

Appendix 1: Technical appendix

This appendix covers:

- definitions and classifications used
- the presentation of data in this report
- information on the quality of the data (where this may affect interpretation)
- analysis methods.

Definitions

If not otherwise indicated, data elements were defined according to the 2009–10 definitions in the *National health data dictionary, version 14* (HDSC 2008) (summarised in the Glossary).

Data presentation

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 7*.

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. For example, for some tables and figures dealing with Indigenous status, data have been presented only for selected states and territories, and the totals in these tables do not include the data for the other states and territories (*chapters 3, 7, 8, 9, 10 and 11*).

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

Other exceptions relate to tables in which data were not published for confidentiality reasons (for private hospitals in Tasmania, the Australian Capital Territory and the Northern Territory), or because only one public hospital was represented in the cell, or because a proportion related to a small number of events and was therefore not very meaningful.

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.

Data on the length of stay have been suppressed if there were fewer than 10 separations in the category being presented (50 separations for the average length of stay by selected AR-DRG analysis in *Chapter 3*). Data on elective surgery waiting times were suppressed if

there were fewer than 10 elective surgery admissions in the category being presented. The abbreviation 'n.p.' has been used in these tables to denote these suppressions. For these tables, the totals include the suppressed information.

State or territory of usual residence

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.

Population rates

Standardised separation rate

Unless noted otherwise (see below), population rates (separation rates) presented in this report are age-standardised, calculated using the direct standardisation method and 5-year age groups. 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 2009 and for 31 December 2009 (see tables A1.1, A1.2 and A1.3 accompanying this report online) were used for the observed rates as detailed below:

- Standard separation rates (by hospital state and by residence state) were directly age standardised, using the estimated resident populations as at 30 June 2009. The estimated resident populations use a highest age group of 85 years and over.
- Separation rates by Indigenous status were directly age-standardised, using the projected Indigenous population (low series) as at 30 June 2009 and the estimated resident populations as at 30 June 2009. As the projected estimates use a highest age group of 65 years and over and population data for June 2009, standardised rates calculated for analyses by Indigenous status are not directly comparable to the rates presented elsewhere.
- Separation rates by remoteness areas and by quintiles of socioeconomic advantage/disadvantage (see SEIFA below) were directly age-standardised, using the estimated resident populations as at 30 June 2009. The estimated resident populations use a highest age group of 85 years and over.
- The crude population rates presented in some tables (for example, average available beds per 1,000 population) were calculated using the population estimates for 31 December 2009.

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:

Standardised separation rate ratio (SRR) = 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, 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.

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 National Hospital Morbidity Database (NHMD) and the National Public Hospital Establishments Database (NPHED) (Table A1.4):

- In the cost per casemix-adjusted separation analysis (*Chapter 3*), entities for which there was expenditure information were reported as hospitals. A small number of hospitals in the NPHED with incomplete expenditure information were omitted. In some jurisdictions, hospitals exist in networks, and expenditure data were available only for these networks, so the networks are the entities counted as hospitals for these tables.
- 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 A1.4: Numbers of public hospitals reported in this report, states and territories, 2009–10

Hospitals	NSW	Vic	Qld	WA	SA	Tas	ACT ^(a)	NT	Total
Chapter 3 (expenditure data)	226	95	170	95	80	24	3	5	698
Chapter 4	226	150	170	95	80	24	3	5	753

(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 3*, but is not included in the cost per casemix-adjusted separation analysis presented 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.

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 presented in *Chapter 3* and the lists of private hospitals contributing to the NHMD (which are the basis of the numbers presented in *Chapter 4*). 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.

Non-admitted patient emergency department care data analyses

The proportion of emergency services with episode-level data for 2009–10 is calculated as the number of presentations reported to the Non-admitted Patient Emergency Department Care Database (NNAPEDCD) divided by the number of accident and emergency occasions of service reported to the National Public Hospital Establishments Database (NPHEd) as a percentage. This may underestimate the NNAPEDCD proportion because some accident and emergency occasions of service are for other than emergency presentations. As accident and emergency occasions of service may have been under-enumerated for some jurisdictions, the proportion may also be overestimated. The proportion has been adjusted to 100% for jurisdictions where the number of presentations reported to the NNAPEDCD exceeded the number of accident and emergency occasions of service reported to the NPHEd.

Patients who present to the emergency department with a Type of visit of *Return visit*, *Planned*, *Pre-arranged admission* or *Patient in transit* do not necessarily undergo the same processes as *Emergency presentations*, and their waiting times may rely on factors outside the control of the emergency department. Therefore, waiting time statistics (including the proportion ending in admission) and emergency department presentation length statistics are not presented in this report for patients with a Type of visit other than *Emergency presentation* (or *Not reported* for South Australia).

These waiting time statistics include:

- The median and 90th percentile waiting time – determined from the time elapsed between presentation in the emergency department to commencement of service. Presentations were excluded if the waiting time was missing or invalid, or the patient *Did not wait to be attended by a health care professional* or was *Dead on arrival*.
- The proportion of presentations seen on time – determined as the proportion of presentations in each triage category with a waiting time less than or equal to the maximum waiting time stated in the Australasian Triage Scale definition. Presentations were excluded if the waiting time was missing or invalid, the patient *Did not wait to be attended by a health care professional* or was *Dead on arrival* or if the triage category was *Not reported*.
- The proportion of presentations ending in admission – determined as the proportion of all emergency presentations with an episode end status of *Admitted to this hospital*.
- The calculations of median duration of service event, median duration of non-admitted patient episode and median time in emergency department. The calculations exclude presentations with an episode end status of *Did not wait*, *Left at own risk* or *Dead on arrival* and only include those presentations for which the emergency department service commencement time, emergency department episode end time and emergency department physical departure time were all valid and occurred in sequence.

Limitations of the emergency department care data

When interpreting the data presented, the reader should note the following:

- The proportion of accident and emergency occasions of service for which detailed episode-level data were available was 100% for *Principal referral and Specialist women's and children's hospitals* and *Large hospitals* (peer group A and B hospitals), but only about 81% for all hospitals.

- Certain issues of definition have not been resolved, so comparability across jurisdictions may be limited. Development and implementation of standard data definitions is ongoing.
- There is variation between jurisdictions in the point at which the emergency department presentation is recorded as completed for those patients subsequently admitted within the emergency department and/or elsewhere in the hospital. This will affect the comparability of presentation length statistics across jurisdictions.
- For Victoria and Tasmania, the conclusion of the non-admitted patient episode is reported as the time of physical departure for patients admitted to short stay wards within the emergency department.

Admitted patient care data analyses

Records for 2009–10 are for hospital separations (discharges, transfers, deaths or changes in care type) in the period 1 July 2009 to 30 June 2010. Data on patients who were admitted on any date before 1 July 2009 are included, provided that they also separated between 1 July 2009 and 30 June 2010. 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 National Hospital Morbidity Database (NHMD).

Limitations of the admitted patient care data

- Coverage for the NHMD is essentially complete. For 2009–10, all public hospitals were included except for a small mothercraft hospital in the Australian Capital Territory. Private hospital data were not provided for private freestanding day facilities in the Australian Capital Territory and the Northern Territory, and for one private freestanding day facility in Tasmania.
- For 2009–10, Western Australia did not provide data for approximately 13,000 admitted patient separations. Approximately 2,400 of those separations were from public hospitals, and 10,600 separations from one private hospital.
- Hospitals may be re-categorised as public or private between or within years. *Appendix 2* presents information on coverage, hospital amalgamations, and re-categorisation as public and/or private.
- In 2009–10, there were 39 separations that did not have sex reported as male or female, and 78 separations for which date of birth was not reported (age could not be calculated).
- There is apparent variation between states and territories in the use of statistical discharges and associated assignment of care types. There was also variation in whether or not they reported separations for *Newborns* (without qualified days) and records for *Hospital boarders* and *Posthumous organ procurement*.
- Data on state of hospitalisation should be interpreted with caution because of cross-border flows of patients. This is particularly the case for the Australian Capital Territory. In 2009–10, about 22% of separations for Australian Capital Territory hospitals were for patients who resided in New South Wales.

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 2009 to 30 June 2010), 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 2009–10, but who were

admitted before 1 July 2009, will be counterbalanced overall by the patient days for patients in hospital on 30 June 2010 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 below.

The notes above and those in Box 7.1 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 7*.

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.

For 2009–10, private hospitals in Victoria did not report most *Newborn* episodes without qualified days, therefore the count of newborns will be underestimated.

South Australian private hospitals are not required to provide records for *Newborn* episodes without qualified days.

For Tasmania, where a newborn's qualification status was considered qualified at any point during the episode of care, the entire episode was reported as qualified days. As a consequence, the average length of stay for *Newborn* episodes with qualified days only in Tasmanian public hospitals is not directly comparable with that in other states.

Information on reporting practices for *Newborn* episodes before 2009–10 is available in previous *Australian hospital statistics* publications (AIHW 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010a).

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.

Counts of 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.

Standard admitted patient care data analyses

For *chapters 7, 8, 9, 10* and *11* and relevant tables in *Chapter 2*, 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. For more information on these exclusions, see below.

Acute admitted patient care data analyses

For *chapters 7, 8 and 9*, and for tables in the report that include cost weight information, separations are included only for *Acute care, Newborns* (with qualified days) and 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 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 the same day.

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 9*, 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.

Broad categories of service

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

- *Childbirth* includes separations for which the Australian Refined Diagnosis Related Group (AR-DRG) was associated with childbirth (does not include newborn care).
- *Specialist mental health* includes separations for which specialised psychiatric care days were reported.
- *Surgical* includes separations for which the AR-DRG belonged to the *Surgical* partition and excludes separations for *Childbirth* and *Specialist mental health*.
- *Medical* includes separations for which the AR-DRG belonged to the *Medical* partition and excludes separations for *Childbirth* and *Specialist mental health*.
- *Other* includes separations for which the AR-DRG did not belong to the *Surgical* or *Medical* partitions and excludes separations for *Childbirth* and *Specialist mental health*.

Sub- and Non-acute admitted patient care data analyses

For *Chapter 11*, records are included if the patient had a care type of *Rehabilitation care, Palliative care, Geriatric evaluation and management, Psychogeriatric care* or *Maintenance care*. Both same-day and overnight separations for non-acute care are included.

