

Independent Hospital Pricing Authority

# National Hospital Cost Data Collection: Private Hospital Report

Round 22 (Financial year 2017-18)

*February 2020*



IHPA

## National Hospital Cost Data Collection, Private Hospital Report, Round 22 (Financial year 2017-18)

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# Contents

Tables and figures .....	3
Acronyms/Abbreviations .....	4
Disclaimer .....	5
1. Executive summary .....	6
2. Introduction.....	8
3. Scope and methodology .....	11
4. Results .....	15
Appendix A: Analysis performed to determine the minimum sample size.....	34
Appendix B: Private sector costing approaches .....	35
Appendix C: Standard error range for the Round 22 private sector NHCDC .....	37
Appendix D: Cost weight tables by AR-DRG Version 9.0.....	38
Appendix E: Cost weight tables by AR-DRG Version 8.0 .....	39
Appendix F: Cost weight tables by AR-DRG Version 7.0 .....	40
Appendix G: Cost weight tables by AR-DRG Version 6.0x.....	41
Appendix H: Cost bucket matrix.....	42

# Tables and figures

## List of Tables

Table 1. Summary of private hospital participation.....	6
Table 2. Summary of private hospital participation.....	9
Table 3. Comparison of separations and hospitals, Round 12 (2007-08) to Round 22 (2017-18) .....	15
Table 4. Top 20 DRGs ranked by highest cost weight .....	18
Table 5. Top 20 DRGs ranked by highest volume of population adjusted separations .....	20
Table 6. Top 20 DRGs ranked by highest cost weighted separations .....	22
Table 7. Top 20 DRGs ranked by average length of stay (ALOS) .....	24
Table 8. Breakdown of cost by cost-bucket group (Round 22 compared to Round 21) .....	25
Table 9. Top 20 DRGs for operating room/specialist procedure suites cost bucket .....	27
Table 10. Top 20 DRGs for critical care cost bucket.....	29
Table 11. Top 20 DRGs for prostheses cost bucket .....	31
Table 12. Top 20 DRGs for miscellaneous (Misc.) cost bucket .....	33
Table 13. Number of DRGs by standard error range .....	37
Table 14. Round 22 (2017-18) national consolidation cost weight tables – V9.0 .....	38
Table 15. Round 22 (2017-18) national consolidation cost weight tables – V8.0 .....	39
Table 16. Round 22 (2017-18) national consolidation cost weight tables – V7.0 .....	40
Table 17. Round 22 (2017-18) national consolidation cost weight tables – V6.0x.....	41

## List of Figures

Figure 1. Top 20 DRGs ranked by highest cost weight.....	17
Figure 2. Comparison of top 20 DRGs by highest volume of population adjusted separations .....	19
Figure 3. Comparison of top 20 DRGs by highest cost-weighted separations.....	21
Figure 4. Comparison of top 20 DRGs by average length of stay (ALOS).....	23
Figure 5. Breakdown of cost by cost-bucket group (Round 22 compared to Round 21) .....	25
Figure 6. Cost bucket matrix.....	42

# Acronyms/Abbreviations

Acronym/Abbreviation	Description
<b>ABS</b>	Australian Bureau of Statistics
<b>AHPCS</b>	Australian Hospital Patient Costing Standards
<b>AIHW</b>	Australian Institute of Health and Welfare
<b>AR-DRG</b>	Australian Refined - Diagnosis Related Group
<b>DRG</b>	Diagnosis Related Group
<b>EDW</b>	Enterprise Data Warehouse
<b>HCP</b>	Hospital Casemix Protocol
<b>ICD-10-AM</b>	International statistical classification of diseases and related health problems, Tenth Revision, Australian modification
<b>IHPA</b>	Independent Hospital Pricing Authority
<b>NHCDC</b>	National hospital cost data collection
<b>OR</b>	Operating room (theatres)
<b>PHDB</b>	Private Hospital Data Bureau
<b>QA</b>	Quality Assurance
<b>SPS</b>	Specialist procedure suites
<b>WIP</b>	Work in progress

# Disclaimer

## Reliance on this report

This Report has been prepared by PricewaterhouseCoopers Consulting Pty Limited (PwC) at the request of the Independent Hospital Pricing Authority (IHPA). PwC prepared this report solely for IHPA's use in accordance with and for the purpose set out in the contract between IHPA and PwC. PwC acted exclusively for IHPA and considered no-one else's interests and accepts no responsibility, duty or liability to anyone other than IHPA in connection with this report, and for the consequences of using or relying on it for a purpose other than that referred to above.

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# 1. Executive summary

The private sector NHCDC is a voluntary collection that produces a range of hospital cost and activity information by Australian Refined Diagnosis Related Groups (AR-DRG). This report includes the findings from the Round 22 (financial year 2017-18) of the NHCDC for admitted acute care provided by overnight private hospitals.

## Changes in Round 22

Similar to the Round 21 private sector NHCDC, for Round 22 IHPA facilitated the data collection process, which involved stakeholder engagement, validation, quality assurance and data set consolidation. Consultants (PricewaterhouseCoopers Consulting Pty Limited, PwC) were engaged to undertake the data analysis and reporting.

Round 22 has two notable changes:

- Hospitals were required to submit their data in compliance with the Australian Hospital Patient Costing Standards (AHPCS) version 4.0, instead of v3.1 used in Round 21.
- The number of participating hospital groups increased by one group.

## Participation

The high level statistics for the Round 22 private sector NHCDC alongside previously reported Rounds (since 2007-08) are provided in Table 1.

In Round 22, the data set includes 112 hospitals and 2,173,847 separations, representing 66 per cent of the total in scope hospital separations. The number of participating hospitals has increased by 7 hospitals or 7 per cent. The number of sample separations has increased by 250,537 or 13 per cent.

**Table 1. Summary of private hospital participation**

Summary	Round 12 2007-08	Round 13 2008-09	Round 16 2011-12	Round 17 2012-13	Round 18 2013-14	Round 20 2015-16	Round 21 2016-17	Round 22 2017-18
Number of hospitals	109	110	105	95	96	91	105	112
Sample Separations	1,607,678	1,648,989	1,775,059	1,650,816	1,697,311	1,781,699	1,923,310	2,173,847
Participation rate* %)	72	71	66	60	60	58	59	66
AR-DRG version	4.2	5.1	6.0x	6.0x	6.0x	8.0	9.0	9.0

\*Participation rate refers to the percentage of sample separations compared to the population separations.

## Key findings

The data from the Round 22 private sector NHCDC was analysed to identify the top 20 DRGs by a range of factors. These rankings were compared to the rankings from the Round 21 data. The key findings were as follows:

- Overall, there was a high level of consistency between the DRGs appearing in the top 20 in Round 21 and Round 22, apart from the top 20 for average length of stay (ALOS) and the top 20 for the miscellaneous cost bucket.
- Highest cost weight: There was 80 per cent consistency in the top 20 DRGs between Round 21 and Round 22. The two highest ranked DRGs, A13A (Ventilation  $\geq$ 336hours, Major Complexity) and A14A (Ventilation  $\geq$ 96hours &  $<$ 336hours, Major Complexity), were the



same in both Rounds. Three DRGs which were just outside the top 20 in Round 21 have newly entered the top 20 in Round 22.

- Highest volume of population-adjusted separations: There was 100 per cent consistency in the top 20 DRGs between Round 21 and Round 22. The ranking was very similar also, with the top five DRGs in the same order in both Rounds.
- Highest cost weighted separations: The analysis showed 95 per cent consistency in the top 20 DRGs between Round 21 and Round 22. The top three DRGs were the same in both Rounds, and the single new entry to the top 20 was just outside the top 20 in Round 21.
- Highest ALOS: There was 70 per cent consistency between the top 20 DRGs in Round 21 and Round 22. The top two DRGs were the same in both Rounds, A13A (Ventilation  $\geq 336$  hours, Major Complexity) and A14A (Ventilation  $\geq 96$  hours &  $< 336$  hours, Major Complexity), and noting that these were the top two DRGs by cost weight as well. There were six new DRGs in the top 20 for Round 22, the majority of which were just outside the top 20 in Round 21.

The data was also analysed by cost bucket<sup>1</sup>, examining operating rooms (OR) and specialist procedure suites (SPS) combined, critical care, prosthesis and miscellaneous. Round 21 and Round 22 were compared in terms of overall costs within each cost bucket, in addition to comparing the top 20 DRGs in each cost bucket between Rounds. The key findings were:

- The percentage of overall cost in the OR and SPS cost bucket increased by 0.6 per cent from Round 21 to Round 22.
- The percentage of overall cost in the miscellaneous cost bucket decreased by 1.5 per cent between Rounds, and now makes up 48 per cent of overall costs.
- The percentage of overall costs in the critical care and prosthesis cost buckets decreased by 0.3 and increased by 1.2 per cent respectively. These two cost buckets made up the smallest percentage of overall costs.
- The top 20 DRGs within each cost bucket were similar between Round 21 and Round 22, where the majority of DRGs in the top 20 in Round 22 also appeared in the top 20 in Round 21. The OR and SPS cost bucket showed the most consistency between Rounds (80 per cent), while the miscellaneous cost bucket showed the least (70 per cent).

## Considerations

The following factors can have a material impact on the reported costs and cost weights, and should be considered when interpreting the information in this report:

- Application of the AHPCS v4.0.
- Mapping of general ledger to the appropriate and consistent cost buckets.
- Allocation of cost centres to care areas.
- Variability in allocating costs using feeder systems (patient level data) versus service weights.

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<sup>1</sup> Cost buckets represent different combinations of the NHCDC line items, discussed further in Section 3.



## 2. Introduction

### Purpose of this report

The purpose of this report is to provide an overview of costs reported to the Round 22 private sector NHCDC. The Round 22 private sector NHCDC is a voluntary collection that produces a range of hospital cost and activity information.

The information is grouped by AR-DRG, which is a patient classification scheme that provides a means of relating the number and types of patients treated in a hospital to the resources required by the hospital, as represented by a code<sup>2</sup>. The AR-DRG is derived from a range of data collected on admitted patients, including diagnosis and procedure information, classified using ICD-10-AM<sup>3</sup>.

This report documents the data, processes, methodology and results for admitted acute care provided by overnight private hospitals. The results of the collection are expressed as national cost weights by AR-DRG version 9.0. Cost weight tables are provided in AR-DRG versions 9.0, 8.0, 7.0 and 6.0x in the Appendices.

### Format of this report

This report includes AR-DRG aggregated data, cost weights and other cost relativities. The AR-DRG information is displayed for the top 20 AR-DRGs ranked as follows:

- Highest volume of population-adjusted separations
- Highest cost weighted separations
- Highest Average Length of Stay (ALOS)
- Highest cost weight
- Highest cost weight by every reported cost bucket.

For definitions of the cost buckets please refer to the 'Read Me' tab attached to Appendices D-G.

### History of the private sector NHCDC

Round 1 of the private sector NHCDC was conducted in 1996-97 with 23 hospitals and 240,000 episodes being represented. Since then, the collection has grown steadily, although no publication was released for Rounds 8, 9, or 14 due to low participation rates. No collection was carried out for Rounds 10 and 15 as the sector elected to bypass that year and move directly to the following Round. Round 19 was bypassed due to the expectation that achieving a sufficient participation rate would not be met due to competing priorities of participants. Table 2 below shows the participation rate for Round 22 and the last seven published Rounds.

<sup>2</sup> Department of Health, A Users Guide for the Collection of HCP and PHDB (Version 1.2- May 2010 - page 38, [Government Health Website: http://www.health.gov.au/internet/main/publishing.nsf/Content/38E5E5E23C0D4336CA257BF0001E8AC3/\\$File/Data%20Definitions%20Manual.pdf](http://www.health.gov.au/internet/main/publishing.nsf/Content/38E5E5E23C0D4336CA257BF0001E8AC3/$File/Data%20Definitions%20Manual.pdf), dated viewed 21 January 2019

<sup>3</sup> Department of Health, A Users Guide for the Collection of HCP and PHDB (Version 1.2- May 2010 - page 38, [Government Health Website: http://www.health.gov.au/internet/main/publishing.nsf/Content/38E5E5E23C0D4336CA257BF0001E8AC3/\\$File/Data%20Definitions%20Manual.pdf](http://www.health.gov.au/internet/main/publishing.nsf/Content/38E5E5E23C0D4336CA257BF0001E8AC3/$File/Data%20Definitions%20Manual.pdf), dated viewed 21 January 2019

**Table 2. Summary of private hospital participation**

Summary	Round 12 2007-08	Round 13 2008-09	Round 16 2011-12	Round 17 2012-13	Round 18 2013-14	Round 20 2015-16	Round 21 2016-17	Round 22 2017-18
Number of hospitals	109	110	105	95	96	91	105	112
Sample Separations	1,607,678	1,648,989	1,775,059	1,650,816	1,697,311	1,781,699	1,923,310	2,173,847
Participation rate* %	72	71	66	60	60	58	59	66
AR-DRG version	4.2	5.1	6.0x	6.0x	6.0x	8.0	9.0	9.0

\* Participation rate refers to the percentage of sample separations compared to the population separations.

