census data. The population for other Australians was based on the estimated resident populations as at 30 June 2012, based on the 2006 Census data. As the projected estimates use a highest age group of 65 and over and population data for June 2012, standardised rates calculated for analyses by Indigenous status are not directly comparable to the rates presented elsewhere.

### **Standardised separation rate ratios**

For some tables reporting comparative separation rates, standardised separation rate ratios (SRRs) are presented. The ratios are calculated by dividing the age-standardised separation rate for a population of interest (an observed rate) by the age-standardised separation rate for a comparison population (the expected rate). The calculation is as follows:

$$\text{Standardised separation rate ratio (SRR)} = \text{observed rate/expected rate}$$

A standardised separation ratio of 1.0 indicates that the population of interest (for example, Indigenous Australians) had a separation rate similar to that of the comparison group (for example, other Australians). An SRR of 1.2 indicates that the population of interest had a rate that was 20% greater than that of the comparison population and an SRR of 0.8 indicates a rate 20% smaller.

The populations used for the observed and expected rates vary in this report, for example:

- For Indigenous status, the rate ratio is equal to the separation rate for Indigenous Australians divided by the separation rate for other Australians (other Australians includes Indigenous status not reported).
- For analyses by residence state or territory, remoteness areas and socioeconomic status of area of residence, the rate ratio is equal to the separation rate for the residence state or territory, remoteness area or socioeconomic status group divided by the separation rate for Australia.

### **Counts of separations by groups of diagnoses, procedures and external causes**

For tables with counts of separations by groups of diagnoses, procedures or external causes, a separation is counted once for the group if it has at least one diagnosis/procedure/external cause reported within the group. As more than one diagnosis, procedure or external cause can be reported for each separation, the data are not additive and therefore the totals in the tables may not equal the sum of counts in the rows.

#### **Diagnoses**

Most of the information about principal diagnoses in chapters 6, 7, 8, 9 and 10 is presented using two methods of grouping records based on the ICD-10-AM disease classification:

- ICD-10-AM disease chapters – these 20 groups provide information aggregated at the ICD-10-AM chapter level
- 3-character ICD-10-AM groupings – 1,674 categories describe the diseases at a specific level. Detailed information is presented for the 20 groupings with the highest number of separations. Summary information is provided for all the groups (for which separations were reported) online at <[www.aihw.gov.au/hospitals/](http://www.aihw.gov.au/hospitals/)>.

## Procedures

For data on the number of procedures, all procedures within a group are counted, even if more than one is reported for a separation.

The procedure information is presented using three methods of grouping procedures based on the ACHI procedure classification:

- ACHI procedure chapters – these 20 groups provide information aggregated at the ACHI chapter level
- ACHI procedure blocks – these 1,601 categories describe procedures at a specific level. Detailed information is presented for the 10 groups with the highest number of separations and summary information is provided for all the groups (for which separations were reported) online at <[www.aihw.gov.au/hospitals/](http://www.aihw.gov.au/hospitals/)>
- ACHI procedures – there are over 6,300 individual procedures. Chapter 10 presents information for the most common procedures for sub- and non-acute care separations.

## ICD-10-AM codes used for selected analyses

A number of tables in this report use ICD-10-AM/ACHI codes to define diagnoses and procedures. The codes are presented in tables B.S4 to B.S8 accompanying this report online and relate to:

- adverse events (Chapter 3)
- unplanned/unexpected readmissions (Chapter 3)
- selected procedures (Chapter 3)
- selected AR-DRGs (Chapter 3)
- potentially preventable hospitalisations (Chapter 6).

## Counts of AR-DRGs and MDCs

Following receipt of the data from states and territories, the AIHW regrouped the data to ensure that the same grouping method was used for all data. The AR-DRGs that resulted from this regrouping are reported here, and may differ slightly from the AR-DRGs derived by the states and territories.