Public patient analyses

For *Australian hospital statistics* from 2002–03 to 2007–08, 'Patient election status' and 'Funding source' were used in combination to categorise separations as *Public patients* and *Private patients* as described in *Appendix 1 of Australian hospital statistics 2007–08* (AIHW 2009).

From 2008–09 to 2009–10, the funding source for the separation is presented alone.

Throughout the report, the category *Public patients* includes separations for which the funding source was reported as:

- *Australian Health Care Agreements*
- *Reciprocal health care agreements*
- *No charge raised* in public hospitals
- *Other hospital or public authority* with a patient election status of *Public* (regardless of hospital sector).

It should be noted that although the funding source *Australian Health Care Agreements* was a value in the NHDD definition for 'Principal source of funds' for 2009–10, the Australian Health Care Agreements expired on 30 June 2009. This value is interpreted as the patient being Medicare eligible patients, elected to be treated as a public patient and was not charged.

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*
- *No charge raised* (in private hospitals)
- *Other*
- *Not reported*.

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 Table A1.5 (accompanying this report online) and relate to:

- statistics on selected procedures (*Chapter 3*)
- statistics on selected potentially preventable hospitalisations (*Chapter 7*)
- statistics on kidney failure hospitalisations (online only).

National elective surgery waiting times data analyses

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 for elective 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 elective surgery 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 (HDSC 2008).

- For the NHMD, separations have been classified as elective surgery separations according to the following:
 - Separations were included if they had an *Elective* urgency of admission (admission could be delayed by at least 24 hours) and a surgical procedure was reported, based on the procedures used to define surgical AR-DRGs in *Australian Refined Diagnosis Related Groups*, version 5.2 (DoHA 2006).
 - Separations for cosmetic surgery and separations with childbirth-related *Surgical AR-DRGs* were excluded.
- Elective surgery separations were also categorised as *Public* or *Other*:
 - *Public elective surgery* refers to separations for elective surgery in public hospitals and includes elective surgery separations for public patients (as defined above) in private hospitals.
 - *Other elective surgery* separations refers to separations for elective surgery for private patients in private hospitals.

Median and 90th percentile waiting times

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

The 90th percentile data represent the number of days within which 90% of patients were admitted. The 50th and 90th percentiles have been rounded to the nearest whole number of days.

Public hospital establishments data analyses

Average available beds

The collection of *Average available beds for overnight-stay patients* and *Average available beds for same-day patients* was mandated for national reporting, commencing 1 July 2009.

Before July 2009, the number of available beds for admitted patients that were reported to NPHED included beds used for same-day admitted patients and overnight admitted patients. This meant that the count of available beds could not distinguish between the number of beds available in overnight wards and the number of 'chairs' used for day procedures. The comparability of the data was therefore affected by the range and types of patients treated by the hospital (including the proportion of services provided as same-day admitted services and variation in admission practices).

Separate data on same-day and overnight beds is expected to be more comparable, particularly for overnight beds. The comparability of the data will, however, continue to be affected by hospital casemix and the different proportions of beds available for special and more general purposes.

Provision of Average available beds data for 2009–10

All states and territories provided counts of available beds for same-day/overnight admitted patients for some of the hospitals in their jurisdiction (Table A1.6). The majority of states and territories reported approximately 15% of average available beds as for same-day admitted patients. However, the proportion of same-day beds for New South Wales and the Northern

Territory was 7% and 5% respectively, and South Australia reported only 2% of average available beds for same-day admitted patients. The magnitude of this range indicates non-comparability of the data, despite possible differences in admission practices.

The provision of counts of average available beds, disaggregated by same-day/overnight basis also varied with the size of the hospital. By public hospital peer group, average available beds split on a same-day/overnight basis were provided by:

- 73 of the 75 *Principal referral* hospitals, all of which reported same-day separations
- 10 of the 11 *Specialist women's and children's* hospitals, all of which reported same-day separations
- 40 of the 43 *Large* hospitals, all but one of which reported same-day separations
- 66 of the 92 *Medium* hospitals, all of which reported same-day separations.

Table A1.6: Provision of data for average available beds, states and territories, 2009–10

	Hospitals	Total beds	Beds for same-day admitted patients (%)	Number of hospitals that may be missing same-day beds ^(a)	Total beds reported for those hospitals ^(a)	Beds that may not have been disaggregated ^(a) (%)
New South Wales	226	19,608	7%	54	1,743	9%
Victoria ^(b)	150	13,186	15%	22	334	3%
Queensland	170	10,911	16%	38	745	7%
Western Australia	95	5,376	12%	17	331	6%
South Australia	81	4,859	2%	45	3,210	66%
Tasmania	24	1,359	14%	4	46	3%
Australian Capital Territory	2	907	17%	0	0	0%
Northern Territory	5	694	5%	2	80	12%
Total	753	56,900	11%	182	6,489	11%

(a) This is the number of hospitals that reported same-day separations but did not report available beds for same-day admitted patients.

(b) The number of hospitals in Victoria is reported as a count of the campuses that reported data separately to the National Hospital Morbidity Database in 2009–10.

Source: National Public Hospital Establishments Database.

There were 182 hospitals that reported same-day separations but did not report separate counts for *Average available beds for overnight-stay patients* and *Average available beds for same-day patients*. This will overestimate the number of hospitals for which the disaggregated data was missing, as some hospitals did not have same-day beds for admitted patients. The proportion of beds estimated not to have been disaggregated varied markedly among the states and territories, from none (0%) in the Australian Capital Territory to 66% in South Australia.

For these reasons, the quality of the average available beds data for 2009–10 was not considered to be sufficient for analytical purposes and presentation in the body of this report.

Public hospital peer groups

The AIHW worked with the National Health Ministers' Benchmarking Working Group (NHMBWG) and the National Health Performance Committee (NHPC) to develop a national

public hospital peer group classification for use in presenting data on costs per casemix-adjusted separation. The aim was to allow more meaningful comparison of the data than comparison at the jurisdiction level would allow. This classification is currently under review.

The peer groups were designed to explain variability in the average cost per casemix-adjusted separation. They also group hospitals into broadly similar groups in terms of their range of admitted patient activity and geographical location. Selected characteristics of the hospitals assigned to each peer group for 2009–10 are presented in *chapters 3 and 4*. The peer group names are broadly descriptive of the types of hospitals included in each category.

The peer group classification is summarised in Table A1.7. Details of the derivation of the peer groups are in *Appendix 11 of Australian hospital statistics 1998–99* (AIHW 2000). From 2001–02, the method was adjusted slightly, replacing the rural, remote and metropolitan area (RRMA) classification with the 2001 ASGC remoteness area classification for the geographical component of the peer grouping.

A flow chart can be found in *Australian hospital statistics 2002–03* (Figure A4.1 in that report) (AIHW 2004a) to illustrate the assignment of peer groups for almost all hospitals. However, on the advice of jurisdictions, hospitals may be assigned a different peer group due to special circumstances, such as the opening or closing of a hospital during the year.

Although not specifically designed for purposes other than the cost per casemix-adjusted separation analysis, the peer group classification is recognised as a useful way to categorise hospitals for other purposes, including the presentation of other data. For example, the classification has been used to present emergency department presentations data in *Chapter 5* and elective surgery waiting times data in *Chapter 10*. They have also been used to specify the scopes for national minimum data sets (NMDSs), for example, as noted in *Appendix 2* for the NMDSs for Non-admitted patient emergency department care and Outpatient care.

The peer group to which each public hospital was assigned for 2009–10 is included in Table A2.2 (accompanying this report online). In some cases, the establishments defined as hospitals for the cost per casemix-adjusted separation analysis differ from those defined as hospitals for the elective surgery waiting times data or those defined for counts of hospitals presented in *chapters 3 and 4*. In these cases, their peer groups may also differ, and these differences are indicated in Table A2.2.

Table A1.7: Public hospital peer group classification

Peer group	Subgroup	Code	Definition
Principal referral and Specialist women's and children's hospitals	Principal referral	A1	Major city hospitals with >20,000 acute casemix-adjusted separations, and Regional hospitals with >16,000 acute casemix-adjusted separations per annum.
	Specialist women's and children's	A2	Specialised acute women's and children's hospitals with >10,000 acute casemix-adjusted separations per annum.
Large hospitals	Major city	B1	Major city acute hospitals treating more than 10,000 acute casemix-adjusted separations per annum.
	Regional and Remote	B2	Regional acute hospitals treating >8,000 acute casemix-adjusted separations per annum, and Remote hospitals with >5,000 casemix-adjusted separations.
Medium hospitals	Group 1	C1	Medium acute hospitals in Regional and Major city areas treating between 5,000 and 10,000 acute casemix-adjusted separations per annum.
	Group 2	C2	Medium acute hospitals in Regional and Major city areas treating between 2,000 and 5,000 acute casemix-adjusted separations per annum, and acute hospitals treating <2,000 casemix-adjusted separations per annum but with >2,000 separations per annum.
Small acute hospitals	Regional	D1	Small Regional acute hospitals (mainly small country town hospitals), acute hospitals treating <2,000 separations per annum, and with less than 40% non-acute and outlier patient days of total patient days.
	Remote	D3	Small Remote hospitals (<5,000 acute casemix-adjusted separations but not 'multi-purpose services' and not 'small non-acute'). Most are <2,000 separations.
Sub-acute and non-acute hospitals	Small non-acute	D2	Small non-acute hospitals, treating <2,000 separations per annum, and with more than 40% non-acute and outlier patient days of total patient days.
	Multi-purpose services	E2	
	Hospices	E3	
	Rehabilitation	E4	
	Mothercraft	E5	
	Other non-acute	E9	For example, geriatric treatment centres combining rehabilitation and palliative care, with a small number of acute patients.
Unpeered and other hospitals		G	Prison medical services, dental hospitals, special circumstance hospitals, Major city hospitals with <2,000 acute casemix-adjusted separations, hospitals with <200 separations etc.
Psychiatric hospitals		F	

Note: Only the peer groups above the dashed line are included in the cost per casemix-adjusted separation analyses presented in *Chapter 3*.

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 Local Area (SLA), a small area unit within the Australian Bureau of Statistics (ABS) Australian Standard Geographical Classification (ASGC) and/or postcode, and have been aggregated to remoteness areas.