## Private hospital statistics for Round 22 (2017-18)

583 private hospitals reported to the Private Hospital Data Bureau (PHDB) in 2017-18<sup>4</sup>, a net increase of 21 from 2016-17. These hospitals submitted 4.5 million patient separations in 2017-18, with 21 per cent of these separations reported by day facilities. 3.2 million of these separations, or 72 per cent, were same-day separations. Additionally, 4.1 million of patient separations, or 90 per cent, were classified as acute care or newborn care. Total patient separation submitted to the PHDB increased by 1.5 per cent from 2016-17 to 2017-18.

These separations amounted to 9.9 million patient days of care in 2017-18, or an average length of stay of 2.2 days. Of these, acute care and newborn care patients accounted for 8.3 million patient days, or 84 per cent.

## Changes in Round 22

In Round 21, participants submitted data in compliance with the Australian Hospital Patient Costing Standards (AHPCS) Version 3.1. Round 22 was the first year that the AHPCS v4.0 was applied and the participants were required to submit data in accordance with these standards.

## Public and private sector differences

This report does not compare the average cost per separation between the public and private sectors, as the scope of costs between the two sectors is different. Many of the cost items present in the public sector such as medical specialist costs, including pathology and imaging are not equally represented in Private Hospital general ledgers. These costs are generally not reported for the private sector because the majority of hospitals do not provide these services directly and patients pay for these services separately.

## Confidentiality of data

Due to the commercial nature of the sector, all participating hospitals in Round 22 are requested to sign a confidentiality agreement before any final reports are released.

In this report, where a cost weight reported for a Diagnosis Related Group (DRG) is based on less than five separations, the figures for this cost weight have been replaced by asterisks (\*\*\*\*). If the number of contributing hospitals for a particular DRG is less than three, the figures for this cost weight have been replaced by dashes (-----).

<sup>4</sup> Department of Health, Private Hospital Data Bureau (PHDB) Annual Reports, <http://www1.health.gov.au/internet/main/publishing.nsf/Content/health-casemix-data-collections-publications-PHDBAnnualReports>, data viewed 12<sup>th</sup> December 2019

## **Considerations when interpreting the information in this report**

The following factors can have a material impact on the reported costs and cost weights and should be considered, in addition to the changes in Round 22:

- Application of the AHPCS v4.0
- Mapping of general ledger to the appropriate and consistent cost buckets
- Allocation of cost centres to care areas
- The variability in allocating costs using feeder systems (patient level data) by participants verses service weights.

# 3. Scope and methodology

## Scope

The scope of the Round 22 private sector NHCDC includes acute patients admitted to overnight private hospitals in Australia who were discharged in the financial year 2017-18. This includes patients that were admitted to a hospital, were classified under the AR-DRG and had a care type of admitted acute or qualified newborn<sup>5</sup> (see 'In scope care types').

For this report, an overnight hospital was considered in scope if it performed at least 200 admitted acute separations.

## In scope care types

Separations for admitted acute care and newborn care with qualified care days are in scope, and are included in the calculation of the AR-DRG cost weights. The costs associated with unqualified neonate separations<sup>6</sup> have been included in the costs of maternal care on an adjusted basis (as described below for the neonatal adjustment).

Admitted acute care type 1.0 is care in which the clinical intent or treatment goal is to: manage labour (obstetric), cure illness or provide definitive treatment of injury, perform surgery, relieve symptoms of illness or injury (excluding palliative care), reduce severity of an illness or injury, protect against exacerbation and/or complication of an illness and/or injury which could threaten life or normal function, and perform diagnostic or therapeutic procedures.<sup>7</sup>

Newborn care type 7.0 is initiated when the patient is born in hospital or is nine days old or less at the time of admission. Newborn care continues until the care type changes or the patient is separated:

- Patients who turn 10 days of age and do not require clinical care are separated and, if they remain in the hospital, are designated as boarders.
- Patients who turn 10 days of age and require clinical care continue in a newborn episode of care until separated.
- Patients aged less than 10 days and not admitted at birth (e.g. transferred from another hospital) are admitted with newborn care type.
- Patients aged greater than 9 days not previously admitted (e.g. transferred from another hospital) are either boarders or admitted with an acute care type.
- Within a newborn episode of care, until the baby turns 10 days of age, each day is either a qualified or unqualified day.
- A newborn is qualified when it meets at least one of the criteria detailed in Newborn qualification status.

Within a newborn episode of care, each day after the baby turns 10 days of age is counted as a qualified patient day. Newborn qualified days are equivalent to acute days and may be denoted as such.<sup>8</sup>

<sup>5</sup> [Data Dictionary, METeOR ID: 270174](#), AIHW, date viewed 21 January 2019;

<sup>6</sup> These are separations with care type 7.0 (new born care), with zero qualified days in the neonate DRGs (Major Diagnostic Category 15 newborns and other neonates)

<sup>7</sup> [A Users Guide for the Collection of Hospital Casemix Protocol \(HCP\) and Private Hospital Data Bureau \(PHDB\)](#), (Version 1.2- May 2010 page 28), Department of Health, dated viewed 21 January 2019

<sup>8</sup> [A Users Guide for the Collection of Hospital Casemix Protocol \(HCP\) and Private Hospital Data Bureau \(PHDB\)](#), (Version 1.2- May 2010 page 30-31), Department of Health, dated viewed 21 January 2019

## Reporting requirements

The Australian Hospital Patient Costing Standards Version 4.0<sup>9</sup> (AHPCS) guide the hospitals with costing processes for their NHCDC submissions to ensure a consistent treatment of costs between hospitals nationally. Version 4.0 of the AHPCS was released in February 2018 and applied for the first time in Round 22 of the NHCDC.

The AHPCS prescribe the set of line items and cost centres used for mapping hospital costs in the costing process. These costs are then allocated to, and reported under, the NHCDC-defined 'cost buckets' (see Appendix H: Cost bucket matrix). Cost buckets represent different combinations of the NHCDC line items and cost centres and can be considered as cost pools within the hospital.

## Work in Progress Patients

A work in progress (WIP) patient is a patient that is not admitted and discharged within the reporting period for Round 22. Patients who have not been discharged in 2017-18 are out of scope.

In Round 22, all WIP patients were admitted in 2016-17 and discharged in the 2017-18. These records are in scope and they have been included in the results.

## Methodology

There are eight stages of the private sector NHCDC which are outlined below.

### Stage 1: Stakeholder engagement

IHPA sought costed data directly from private hospitals for the private sector NHCDC. Participants were requested to provide a methodology that outlined their costing processes, and all participants demonstrated that they have appropriate costing methodologies.

### Stage 2: Data collection

At the commencement of the data collection phase, a Data Request Specification (DRS) was prepared and distributed to all participants. Participants performed their own data collection.

### Stage 3: Data preparation

Participants performed their own QA checks on their data to verify that it was appropriate to use in their costing process.

### Stage 4: Costing

The costing phase involved participants performing episode-level costing using costing software. Programs used by hospitals in Round 22 include but are not limited to CostPro plus, PPM and C++.

### Stage 5: Data submission

IHPA required that the participating hospital groups submit data in accordance with the Round 22 private sector Data Request Specifications (DRS), along with a data quality checklist, which provided IHPA with details on the hospital costing process. The various costing methodologies used by private sector hospitals are outlined in Appendix B: Private sector costing approaches.

Participants were informed of the timeframes for the costed data collection and provided access to the National Health Reform enterprise data warehouse (EDW) drop box to upload and submit

<sup>9</sup> <https://www.ihsa.gov.au/publications/australian-hospital-patient-costing-standards-version-40>

their data. The participating hospitals were provided a data transfer guide to help navigate through the process and to communicate processing timeframes.

### Stage 6: Data validation and quality assurance

Participants were required to submit their costed data as csv files which passed data checks documented in the DRS. IHPA only accepted data with zero critical errors and which represented at least 90 per cent of the submitted hospital establishment's total in scope activity.

Where the costed data did not meet the DRS requirements, participants were asked to review the files and make the necessary changes and then re-submit the data.

Once the data was validated, IHPA reviewed the data and produced Quality Assurance (QA) reports which helped participants to confirm the accuracy and appropriateness of the data submission. These included checks in areas with potential to have a material impact on results, such as zero or negative cost buckets, extreme high or low cost separations, and DRG flipping<sup>10</sup>. If the QA reports identified uncharacteristic traits, the participant was asked to investigate and either adjust the data or justify the deviation. Once all uncharacteristic traits were justified, the participant confirmed their data was final.

On finalisation of the valid costed data submission, IHPA required participants to submit a data quality statement. The data quality statements informed IHPA of the key matters that may impact each participant's data submission and provided assurance that the data was fit for purpose. IHPA then consolidated the data submission into a national costed data set.

### Stage 7: Data analysis (including adjustments)

PwC checked the national cost data set supplied by IHPA to ensure that the separations were in scope. PHDB was also used to estimate the number of in scope private hospitals and the number of in scope separations Australia-wide in 2017-18.

The data was also examined by hospital group and compared against PHDB, in order to ensure that no hospital group was over represented in the data set (compared to the Australian population) in a way that would potentially bias the analysis. It was determined that the level of representation of each group was appropriate, and no adjustments were required. An overall participation rate was calculated relative to the Australian population, and this was flagged to participating hospital groups to ensure they were satisfied with the level of participation in the Round. The separations in the submitted data were then scaled up using estimated weights to be reflective of the Australian population.

PwC reviewed the data set for DRG flipping. In Round 22, there were a small number of instances of DRG flipping identified. After consultation with IHPA, it was agreed that the impact of these DRGs was not material and that no adjustments needed to be made.

Based on the adjustments described above the cost weight tables were produced, checked for reasonableness and compared to the Round 21 results.

### Stage 8: Reporting

PwC produced the private hospital report, which outlines the results of the Round 22 private sector NHCDC and draws on the data analysis to provide an interpretation of the results.

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<sup>10</sup> DRG flipping occurs when the average cost of a lower complexity DRG within the related adjacent DRG is higher than the one with more complexity.

## Data adjustments

The following adjustments were applied to the dataset during the NHCDC process.

### Neonate adjustment

The costs for newborn infants with zero qualified days, in respect of care type 7 (newborn care) were allocated to the delivery AR-DRGs of mothers at the same hospital.

The definition of unqualified days in the National Health Data Dictionary<sup>11</sup>, relates to the first nine days of a newborn's life, unless the newborn is a second or subsequent live born infant or it requires intensive care. The adjustment for unqualified days for Round 22 was conducted in a similar way to that in Round 21.

### Market share adjustment process

The market share was determined for each hospital group, to ensure appropriate representation. This was done by calculating the share of the PHDB separations that belonged to the relevant group, against those of the hospital groups that submitted to the NHCDC. The market share was then compared to the submitted data to see if any hospital groups submitted more separations than their market share would warrant, and if so, whether this would lead to an inappropriate representation. The representation for each hospital group was appropriate, and no adjustments were made to the data due to the market share.

### Population adjustment process

To ensure the results reflect the full range of Australia's private hospitals, an estimation process was adopted to create representative national costing and activity figures from sample data. The estimation process produces population data by estimating weights, based on admitted acute separations that are applied to the sample data so that the admitted acute separations equal the total population figures. The weights are calculated based on the number of separations in each hospital group in the submitted data and Australia-wide, based on the total population in PHDB.

The total population was determined as the number of acute separations in 2017-18 obtained from PHDB. All private acute hospitals in Australia (excluding private day hospital facilities) with more than 200 admitted acute separations during the financial year were included.

The number of hospitals in the population file for Round 22 is 260.