The information in chapters 6, 7, 8, and 9 is presented using different methods of grouping the AR-DRG classification:

- Separations have been categorised as *Childbirth, Medical, Surgical* or *Other* based on the AR-DRG recorded for the separation
- MDCs – these 23 groups are used to provide information at a high level of aggregation
- AR-DRGs – detailed information is presented for the 20 AR-DRGs having the largest number of separations.

## AR-DRG versions

For 2012–13, each separation in the NHMD was classified to AR-DRG version 6.0x (DoHA 2010) on the basis of demographic and clinical characteristics of the patient.

Each AR-DRG version is based on a specific edition of the ICD-10-AM/ACHI (Table B1). However, AR-DRGs can be mapped from other ICD-10-AM/ACHI editions.

**Table B1: ICD-10-AM and AR-DRG versions, 2008–09 to 2012–13**

Year	ICD-10-AM edition	Relevant AR-DRG version	AR-DRG version reported in Australian hospital statistics
2008–09	Sixth edition	Version 6.0	Version 5.2
2009–10	Sixth edition	Version 6.0	Version 5.2
2010–11 <sup>(a)</sup>	Seventh edition	Version 6.0	Version 6.0
2011–12	Seventh edition	Version 6.0	Version 6.0x
2012–13	Seventh edition	Version 6.0x	Version 6.0x

(a) For *Australian hospital statistics 2010–11* in analyses where cost weights were required, AR-DRG version 5.2 Round 13 cost weights (2008–09) were applied to AR-DRG version 5.2.

For the purpose of making AR-DRG-based time series comparisons, the coded clinical data for 2008–09 to 2009–10 were grouped to AR-DRG version 6.0 using the mapping facility in the DRGroup™ software. Due to the mapping necessary to generate the AR-DRG versions, the data presented in these tables may not be comparable to those reported by the states and territories for a small number of AR-DRGs.

### Broad categories of service

Separations have been categorised as *Childbirth*, *Specialist mental health*, *Medical*, *Surgical* or *Other* based mainly on the AR-DRG recorded for the separation:

- *Childbirth*: separations for which the AR-DRG was associated with childbirth:
  - O01A *Caesarean delivery with catastrophic complication or comorbidity*
  - O01B *Caesarean delivery with severe complication or comorbidity*
  - O01C *Caesarean delivery without catastrophic or severe complication or comorbidity*
  - O02A *Vaginal delivery with operating room procedure with catastrophic or severe complication or comorbidity*
  - O02B *Vaginal delivery with operating room procedure without catastrophic or severe complication or comorbidity*
  - O60A *Vaginal delivery with catastrophic or severe complication or comorbidity*
  - O60B *Vaginal delivery without catastrophic or severe complication or comorbidity*
  - O60C *Vaginal delivery single uncomplicated without other condition*

Does not include newborn care. Includes separations for childbirth for which specialised psychiatric care days were reported.

- *Specialist mental health*: separations for which at least one specialised psychiatric care day was reported. Excludes separations for *Childbirth* that also reported specialised psychiatric care days.
- *Surgical*: separations for which the AR-DRG belonged to the *Surgical* partition (involving an operating room procedure), excluding separations for *Childbirth* and *Specialist mental health*.
- *Medical*: separations for which the AR-DRG belonged to the *Medical* partition (not involving an operating room procedure), excluding separations for *Childbirth* and *Specialist mental health*.



- *Other*: separations for which the AR-DRG did not belong to the *Surgical* or *Medical* partitions (involving a non-operating room procedure, such as endoscopy), excluding separations for *Childbirth* and *Specialist mental health*.

For Chapter 6, broad categories of service are presented for standard admitted patient care data analyses. For chapters 7, 8, and 9, broad categories of service are presented for acute admitted patient care data analyses.

### **Standard admitted patient care data analyses**

For chapters 2 and 6, the counts of separations do not include separations for *Newborns* (without qualified days) and records for *Hospital boarders* or *Posthumous organ procurement*, and the patient days are also not included for those records. In addition, patient days for *Newborns* that were not qualified days are excluded from the counts of patient days.