The ASGC's remoteness structure categorises geographical areas in Australia into remoteness areas, described in detail on the ABS website <www.abs.gov.au>.

The classification is as follows:

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

Geographical location of hospital

The remoteness area of each public hospital was determined on the basis of its SLA. For 2009–10, the geographical location was updated to align with the ABS's ASGC Remoteness Structure 2006. Data on the remoteness area of hospitals are presented in *Chapter 4*.

Geographical location of usual residence of the patient

Information on the area of usual residence of the patient is supplied by the states and territories for the NHMD and the NNAPEDCD. The *National health data dictionary* specifies that these data should be provided as the state or territory and the SLA of usual residence. Not all states and territories were able to provide information on the area of usual residence in the form of an SLA code. New South Wales, Victoria, Western Australia, the Australian Capital Territory and the Northern Territory were able to provide SLA codes both for patients usually resident in the jurisdiction and for patients not usually resident in the jurisdiction. Queensland, South Australia and Tasmania provided SLA codes for patients usually resident in the jurisdiction and postcodes for patients not usually resident in the jurisdiction.

Where necessary, the AIHW mapped the supplied area of residence data for each separation or emergency department presentation to 2009 SLA codes and to remoteness area categories based on the ABS's ASGC Remoteness Structure 2006. This was undertaken on a probabilistic basis as necessary, using ABS concordance information describing the distribution of the population by postcode, remoteness areas and SLAs (for 2008 and previous years).

Because of the probabilistic nature of this mapping, the SLA and 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, most separations included data on the area of usual residence. The mapping process identified some missing or invalid codes, but about 99.5% of records were assigned 2009 SLA codes. For the remaining 0.5% of records, about 53% were for overseas residents, 8% were of no fixed abode, and the remainder not reported.

For the NNAPEDCD, most presentations included data on the area of usual residence with about 98.6% of records assigned 2009 SLA codes. For the remaining 2% of records, about 23% were for overseas residents, 2% 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, 7, 8, 9, 10 and 11*.

Between 2006–07 and 2009–10, the patients' area of residence data was mapped to the ABS's ASGC Remoteness Structure 2006. For 2001–02 to 2006–07, the AIHW mapped the patients' area of residence data to the ABS's ASGC Remoteness Structure 2001.

The data presented by remoteness areas using the ABS's ASGC Remoteness Structure 2006 in this report and the 2007–08, 2008–09 reports are not comparable to the data presented by remoteness areas using the ABS's ASGC Remoteness Structure 2001 in *Australian hospital statistics* reports for 2001–02 to 2006–07 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 as the remoteness areas categories presented are not directly comparable.

Socioeconomic status

The Socio-Economic Indexes For Areas 2006 (known as SEIFA 2006 (ABS 2008)) are generated by the ABS using a combination of 2006 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 SLA. The SEIFAs are described in detail on the ABS website <www.abs.gov.au>.

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 by using the SEIFA Index of Relative Advantage and Disadvantage scores for the SLA 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:

Label	Socioeconomic status group
1—Lowest	Most disadvantaged
2	Second most disadvantaged
3	Middle
4	Second least disadvantaged
5—Highest	Least disadvantaged

Quality of Indigenous status data

Indigenous identification in hospital separations data—quality report

The 2010 AIHW report *Indigenous identification in hospital separations data—quality report*, (AIHW 2010f) presented the latest findings on the quality of Indigenous identification in hospital separations data in Australia, based on studies of Indigenous identification in public hospitals conducted during 2007 and 2008.

The results of the studies indicated that, overall, the quality of Indigenous identification in hospital separations data had improved since last assessed. However, the quality of Indigenous identification still varied substantially between jurisdictions. The results supported expanding national reporting to include data for New South Wales, Victoria, Queensland, South Australia, Western Australia, and the Northern Territory (public hospitals only). Levels of Indigenous identification were estimated to be 80% or higher for those jurisdictions.

An estimated 89% of Indigenous patients were correctly identified in Australian public hospital admission records in 2007–2008. In other words, 11% of Indigenous patients were not identified, and the ‘true’ number of hospital admissions for Indigenous persons was about 12% higher than reported.

Quality 2009–10

Overall, the quality of the Indigenous status data provided for admitted patients in 2009–10 is considered to be in need of some improvement, being considered acceptable for analysis purposes only for New South Wales, Victoria, Queensland, Western Australia, South Australia and public hospitals in the Northern Territory.

The quality of the Indigenous status data provided for 2009–10 for emergency department presentations also varied by jurisdiction. Most states and territories advised that the Indigenous status data collected in an emergency department setting could be less accurate than the data collected for admitted patients.

The data presented on Indigenous status in *chapters 3, 5, 7, 8, 9, 10 and 11* should therefore be used with caution.

The following information has been provided by the states and territories to provide some insight into the quality of Indigenous status data in both the NHMD and the NNAPEDCD.

New South Wales

In 2010, the New South Wales Health Department (NSW Health) repeated the survey conducted in 2007, to ascertain whether or not there had been an improvement following the 2007 survey of admitted patient data. In 2010, NSW Health used the same methodology used in 2007, a similar number of patients and the same hospitals. The only variation was that 3 of the 20 hospitals involved in the 2007 survey, declined to participate in the 2010 survey.

The analysis of the 2010 survey on the completeness of Aboriginal identification in the admitted patient data collection has been completed and the result shows an improvement on the 2007 survey. Some 2,400 patients were interviewed in 2010. The same weighting methodology was used as in 2007, so that the results could be compared. The 2010 results indicate that Aboriginal identification was 83.5% complete in metropolitan (2007: 80%), 92% in inner regional (2007: 90.4%), 94.2% in outer regional (2007: 95.4%) and 100% complete in rural hospitals (2007: 100%). The slight drop in outer regional could be due to the fact that

Wagga Wagga, Bourke and Griffith Hospitals did not participate this time. The outer regional result could be due to a greater volatility of the figures brought about by the reduced number of patients interviewed in that region. The combined result for 2010 was 90.1%, an improvement on the 2007 result of 88.2%.

An article about the 2010 New South Wales survey, and its results, is currently being prepared for publication.

Indigenous status is a mandatory data item collected at all facilities that provide data for the NSW Health Emergency Department Data Collection. NSW Health noted that for 2009–10, approximately 10% of emergency department records were missing Indigenous status data, despite the information being recorded on the patient administration system. The high level of non-reporting resulted from difficulties in the implementation of new systems. NSW Health is working to correct the information. NSW Health considers that Indigenous status identification in its emergency department data is acceptable.

Victoria

The Victorian Department of Health reports Indigenous status as a mandatory field in both the Admitted and Emergency Department collections. The quality of Indigenous data has continued to improve in both collections, although there is still a small under-count of Aboriginal and Torres Strait Islander patients. Unknown Indigenous status is reported through the fields 'Patient refused to answer' and 'Question unable to be asked'. These fields are monitored carefully to ensure they are used appropriately. Other quality improvement activities are undertaken through the ICAP (Improving Care for Aboriginal and Torres Strait Islander Patients) program.

Queensland

Queensland Health noted that for 2009–10, Indigenous status was reported as 'not stated' for 5.2% of admitted patient separations (1.6% of public hospital separations and 9.1% of private hospital separations). The level of non-reporting of Indigenous status had decreased slightly for both public and private hospitals compared to the previous financial year.

Queensland Health also noted that the available evidence continued to suggest that the number of Indigenous separations is significantly understated in the Queensland hospital morbidity data due to non-reporting as well as mis-reporting of Indigenous status.

Queensland Health advised that efforts continue to be made to address these data quality issues, and that improving the completeness and coverage of Indigenous status reporting is now a key performance indicator for Queensland Health Service Districts.

Queensland Health noted that, for 2009–10 emergency department data, Indigenous status was not reported in 1.5% of cases. This is a slight improvement from the 1.6% level of non-reporting that existed in the 2008–09 data. Efforts will continue to be made to ensure that reporting of Indigenous status is as complete and accurate as possible.

Western Australia

The Western Australian Department of Health regards its admitted patient Indigenous status data as being of good quality. Quality improvement activities, including cross-referencing between metropolitan and country hospitals, continue to enhance the accuracy of this data element.

South Australia

The South Australian Department of Health (SA Health) considers its admitted patient data on Indigenous status for 2009–10 to be suitable for inclusion in national statistical reports. It is known that standards of identification are better in country hospitals than metropolitan hospitals. The department conducts annual training programs on the collection of admitted patient data, and the programs include instructions on the correct way to ask and record the response to the Indigenous status question.

At SA Health's request, the Australian Bureau of Statistics developed a training package on the collection of the Indigenous identifier for frontline staff in hospitals and other health care units. Specialised training was delivered to frontline staff working in country hospitals between October and December 2010. Equivalent training will be provided to metropolitan hospital staff before the end of June 2011.

A 30% loading has been applied to casemix payments for Indigenous separations in public hospitals for a number of years, which acts as an incentive for improved identification.

SA Health advised that the quality of Indigenous status data is higher for admitted patients than non-admitted emergency department patients, as evidenced by the higher proportion of emergency department episodes for which Indigenous status was not reported. However, there had been an improvement in data quality. In 2009–10 Indigenous status was not reported in 8.3% of emergency department presentations (Table 5.4), compared with 17.7% in 2005–06. Further improvements are expected in 2010–11.

Tasmania

The Tasmanian Department of Health and Human Services reports that the quality and the level of Indigenous status identification, across public hospital information collections, is of a high standard. However, as with all data collections, there is constant and continued work on maintaining and improving, where needed, the collection of this data element. The department is continuing to monitor and implement actions to improve the coverage and quality of Indigenous data in the private sector.

Australian Capital Territory

The Australian Capital Territory Health Department (ACT Health) commenced collection of the Aboriginal and Torres Strait identifier within the Patient Master Index Hub, which will enable the identification status of a person to be shared throughout ACT Health IT systems. Development of reporting outputs is progressing. The Aboriginal and Torres Strait Islander Health Unit of ACT Health is working to ensure adherence to standards is maintained and is ensuring ethical and privacy considerations are taken into account. This initiative will lead to future improvements in the quality of Indigenous data.