### Corporate overheads data issue

During the data collection and submission process, it was identified that one hospital group's corporate overhead costs were over-allocated in Round 20 and 21. This issue has been rectified in the hospital group's data submission for Round 22, but no adjustment has been made for previous rounds. Any variances in the comparison of Round 21 and 22 corporate overhead costs need to be considered in the context of this issue.

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<sup>11</sup> Data Dictionary, Meteor ID 327254, <https://meteor.aihw.gov.au/content/index.phtml/itemId/327254>, viewed 22<sup>nd</sup> January 2019



## 4. Results

### Participation

The population of separations in Round 22 is defined as all admitted acute separations performed at 260 in scope overnight private hospitals in 2017-18, which is 3,297,288 separations.

The number of sample separations in Round 22 was 2,173,847, which represents a 13 per cent increase in the sample separations compared to Round 21 (shown in Table 3). In Round 22, the participation rate was 66 per cent of separations, which is an increase of 7 percentage points compared to Round 21. The increase in the participation rate raises the level of confidence in the results.

The average number of sample separations submitted per participant increased by 1,092 separations (from 18,317 to 19,409) between Round 21 and Round 22. The average number of separations per population hospital (all hospitals including non-participating hospitals) decreased by 236 separations (from 12,918 to 12,682) between Round 21 and Round 22.

In the table below, Change in separations (%) represents a comparison to the previous Round.

**Table 3. Comparison of separations and hospitals, Round 12 (2007-08) to Round 22 (2017-18)**

Key Statistic	Round 12 2007-08	Round 13 2008-09	Round 16 2011-12	Round 17 2012-13	Round 18 2013-14	Round 20 2015-16	Round 21 2016-17	Round 22 2017-18
Sample separations	1,607,678	1,648,989	1,775,059	1,650,816	1,697,311	1,781,699	1,923,310	2,173,847
Change in separations (%)	24	3	8	-7	3	5	8	13
Population separations	2,248,324	2,328,814	2,703,667	2,753,670	2,827,996	3,051,681	3,242,411	3,297,288
Participation rate (%)	72	71	66	60	60	58	59	66
Sample hospitals	109	110	105	95	96	91	105	112
Change in sample hospitals (%)	33	1	-5	-10	1	-5	15	7
Population hospitals	229	226	248	244	235	246	251	260
Sample hospitals to population hospitals (%)	48	49	42	39	41	37	42	43
Average separations per participant	14,749	14,991	16,905	17,377	17,680	19,579	<b>18,317</b>	<b>19,409</b>
Average separations per population hospital	9,818	10,304	10,902	11,286	12,034	12,405	<b>12,918</b>	<b>12,682</b>
Average Length of Stay	2.62	2.57	2.51	2.53	2.45	2.34	<b>2.26</b>	<b>2.28</b>
Change (%)	-9.0	-1.9	-2.2	0.5	-3.1	-4.6	<b>-3.2</b>	<b>0.9</b>
Overnight Average Length of Stay	unknown	unknown	unknown	4.42	4.38	4.18	<b>4.10</b>	<b>4.12</b>

The average length of stay (ALOS) increased from 2.26 days in Round 21 to 2.28 days in Round 22. Contributing to this increase of 0.9 per cent (see Table 3) was:

- an increase in overnight length of stay from 4.10 days to 4.12 days (0.6 per cent increase)
- a decrease in the proportion of same-day separations from 59.3 per cent to 59.0 per cent (0.3 per cent decrease).

Some of the variation between Round 21 and Round 22 may be due to a change in casemix that can be attributed to an increase in the number of participating hospitals from 105 to 112. The change in casemix should be considered when interpreting the results.

## Analysis of Top 20 DRGs

Analysing the top 20 DRGs provides insight into the consistency between Rounds, the identification of any trends, and highlights the DRGs that are driving costs. This section of the report provides an analysis of the top 20 DRGs by the following categories:

- Highest cost weight
- Highest number of population-adjusted separations
- Highest cost weighted separations
- Highest ALOS including minimum and maximum range.

Additional analysis of the cost buckets (operating room/specialist procedure suites, critical care, prostheses and miscellaneous) has been undertaken to identify the top 20 DRGs for each of these buckets.

### Top 20 DRGs ranked by highest cost weight

#### Key findings

As shown in Figure 1 the highest cost weight DRG was A13A (Ventilation  $\geq 336$  hours, Major Complexity). As illustrated in Table 4, this was ranked number one in Round 21 and was ranked among the highest cost weight DRGs due to its complexity. Of the six highest cost weight DRGs, five are closely related to A13A, reflecting the resource-intensive nature of these groups.

The DRGs in Table 4 were high cost low volume DRGs, representing only 0.2 per cent (or 6,831 population-adjusted separations) of the total population-adjusted separations (3,297,288). However, despite this small volume, they make up 3.3 per cent of the total population cost weighted separations.

#### Consistencies between Round 22 and Round 21

80 per cent (16 out of 20) of the top 20 DRGs for Round 22 were also in the Round 21 results, with the top two DRGs remaining the highest cost weight DRGs in both Round 21 and Round 22. A13B (Ventilation  $\geq 336$  hours, Minor Complexity) and P64A (Neonate, AdmWt 1250-1499g W/O Significant GI/Vent  $\geq 96$  hrs, Major Complexity) have both experienced an increase in their cost weights, and consequently have risen to be the third and fourth highest cost weight DRGs.

Many of the DRGs in the top 20 list are recurring as they have high patient complexity and resource utilisation.

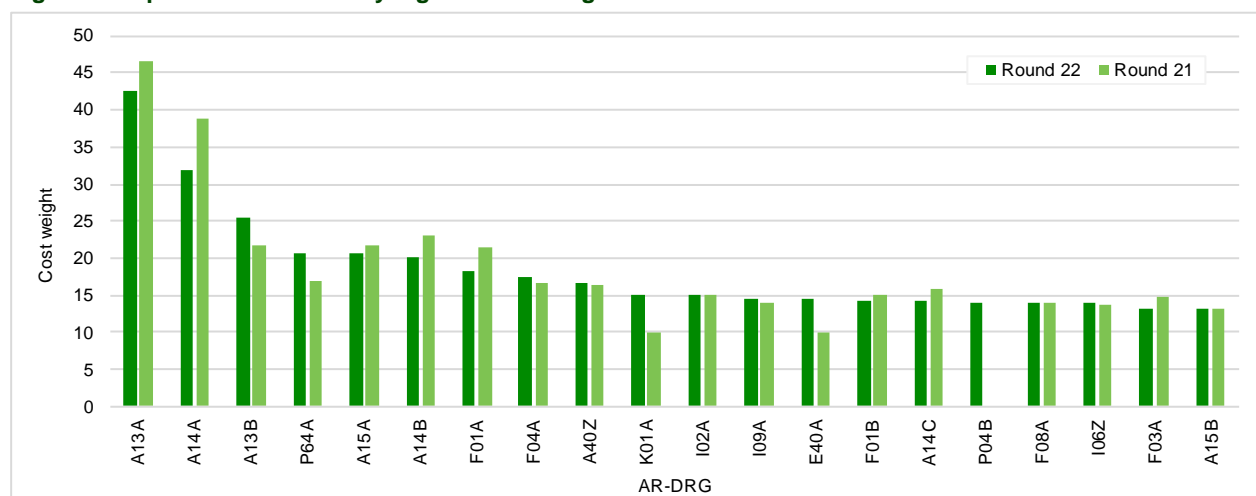
### Differences between Round 22 and Round 21

There were four new DRGs in the top 20 list in Round 22:

- K01A (GIs for Diabetic Complications, Major Complexity)
- E40A (Respiratory System Disorders W Ventilator Support, Major Complexity)
- P04B (Neonate, AdmWt 1500-1999g W Significant GI/Vent $\geq$ 96hrs, Minor Complexity)
- A15B (Tracheostomy, Intermediate Complexity).

P04B was not included in the analysis last year for having fewer than three hospitals with that DRG. The other three DRGs were all just outside the top 20 in Round 21, sitting at ranks 22, 35 and 36 respectively, indicating that they were consistently high cost weight DRGs.

**Figure 1. Top 20 DRGs ranked by highest cost weight**



**Note:** When a Round 21 bar is missing from the chart, this is because the DRG was masked in Round 21 due to having fewer than five separations or having fewer than three hospitals with that DRG.

**Table 4. Top 20 DRGs ranked by highest cost weight**

Top 20 Round 21	Rank Round 22	DRG	DRG Description	Cost weight (a)	No. of weighted seps (b)	Cost weighted seps (c)=(a)x(b)	Number of days (d)	ALOS (days) (e)=(d)/(b)	Std error	% of total seps	% of CW seps	Cost weight Round 21	Rank Round 21	No. of weighted seps Round 21
Yes	1	A13A	Ventilation >=336hours, Major Complexity	42.67	132	5,632	7,963	60.5	2.26	0.0%	0.2%	46.60	1	98
Yes	2	A14A	Ventilation >=96hours & <336hours, Major Complexity	32.01	153	4,898	7,698	50.3	2.27	0.0%	0.1%	38.79	2	165
Yes	3	A13B	Ventilation >=336hours, Minor Complexity	25.61	54	1,383	1,848	34.1	2.04	0.0%	0.0%	21.63	5	8
Yes	4	P64A	Neonate, AdmWt 1250-1499g W/O Significant GI/Vent>=96hrs, Major Complexity	20.69	27	559	1,099	40.1	1.99	0.0%	0.0%	16.93	8	16
Yes	5	A15A	Tracheostomy, Major Complexity	20.54	31	637	1,052	34.5	2.68	0.0%	0.0%	21.86	4	11
Yes	6	A14B	Ventilation >=96hours & <336hours, Intermediate Complexity	20.06	436	8,746	12,114	27.8	0.70	0.0%	0.3%	23.16	3	288
Yes	7	F01A	Implantation and Replacement of AICD, Total System, Major Complexity	18.23	305	5,560	3,092	10.1	0.37	0.0%	0.2%	21.58	6	278
Yes	8	F04A	Cardiac Valve Procedures W CPB Pump W/O Invasive Cardiac Invest, Major Comp	17.48	234	4,090	5,619	24.0	0.66	0.0%	0.1%	16.69	9	177
Yes	9	A40Z	ECMO	16.53	23	380	359	15.7	4.97	0.0%	0.0%	16.45	10	13
No	10	K01A	GIs for Diabetic Complications, Major Complexity	15.03	77	1,157	3,577	46.5	2.16	0.0%	0.0%	10.09	35	71
Yes	11	I02A	Microvascular Tissue Transfers or Skin Grafts, Excluding Hand, Major Complexity	14.99	54	809	2,359	43.6	2.70	0.0%	0.0%	15.04	14	59
Yes	12	I09A	Spinal Fusion, Major Complexity	14.51	630	9,141	11,618	18.4	0.35	0.0%	0.3%	14.00	18	547
No	13	E40A	Respiratory System Disorders W Ventilator Support, Major Complexity	14.46	40	578	780	19.7	2.24	0.0%	0.0%	9.97	36	21
Yes	14	F01B	Implantation and Replacement of AICD, Total System, Minor Complexity	14.25	2,606	37,136	5,551	2.1	0.09	0.1%	1.1%	15.11	13	2,179
Yes	15	A14C	Ventilation >=96hours & <336hours, Minor Complexity	14.22	215	3,057	4,189	19.5	0.62	0.0%	0.1%	15.87	11	172
No	16	P04B	Neonate, AdmWt 1500-1999g W Significant GI/Vent>=96hrs, Minor Complexity	14.01	31	434	906	29.1	2.16	0.0%	0.0%	-----	-----	-----
Yes	17	F08A	Major Reconstructive Vascular Procedures W/O CPB Pump, Major Complexity	14.01	156	2,186	3,323	21.3	0.91	0.0%	0.1%	14.00	16	150
Yes	18	I06Z	Spinal Fusion for Deformity	13.92	1,235	17,191	11,587	9.4	0.27	0.0%	0.5%	13.78	19	988
Yes	19	F03A	Cardiac Valve Procedures W CPB Pump W Invasive Cardiac Investigation, Major Comp	13.30	314	4,176	5,662	18.0	0.41	0.0%	0.1%	14.82	15	257
No	20	A15B	Tracheostomy, Intermediate Complexity	13.15	78	1,026	1,429	18.2	1.09	0.0%	0.0%	13.16	22	63
16 in Top 20	<b>Sub-total, top 20 highest cost weight All DRGs</b>			<b>15.92</b>	<b>6,831</b>	<b>108,777</b>	<b>91,825</b>	<b>13.4</b>		0.2%	3.3%			
				<b>1.00</b>	<b>3,297,288</b>	<b>3,297,288</b>	<b>7,524,561</b>	<b>2.3</b>		100%	100%			
		<b>Top 20, % of all DRGs</b>			<b>0.2%</b>	<b>3.3%</b>	<b>1.2%</b>							

**Notes**

(a) For cost weight (cost bucket specific) calculations please refer to Appendix D: Cost weight tables by AR-DRG Version 9.0

(b) Separations shown are strata weighted

(e) ALOS means Average Length of Stay

## Top 20 DRGs ranked by highest volume of population-adjusted separations

### Key findings

Table 5 and Figure 2 show the DRGs with the highest population-adjusted separations for Round 22. This is a measure of the volume of separations in the entire Australian overnight private hospital population (i.e. the separations in the Round 22 sample, adjusted using weights to reflect the whole population).