### **Acute admitted patient care data analyses**

For chapters 6, 7, 8 and 9, and for tables in other chapters that include AR-DRGs and/or cost weight information, separations are included only for *Acute care*, *Newborns* (with qualified days) or where care type was not reported. Patient days for *Newborns* that were not qualified days are excluded from the counts of patient days.

### **Same-day acute admitted patient care data analyses**

For Chapter 7, records are included if the patient had a care type of *Acute*, *Newborn* (with qualified days), or the care type was not reported, and the patient was admitted and separated on the same date.

As a separation may be generated by a transfer between hospitals, or a change in the type of care provided, these data may include records for patients whose stay in hospital was longer than one day but involved more than one separation.

### **Overnight acute admitted patient care data analyses**

For Chapter 8, records are included if the patient had a care type of *Acute*, *Newborn* (with qualified days), or the care type was not reported, and the patient was admitted and separated on different dates.

### **Separations involving surgery**

For Chapter 9, separations involving surgery are defined as acute separations with a 'surgical procedure' reported, based on the procedures used to define 'surgical' AR-DRGs in AR-DRG version 6.0x (DoHA 2010). Separations for *Specialist mental health* care and *Childbirth* were excluded (see Chapter 9).

Separations involving surgery are further disaggregated in Chapter 9 based on the reported urgency of admission as:

- *Emergency admissions involving surgery* – includes separations for which the urgency of admission was reported as *Emergency*
- *Elective admissions involving surgery* – includes separations for which the urgency of admission was reported as *Elective*.

Separations involving surgery for which the urgency of admission was *Not assigned* or not reported are only included in the first table of Chapter 9.

## **Subacute and non-acute admitted patient care data analyses**

For Chapter 10, records are included if the patient had a care type of *Rehabilitation care*, *Palliative care*, *Geriatric evaluation and management*, *Psychogeriatric care* or *Maintenance care*. It includes both same-day and overnight separations for subacute and non-acute care.

### **Funding source**

Between 2011–12 and 2012–13, some changes were made to the data element 'Episode of care – source of funding' (METeOR id 472033) to facilitate the use of this data element in non-admitted patient care as well as admitted patient care.

Some of the existing domain values were renamed as the category title 'Australian health care agreements' (AHCA) was no longer valid after the cessation of the AHCA's in 2009. In addition, a domain value was added for the funding source 'Medicare benefits schedule', which is not applicable for admitted patient care.

### **Public patient analyses**

From 2012–13, the category *Public patients* includes separations for which the funding source was reported as:

- *Health service budget*
- *Health service budget (due to eligibility for Reciprocal health care agreements)*
- *Health service budget (no charge raised due to hospital decision)* in public hospitals
- *Other hospital or public authority* with a patient election status of *Public* (regardless of hospital sector).

In tables presenting information by funding source, the category *Other* includes separations for which the funding source was reported as:

- *Other compensation*
- *Department of Defence*
- *Correctional facility*
- *Other hospital or public authority* with a patient election status of *Private* (or not reported)
- *Health service budget (no charge raised due to hospital decision)* in private hospitals
- *Other funding source*.

## **Non-admitted patient emergency department care data analyses**

### **Estimated proportion of emergency services**

The estimated proportion of emergency occasions of service covered by the National Non-admitted Patient Emergency Department Care Database (NNAPEDCD) data is calculated as the number of presentations reported to the NNAPEDCD divided by the number of emergency occasions of service reported to the NPHED, as a percentage. See Chapter 5.

## **Emergency department length of stay statistics calculations**

Length of stay statistics are calculated for all emergency department *Type of visit* categories.

### **Proportion of emergency department presentations completed in 4 hours or less**

The proportion of presentations completed in 4 hours or less is determined as the proportion of all emergency presentations with time elapsed between the presentation and the physical departure of the patient of less than or equal to 240 minutes. See Chapter 5.

Presentations were excluded if either (or both) of the presentation date/time or physical departure date/time were missing or invalid, or if the calculation resulted in an invalid length of stay (that is, missing or negative number of minutes).