Northern Territory

The Northern Territory Department of Health reported that the quality of its 2009–10 Indigenous status data for both admitted patients and emergency department patients is considered to be acceptable. The department retains historical reporting of Indigenous status and individual client systems receive a report (for follow up) of individuals who have reported their Indigenous status as Aboriginal on one occasion and as Torres Strait Islander on another. All management and statistical reporting, however, is based on a person's most recently reported Indigenous status.

ICD-10-AM/ACHI

Diagnosis, procedure and external cause data for 2009–10 were reported to the NHMD by all states and territories using the sixth edition of the *International statistical classification of diseases and related health problems, 10th revision, Australian modification (ICD-10-AM)* (NCCH 2008), incorporating the *Australian classification of health interventions (ACHI)*.

The tables and figures presented in *chapters 7, 8, 9, 10 and 11* 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 publication (NCCH 2008).

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- and 5-character codes.

Most of the information about principal diagnoses in *chapters 7, 8, 9, 10 and 11* 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 – 2,067 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/>.

External causes

The external cause classification (Chapter 20 of ICD-10-AM) is hierarchical, consisting of 373 three-character categories. The information in *Chapter 7* is presented by categorising the ICD-10-AM external cause codes into 16 groups to provide an overview of the reported external causes. 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/>.

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.

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 1,598 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/>
- ACHI procedures – there are over 6,200 individual procedures. *Chapter 11* presents information for the 10 procedures with the highest number of non-acute care separations.

Quality of coded data

The comparability of the coded diagnosis, procedure and external cause data can be affected by variations in the quality of the coding, the numbers of diagnoses/procedures reported and can also be influenced by state-specific coding standards.

The quality of coded diagnosis, procedure and external cause data can be assessed using coding audits in which, in general terms, selected records are independently recoded and the resulting codes compared with the codes originally assigned for the separation. There are no national standards for this auditing, so it is not possible to use information on coding audits to make quantitative assessments of data quality on a national basis.

The quality and comparability of the coded data can, however, be gauged by information provided by the states and territories on the quality of the data, by the numbers of diagnosis and procedure codes reported and by assessment of apparent variation in the reporting of additional diagnoses.

State-specific coding standards

The Australian Coding Standards were developed for use in both public and private hospitals with the aim of satisfying sound coding convention according to the ICD-10-AM/ACHI. Although all states and territories instruct their coders to follow the Australian Coding Standards, some jurisdictions also apply state-specific coding standards to deal with state-specific reporting requirements. These standards may be in addition to or instead of the relevant Australian Coding Standard, and may affect the comparability of ICD-10-AM coded data.

For example, there are variations in coding standards between jurisdictions with regard to the reporting of external cause codes and place of occurrence codes. The Australian Coding Standard requires a place of occurrence code to be reported if an external cause code in the range V00–Y89 has been reported, and requires an activity when injured code to be recorded if the external cause code is in the range V00–Y34. The Western Australian coding standard requires the mandatory recording of a place of occurrence and activity when injured code for all records with a diagnosis code in the range S00–T98, regardless of the external cause code reported. The Victorian coding standard does not require the recording of external cause, place of occurrence or activity when injured for separations where the care type is *Rehabilitation care*.

State and territory comments on the quality of the data

The following information has been provided by the states and territories to provide some insight into the quality of the coded data in the NHMD.

New South Wales

For New South Wales, hospitals perform formal audits on ICD-10-AM coded data at a local level. Data edits are monitored regularly and consistent errors are identified and rectified by individual hospitals.

Victoria

As part of a comprehensive health data integrity audit program, the Victorian Department of Health continues to conduct state-wide external audits across public sites. These audits review the ICD-10-AM/ACHI coding and the application of Australian Coding Standards along with some key demographic data. A total of 10,000–13,000 case records are audited within each audit cycle. The rate of AR-DRG change in records subject to audit is consistently under 10%, indicating a high quality of coding.

Queensland

Hospitals in Queensland conduct their own coding quality audits, and ICD-10-AM validations are automatically executed as part of the general processing of morbidity data in the corporate data collection.

A corporate run program of clinical coding audits continued during 2009–10. Results from this audit program show a change in AR-DRGs of less than 10%. In addition, a state-wide audit of 30 public hospitals covering 3,300 medical records was undertaken in May to June 2010 to determine coding accuracy against national standards. It was estimated that the change in AR-DRGs for this round of coding audits was also less than 10%.

A number of hospitals also validated their coded data using Performance Indicators for Coding Quality (PICQ™) 2008.

Western Australia

The Western Australian Department of Health conducts regular audits of hospital medical records and inpatient data-reporting processes. This Clinical Information Audit Program aims to provide assurances of data quality and integrity, promoting confidence in the use of health information by hospitals and throughout the system. The results of these audits for 2009–10 admitted patient cases from teaching and non-teaching hospitals indicate that the quality of the coded data is very good. The National Centre for Classification in Health's PICQ™ software and in-house quality activities were also applied to all cases received by the department.

South Australia

The South Australian Department of Health (SA Health) performed a major audit of coding practices in major metropolitan hospitals on random samples of 2004–05 data. The purpose of the audit was to ascertain the level of coding accuracy and the impact on AR-DRG assignment. The audit found that coding practices in major metropolitan hospitals had improved significantly since the last major audit (conducted in 2002), with almost all hospitals reporting a reduction in their AR-DRG error rate. In addition, the department conducts regular targeted desktop audits of coded data. Results are reported to all South Australian Coders in a quarterly newsletter, and individual hospitals are notified if a problem exists, and where coding needs to be corrected.

SA Health is in the process of conducting another major audit of coding practices, covering both major metropolitan and country hospitals.

Tasmania

In Tasmania, hospitals continue to conduct coding quality improvement activities using the Australian Coding Benchmark Audit tool and PICQ™. Validation of ICD-10-AM data also occurs routinely as the data are processed from the hospitals. A state-wide coding auditor/educator has been appointed and that position will assume the responsibility of managing state-wide coding audits and education in relation to findings from them. Also the position will manage changes/updates to coding classifications and grouping systems.

Australian Capital Territory

The Australian Capital Territory continues to code medical records to a high standard. Coded data is analysed for quality using the PICQ™ tool. Also internal coding audits are performed on a six monthly basis by some hospitals.

Northern Territory

The Northern Territory is committed to the continual improvement of clinical coding across the Northern Territory Hospitals Network, conducting regular internal audits to promote confidence in the system's health information. Recent audit activities have enabled the implementation of Key Performance Indicators and Benchmarking across the network with mentoring of the coding team provided through the Coders' Forum. Recent audit activities have shown the quality of coded data is good with a consistent improvement in AR-DRG assignment across the network.

Number of procedure codes

Table A1.8 presents information on the number of procedure codes reported to the NHMD. Ideally, the number of procedures recorded for a patient should reflect the procedures undertaken and not be restricted by administrative or technical limitations.

There were marked differences between the states and territories in the maximum number of procedures reported, ranging from 25 for South Australia to over 50 for Western Australia. However, with the exception of the Northern Territory, the average number of procedure codes per separation in the public sector varied little among the jurisdictions, as was the case in the private sector. The AIHW requested a maximum of 50 codes, so this may have restricted the number of codes reported by New South Wales, Queensland, Tasmania and the Australian Capital Territory. The proportion of separations for which no procedures were reported was higher in the public sector (24%) than in the private sector (6%). However, this may reflect casemix differences between public and private hospitals.

In recent years, the proportion of records for which five or more procedures were reported has increased in both sectors. In the public sector, 8.1% of records had five or more procedure codes in 2009–10, compared with 7.2% in 2003–04 (AIHW 2005). In the private sector, 7.2% of records had five or more procedure codes in 2009–10, compared with 8.2% in 2003–04.

Table A1.8: Proportion of separations^(a), by number of procedure codes^(b) reported, public and private hospitals, states and territories, 2009–10

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Total
	Per cent								
Public hospitals									
No procedure reported	27.1	20.1	28.0	18.9	24.8	18.3	16.0	21.5	23.8
One procedure code only	31.4	37.6	34.0	37.2	33.5	39.4	43.0	55.1	35.1
Two procedure codes only	17.0	18.3	16.9	20.0	17.0	19.1	17.1	10.6	17.6
Three procedure codes only	11.0	10.3	9.2	11.2	10.8	10.3	10.5	5.5	10.3
Four procedure codes only	5.6	5.2	4.8	5.5	5.6	4.8	5.4	2.8	5.2
Five or more procedure codes	8.1	8.6	7.2	7.4	8.2	8.2	8.0	4.5	7.9
Private hospitals									
No procedure reported	3.4	9.2	7.2	4.9	4.7	n.p.	n.p.	n.p.	6.3
One procedure code only	21.5	23.4	27.6	34.8	25.2	n.p.	n.p.	n.p.	25.0
Two procedure codes only	35.0	34.6	34.3	30.1	33.2	n.p.	n.p.	n.p.	34.1
Three procedure codes only	24.4	19.2	18.0	16.2	20.8	n.p.	n.p.	n.p.	20.2
Four procedure codes only	8.0	6.5	6.2	6.9	7.9	n.p.	n.p.	n.p.	7.1
Five or more procedure codes	7.7	7.0	6.8	7.1	8.3	n.p.	n.p.	n.p.	7.3

(a) Separations for which the care type was reported as *Newborn* (without qualified days), and records for *Hospital boarders* and *Posthumous organ procurement* have been excluded.

(b) Includes separations for which no procedure codes were reported.

Number of diagnosis codes

The NHMD contains data on principal diagnoses and additional diagnoses. Additional diagnoses include comorbidities (coexisting conditions) and/or complications which may contribute to longer lengths of stay, more intensive treatment or the use of greater resources. Ideally, the number of additional diagnoses recorded for a patient should be related to the person's clinical condition and not be restricted by administrative or technical limitations.

The AIHW requested that the states and territories report a maximum of 50 diagnosis codes, but some report more. Table A1.9 presents information on the number of diagnosis codes (principal and additional) reported to the NHMD. There are differences between the states and territories in the maximum number of diagnoses reported. For example, in the public sector, South Australia reported a maximum of 25 diagnoses and Queensland a maximum of 66. For both public and private sectors, the average number of diagnosis codes per separation varied little among the jurisdictions.