Table 5 shows that for Round 22, R63Z (Chemotherapy) was ranked number one, consistent with its Round 21 ranking. Table 5 also shows that the top 20 DRGs represented 44 per cent (1,453,925 population-adjusted separations) of the total population-adjusted separations (3,297,288). However, these DRGs represented only 19 per cent (627,276) of the total population cost weighted separations. This indicates that these DRGs were high volume and low cost.

The ALOS for these top 20 DRGs is 1.2 days compared to the population average of 2.3 days. The reason for this is that the majority of these DRGs were same-day procedures.

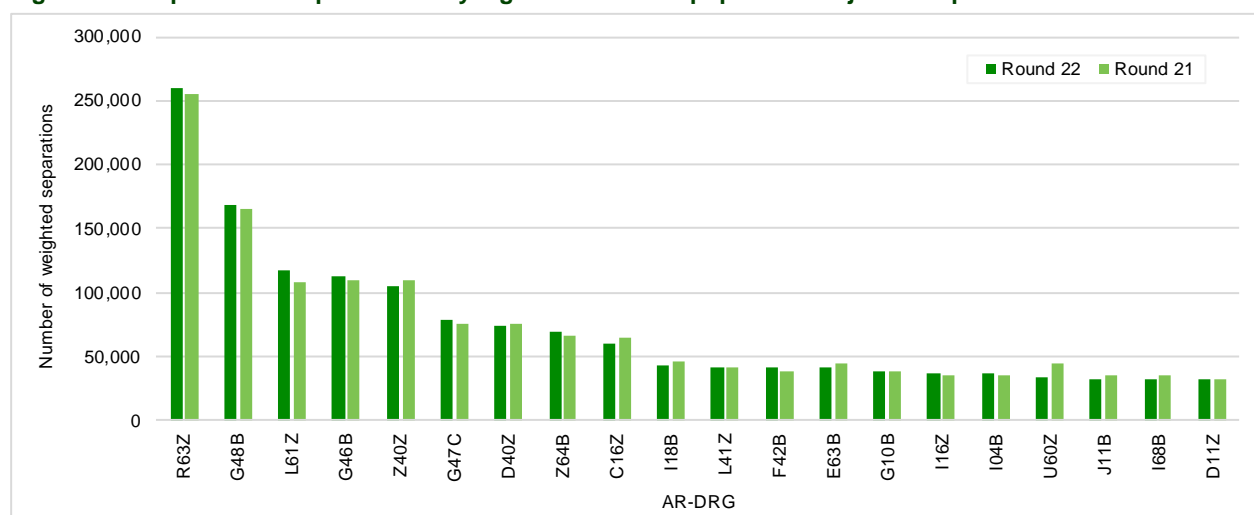
### Consistencies between Round 22 and Round 21

All of the DRGs in this Round's top 20 DRGs were included in Round 21's top 20 (see Table 5), and furthermore the top five in Round 22 are the same as the top five from Round 21, albeit in a different order. This was expected given the high frequency of treatments required for R63Z (Chemotherapy) and the demand for colonoscopies and endoscopies as day procedures.

### Differences between Round 22 and Round 21

While there has been some movement in the rank of individual DRGs, otherwise there have been very few changes between Round 21 and Round 22. This very small movement between the Rounds indicated that there is a high level of consistency in the number of high-volume DRGs.

**Figure 2. Comparison of top 20 DRGs by highest volume of population adjusted separations**



**Table 5. Top 20 DRGs ranked by highest volume of population adjusted separations**

Top 20 Round 21	Rank Round 22	DRG	DRG Description	Cost weight (a)	No. of weighted seps (b)	Cost weighted seps (c)=(a)x(b)	Number of days (d)	ALOS (days) (e)=(d)/(b)	Std error	% of total seps	% of CW seps	No. of weighted seps Round 21	Rank Round 21	Cost weight Round 21
Yes	1	R63Z	Chemotherapy	0.19	<b>259,662</b>	49,336	259,678	1.0	0.001	7.9%	1.5%	256,062	1	0.15
Yes	2	G48B	Colonoscopy, Minor Complexity	0.30	<b>168,916</b>	50,675	174,737	1.0	0.001	5.1%	1.5%	166,005	2	0.29
Yes	3	L61Z	Haemodialysis	0.10	<b>117,511</b>	11,751	117,518	1.0	0.000	3.6%	0.4%	108,871	5	0.10
Yes	4	G46B	Complex Endoscopy, Minor Complexity	0.34	<b>112,106</b>	38,116	118,429	1.1	0.001	3.4%	1.2%	109,420	4	0.35
Yes	5	Z40Z	Other Contacts W Health Services W Endoscopy	0.24	<b>105,036</b>	25,209	106,602	1.0	0.001	3.2%	0.8%	110,439	3	0.24
Yes	6	G47C	Gastroscopy, Minor Complexity	0.24	<b>78,074</b>	18,738	82,756	1.1	0.001	2.4%	0.6%	75,952	7	0.22
Yes	7	D40Z	Dental Extractions and Restorations	0.43	<b>74,015</b>	31,826	74,422	1.0	0.001	2.2%	1.0%	76,067	6	0.45
Yes	8	Z64B	Other Factors Influencing Health Status, Minor Complexity	0.16	<b>69,093</b>	11,055	73,623	1.1	0.002	2.1%	0.3%	66,815	8	0.18
Yes	9	C16Z	Lens Procedures	0.54	<b>59,371</b>	32,060	59,548	1.0	0.001	1.8%	1.0%	64,268	9	0.59
Yes	10	I18B	Other Knee Procedures, Minor Complexity	0.54	<b>43,458</b>	23,467	45,164	1.0	0.002	1.3%	0.7%	45,662	10	0.54
Yes	11	L41Z	Cystourethroscopy for Urinary Disorder, Sameday	0.24	<b>41,534</b>	9,968	41,534	1.0	0.001	1.3%	0.3%	41,369	13	0.23
Yes	12	F42B	Circulatory Dsrds, Not Adm for AMI W Invasive Cardiac Inves Proc, Minor Comp	0.86	<b>41,159</b>	35,397	57,147	1.4	0.004	1.2%	1.1%	38,621	14	0.92
Yes	13	E63B	Sleep Apnoea, Minor Complexity	0.19	<b>40,768</b>	7,746	40,868	1.0	0.001	1.2%	0.2%	45,117	11	0.20
Yes	14	G10B	Hernia Procedures, Minor Complexity	0.96	<b>38,440</b>	36,902	46,536	1.2	0.003	1.2%	1.1%	38,455	15	0.98
Yes	15	I16Z	Other Shoulder Procedures	1.37	<b>36,201</b>	49,595	43,905	1.2	0.004	1.1%	1.5%	35,616	16	1.39
Yes	16	I04B	Knee Replacement, Minor Complexity	4.07	<b>36,102</b>	146,935	177,015	4.9	0.006	1.1%	4.5%	34,532	19	4.35
Yes	17	U60Z	Mental Health Treatment W/O ECT, Sameday	0.08	<b>34,341</b>	2,747	34,341	1.0	0.000	1.0%	0.1%	44,630	12	0.07
Yes	18	J11B	Other Skin, Subcutaneous Tissue and Breast Procedures, Minor Complexity	0.41	<b>32,950</b>	13,510	33,948	1.0	0.002	1.0%	0.4%	35,256	18	0.41
Yes	19	I68B	Non-surgical Spinal Disorders, Minor Complexity	0.45	<b>32,887</b>	14,799	57,286	1.7	0.003	1.0%	0.4%	35,278	17	0.46
Yes	20	D11Z	Tonsillectomy and Adenoidectomy	0.54	<b>32,303</b>	17,444	32,812	1.0	0.002	1.0%	0.5%	32,793	20	0.57
20 in Top 20	<b>Sub-total, top 20 highest cost weight All DRGs</b>			<b>0.43</b>	<b>1,453,925</b>	<b>627,276</b>	<b>1,677,869</b>	<b>1.2</b>		44%	19%			
				<b>1.00</b>	<b>3,297,288</b>	<b>3,297,288</b>	<b>7,524,561</b>	<b>2.3</b>		100%	100%			
		<b>Top 20, % of all DRGs</b>			<b>44%</b>	<b>19%</b>	<b>22%</b>							

**Notes**

(a) For cost weight (cost bucket specific) calculations please refer to Appendix D: Cost weight tables by AR-DRG Version 9.0

(b) Separations shown are strata weighted

(e) ALOS means Average Length of Stay

## Top 20 DRGs ranked by highest cost weighted separations

### Key findings

Table 6 and Figure 3 present the top 20 DRGs ranked by highest cost weight separations. A cost-weighted separation refers to the number of population-adjusted separations multiplied by the cost weight for that DRG, and measures the total cost, or resource utilisation, associated with that DRG.

Figure 3 shows that the highest cost weight DRG was I04B (Knee Replacement, Minor Complexity). This procedure is a common procedure within the private sector and it is frequently ranked amongst the highest cost weighted DRGs. As can be seen in Table 6, the number of cost weighted separations for this DRG decreased by 3,165 or 2.1 per cent (from 150,214 to 146,935 separations) between Rounds.

The DRGs listed in the top 20 (Table 6) were anticipated to be within this ranking given that 85 per cent (17 out of 20) are either within orthopaedic, neurology or cardiac procedures which require high cost prostheses or high volume treatments like colonoscopy/endoscopy or chemotherapy.

The top 20 DRGs by cost weighted separations represented 30 per cent (1,002,822 cost-weighted separations) of the total population cost-weighted separations of 3,297,288. Additionally, these DRGs represented 22 per cent of the total population adjusted separations. This indicated that these were a mixture of high volume and high cost DRGs.

### Consistencies between Round 22 and Round 21

As shown in Table 6 the top three DRGs by cost-weighted separations were ranked in the same order as Round 21. The top two – I04B (Knee Replacement, Minor Complexity) and I33B (Hip Replacement for Non-Trauma, Minor Complexity) – are influenced by the high volume of separations, length of stay above average and high cost prostheses being used in these orthopaedic procedures. The third DRG, K11Z (Major Laparoscopic Bariatric Procedures), has been influenced by high prostheses costs and high year-on-year growth in separation volume.

### Differences between Round 22 and Round 21

There was one new DRG in the top 20 as can be seen in Table 6, I09B (Spinal Fusion, Intermediate Complexity), which was ranked 22<sup>nd</sup> in Round 21. The cost weight for this DRG has remained level, but the volume of population-adjusted separations has increased by 19 per cent, leading to a similar increase in the number of cost-weighted separations and pushing it into the top 20 for Round 22.