## **National elective surgery waiting times data analyses**

### **Elective surgery waiting times**

The waiting times data presented in this report are for patients who complete their wait and are admitted for their surgery as either an elective or emergency admission. In reports before 2011–12, this information was presented for elective admissions only. Therefore, the data presented are not directly comparable with the data reported in previous *Australian hospital statistics* reports.

See also 'Median and 90th percentiles'.

### **Elective surgery care and elective surgical separations**

The definition of elective surgery care for the purposes of the National Elective Surgery Waiting Times Data Collection (NESWTDC), and the definition of separations described as elective admissions involving surgery in the National Hospital Morbidity Database (NHMD) differ. In particular, the procedures defined as surgical differ between those used to define the scope of the NESWTDC and those used to define surgical separations in the NHMD.

For the NESWTDC, elective surgery comprises elective care where the procedures required by patients are listed in the surgical operations section of the Medicare Benefits Schedule, with the exclusion of specific procedures frequently done by non-surgical clinicians (AIHW 2012).

For the NHMD (see Chapter 9), separations involving surgery are defined as acute separations with a 'surgical procedure' reported, based on the procedures used to define 'surgical' AR-DRGs in AR-DRG version 6.0x (DoHA 2010).

## **National public hospital establishment data analyses**

### **Counting public hospitals**

Two different counts of hospitals are used in this report, depending on the type of information being presented and the way in which the hospitals were reported to the NHMD and the National Public Hospital Establishments Database (NPHED) (Table B2):

- Entities for which there was expenditure information were counted as hospitals. A small number of hospitals in the NPHED had incomplete expenditure information. In addition, in some jurisdictions, expenditure data were available at the Local Hospital Networks level, not at campus-level, so the networks were the entities counted as hospitals in these cases.

- In Chapter 4, hospitals are generally counted as they were reported to the NPHEd. These entities are usually 'physical hospitals' (buildings or campuses) but may encompass some outpost locations such as dialysis units. Conversely hospitals on the one 'campus' can be reported as separate entities to this database if, for example, they are managed separately and have separate purposes, such as specialist women's services and specialist children's services. Although most of the hospitals counted in this way report separations to the NHMD, some small hospitals do not have separations every year.

**Table B2: Numbers of public hospitals reported in this report, states and territories, 2012–13**

Hospitals	NSW	Vic	Qld	WA	SA	Tas	ACT <sup>(a)</sup>	NT	Total
For expenditure data	225	104	167	90	80	23	3	5	697
Chapter 4 (physical campuses)	225	150	170	90	80	23	3	5	746

(a) The count of hospitals for the Australian Capital Territory includes a small mothercraft hospital for which admitted patient data were not reported. The expenditure for this hospital is included in the total reported for the Australian Capital Territory in Chapter 4.

Data on numbers of hospitals should therefore be interpreted taking these notes into consideration. Changes in the numbers of hospitals over time can be due to changes in administrative or reporting arrangements rather than changes in the number of hospital campuses or buildings. For example, for 2012–13, Western Australia reported 6 fewer hospitals than in 2011–12, due to the amalgamation of reporting for 5 small campuses with their respective parent hospitals.

Counts of private hospitals can also vary, depending on the source of the information. Therefore, there may be discrepancies between counts of private hospitals from the ABS Private Health Establishments Collection and the lists of private hospitals contributing to the NHMD (which are the basis of admitted patient data presented in chapters 6, 7, 8, 9 and 10). The states and territories provided the latter information, which may not correspond with the way in which private hospitals report to the Private Health Establishments Collection.

## Expenditure and revenue

### Constant prices

Constant price expenditure adjusts current prices for the effects of inflation, that is, it aims to remove the effects of inflation. Hence, expenditures in different years can be compared on a dollar-for-dollar basis, using this measure of changes in the volume of health goods and services.