Overall, the average number of codes reported for the public sector was slightly higher than for the private sector. In the public sector, 17% of records had five or more diagnosis codes, but in the private sector less than 10% of records fell into this category. It may be that more complicated cases were treated in public hospitals, or there may have been differences in coding practices.

Table A1.9: Proportion of separations^(a), by number of diagnosis codes^{(b)(c)} reported, public and private hospitals, states and territories, 2009–10

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Total
	Per cent								
Public hospitals									
One diagnosis code only	40.6	39.0	35.0	39.0	37.4	46.5	47.9	38.6	39.0
Two diagnosis codes only	21.6	25.0	23.7	22.3	25.6	22.0	18.0	32.6	23.5
Three diagnosis codes only	12.4	12.8	14.2	13.9	12.9	12.3	11.1	8.9	12.9
Four diagnosis codes only	7.9	7.4	8.5	8.1	7.6	7.0	7.1	5.8	7.8
Five or more diagnosis codes	17.4	15.8	18.6	16.7	16.5	12.2	15.8	14.1	16.8
Private hospitals									
One diagnosis code only	35.5	38.3	34.1	35.7	31.7	n.p.	n.p.	n.p.	35.5
Two diagnosis codes only	26.4	30.7	30.0	30.7	32.4	n.p.	n.p.	n.p.	29.6
Three diagnosis codes only	18.3	15.1	16.4	17.4	16.3	n.p.	n.p.	n.p.	16.7
Four diagnosis codes only	9.0	7.2	8.8	7.2	8.4	n.p.	n.p.	n.p.	8.2
Five or more diagnosis codes	10.8	8.2	10.7	9.0	11.2	n.p.	n.p.	n.p.	9.9

(a) Separations for which the care type was reported as *Newborn* (without qualified days), and records for *Hospital boarders* and *Posthumous organ procurement* have been excluded.

(b) Codes reporting external causes of injury and poisoning are not included.

(c) For 2009–10, there were 390 records in public hospitals and 4,623 records in private hospitals for which no diagnosis codes were reported.

Apparent variation in reporting of additional diagnoses

A measure of apparent variation among Australian states and territories in the reporting and coding of additional diagnoses is the proportion of separations in the lowest resource split for adjacent AR-DRGs, standardised to the national distribution of adjacent AR-DRGs to take into account differing casemixes (Coory & Cornes 2005).

Table A1.10 shows that there is variation among jurisdictions, and by sector, in the proportion of separations grouped to the lowest resource split for adjacent AR-DRGs.

For the Northern Territory, data for some measures were suppressed because of limitations with direct standardisation for groups that report a limited range of AR-DRGs (see the discussion of relative stay indexes below).

Method

An adjacent AR-DRG is a set of AR-DRGs that is split on a basis supplementary to the principal diagnoses and procedures that are used to define the adjacent AR-DRG grouping. For many adjacent AR-DRGs, this split is based on the inclusion of significant additional diagnoses, also known as complications or comorbidities (CCs). Adjacent AR-DRGs are signified in the AR-DRG classification by having the first three characters in common. The allocation of a fourth character code is hierarchical, with the highest resource use level being assigned an A and the lowest resource use level being assigned the lowest letter in the sequence.

Table A1.10: Standardised proportion in lowest resource level AR-DRG^(a) for selected adjacent AR-DRG version 5.2, public and private hospitals, states and territories, 2009–10

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Total
All adjacent AR-DRGs where the lowest split was <i>Without complication or comorbidity</i>									
Public hospitals	0.78	0.76	0.76	0.79	0.77	0.76	0.74	0.77	0.77
Private hospitals	0.69	0.69	0.71	0.72	0.71	n.p.	n.p.	n.p.	0.70
Adjacent AR-DRGs where the lowest split was <i>With a moderate complication</i>									
Public hospitals	0.58	0.56	0.60	0.58	0.57	0.64	0.59	0.55	0.58
Private hospitals	0.58	0.57	0.57	0.57	0.56	n.p.	n.p.	n.p.	0.57
Adjacent DRGs where the lowest split was <i>Without a severe or catastrophic complication</i>									
Public hospitals	0.74	0.72	0.74	0.75	0.73	0.80	0.73	0.70	0.73
Private hospitals	0.81	0.80	0.79	0.80	0.80	n.p.	n.p.	n.p.	0.80
Adjacent AR-DRGs classified as <i>Major medical conditions</i>									
Public hospitals	0.61	0.54	0.60	0.64	0.61	0.70	0.61	0.58	0.59
Private hospitals	0.62	0.65	0.61	0.61	0.67	n.p.	n.p.	n.p.	0.63
Adjacent AR-DRGs for <i>Vaginal and caesarean delivery</i>									
Public hospitals	0.39	0.35	0.42	0.35	0.37	0.43	0.39	0.41	0.38
Private hospitals	0.35	0.36	0.38	0.36	0.34	n.p.	n.p.	n.p.	0.37

(a) Separations for which the care type was reported as *Acute*, or *Newborn* with qualified days, or was *Not reported*.

Abbreviations: AR-DRG—Australian Refined Diagnosis Related Group; n.p.—not published.

The underlying assumption of this analysis is that variation in the proportions of separations assigned to individual AR-DRGs within an adjacent AR-DRG is caused by variation in the reporting and coding of additional diagnoses that are relevant to the split of the adjacent AR-DRG. A corollary of this assumption is that any variation seen was not caused by age, diagnosis, socioeconomic status or other factors. This assumption is less likely to be valid when comparing hospital sectors which have differing casemixes, or the smaller jurisdictions because of differing population profiles and the limitations of the standardisation method.

The data were directly standardised by scaling the distribution of adjacent AR-DRGs in each jurisdiction/sector to the same distribution as the national total. The resulting proportions of separations in the lowest resource AR-DRG within the adjacent AR-DRG are comparable.

This analysis concentrates on differences in the reporting of additional diagnoses that are significant in AR-DRG assignment within the adjacent AR-DRG groupings. The analysis covers five groups of adjacent AR-DRGs:

1. all applicable adjacent AR-DRGs (that is, excluding adjacent AR-DRGs with other factors affecting partitioning)
2. adjacent DRGs where the lowest split was without CCs
3. adjacent DRGs where the lowest split was without severe or catastrophic CCs
4. major medical conditions: adjacent AR-DRGs E61 *Pulmonary embolism*, F62 *Heart failure and shock*, T60 *Septicaemia* – these adjacent AR-DRGs are selected because admission for these conditions is seen to be relatively non-discretionary and less likely than for other AR-DRGs to be influenced by variation in admission practices
5. vaginal and caesarean deliveries.

The above categories overlap; in particular, Vaginal and caesarean deliveries is a subset of the second category, and Major medical conditions is a subset of the third category.

See Table A1.11 (accompanying this report online) for additional detail on this analysis and the list of AR-DRGs included.

Condition onset flag data

The data element 'Episode of admitted patient care – condition onset flag' was mandated for national collection for the first time for the 2008–09 reporting period.

The condition onset flag is a means of differentiating those conditions which arise during, or arose before, an admitted patient episode of care. It is reported for each ICD-10-AM diagnosis, external cause, place of occurrence, and activity when injured code.

A better understanding of those conditions arising during the episode of care may inform prevention strategies particularly in relation to complications of medical care.

Conditions which arise during the episode of care can include:

- conditions resulting from misadventure during medical or surgical care during the episode of admitted patient care
- abnormal reactions to, or later complication of, surgical or medical care arising during the episode of admitted patient care
- conditions arising during the episode of admitted patient care that may not be related to surgical or medical care (for example, pneumonia).

Quality of the Condition onset flag data for 2009–10

The quality of the Condition onset flag data for 2009–10 was not considered to be sufficient for analytical purposes and presentation in the body of this report. This was for three main reasons:

- The data were not provided for all separations, with major gaps for public hospitals for New South Wales, and for private hospitals for New South Wales, Tasmania, the Australian Capital Territory and the Northern Territory.
- There was variation in the proportion of separations for which there was a report of a condition with onset during the episode of care, among states and territories for both the public and private sectors. Although some variation could be expected, it was considered that further investigation of the data quality was warranted at this stage.
- There were unexpected reports of condition with onset during the episode of care, such as for congenital conditions and conditions such as cancer. Although the numbers of these reports were small, it was considered that further investigation of the data quality was warranted at this stage.

The data were considered to be of insufficient quality for analytical purposes for these reasons.

Coverage

For public hospitals, Condition onset flag was provided for over 90% of separations for all states and territories except New South Wales (Table A1.12).

For New South Wales, Condition onset flag was provided for about 28% of separations in public hospitals. Only some of the New South Wales Area Health Services provided data.

For private hospitals, Condition onset flag was provided for over 99% of separations for Victoria, Queensland, Western Australia and South Australia.

Table A1.12: Proportion of separations^(a) with Condition onset flag reported^(b) (%), public and private hospitals, states and territories, 2009–10

	Public hospitals	Private hospitals
New South Wales ^(c)	28.3	0.0
Victoria	100.0	100.0
Queensland	100.0	100.0
Western Australia	100.0	100.0
South Australia	100.0	99.8
Tasmania	91.9	10.8
Australian Capital Territory	100.0	57.2
Northern Territory	100.0	0.0
Total	78.0	69.4

(a) Separations for which the care type was reported as *Newborn* (without qualified days), and records for *Hospital boarders* and Posthumous organ procurement have been excluded.

(b) The proportion of separations for which Condition onset flag was reported may include records where the flag was provided for some diagnoses and not for others.

(c) For New South Wales, Condition onset flag data were only reported for public hospitals for three NSW Area Health Services.

Proportion of separations for which there was a report of a condition with onset during the episode of care

For separations for which Condition onset flag was provided, about 6.5% of public hospital separations and about 3.3% of private hospital separations reported at least one condition that arose during the episode of care (tables A1.13 and A1.14).

Public hospitals

About 6.5% of public hospital separations reported at least one condition that arose during the episode of care (Table A1.13). There was marked variation between states and territories, with the overall proportion ranging from 0.9% to 10.0%. Differences in casemix between states and territories may account for some of this variation. However, this variation may indicate that there are differences in the allocation of Condition onset flags.