**Figure 3. Comparison of top 20 DRGs by highest cost-weighted separations**

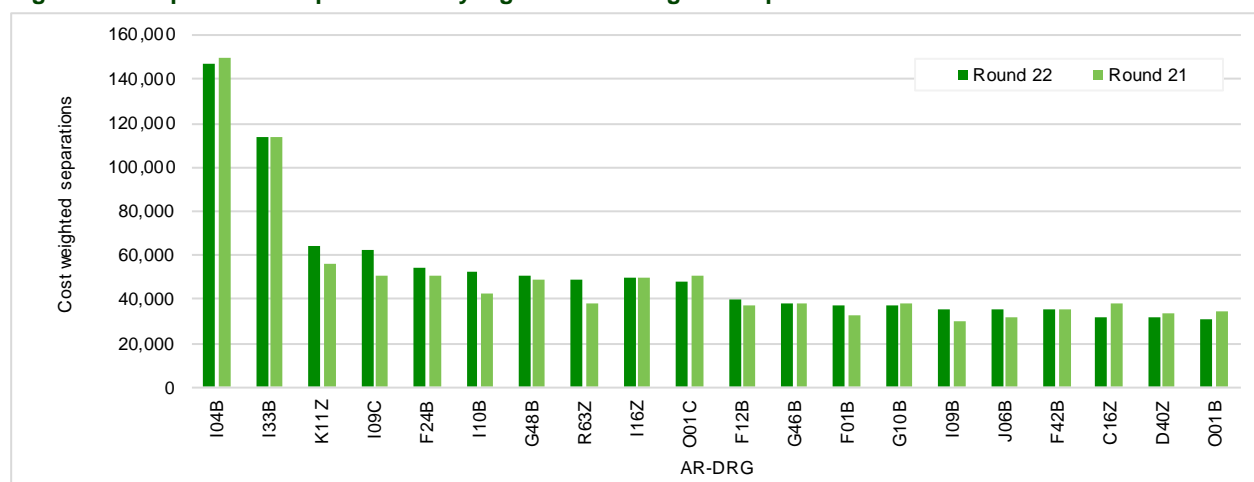




Table 6. Top 20 DRGs ranked by highest cost weighted separations

Top 20 Round 21	Rank Round 22	DRG	DRG Description	Cost weight (a)	No. of weighted seps (b)	Cost weighted seps (c)= (a)x(b)	Number of days (d)	ALOS (days) (e)=(d)/(b)	Std error	% of total seps	% of CW seps	Cost weighted seps Round 21	Rank Round 21	No. of weighted seps Round 21	Cost weight Round 21
Yes	1	I04B	Knee Replacement, Minor Complexity	4.07	36,102	146,935	177,015	4.9	0.01	1.1%	4.5%	150,214	1	34,532	4.35
Yes	2	I33B	Hip Replacement for Non-Trauma, Minor Complexity	4.63	24,477	113,329	110,993	4.5	0.01	0.7%	3.4%	114,054	2	22,720	5.02
Yes	3	K11Z	Major Laparoscopic Bariatric Procedures	2.45	26,028	63,769	62,934	2.4	0.01	0.8%	1.9%	55,761	3	21,042	2.65
Yes	4	I09C	Spinal Fusion, Minor Complexity	6.50	9,583	62,290	48,192	5.0	0.04	0.3%	1.9%	50,566	6	7,864	6.43
Yes	5	F24B	Interventional Coronary Procs, Not Adm for AMI, Minor Comp	2.33	23,110	53,846	37,949	1.6	0.01	0.7%	1.6%	51,174	4	20,973	2.44
Yes	6	I10B	Other Back and Neck Procedures, Minor Complexity	2.48	21,147	52,445	66,115	3.1	0.02	0.6%	1.6%	42,926	9	18,423	2.33
Yes	7	G48B	Colonoscopy, Minor Complexity	0.30	168,916	50,675	174,737	1.0	0.00	5.1%	1.5%	48,141	8	166,005	0.29
Yes	8	R63Z	Chemotherapy	0.19	259,662	49,336	259,678	1.0	0.00	7.9%	1.5%	38,409	12	256,062	0.15
Yes	9	I16Z	Other Shoulder Procedures	1.37	36,201	49,595	43,905	1.2	0.00	1.1%	1.5%	49,506	7	35,616	1.39
Yes	10	O01C	Caesarean Delivery, Minor Complexity	1.96	24,431	47,885	111,588	4.6	0.00	0.7%	1.5%	51,106	5	25,426	2.01
Yes	11	F12B	Implantation and Replacement of Pacemaker, Total System, Minor Complexity	4.95	8,031	39,753	19,341	2.4	0.02	0.2%	1.2%	37,585	14	7,298	5.15
Yes	12	G46B	Complex Endoscopy, Minor Complexity	0.34	112,106	38,116	118,429	1.1	0.00	3.4%	1.2%	38,297	10	109,420	0.35
Yes	13	F01B	Implantation and Replacement of AICD, Total System, Minor Complexity	14.25	2,606	37,136	5,551	2.1	0.09	0.1%	1.1%	32,925	19	2,179	15.11
Yes	14	G10B	Hernia Procedures, Minor Complexity	0.96	38,440	36,902	46,536	1.2	0.00	1.2%	1.1%	37,686	13	38,455	0.98
No	15	I09B	Spinal Fusion, Intermediate Complexity	9.09	3,941	35,824	32,516	8.3	0.08	0.1%	1.1%	30,149	22	3,324	9.07
Yes	16	J06B	Major Procedures for Breast Disorders, Minor Complexity	1.78	19,865	35,360	45,525	2.3	0.01	0.6%	1.1%	32,029	20	18,302	1.75
Yes	17	F42B	Circulatory Dsrds, Not Adm for AMI W Invasive Cardiac Inves Proc, Minor Comp	0.86	41,159	35,397	57,147	1.4	0.00	1.2%	1.1%	35,531	15	38,621	0.92
Yes	18	C16Z	Lens Procedures	0.54	59,371	32,060	59,548	1.0	0.00	1.8%	1.0%	37,918	11	64,268	0.59
Yes	19	D40Z	Dental Extractions and Restorations	0.43	74,015	31,826	74,422	1.0	0.00	2.2%	1.0%	34,230	18	76,067	0.45
Yes	20	O01B	Caesarean Delivery, Intermediate Complexity	2.26	13,632	30,808	76,396	5.6	0.01	0.4%	0.9%	34,021	17	14,355	2.37
19	<b>Sub-total, top 20 highest cost weighted separations</b>			<b>1.04</b>	<b>1,002,822</b>	<b>1,043,286</b>	<b>1,628,517</b>	<b>1.6</b>		30%	32%				
in	<b>All DRGs</b>			<b>1.00</b>	<b>3,297,288</b>	<b>3,297,288</b>	<b>7,524,561</b>	<b>2.3</b>		100%	100%				
Top 20	<b>Top 20 cost weighted separations, % of all DRGs</b>				<b>30%</b>	<b>32%</b>	<b>22%</b>								

## Notes

(a) For cost weight (cost bucket specific) calculations please refer to Appendix D: Cost weight tables by AR-DRG Version 9.0

(b) Separations shown are strata weighted (e) ALOS means Average Length of Stay

## Top 20 DRGs ranked by average length of stay (ALOS)

### Key findings

Table 7 and Figure 4 show that the DRG with the highest ALOS is A13A (Ventilation  $\geq 336$  hours, Major Complexity) with an ALOS of 60.5 days. This DRG was also ranked number one in Round 21, and was also ranked as the DRG with the highest cost weight. DRGs with a high cost weight are expected to have a high ALOS, and vice versa.

The DRGs listed in the top 20 for Round 22 are expected to be within this ranking given their complex nature. The majority of DRGs within the top 20 are either intermediate or major complexity DRGs which have long length of stays.

As shown in Table 7, these DRGs represent 0.1 per cent (3,277 population-adjusted separations) of the total 3,297,288 population-adjusted separations. They also represented 1.2 per cent (41,190 cost-weighted separations) of the total population cost-weighted separations.

### Consistencies between Round 22 and Round 21

70 per cent (14 out of 20) of this Round's top 20 DRGs were in the top 20 in Round 21. The top two DRGs in Round 21 have remained the top DRGs in Round 22. For A13A (Ventilation  $\geq 336$  hours, Major Complexity), the top DRG, the ALOS has increased from 56.7 to 60.5 days, or an increase of 6.8 per cent.

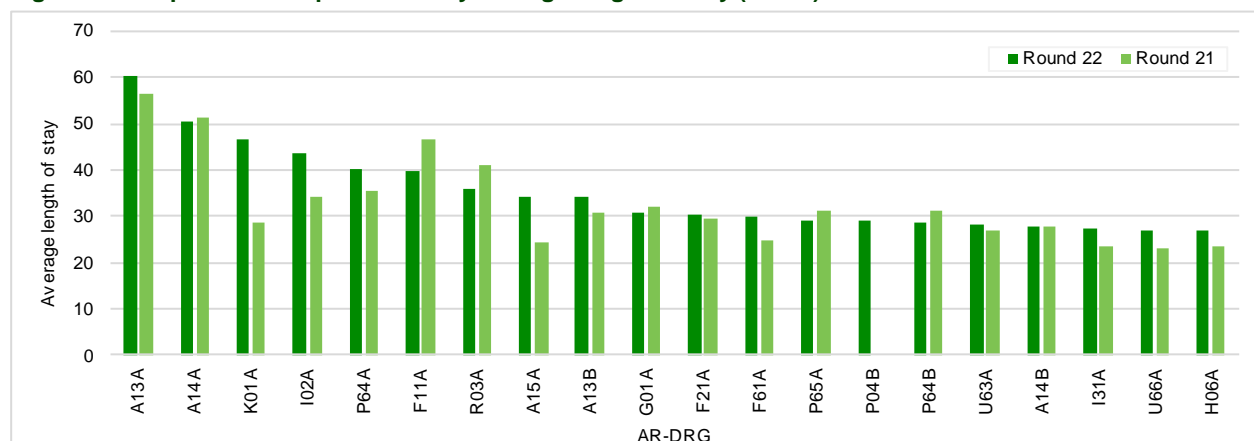
### Differences between Round 22 and Round 21

The differences between the top 20 rankings in Round 21 and Round 22, were largely due to the nature of the DRGs with a high ALOS which tend to have a very broad range and can vary from very short (including same-day separations) to very long (several months). These DRGs also tend to be low in volume, which leads to more volatile results.

Six DRGs are new to the top 20 in Round 22. P04B was not included in the analysis in Round 21 due to having fewer than three hospitals with that DRG. Of the other five, their Round 21 ranks ranged from 26 to 35, suggesting that they have been consistently high ALOS DRGs Round-to-Round.

DRG K01A (GIs for Diabetic Complications, Major Complexity) was ranked 15 in Round 21, with an ALOS of 28.6 days. In Round 22, K01A is now ranked third, with an ALOS of 46.5 days, or an increase of 17.9 days. This is the largest movement in ALOS between Rounds for any DRG in the top 20 (in Round 22). We note that this DRG has a small number of population-adjusted separations (77), and so would be susceptible to volatility in their results.

**Figure 4. Comparison of top 20 DRGs by average length of stay (ALOS)**



**Note:** When a Round 21 bar is missing from the chart, this is because the DRG was masked in Round 21 due to having fewer than five separations or having fewer than three hospitals with that DRG.