Constant price estimates for expenditure aggregates have been derived in terms of prices in the reference year 2012–13 with the ABS Government Final Consumption Expenditure, State and Local– Hospitals & Nursing Homes deflator used for public hospitals. The ABS Household Final Consumption Expenditure Hospital Services deflator was used for private hospitals.

## Median and 90th percentiles

The 50th percentile is the median (or the middle value) in a group of data arranged from lowest to highest value. It represents, for example, the amount of time within which 50% of patients were admitted; half the waiting times will have been shorter, and half the waiting times longer, than the median.

Using the same example, the 90th percentile data represent the number of days within which 90% of patients were admitted.

The 50th percentile and 90th percentile waiting times are calculated using an empirical distribution function with averaging. Using this method, observations are sorted in ascending order.

The calculation is where:

$n$  is the number of observations and

$p$  is the percentile value divided by 100,

then  $n \times p = i + f$  (where  $i$  is an integer and  $f$  is the fractional part of  $n \times p$ ).

If  $n \times p$  is an integer, then the percentile value will correspond to the average of the values for the  $i$ th and  $(i+1)$ th observations.

If  $n \times p$  is not an integer, then the percentile value will correspond to the value for the  $(i+1)$ th observation.

For example, if there were 100 observations, the median waiting time will correspond to the average waiting time for the 50th and 51st observations (ordered according to waiting time). Similarly, the 90th percentile will correspond to the average waiting time for the 90th and 91st observations if there are 100 observations.

If there were 101 observations, then the median waiting time will correspond to the waiting time for the 51st observation and the 90th percentile waiting time will correspond to the waiting time for the 91st observation.

The 50th and 90th percentiles have been rounded to the nearest whole number; in days for elective surgery waiting times and in minutes for emergency department waiting times.

## Data on geographical location

Data on geographical location are collected on hospitals in the NPHEd and on the area of usual residence of patients in the NHMD and the NAPEDCD. These data have been provided as state or territory and Statistical Area level 2 (SA2), a small area unit within the ABS's ASGS and/or postcode, and have been aggregated to remoteness areas.

### Geographical location of hospital

The remoteness area of each public hospital was determined on the basis of its location. For 2012–13, the geographical location aligns with the ABS's ASGS Remoteness Structure 2011 (ABS 2011b). Data on the remoteness area of hospitals are presented in Chapter 4.

### Geographical location of usual residence of the patient

The NHDD specifies that these data should be provided as the state or territory and the SA2 of usual residence. All states and territories were able to provide SA2 codes both for patients usually resident in the jurisdiction and for patients not usually resident in the jurisdiction.

The AIHW mapped the supplied area of residence data for each separation to remoteness area categories based on the ABS's ASGS Remoteness Structure 2011. This was undertaken on a probabilistic basis as necessary, using ABS concordance information describing the distribution of the population by remoteness areas and SA2s. Because of the probabilistic

nature of this mapping, the remoteness area data for individual records may not be accurate; however, the overall distribution of records by geographical areas is considered useful.

For the NHMD, about 99% of records included data on the area of usual residence in the form of an SA2. For the remaining 0.4% of records, about 50% were for overseas residents, 5% were of no fixed abode, and the remainder not reported.

### **Remoteness area of usual residence**

Data based on the area of usual residence for admitted patients are presented by remoteness area in chapters 3, 4, 6, 7, 8, 9 and 10.

The data presented in this report by remoteness areas using the ABS's ASGS Remoteness Structure 2011 are not comparable to the data presented by remoteness areas using the ABS's ASGC Remoteness Structure 2006 (ABS 2006) in *Australian hospital statistics* reports for 2006–07 to 2011–12 because of differences in the underlying calculation of the Accessibility/Remoteness Index of Australia (ARIA) scores used to determine remoteness areas. Therefore, caution should be used when making comparisons over time.

### **Socioeconomic status**

Separation rates by socioeconomic status were generated by the AIHW using the ABS Index of Relative Socio-Economic Disadvantage (IRSD) scores for the SA2 of usual residence of the patient reported for each separation.