The proportion of same-day separations that recorded a condition with onset during the episode was 0.7%, with state/territory proportions ranging from 0.1% to 1.1% (Table A1.13).

About 12.4% of public hospital overnight separations recorded a diagnosis with onset during the episode of care. There was variation by jurisdiction, ranging from 1.6% to 22.2%. For overnight separations with an *Elective* urgency of admission, the proportion reported with a condition with onset during the episode ranged from 1.7% to 23.6%.

Private hospitals

For private hospitals, data are not presented for New South Wales, Tasmania and Northern Territory. For the Australian Capital Territory, data are presented for the hospitals that provided Condition onset flag data.

About 3.3% of private hospital separations reported at least one condition that arose during the episode of care (Table A1.14). There was marked variation between states and territories, with the overall proportion ranging from 3.3% to 5.9%. As for public hospitals, this variation may indicate that there are differences in the allocation of Condition onset flags.

Table A1.13: Proportion of separations^(a) with condition onset during episode of care, by same-day/overnight status and Urgency of admission, public hospitals, 2009–10

	State 1	State 2	State 3	State 4	State 5	State 6	State 7	State 8	Total
Same-day separations									
Emergency	1.4	0.6	0.6	1.5	0.2	1.5	0.9	0.9	0.9
Elective	1.9	0.6	0.6	2.9	0.1	1.1	0.7	0.5	0.7
Not assigned	0.5	0.2	0.2	0.2	0.2	0.1	2.3	0.4	0.4
Not reported	..	..	..	..	..	..	0.0	0.6	0.6
<i>Total</i>	1.1	0.4	0.4	1.6	0.1	0.6	0.8	0.5	0.7
Overnight separations									
Emergency	12.5	9.2	9.7	13.8	1.1	14.7	18.1	13.8	9.6
Elective	17.7	12.5	23.2	17.9	1.7	19.9	23.6	15.6	16.2
Not assigned	29.5	23.5	19.6	32.0	2.9	23.9	38.2	17.2	19.0
Not reported	..	..	..	..	..	..	0.0	10.4	10.1
<i>Total</i>	16.3	12.7	14.0	16.5	1.6	17.4	22.2	13.4	12.4
Total	0.9	8.6	4.9	6.8	9.8	0.9	8.4	10.0	6.5

(a) Proportion of separations is calculated for separations for which the Condition onset flag was reported only. States and territories have been presented in random order, and this is not necessarily the same as in Table A1.14.

Abbreviation: .. —not applicable.

The proportion of same-day separations that recorded a condition with onset during the episode was 0.3%, with state/territory proportions ranging from 0.2% to 1.1% (Table A1.14).

About 9.8% of private hospital overnight separations recorded a diagnosis with onset during the episode of care. There was variation by jurisdiction, ranging from 4.7% to 18.4%. For overnight separations with an *Elective* urgency of admission, the proportion reported with a condition with onset during the episode ranged from 3.4% to 15.2%.

Table A1.14: Proportion of separations^(a) with condition onset during episode of care, by same-day/overnight status and urgency of admission, private hospitals, reporting states and territories, 2009–10

	State A	State B	State C	State D	State E	Total
Same-day separations						
Emergency	1.3	16.7	1.0	0.8	0.8	0.8
Elective	0.4	0.3	0.3	0.3	1.2	0.3
Not assigned	0.1	0.0	0.1	0.1	0.8	0.2
Not reported	..	..	..	..	..	..
<i>Total</i>	0.4	0.3	0.3	0.2	1.1	0.3
Overnight separations						
Emergency	42.4	7.8	9.9	12.7	14.4	11.8
Elective	15.2	3.4	8.4	12.9	14.4	8.7
Not assigned	27.0	14.4	18.7	17.5	30.6	16.1
Not reported	..	..	..	..	..	..
<i>Total</i>	18.4	4.7	9.6	13.0	14.9	9.8
Total	5.7	2.2	3.3	4.3	5.9	3.3

(a) Proportion of separations is calculated for separations for which the Condition onset flag was reported only. States and territories have been presented in random order, and this is not necessarily the same as in Table A1.13.

Abbreviation: .. —not applicable.

Diagnoses reported with onset during the episode of care

Table A1.15 presents information on the number and proportion of additional diagnoses that were reported as arising during the episode of care, by ICD-10-AM disease chapter for public and private hospitals. These data are included only for establishments for which the Condition onset flag was reported. It should be noted that some diseases or conditions are coded using more than one code, so the count of additional diagnosis codes is not a count of conditions.

For public hospitals, the disease chapters with the highest proportion of additional diagnoses that arose during the episode of care were *Pregnancy, childbirth and the puerperium* (36.2%), *Certain conditions originating in the perinatal period* (21.8%), *Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified* (21.3%) and *Diseases of the skin and subcutaneous tissues* (17.9%).

For private hospitals, the disease chapters with the highest proportions of additional diagnoses that arose during the episode of care were *Pregnancy, childbirth and the puerperium* (28.3%), *Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified* (27.3%), and *Injury, poisoning and certain other consequences of external causes* (27.1%).

Some diseases or disorders are not expected to arise during the episode of care, such as diseases or disorders in the chapters *Neoplasms* and *Congenital malformations, deformations and chromosomal abnormalities*. Therefore it is not expected that additional diagnoses would be reported with onset during the episode of care for these chapters. However, there were some diagnoses in these chapters that were reported as having onset during the episode of care. These may indicate data quality issues that the AIHW will consider with states and territories before publication of future condition onset data.

High-volume diagnoses with onset during the episode of care

Table A1.16 presents the 20 most common diagnoses (at the 3-character level of the ICD-10-AM classification) reported as having onset during the episode of care, for public and private hospitals. This table provides some evidence that the Condition onset flag data were reported as would be expected and that the data have potential to be useful for analysis purposes in the future.

Five of the top 20 diagnoses were related to childbirth episodes, including perineal lacerations and postpartum haemorrhage. Four were categorised as signs or symptoms, such as nausea, retention of urine, pain, headache and fever. Four were for infectious diseases and two were for complications of medical or surgical care.

Table A1.15: Conditions (additional diagnoses) with onset during the episode of care, by ICD-10-AM disease chapter, public and private hospitals, selected states and territories^(a), 2009–10

Diagnosis chapter		Public hospitals			Private hospitals		
		Condition with onset during episode	Total additional diagnoses	% with onset during episode	Condition with onset during episode	Total additional diagnoses	% with onset during episode ^(b)
A00–B99	Certain infectious and parasitic diseases	48,467	298,505	16.2	14,368	75,389	19.1
C00–D48	Neoplasms	629	581,220	0.1	687	494,569	0.1
D50–D89	Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	31,126	169,837	18.3	7,795	49,620	15.7
E00–E90	Endocrine, nutritional and metabolic diseases	74,974	683,278	11.0	13,707	148,864	9.2
F00–F99	Mental and behavioural disorders	12,903	333,758	3.9	2,754	92,847	3.0
G00–G99	Diseases of the nervous system	9,273	176,953	5.2	2,539	56,116	4.5
H00–H59	Diseases of the eye and adnexa	4,507	105,046	4.3	1,152	26,116	4.4
H60–H95	Diseases of the ear and mastoid process	1,330	27,393	4.9	336	7,185	4.7
I00–I99	Diseases of the circulatory system	79,551	792,556	10.0	28,479	268,082	10.6
J00–J99	Diseases of the respiratory system	41,557	261,372	15.9	11,302	65,233	17.3
K00–K93	Diseases of the digestive system	41,451	460,223	9.0	14,871	359,061	4.1
L00–L99	Diseases of the skin and subcutaneous tissue	25,507	142,650	17.9	6,537	47,286	13.8
M00–M99	Diseases of the musculoskeletal system and connective tissue	12,799	217,636	5.9	5,398	165,312	3.3
N00–N99	Diseases of the genitourinary system	33,520	532,061	6.3	10,734	238,730	4.5
O00–O99	Pregnancy, childbirth and the puerperium	116,297	320,883	36.2	32,140	113,508	28.3
P00–P96	Certain conditions originating in the perinatal period	17,174	78,914	21.8	2,578	12,514	20.6
Q00–Q99	Congenital malformations, deformations and chromosomal abnormalities	200	36,274	0.6	65	7,055	0.9
R00–R99	Symptoms, signs and abnormal clinical and laboratory findings, n.e.c.	147,026	690,767	21.3	57,835	211,813	27.3
S00–T98	Injury, poisoning and certain other consequences of external causes	69,422	518,186	13.4	23,609	87,208	27.1
Z00–Z99	Factors influencing health status and contact with health services	27,750	2,064,982	1.3	5,299	870,030	0.6
Total		795,463	8,492,495	9.4	242,185	3,396,538	7.1

(a) For public hospitals, data are included for all states and territories. For private hospitals, data are included for the five jurisdictions that provided Condition onset flag information.

(b) Proportions are of separations for which the Condition onset flag was reported.

Table A1.16: The 20 most common diagnoses with onset during the episode of care, selected states and territories^(a), public and private hospitals, 2009–10

3-character ICD-10-AM diagnosis code	Public hospitals ^(b)	Private hospitals ^(b)	Total ^(b)
E87 Other disorders of fluid, electrolyte and acid-base balance	41,476	7,780	49,256
I95 Hypotension	29,910	9,943	39,853
T81 Complications of procedures, not elsewhere classified	24,890	11,041	35,931
R11 Nausea and vomiting	16,072	11,332	27,404
K59 Other functional intestinal disorders	17,416	6,198	23,614
O70 Perineal laceration during delivery	18,184	5,317	23,501
N39 Other disorders of urinary system	16,711	5,289	22,000
B96 Other bacterial agents as the cause of diseases classified to other chapters	15,580	5,192	20,772
O92 Other disorders of breast and lactation associated with childbirth	13,810	2,907	16,717
R00 Abnormalities of heart beat	13,151	3,415	16,566
O92 Other disorders of breast and lactation associated with childbirth	10,430	5,713	16,143
I48 Atrial fibrillation and flutter	10,271	4,883	15,154
O72 Postpartum haemorrhage	12,240	1,909	14,149
R33 Retention of urine	9,950	4,011	13,961
D64 Other anaemias	10,019	3,929	13,948
R07 Pain in throat and chest	10,278	3,366	13,644
O68 Labour and delivery complicated by fetal stress [distress]	10,298	2,699	12,997
E86 Volume depletion	10,692	1,617	12,309
R50 Fever of unknown origin	8,770	3,115	11,885
A09 Diarrhoea and gastroenteritis of presumed infectious origin	8,890	2,949	11,839

(a) For public hospitals, data are included for all states and territories. For private hospitals, data are included for the five jurisdictions that provided Condition onset flag information.