**Table 7. Top 20 DRGs ranked by average length of stay (ALOS)**

Top 20 Round 21	Rank Round 22	DRG	DRG Description	ALOS (days) (a)	Min LoS	Max LoS	Cost weight	No. of weighted seps (b)	Cost weighted seps	Std error	% of total seps	% of CW seps	ALOS Round 21	Rank Round 21	Number of days
Yes	1	A13A	Ventilation >=336hours, Major Complexity	60.5	18	237	42.67	132	5,632	2.26	0.0%	0.2%	56.7	1	7,963
Yes	2	A14A	Ventilation >=96hours & <336hours, Major Complexity	50.3	4	178	32.01	153	4,898	2.27	0.0%	0.1%	51.2	2	7,698
Yes	3	K01A	GIs for Diabetic Complications, Major Complexity	46.5	10	166	15.03	77	1,157	2.16	0.0%	0.0%	28.6	15	3,577
Yes	4	I02A	Microvascular Tissue Transfers or Skin Grafts, Excluding Hand, Major Complexity	43.6	2	187	14.99	54	809	2.70	0.0%	0.0%	34.3	7	2,359
Yes	5	P64A	Neonate, AdmWt 1250-1499g W/O Significant GI/Vent>=96hrs, Major Complexity	40.1	14	57	20.69	27	559	1.99	0.0%	0.0%	35.3	6	1,099
Yes	6	F11A	Amputation, Except Upper Limb and Toe, for Circulatory Disorders, Major Comp	40.0	10	97	11.90	60	714	0.92	0.0%	0.0%	46.5	3	2,401
Yes	7	R03A	Lymphoma and Leukaemia W Other GIs, Major Complexity	35.9	1	107	11.34	94	1,066	0.95	0.0%	0.0%	41.1	4	3,377
No	8	A15A	Tracheostomy, Major Complexity	34.5	7	110	20.54	31	637	2.68	0.0%	0.0%	24.3	29	1,052
Yes	9	A13B	Ventilation >=336hours, Minor Complexity	34.1	15	92	25.61	54	1,383	2.04	0.0%	0.0%	30.6	12	1,848
Yes	10	G01A	Rectal Resection, Major Complexity	30.7	2	236	12.15	310	3,767	0.64	0.0%	0.1%	32.1	9	9,514
Yes	11	F21A	Other Circulatory System GIs, Major Complexity	30.5	6	133	7.64	63	481	1.61	0.0%	0.0%	29.7	14	1,912
No	12	F61A	Infective Endocarditis, Major Complexity	29.9	4	68	6.91	69	477	0.56	0.0%	0.0%	24.8	26	2,067
Yes	13	P65A	Neonate, AdmWt 1500-1999g W/O Significant GI/Vent>=96hrs, Extreme Comp	29.1	5	54	11.40	52	593	1.04	0.0%	0.0%	31.2	11	1,509
No	14	P04B	Neonate, AdmWt 1500-1999g W Significant GI/Vent>=96hrs, Minor Complexity	29.1	1	48	14.01	31	434	2.16	0.0%	0.0%	-----	-----	906
Yes	15	P64B	Neonate, AdmWt 1250-1499g W/O Significant GI/Vent>=96hrs, Minor Complexity	28.8	1	49	8.18	50	409	0.67	0.0%	0.0%	31.3	10	1,429
Yes	16	U63A	Major Affective Disorders, Major Complexity	28.2	1	217	4.68	1,154	5,401	0.12	0.0%	0.2%	26.8	19	32,578
Yes	17	A14B	Ventilation >=96hours & <336hours, Intermediate Complexity	27.8	5	133	20.06	436	8,746	0.70	0.0%	0.3%	27.8	17	12,114
No	18	I31A	Revision of Hip Replacement, Major Complexity	27.4	2	115	11.92	236	2,813	0.50	0.0%	0.1%	23.5	33	6,465
No	19	U66A	Eating and Obsessive-Compulsive Disorders, Major Complexity	26.8	1	77	4.92	130	640	0.33	0.0%	0.0%	23.0	35	3,487
No	20	H06A	Other Hepatobiliary and Pancreas GIs, Major Complexity	26.8	2	88	8.98	64	575	1.28	0.0%	0.0%	23.6	32	1,723
14 in Top 20	<b>Sub-total, top 20 highest cost weight</b>			<b>32.1</b>			<b>12.57</b>	<b>3,277</b>	<b>41,190</b>		0.1%	1.2%			<b>105,078</b>
	<b>All DRGs</b>			<b>2.3</b>			<b>1.00</b>	<b>3,297,288</b>	<b>3,297,288</b>		100%	100%			<b>7,524,561</b>
	<b>Top 20, % of all DRGs</b>							<b>0.1%</b>	<b>1.2%</b>						<b>1.4%</b>

**Notes**

(a) For cost weight (cost bucket specific) calculations please refer to Appendix D: Cost weight tables by AR-DRG Version 9.0

(b) Separations shown are strata weighted

(e) ALOS means Average Length of Stay

## Analysis of cost buckets

The private sector NHCDC has analysed and reported on the cost buckets below since Round 17 (2012-13):

- Operating room/Specialist Procedure Suites
- Critical care
- Prostheses
- Miscellaneous (representing the remainder of the cost buckets – see Appendix B: Private sector costing approaches for the list of cost buckets).

The same cost buckets are reported in Round 22.

This section contains the analysis of the differences between cost buckets in Round 21 and Round 22 as well as the top 20 DRGs by these cost buckets.

### Differences between Round 22 and Round 21

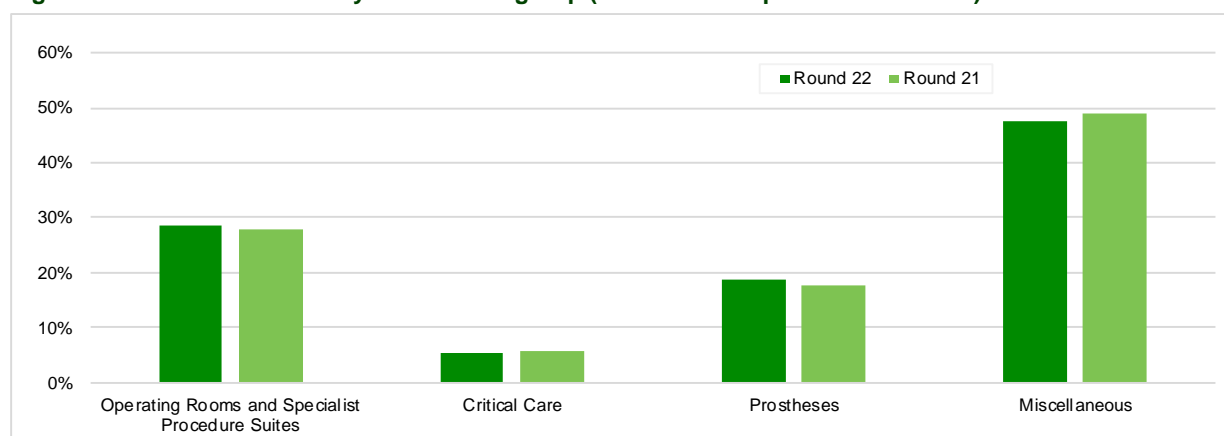
Table 8 and Figure 5 illustrate the differences between the cost buckets in Round 21 and Round 22. The movements between the Rounds are relatively small which is expected given that participants undertook their own costing in Round 21 and continued in Round 22.

Figure 5 shows that Miscellaneous had the largest movement between Rounds with a decrease of 1.5 per cent. There was also an increase of 1.2 per cent in prostheses.

Changes in cost buckets may be due to:

- Improvements in the accuracy of cost allocations through quality improvement of the participant's feeder data and/or allocation statistics
- Changes in service weights between Rounds
- Increases in same-day theatre related separations.

**Figure 5. Breakdown of cost by cost-bucket group (Round 22 compared to Round 21)**



**Table 8. Breakdown of cost by cost-bucket group (Round 22 compared to Round 21)**

Cost Bucket	Round 21 2016-17	Round 22 2017-18	Movement
Operating Rooms and Specialist Procedure Suites	27.9%	<b>28.5%</b>	0.6%
Critical Care	5.6%	<b>5.3%</b>	-0.3%
Prostheses	17.5%	<b>18.8%</b>	1.2%
Miscellaneous	49.0%	<b>47.5%</b>	-1.5%
<b>Total</b>	<b>100.0%</b>	<b>100.0%</b>	0.0%

## Operating room/specialist procedure suites cost bucket

### Key findings

Table 9 shows that the highest operating room/specialist procedure suites cost weight DRG was J01A (Microvas Tiss Transf for Skin, Subcut Tiss & Breast Dsrds, Major Complexity). This DRG was ranked number three in Round 21. We note that this DRG only had 39 population-adjusted separations in Round 22.

The top operating room/specialist procedure suites DRGs presented in Table 9 have a lower percentage of their total cost belonging to the operating room and specialist procedure suites buckets (20 per cent) than the average DRG (29 per cent). This indicated that most of the DRGs in this table were overall high cost DRGs with only a small share of their cost coming from the operating room/specialist procedure suites bucket (but due to the high overall cost, this is still enough to be a top-ranking DRG).

There were a few DRGs which are lower in cost overall, but have a high share of their costs allocated to the operating room/specialist procedure suites cost buckets. These were:

- J01B (Microvas Tiss Transf for Skin, Subcut Tiss & Breast Dsrds, Minor Complexity) which had 46 per cent of its total cost belonging to the operating room/specialist procedure suites cost bucket
- J01A (Microvas Tiss Transf for Skin, Subcut Tiss & Breast Dsrds, Major Complexity) which had 38 per cent of its total cost belonging to the operating room/specialist procedure suites cost bucket
- A15C (Tracheostomy, Minor Complexity) which had 33 per cent of its total cost belonging to the operating room/specialist procedure suites cost bucket.

### Consistencies between Round 22 and Round 21

80 per cent (16 of 20) of the top 20 DRGs by operating room/specialist procedure suites costs in Round 21 were present in the top 20 of Round 22. Two of the DRGs in the top three of Round 21, J01A (Microvas Tiss Transf for Skin, Subcut Tiss & Breast Dsrds, Major Complexity) and A15B (Tracheostomy, Intermediate Complexity), remained in the top three of Round 22.

### Differences between Round 22 and Round 21

There were four new entrants to the top 20 in Round 22. These were:

- W02A (Hip, Femur and Lower Limb Procedures for Multiple Sig Trauma, Major Complexity)
- I06Z (Spinal Fusion for Deformity)
- F07A (Other Cardiothoracic/Vascular Procedures W CPB Pump, Major Complexity)
- F06A (Coronary Bypass W/O Invasive Cardiac Investigation, Major Complexity).

Of these, one DRG (W02A) was not included in Round 21's analysis due to having fewer than five sample separations. The remaining DRGs were all highly ranked in Round 21, with ranks between 21 and 36.

The top ranked DRG in Round 21, A15A (Tracheostomy, Major Complexity), fell to rank five in Round 22. A15A's operating room and specialist procedure suites cost weight fell from 4.17 to 3.12, or a reduction of 25 per cent. However, this DRG only had 31 population-adjusted separations, so these results may be influenced by volatility.

**Table 9. Top 20 DRGs for operating room/specialist procedure suites cost bucket**

Top 20 Round 21	Rank Round 22	DRG	DRG Description	OR and SPS cost weight (a)	No. of weighted seps (b)	Overall cost weight (c)	ALOS (days) (d)	% of AR-DRG total cost				OR and SPS cost weight Round 21	Rank Round 21
								OR and SPS	Critical care	Prosthesis	Miscellaneous		
Yes	1	J01A	Microvas Tiss Transf for Skin, Subcut Tiss & Breast Dsrds, Major Complexity	4.12	39	10.94	17.1	38%	15%	7%	40%	3.54	3
Yes	2	A40Z	ECMO	3.77	23	16.53	15.7	23%	41%	14%	22%	2.88	8
Yes	3	A15B	Tracheostomy, Intermediate Complexity	3.45	78	13.15	18.2	26%	33%	5%	36%	3.58	2
Yes	4	I02A	Microvascular Tissue Transfers or Skin Grafts, Excluding Hand, Major Complexity	3.26	54	14.99	43.6	22%	4%	13%	62%	2.46	11
Yes	5	A15A	Tracheostomy, Major Complexity	3.12	31	20.54	34.5	15%	46%	5%	34%	4.17	1
No	6	W02A	Hip, Femur and Lower Limb Procedures for Multiple Sig Trauma, Major Complexity	3.05	10	11.57	23.2	26%	10%	20%	44%	*****	*****
Yes	7	F03A	Cardiac Valve Procedures W CPB Pump W Invasive Cardiac Investigation, Major Comp	2.92	314	13.30	18.0	22%	21%	22%	35%	2.90	6
Yes	8	J01B	Microvas Tiss Transf for Skin, Subcut Tiss & Breast Dsrds, Minor Complexity	2.90	560	6.26	7.6	46%	6%	9%	39%	2.90	7
Yes	9	F04A	Cardiac Valve Procedures W CPB Pump W/O Invasive Cardiac Invest, Major Comp	2.83	234	17.48	24.0	16%	31%	18%	35%	2.22	16
Yes	10	A15C	Tracheostomy, Minor Complexity	2.78	84	8.50	10.9	33%	27%	6%	34%	2.58	9
Yes	11	A14A	Ventilation >=96hours & <336hours, Major Complexity	2.76	153	32.01	50.3	9%	46%	6%	39%	3.36	4
Yes	12	A13A	Ventilation >=336hours, Major Complexity	2.70	132	42.67	60.5	6%	61%	4%	29%	3.15	5
No	13	I06Z	Spinal Fusion for Deformity	2.55	1,235	13.92	9.4	18%	5%	57%	20%	1.98	25
Yes	14	F05A	Coronary Bypass W Invasive Cardiac Investigation, Major Complexity	2.52	341	11.52	17.3	22%	38%	7%	33%	2.49	10
Yes	15	F03B	Cardiac Valve Procedures W CPB Pump W Invasive Cardiac Investigation, Minor Comp	2.47	526	10.61	12.3	23%	20%	27%	30%	2.24	14
Yes	16	I09A	Spinal Fusion, Major Complexity	2.45	630	14.51	18.4	17%	11%	44%	28%	2.16	18
No	17	F07A	Other Cardiothoracic/Vascular Procedures W CPB Pump, Major Complexity	2.45	94	12.18	19.3	20%	26%	14%	40%	1.93	26
Yes	18	F05B	Coronary Bypass W Invasive Cardiac Investigation, Minor Complexity	2.45	1,117	8.76	12.1	28%	31%	7%	34%	2.20	17
Yes	19	F08A	Major Reconstructive Vascular Procedures W/O CPB Pump, Major Complexity	2.44	156	14.01	21.3	17%	26%	20%	37%	2.44	12
No	20	F06A	Coronary Bypass W/O Invasive Cardiac Investigation, Major Complexity	2.28	213	11.16	16.7	20%	40%	7%	33%	2.10	21
16 in Top 20	<b>Sub-total, top 20 highest cost weight All DRGs</b>			<b>2.61</b>	<b>6,024</b>	<b>12.90</b>	<b>15.9</b>	20%	24%	26%	31%		
	<b>Top 20, % of all DRGs</b>			<b>0.29</b>	<b>3,297,288</b>	<b>1.00</b>	<b>2.3</b>	29%	5%	19%	47%		
					<b>0.2%</b>								

**Notes**

(a) For cost weight (cost bucket specific) calculations please refer to Appendix D: Cost weight tables by AR-DRG Version 9.0

(b) Separations shown are strata weighted

(d) ALOS means Average Length of Stay

## Critical care cost bucket

### Key findings

Table 10 demonstrates that the highest critical care cost weight DRG was A13A (Ventilation  $\geq 336$  hours, Major Complexity). This was ranked number one in Round 21 and is expected to be highly ranked given its complex and resource intensive nature.