The SEIFA Index of Relative Socio-Economic Disadvantage is one of the ABS's SEIFA indexes. The relative disadvantage scores indicate the collective socioeconomic status of the people living in an area, with reference to the situation and standards applying in the wider community at a given point in time. A relatively disadvantaged area is likely to have a high proportion of relatively disadvantaged people. However, such an area is also likely to contain people who are not disadvantaged, as well as people who are relatively advantaged.

Separation rates by socioeconomic status were generated by the AIHW using the ABS Index of Relative Socio-Economic Disadvantage (IRSD) scores for the SA2 of usual residence of the patient reported for each separation. The 1 – Lowest SES group represents the areas containing the 20% of the population with the most disadvantage, and the 5 – Highest SES group represents the areas containing the 20% of the population with the least disadvantage.

The following labels for each socioeconomic group have been used throughout the report:

<b>Label</b>	<b>Socioeconomic status group</b>
1 – Lowest	Most disadvantaged
2	Second most disadvantaged
3	Middle
4	Second least disadvantaged
5 – Highest	Least disadvantaged

## AR-DRG cost weights and cost estimates

Cost weights and cost estimates were prepared by the Independent Hospital Pricing Authority (IHPA) through the National Hospital Cost Data Collection (NHCDC) (IHPA 2013a, 2013b). The NHCDC estimates the average cost of each AR-DRG and the cost weight is the average cost for that AR-DRG divided by the average cost across all AR-DRGs.

Separate cost weights are usually estimated for the public and private sectors because of the differences in the range of costs recorded in public and private hospitals.

The most recent public hospital cost weights based on version 6.0x relate to the 2010–11 reporting period (Round 15, IHPA 2013a). For 2010–11, the average cost for public hospital separations was \$4,613.

For private hospitals, the most recent private hospital cost weights based on version 6.0x relate to the 2011–12 reporting period (Round 16, IHPA 2013b). For 2011–12, an average cost for private hospital separations was not reported.

### Average cost weight

Average cost weight information provides a guide to the expected resource use for separations, with a value of 1.00 representing the average cost for all separations.

The average cost weight for a hospital (or group of hospitals) is calculated as the sum of the average cost weights for each separation, divided by the total number of separations for the hospital. It represents in a single number the overall relative expected use of resources by a hospital. For example, a hospital with an average cost weight of 1.08 has an 8% more costly casemix than the national average (equal to 1.00).

### Cost per casemix-adjusted separation analysis

In previous *Australian hospital statistics* reports, the cost per casemix-adjusted separation was presented as an indicator of the efficiency of public acute care hospitals (see Chapter 3).

The cost per casemix-adjusted separation is a measure of the average recurrent expenditure for each admitted patient, adjusted using AR-DRG cost weights for the resources expected to be used for the separation. A summary of the method used in this analysis was included in Appendix B of *Australian hospital statistics 2011–12*, and more detail is available in *Australian hospital statistics 2000–01* (AIHW 2002).

This indicator has been omitted from *Australian hospital statistics 2012–13* for two reasons:

- There are concerns about the potential for this indicator to be confused with the IHPA's calculation of the national efficient price and the allocation of activity based funding for the 2012–13 reporting period.
- The method has not been revised since the 2000–01 reporting period. Over the past two years, the IHPA have been developing costing models for subacute and non-acute care, mental health care, emergency department care and outpatient care, which may contain elements that could be appropriately included in the AIHW's cost per casemix-adjusted separation analysis.

The AIHW will undertake a revision of this indicator during the first half of 2014, and aims to publish the results in an addendum to this report in the second half of 2014.

## Relative stay index analysis

Relative stay indexes (RSIs) have been identified as indicators of efficiency and are presented in Chapter 3. They are calculated as the number of 'observed patient days' for separations in selected AR-DRGs, divided by the number of 'expected patient days', standardised for casemix (based on national figures).