Australian Refined Diagnosis Related Groups (AR-DRGs)

Australian Refined Diagnosis Related Groups (AR-DRGs) 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 5.2 (DoHA 2006) to classify separations, and the most recent cost weights based on version 5.2 (Round 13, 2008–09 DOHA 2010).

The AR-DRG classification is partly hierarchical, with 23 Major Diagnostic Categories (MDCs), divided into *Surgical*, *Medical* and *Other* partitions, and then into 665 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–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 901Z–903Z and 960Z–963Z), even if they were assigned to an MDC (*Error DRGs* are included within *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.

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 7, 8 and 9* is presented using the three levels of the AR-DRG classification:

- Separations have been categorised as *Childbirth*, *Specialist mental health*, *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 2009–10, each separation in the NHMD was classified to AR-DRG version 5.2 (DoHA 2006) on the basis of demographic and clinical characteristics of the patient. AR-DRG version 5.2 has been used throughout this report as cost weights for AR-DRG version 6.0 are designated as interim and are not available for both public and private hospitals.

Each AR-DRG version is based on a specific edition of the ICD-10-AM/ACHI (Table A1.17). However, AR-DRGs can be mapped from other ICD-10-AM/ACHI editions.

Table A1.17: ICD-10-AM and AR-DRG versions, 2004–05 to 2009–10

Year	ICD-10-AM edition	Relevant AR-DRG version	AR-DRG version reported in Australian hospital statistics
2002–03	Third edition	Version 5.0	Version 5.0
2003–04	Third edition	Version 5.0	Version 5.0
2004–05	Fourth edition	Version 5.1	Version 5.1
2005–06	Fourth edition	Version 5.1	Version 5.1
2006–07	Fifth edition	Version 5.2	Version 5.1
2007–08	Fifth edition	Version 5.2	Version 5.1
2008–09	Sixth edition	Version 6.0	Version 5.2
2009–10	Sixth edition	Version 6.0	Version 5.2

For AR-DRG-based time series comparisons, AR-DRG version 5.1 was used for the years 2005–06 to 2007–08 and AR-DRG version 5.2 was used for 2008–09 to 2009–10. For the purpose of these analyses, the coded clinical data for 2005–06 were mapped forwards to the fourth edition of the ICD-10-AM and then grouped to AR-DRG version 5.1 and the ICD coded data for 2006–07 and 2007–08 were mapped backward to the fourth edition of the ICD-10-AM and then grouped to AR-DRG version 5.1. Due to the mapping necessary to generate the AR-DRG versions, the data presented in these tables may not be comparable for a small number of AR-DRGs.

Similarly, the AIHW's AR-DRG online data cubes (<www.aihw.gov.au/hospitals/>) present AR-DRG versions 4.0, 4.1 and 4.2 based on the relevant AR-DRG versions for 1997–98 to 2001–02, and for the years 2002–03 to 2004–05 the supplied third and fourth edition ICD-10-AM codes were mapped backwards to second edition codes to group the data for those years to AR-DRG version 4.2. Similarly, for the AR-DRG version 5.0/5.1/5.2 cube, which covers the years 1998–99 to 2009–10, the data for 1998–99 to 2001–02 based on earlier editions of the ICD-10-AM were mapped forwards to the third edition codes and then grouped to AR-DRG version 5.0.

AR-DRG cost weights and cost estimates

Cost weights and cost estimates are prepared by the Australian Government Department of Health and Ageing through the National Hospital Cost Data Collection (NHCCDC) (DoHA 2010). The NHCCDC 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. They were \$4,133 for the public sector, and \$3,047 for the private sector in 2008–09. 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 latest available cost weights (at the time of publication of this report) were for version 5.2 AR-DRGs for 2008–09 (DoHA 2010). When the NHCCDC 2009–10 results become available, updated information using those data will be provided in the tables accompanying this report online at <www.aihw.gov.au/hospitals/>.

The cost by volume estimates presented in the supplementary *APC–DRG Additional Tables (Part 2)* (accompanying this report online) are calculated by applying the AR-DRG version 5.2 2008–09 national public and private sector estimated average costs to the AR-DRG version 5.2 data for 2009–10.

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).

Analysis methods

Cost per casemix-adjusted separation analysis

The cost per casemix-adjusted separation (*Chapter 3*) is an indicator of the efficiency of public acute care hospitals. It 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 synopsis of the methods used in this analysis is presented below, and more detail is available in *Australian hospital statistics 2000–01* (AIHW 2002).

Definition

The formula used to calculate the cost per casemix-adjusted separation is:

$$\frac{\text{Recurrent expenditure} \times \text{IFRAC}}{\text{Total separations} \times \text{Average cost weight}}$$

where:

- recurrent expenditure is as defined by the recurrent expenditure data elements in the *National health data dictionary* (HDSC 2008)
- IFRAC (admitted patient cost proportion) is the estimated proportion of total hospital expenditure that relates to admitted patients
- total separations excludes *Newborns* (without qualified days) and records that do not relate to admitted patients (*Hospital boarders* and *Posthumous organ procurement*)
- average cost weight is a single number representing the relative expected resource use for the separations (see above).

Matters affecting the interpretation of cost per casemix-adjusted separation

The inclusion of non-acute care

The formula used to calculate the cost per casemix-adjusted separation includes all admitted patient separations and their associated costs. It is appropriate to include the acute care separations, which comprise almost 98% of the total for the hospitals included in the analysis (see Table A1.18, accompanying this report online), as cost weights are available for acute care. However, the 2% of separations that are not acute care are also included and, as there are no cost weights for these separations, the average cost weight for the acute separations for each hospital is used. This method may affect the estimates of cost-weighted separations (see below) for each state and territory, depending on the proportion of non-acute separations for the state or territory. Non-acute separations (including rehabilitation care)

generally have higher costs per separation than acute care separations because, although their daily costs are lower, these episodes typically involve longer lengths of stay.

For 2009–10, estimates of expenditure for acute care for admitted patients (acute care IFRACs) were available for some jurisdictions, and the effect of limiting the analysis to acute care is presented below.

The inclusion of psychiatric care

The validity of comparisons of average cost weights is also limited by differences in the extent to which each jurisdiction's psychiatric care services are integrated into its public hospital system. For example, in Victoria, almost all public psychiatric hospitals are mainstreamed into acute hospital services, and psychiatric patient data are therefore included in the acute hospital reports. Cost weights are not as useful as measures of resource requirements for acute psychiatric care because the relevant AR-DRGs are less homogeneous than for other acute care.

Cost per acute care casemix-adjusted separation and cost per non-psychiatric acute care casemix-adjusted separation

As cost weights are available only for acute care separations, the cost per casemix-adjusted separation analysis applies these cost weights to all separations. A more accurate estimate of cost could be obtained by restricting the analysis to acute, or acute non-psychiatric separations and expenditure.

New South Wales, Victoria and Western Australia provided estimates of expenditure on acute care for admitted patients, so estimates of the cost per casemix-adjusted acute care separation are presented for these jurisdictions (Table A1.17). Separations were included only if their care type was *Acute, Newborn* (with qualified days) or for which the care type was *Not reported*.

Hospitals were excluded from the analysis if the estimated cost per day was more than \$1,000 (as this would be considered unreasonably high for non-acute care types) or if the same IFRACs were reported for acute care (and non-psychiatric acute care) as for all care types (where they reported more than 1,000 patient days for non-acute separations).

Using these criteria, the 2009–10 analysis excluded 35 hospitals for New South Wales, 2 hospitals for Victoria and 8 hospitals for Western Australia.

The estimated cost per acute care casemix-adjusted separation (excluding depreciation) for the selected hospitals was:

- \$4,636 in New South Wales, \$2 more than the cost per casemix-adjusted separation for all separations
- \$3,975 in Victoria, 13.4% less than for all separations
- \$4,411 in Western Australia, 6.4% less than for all separations (Figure A1.1 and Table A1.19).

The estimated cost per non-psychiatric acute care casemix-adjusted separation (excluding depreciation) for the selected hospitals was:

- \$4,876 in New South Wales, 5.2% greater than the cost per casemix-adjusted separation for all separations
- \$3,951 in Victoria, 13.9% less than for all separations
- \$4,375 in Western Australia, 7.2% less than for all separations.

Table A1.19: Cost per casemix-adjusted separation (\$) for acute and non-psychiatric acute separations, subset of selected public acute hospitals^(a), New South Wales, Victoria and Western Australia, 2009–10