As seen in Table 10 the DRGs listed in the top 20 were expected to be within this ranking given that they include either mechanical ventilation or neonatal DRGs.

The DRGs with the highest critical care costs were low-volume, high complexity DRGs.

### Consistencies between Round 22 and Round 21

75 per cent (15 of 20) of the top 20 DRGs by critical care costs in Round 21 were present in the top 20 of Round 22. Of the top four DRGs in Round 21, three DRGs have remained in the top 4 in Round 22. These three DRGs are all closely related and reflect the highly resource-intensive nature of the A13 (Ventilation  $\geq 336$  hours) and A14 (Ventilation  $\geq 96$  hours &  $< 336$  hours) ADRGs.

### Differences between Round 22 and Round 21

There were five new DRGs entering the top 20 critical care cost weights (see Table 10) in Round 22. These were:

- P04B (Neonate, AdmWt 1500-1999g W Significant GI/Vent  $\geq 96$  hrs, Minor Complexity)
- T40Z (Infectious and Parasitic Diseases W Ventilator Support)
- P65B (Neonate, AdmWt 1500-1999g W/O Significant GI/Vent  $\geq 96$  hrs, Major Complexity)
- F40A (Circulatory Disorders W Ventilator Support, Major Complexity)
- B42A (Nervous System Disorders W Ventilator Support, Major Complexity).

P04B was excluded from the analysis in Round 21 for having fewer than three hospitals with that DRG, while B42A was excluded in Round 21 for having fewer than five sample separations. The remaining three DRGs were all highly ranked in Round 21 (ranging from rank 21 to 36), and are all low volume DRGs, and so may be influenced by volatility.



**Table 10. Top 20 DRGs for critical care cost bucket**

Top 20 Round 21	Rank Round 22	DRG	DRG Description	Critical care cost weight (a)	No. of weighted seps (b)	Overall cost weight (c)	ALOS (days) (d)	% of AR-DRG total cost				Critical care cost weight Round 21	Rank Round 21
								OR and SPS	Critical care	Prosthesis	Miscellaneous		
Yes	1	A13A	Ventilation >=336hours, Major Complexity	25.90	132	42.67	60.5	6%	61%	4%	29%	29.90	1
Yes	2	A13B	Ventilation >=336hours, Minor Complexity	16.89	54	25.61	34.1	3%	66%	5%	26%	14.28	4
Yes	3	A14A	Ventilation >=96hours & <336hours, Major Complexity	14.84	153	32.01	50.3	9%	46%	6%	39%	20.93	2
Yes	4	A14B	Ventilation >=96hours & <336hours, Intermediate Complexity	10.33	436	20.06	27.8	10%	51%	6%	33%	12.99	6
Yes	5	E40A	Respiratory System Disorders W Ventilator Support, Major Complexity	9.46	40	14.46	19.7	1%	65%	0%	33%	6.25	11
Yes	6	A15A	Tracheostomy, Major Complexity	9.35	31	20.54	34.5	15%	46%	5%	34%	8.95	8
Yes	7	A14C	Ventilation >=96hours & <336hours, Minor Complexity	7.97	215	14.22	19.5	7%	56%	6%	30%	9.85	7
Yes	8	P64A	Neonate, AdmWt 1250-1499g W/O Significant GI/Vent>=96hrs, Major Complexity	7.62	27	20.69	40.1	0%	37%	0%	63%	13.55	5
Yes	9	A40Z	ECMO	6.83	23	16.53	15.7	23%	41%	14%	22%	8.83	9
No	10	P04B	Neonate, AdmWt 1500-1999g W Significant GI/Vent>=96hrs, Minor Complexity	6.52	31	14.01	29.1	0%	47%	0%	53%	-----	-----
Yes	11	P65A	Neonate, AdmWt 1500-1999g W/O Significant GI/Vent>=96hrs, Extreme Comp	6.47	52	11.40	29.1	0%	57%	0%	43%	6.41	10
Yes	12	F04A	Cardiac Valve Procedures W CPB Pump W/O Invasive Cardiac Invest, Major Comp	5.42	234	17.48	24.0	16%	31%	18%	35%	6.24	12
No	13	T40Z	Infectious and Parasitic Diseases W Ventilator Support	5.18	30	9.57	19.5	1%	54%	0%	44%	4.65	21
Yes	14	P64B	Neonate, AdmWt 1250-1499g W/O Significant GI/Vent>=96hrs, Minor Complexity	4.76	50	8.18	28.8	0%	58%	0%	42%	4.88	19
No	15	P65B	Neonate, AdmWt 1500-1999g W/O Significant GI/Vent>=96hrs, Major Complexity	4.65	79	7.78	23.8	0%	60%	0%	40%	4.02	26
No	16	F40A	Circulatory Disorders W Ventilator Support, Major Complexity	4.60	13	11.54	20.9	2%	40%	1%	58%	3.20	36
Yes	17	F06A	Coronary Bypass W/O Invasive Cardiac Investigation, Major Complexity	4.46	213	11.16	16.7	20%	40%	7%	33%	5.47	16
Yes	18	F05A	Coronary Bypass W Invasive Cardiac Investigation, Major Complexity	4.39	341	11.52	17.3	22%	38%	7%	33%	5.68	14
Yes	19	B42B	Nervous System Disorders W Ventilator Support, Intermediate Complexity	4.36	16	7.49	15.6	1%	58%	0%	40%	6.04	13
No	20	B42A	Nervous System Disorders W Ventilator Support, Major Complexity	4.31	16	8.99	17.2	3%	48%	1%	48%	*****	*****
15 in Top 20	<b>Sub-total, top 20 highest cost weight All DRGs</b>			<b>8.72</b>	<b>2,185</b>	<b>17.85</b>	<b>27.1</b>	11%	49%	7%	34%		
	<b>Top 20, % of all DRGs</b>			<b>0.05</b>	<b>3,297,288</b>	<b>1.00</b>	<b>2.3</b>	29%	5%	19%	47%		
					<b>0.1%</b>								

**Notes**

(a) For cost weight (cost bucket specific) calculations please refer to Appendix D: Cost weight tables by AR-DRG Version 9.0

(b) Separations shown are strata weighted

(d) ALOS means Average Length of Stay

## Prostheses cost bucket

### Key findings

The highest cost weight DRG is F01A (Implantation and Replacement of AICD, Total System, Major Complexity) as shown in Table 11. This was ranked number one in Round 21 due to the high cost of the defibrillator prostheses and increased activity. The prostheses cost weight for this DRG decreased between Rounds, from 15.91 in Round 21 to 12.60 in Round 22, a change of 3.3 cost weights (or 21 per cent).

All DRGs in the top 20 by prostheses cost have a higher percentage of the total cost belonging to the prostheses bucket than the average for all DRGs. The average percentage of costs belonging to the prosthesis bucket for all DRGs is 19 per cent, whereas it is 59 per cent for the DRGs in the top 20 table, ranging from 18 per cent for F04A (Cardiac Valve Procedures W CPB Pump W/O Invasive Cardiac Invest, Major Comp) to 83 per cent for F01B (Implantation and Replacement of AICD, Total System, Minor Complexity). This indicates that the majority of the cost of these DRGs comes from the cost of the prostheses.

These high cost prostheses procedures only represented 1.1 per cent (37,099 population-adjusted separations) of the total 3,297,288 population-adjusted separations.

### Consistencies between Round 22 and Round 21

75 per cent (15 out of 20) of the top 20 DRGs were included in the Round 21 results, with the same DRGs appearing in the top 8 of both Rounds, albeit in a different order. This indicated that these DRGs are consistently high in prostheses costs.

### Differences between Round 22 and Round 21

There were five new DRGs entering the top 20 prostheses cost weights (see Table 11) in Round 22. These were:

- I11Z (Limb Lengthening Procedures)
- F04A (Cardiac Valve Procedures W CPB Pump W/O Invasive Cardiac Invest, Major Comp)
- F02Z (Other AICD Procedures)
- W04A (Multiple Significant Trauma W Other GIs, Major Complexity)
- F03A (Cardiac Valve Procedures W CPB Pump W Invasive Cardiac Investigation, Major Comp).

W04A experienced the most significant movement, rising from rank 118 in Round 21 to rank 18 in Round 22. However, W04A only has 10 population-adjusted separations, so it is likely that this result is due to volatility. The other four DRGs were highly ranked in Round 21, ranging from 23<sup>rd</sup> to 41<sup>st</sup>. These DRGs also have relatively low separations, and so may have been influenced by volatility.

Table 11. Top 20 DRGs for prostheses cost bucket

Top 20 Round 21	Rank Round 22	DRG	DRG Description	Prosthesis cost weight (a)	No. of weighted seps (b)	Overall cost weight (c)	ALOS (days) (d)	% of AR-DRG total cost				Prosthesis cost weight Round 21	Rank Round 21
								OR and SPS	Critical care	Prosthesis	Miscellaneous		
Yes	1	F01A	Implantation and Replacement of AICD, Total System, Major Complexity	12.60	305	18.23	10.1	12%	7%	69%	12%	15.91	1
Yes	2	F01B	Implantation and Replacement of AICD, Total System, Minor Complexity	11.84	2,606	14.25	2.1	11%	1%	83%	5%	13.65	2
Yes	3	I06Z	Spinal Fusion for Deformity	7.93	1,235	13.92	9.4	18%	5%	57%	20%	8.11	3
Yes	4	I09A	Spinal Fusion, Major Complexity	6.41	630	14.51	18.4	17%	11%	44%	28%	6.49	5
Yes	5	D01Z	Cochlear Implant	6.19	1,100	7.92	1.4	14%	0%	78%	7%	6.96	4
Yes	6	I09B	Spinal Fusion, Intermediate Complexity	4.85	3,941	9.09	8.3	20%	5%	53%	22%	4.94	6
Yes	7	I01A	Bilateral and Multiple Major Joint Procedures of Lower Limb, Major Complexity	4.06	622	9.73	14.6	17%	6%	42%	35%	4.51	7
Yes	8	I01B	Bilateral and Multiple Major Joint Procedures of Lower Limb, Minor Complexity	3.80	3,474	6.98	5.9	20%	3%	54%	22%	4.50	8
Yes	9	I09C	Spinal Fusion, Minor Complexity	3.60	9,583	6.50	5.0	22%	3%	55%	20%	3.58	13
No	10	I11Z	Limb Lengthening Procedures	3.54	80	5.91	3.7	20%	0%	60%	19%	2.48	25
Yes	11	F12A	Implantation and Replacement of Pacemaker, Total System, Major Complexity	3.43	1,498	7.06	8.6	16%	12%	49%	23%	3.88	10
Yes	12	F12B	Implantation and Replacement of Pacemaker, Total System, Minor Complexity	3.27	8,031	4.95	2.4	17%	5%	66%	11%	3.69	11
No	13	F04A	Cardiac Valve Procedures W CPB Pump W/O Invasive Cardiac Invest, Major Comp	3.19	234	17.48	24.0	16%	31%	18%	35%	2.28	29
No	14	F02Z	Other AICD Procedures	3.18	181	5.16	3.1	20%	5%	62%	14%	1.73	41
Yes	15	I32A	Revision of Knee Replacement, Major Complexity	3.07	514	8.46	16.6	17%	6%	36%	41%	3.62	12
Yes	16	F17B	Insertion and Replacement of Pacemaker Generator, Minor Complexity	3.06	1,771	4.17	1.2	18%	1%	73%	8%	3.40	14
Yes	17	I31A	Revision of Hip Replacement, Major Complexity	3.02	236	11.92	27.4	15%	11%	25%	49%	3.40	15
No	18	W04A	Multiple Significant Trauma W Other GIs, Major Complexity	3.01	10	9.35	18.2	14%	8%	32%	45%	0.48	118
No	19	F03A	Cardiac Valve Procedures W CPB Pump W Invasive Cardiac Investigation, Major Comp	2.97	314	13.30	18.0	22%	21%	22%	35%	2.60	23
Yes	20	I05A	Other Joint Replacement, Major Complexity	2.87	733	6.40	8.5	19%	6%	45%	30%	2.82	19
15 in Top 20	Sub-total, top 20 highest cost weight in All DRGs			4.54	37,099	7.70	5.7	18%	5%	59%	18%		
	Top 20, % of all DRGs			0.19	3,297,288	1.00	2.3	29%	5%	19%	47%		
					1.1%								