An RSI greater than 1.0 indicates that an average patient's length of stay is higher than expected given the casemix for the group of separations of interest. An RSI of less than 1.0 indicates that the length of stay was less than expected.

The standardisation for casemix (based on AR-DRG version 6.0x and the age of the patient for each separation) allows comparisons to be made that take into account variation in types of services provided; however, it does not take into account other influences on length of stay, such as Indigenous status or the remoteness area of the patient's residence or of the hospital.

The RSI method includes acute care separations only, and excludes separations for patients who died or were transferred within 2 days of admission, or with a length of stay greater than 120 days. Excluded from the analysis were:

- AR-DRGs for rehabilitation (such as Z60A *Rehabilitation with catastrophic/severe complications or comorbidities*)
- predominantly same-day AR-DRGs (such as R63Z *Chemotherapy* and L61Z *Admit for renal dialysis*)
- AR-DRGs with a length of stay component in the definition (see tables accompanying this report online)
- *Error AR-DRGs.*

Comparisons with RSIs presented in earlier reports should be made with caution, because the indexes for reports from 2004–05 to 2009–10 were calculated using AR-DRG versions 5.0/5.1/5.2.

### RSI standardisation methods—direct and indirect relative stay indexes

The two methods for standardisation of the length of stay data used in this report are analogous to direct and indirect age-standardisation methods.

#### Indirect relative stay index

The indirect RSI method applies the national average length of stay (ALOS) for each AR-DRG to the relevant population of interest (number of separations for each AR-DRG in the hospital group) to derive the expected number of patient days. This method is generally used when rate information (ALOS for each AR-DRG in this analysis) for the population of interest is unknown or subject to fluctuation because of small population sizes. It provides a measure of efficiency for a hospital, or group of hospitals, based on their actual activity.

However, an indirectly standardised rate compares a group with a 'standard population rate' so, using this method, rates for different groups are not strictly comparable because each group has a different casemix to which the national ALOS data have been applied. Therefore, the indirectly standardised data for hospital groups should be compared with the national average of 1.00.



### **Direct relative stay index**

For the direct RSI method, the ALOS of each AR-DRG for the group of interest is multiplied by the national population (total number of separations in each AR-DRG) to derive the expected number of patient days. This method provides a measure of efficiency for a hospital, or group of hospitals, and is suitable if all or most AR-DRGs are represented in a hospital group.

Direct standardisation methods are generally used where the populations and their characteristics are stable and reasonably similar, for example for total separations for New South Wales and Victoria. Groups can be compared using the directly standardised rates as the activity of each group is weighted using the same set of weights, namely the national casemix.

However, the ALOS data for AR-DRGs which are not represented in a group need to be estimated. The method in this report uses the assumption that the missing AR-DRGs for the hospital group had a relative length of stay that was the same as that for the reported AR-DRGs for the hospital group, weighted by the national distribution of the reported AR-DRGs in the group. Also, this method can scale up AR-DRGs to have an impact that does not reflect their relative volume in a hospital group, which can be particularly problematic if the low-volume AR-DRGs are atypical.

For those jurisdictions and sectors for which RSI statistics are presented in tables 3.9 and 3.10, there were between 502 and 672 AR-DRGs represented, meaning that ALOS data was estimated for up to 170 AR-DRGs.

Due to the issues with the direct RSI detailed above, this report mainly presents RSI information using the indirect standardised method. However, the direct standardised method has also been presented in Chapter 3. This allows comparison between the two methods and more direct comparison for those jurisdictions and sectors for which the data are presented.

For public hospitals in the Northern Territory, about 500 of the 672 DRGs used in the national RSI analysis are represented, so results are likely to have been affected by estimation of the missing ALOS data. Therefore the data presented for the direct standardised method in the public sector for the Northern Territory in tables 3.9 and 3.10 should be interpreted with caution.

Table B.S9, accompanying this report online, shows the number of AR-DRGs represented in each cell in tables 3.9 and 3.10, so that the number of AR-DRGs for which ALOS was estimated can be derived.