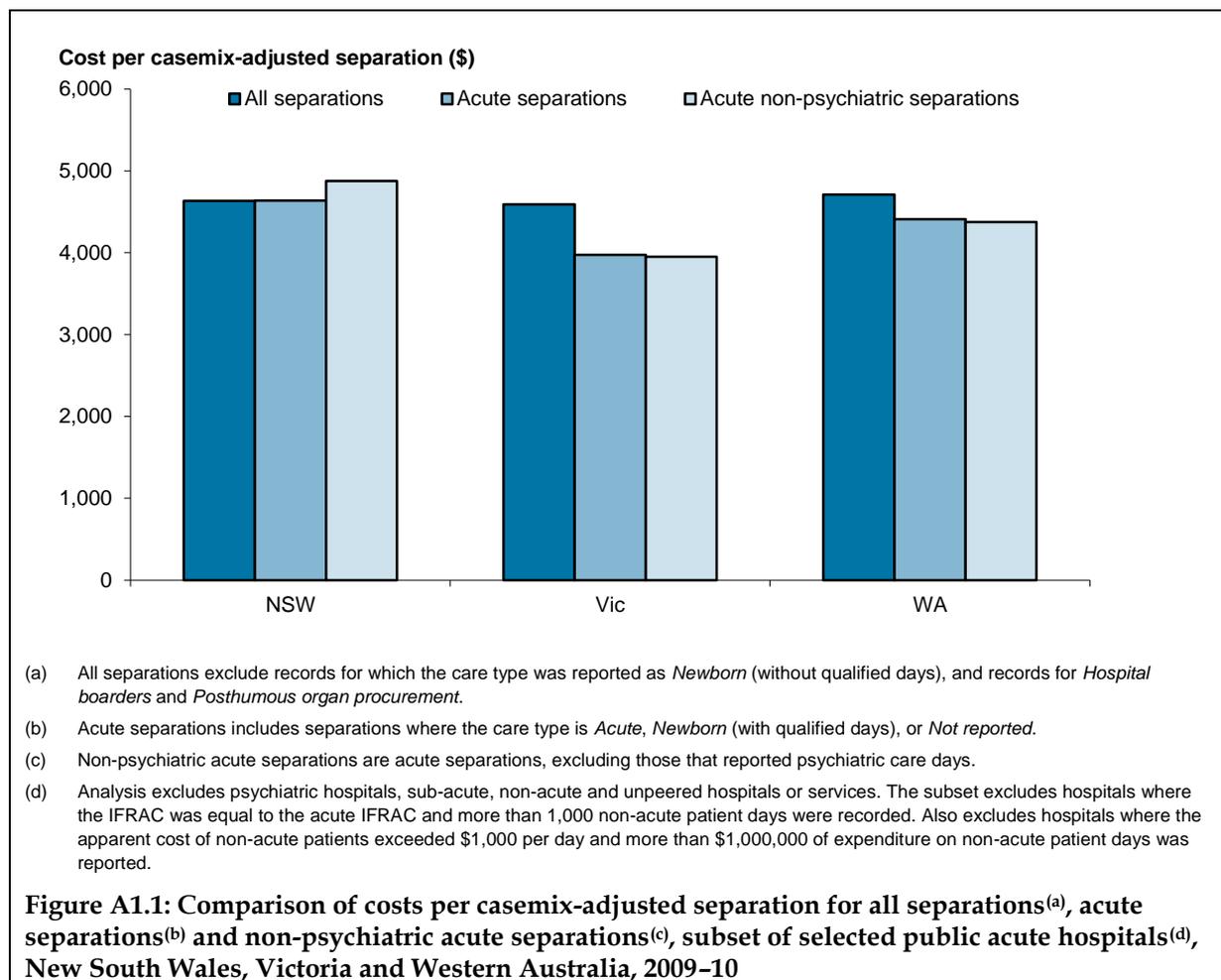
	NSW	Vic	WA
Cost per casemix-adjusted separation excluding depreciation	4,634	4,591	4,712
Cost per casemix-adjusted acute separation excluding depreciation ^(b)	4,636	3,975	4,411
Percentage that exceeds cost per casemix-adjusted separation for subset hospitals	<0.1%	-13.4%	-6.4%
Cost per casemix-adjusted acute non-psychiatric separation excluding depreciation^(c)	4,876	3,951	4,375
Percentage that exceeds cost per casemix-adjusted separation for subset hospitals	5.2%	-13.9%	-7.2%
Cost per casemix-adjusted separation including depreciation	4,800	4,909	4,830
Cost per casemix-adjusted acute separation including depreciation ^(b)	4,802	4,251	4,521
Percentage that exceeds cost per casemix-adjusted separation for subset hospitals	<0.1%	-13.4%	-6.4%
Cost per casemix-adjusted acute non-psychiatric separation including depreciation ^(c)	5,050	4,224	4,224
Percentage that exceeds cost per casemix-adjusted separation for subset hospitals	5.2%	-14.0%	-12.5%

(a) Excludes psychiatric hospitals, sub-acute, non-acute and unpeered hospitals or services. This subset excludes hospitals where the admitted patient cost proportion (IFRAC) was equal to the acute IFRAC and more than 1,000 non-acute patient days were recorded. Also excludes hospitals where the apparent cost of non-acute patients exceeded \$1,000 per day and more than \$1,000,000 of expenditure on non-acute patient days was reported.

(b) Separations where the care type is *Acute, Newborn* (with qualified days), or *Not reported*. Details of acute and non-acute separations and patient days are presented in Table A1.17.

(c) Separations where the care type is *Acute, Newborn* (with qualified days), or *Not reported*, and excludes records for which psychiatric care days were reported. Psychiatric separations are those with specialised psychiatric care days.

The estimated cost per acute care casemix-adjusted separation, including depreciation and cost per non-psychiatric acute casemix-adjusted separation, including depreciation is available in Table A1.20 accompanying this report online.



Cost per casemix-adjusted separation, including capital

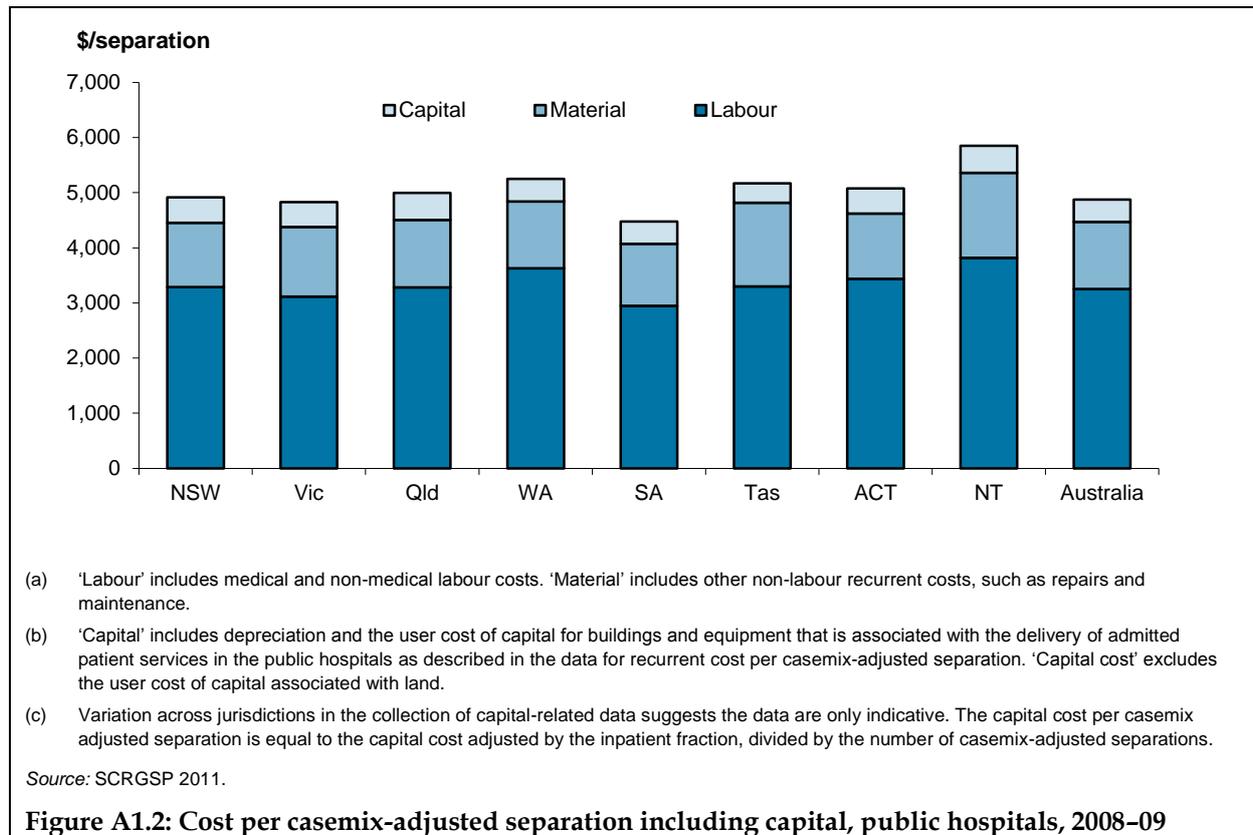
The cost per casemix-adjusted separation analysis includes recurrent expenditure and depreciation for those states that reported it (see *Chapter 3*).

The Steering Committee for the Review of Government Service Provision (SCRGSP) reported ‘total costs per casemix-adjusted separation’ by state and territory for 2008–09 (SCRGSP 2011). It was defined as the recurrent cost per casemix-adjusted separation plus the capital costs (depreciation and the user cost of capital of buildings and equipment) per casemix adjusted separation.

‘Depreciation is defined as the cost of consuming an asset’s services. It is measured by the reduction in value of an asset over the financial year. The user cost of capital is the opportunity cost of the capital invested in an asset, and is equivalent to the return foregone from not using the funds to deliver other government services or to retire debt. Interest payments represent a user cost of capital, so are deducted from capital costs in all jurisdictions to avoid double counting’ (SCRGSP 2011).

Excluding the user cost of capital for land, the total cost per casemix-adjusted separation ranged from \$4,477 in South Australia to \$5,852 in the Northern Territory (SCRGSP 2011) (Figure A1.2).

Further details about the SCRGSP calculation of total cost per casemix-adjusted separation are available in the *Report on government services 2011* (SCRGSP 2011).



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 5.2 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.

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 Table A1.19 accompanying this report online)
- *Error* AR-DRGs.

Comparisons with RSIs presented in *Australian hospital statistics 2003–04* (AIHW 2005) and earlier reports should be made with caution, because the indexes for earlier years were calculated using AR-DRG version 4 and, for reports after 2003–04, the RSIs 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 relative stay index method applies the national average length of stay (ALOS) for each AR-DRG (version 5.0/5.1/5.2) 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 relative stay index 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.

Due to the issues with the direct relative stay index 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. Data for the direct standardised method in the public sector in the Northern Territory are suppressed in Table 3.17, because of problems with using the direct standardisation for hospital groups that reported a limited range of AR-DRGs. For public hospitals in the Northern Territory, less than 500 of the 635 DRGs used in the national RSI analysis are represented, so results are likely to have been affected by estimation of the missing ALOS data.

Table A1.21, accompanying this report online, shows the number of AR-DRGs represented in each cell in Table 3.17, so that the number of AR-DRGs for which ALOS was estimated can be derived.

For those jurisdictions and sectors for which RSI statistics are presented in Table 3.17, there were between 569 and 634 AR-DRGs represented, meaning that ALOS data was estimated for up to 96 AR-DRGs.