## Notes

(a) For cost weight (cost bucket specific) calculations please refer to Appendix D: Cost weight tables by AR-DRG Version 9.0

(b) Separations shown are strata weighted

(d) ALOS means Average Length of Stay

## Miscellaneous cost bucket

### Key findings

As in previous Rounds, the miscellaneous cost bucket was the most volatile in rankings of all the cost buckets. The volatility may be driven by the sample size, different hospitals participating and a different approach to costing being used by the participating hospitals.

Table 12 shows that the highest cost weight DRG in this cost bucket was P64A (Neonate, AdmWt 1250-1499g W/O Significant GI/Vent $\geq$ 96hrs, Major Complexity).

The DRGs listed in the top 20 were to be expected given that they are high cost, low volume treatments and have appeared in the top 20 of previous tables throughout this report.

These DRGs represented only 0.1 per cent (3,117 population-adjusted separations) of the total 3,297,288 population-adjusted separations.

### Consistencies between Round 22 and Round 21

70 per cent (14 out of 20) of the top 20 DRGs were included in the Round 21 results, which is the lowest level of consistency between Rounds seen across the four cost buckets analysed in this report. The top six DRGs in Round 21 all remained highly ranked this Round, staying in the top 8 for Round 22.

### Differences between Round 22 and Round 21

The six new DRGs in the top 20 in Round 22 were:

- P64A (Neonate, AdmWt 1250-1499g W/O Significant GI/Vent $\geq$ 96hrs, Major Complexity)
- P04B (Neonate, AdmWt 1500-1999g W Significant GI/Vent $\geq$ 96hrs, Minor Complexity)
- F40A (Circulatory Disorders W Ventilator Support, Major Complexity)
- F61A (Infective Endocarditis, Major Complexity)
- H06A (Other Hepatobiliary and Pancreas GIs, Major Complexity)
- I31A (Revision of Hip Replacement, Major Complexity).

P04B was not included in the analysis last year for having fewer than 3 hospitals with that DRG. Of the remaining five DRGs, the biggest movement was seen in P64A, which moved from a rank of 93 in Round 21, with a miscellaneous cost weight of 3.38 to the top rank in Round 22, with a miscellaneous cost weight of 13.07. This DRG has a low number of population-adjusted separations (27 in Round 22), and so would be susceptible to volatility.

**Table 12. Top 20 DRGs for miscellaneous (Misc.) cost bucket**

Top 20 Round 21	Rank Round 22	DRG	DRG Description	Miscellaneous cost weight (a)	No. of weighted seps (b)	Overall cost weight (c)	ALOS (days) (d)	% of AR-DRG total cost				Miscellaneous cost weight Round 21	Rank Round 21
								OR and SPS	Critical care	Prosthesis	Miscellaneous		
No	1	P64A	Neonate, AdmWt 1250-1499g W/O Significant GI/Vent>=96hrs, Major Complexity	13.07	27	20.69	40.1	0%	37%	0%	63%	3.38	93
Yes	2	A14A	Ventilation >=96hours & <336hours, Major Complexity	12.34	153	32.01	50.3	9%	46%	6%	39%	12.50	1
Yes	3	A13A	Ventilation >=336hours, Major Complexity	12.34	132	42.67	60.5	6%	61%	4%	29%	12.22	2
Yes	4	K01A	GIs for Diabetic Complications, Major Complexity	11.12	77	15.03	46.5	11%	10%	5%	74%	6.53	13
Yes	5	I02A	Microvascular Tissue Transfers or Skin Grafts, Excluding Hand, Major Complexity	9.26	54	14.99	43.6	22%	4%	13%	62%	8.93	6
Yes	6	R06A	Autologous Bone Marrow Transplant, Major Complexity	9.17	114	10.50	25.1	1%	11%	1%	87%	9.99	5
Yes	7	R03A	Lymphoma and Leukaemia W Other GIs, Major Complexity	8.93	94	11.34	35.9	6%	10%	5%	79%	11.10	3
Yes	8	F11A	Amputation, Except Upper Limb and Toe, for Circulatory Disorders, Major Comp	7.98	60	11.90	40.0	17%	13%	3%	67%	10.88	4
No	9	P04B	Neonate, AdmWt 1500-1999g W Significant GI/Vent>=96hrs, Minor Complexity	7.47	31	14.01	29.1	0%	47%	0%	53%	-----	-----
Yes	10	A15A	Tracheostomy, Major Complexity	7.01	31	20.54	34.5	15%	46%	5%	34%	6.83	11
Yes	11	R60A	Acute Leukaemia, Major Complexity	6.99	433	7.61	23.9	2%	6%	1%	92%	7.78	8
No	12	F40A	Circulatory Disorders W Ventilator Support, Major Complexity	6.65	13	11.54	20.9	2%	40%	1%	58%	2.58	145
Yes	13	A13B	Ventilation >=336hours, Minor Complexity	6.60	54	25.61	34.1	3%	66%	5%	26%	6.32	16
Yes	14	A14B	Ventilation >=96hours & <336hours, Intermediate Complexity	6.55	436	20.06	27.8	10%	51%	6%	33%	6.86	10
Yes	15	G01A	Rectal Resection, Major Complexity	6.29	310	12.15	30.7	18%	25%	6%	52%	7.57	9
No	16	F61A	Infective Endocarditis, Major Complexity	6.19	69	6.91	29.9	3%	6%	1%	90%	5.41	25
No	17	H06A	Other Hepatobiliary and Pancreas GIs, Major Complexity	6.14	64	8.98	26.8	9%	17%	5%	68%	5.75	21
Yes	18	F04A	Cardiac Valve Procedures W CPB Pump W/O Invasive Cardiac Invest, Major Comp	6.04	234	17.48	24.0	16%	31%	18%	35%	5.95	19
Yes	19	T01A	Infectious and Parasitic Diseases W GIs, Major Complexity	5.99	494	8.90	26.4	11%	17%	4%	67%	6.33	15
No	20	I31A	Revision of Hip Replacement, Major Complexity	5.84	236	11.92	27.4	15%	11%	25%	49%	5.60	23
14 in Top 20	<b>Sub-total, top 20 highest cost weight All DRGs</b>			<b>7.34</b>	<b>3,117</b>	<b>15.01</b>	<b>30.9</b>	10%	34%	7%	49%		
	<b>Top 20, % of all DRGs</b>			<b>0.47</b>	<b>3,297,288</b>	<b>1.00</b>	<b>2.3</b>	29%	5%	19%	47%		
					<b>0.1%</b>								

**Notes**

(a) For cost weight (cost bucket specific) calculations please refer to Appendix D: Cost weight tables by AR-DRG Version 9.0

(b) Separations shown are strata weighted

(d) ALOS means Average Length of Stay

# Appendix A: Analysis performed to determine the minimum sample size

In 2012 IHPA engaged PwC to review the methodology for calculating the minimum sample size to have a valid and reliable private sector NHCDC collection. In any process where a sample is used to infer the characteristics of a population, a larger sample size will result in a lower margin of error and higher statistical confidence. This review was requested by the private sector to consider how large of a sample is required to be sufficiently representative of the population, in order to ensure the validity and reliability of the collection. The calculations were based on data received from IHPA, the Department of Health and the PHDB to determine the number of separations, number of hospitals and number of hospital groups required to participate.

The conclusion of this review based on 2012 data was:

- A threshold of 60 per cent of all separations achieves a 95 per cent confidence level and 4.0 per cent acceptable margin of error.
- The 95 per cent confidence level and 4.0 per cent margin of error parameters have been informed by considering participation levels in historic publications.
- The collection should include approximately 90 hospitals and 10 hospitals 'groups' (of 2 or more hospitals) to be representative.

In previous Rounds, these participation targets were used as a strict pre-condition for the private sector NHCDC to proceed. However, starting from Round 21, these thresholds have instead been used to inform the decision on whether to proceed with a Round or not. Ultimately, the decision to proceed with the NHCDC depends on discussions between IHPA and participant hospital groups to decide what a satisfactory sample means.

# Appendix B: Private sector costing approaches

## Costing methodologies

Hospital costing is the process of identifying the resources and inputs used during an episode and applying the costs of those inputs to the different types of clinical procedures and treatments provided to each patient in a hospital.

From Round 20, the participating hospitals have been required to undertake their own costing and during Round 20 and Round 21 they were asked to provide a summary of their costing methodology process as well as the process they used to submit the costing data. During Round 22, participating hospitals have been asked to indicate which of the costing methodologies (outlined below) they have used.

There are two main methodologies that are adopted by participants for hospital cost allocations: cost modelling or patient costing. In recent Rounds of the NHCDC, hospital groups have moved away from cost modelling to patient costing approaches, although some hospital groups continue to use cost modelling for specific cost buckets.

**Patient costing:** Patient costing (also known as bottom-up costing) uses activity feeder systems to provide actual resource consumption. For example, a prostheses system within a hospital will record what type of prostheses has been implanted into a patient and the cost of the implant. This data is used to allocate costs to patients from the Prostheses patient care area. Patient level costing yields results that are closer to the true cost of an encounter within a hospital, however due to the dependency on feeder systems, perfect patient level costing can be difficult to achieve.

**Cost modelling:** Cost modelling (also known as top down costing) takes the total admitted acute costs for patient areas (such as Wards) and allocates costs to encounters based on an assumed level of consumption using service weights. Service weights are the relative costs of a service for each type of patient care product. Service weights are applied to apportion costs to patient groups defined by their DRG (in the case of admitted acute care).

## Data sources

The following categories of patient level data components are utilised during the costing process:

**Financial data:** This includes the general ledger cost centres and account codes, along with mapping of those cost centres to patient care areas and standardised line items. This data set excludes revenue cost centres and/or account codes.

**Activity data:** This includes the encounter level data (such as patient ID, encounter ID, date of birth etc.) and transfer information identifying the patient's pathway through the hospital via transfers between areas such as operating rooms and wards.

**Feeder data:** This includes data that identifies patient consumption of hospital products or services within a patient care area. For example, a prostheses feeder might list the prosthetic items received by a patient and the cost of each. This feeder data is used to allocate costs in the general ledger as it identifies how much of the prostheses products each encounter consume.

Where no feeder data is available, patient care area costs are allocated using service weights.



### Cost bucket or cost components

The cost of a separation of admitted acute care is reported by allocating patient level costs to a set of pre-defined cost buckets/cost components. The cost buckets are listed as follows:

- |                          |                                 |                    |
|--------------------------|---------------------------------|--------------------|
| 1. Ward Medical          | 7. Pharmacy                     | 12. On-costs       |
| 2. Ward Nursing          | 8. Critical Care                | 13. Prostheses     |
| 3. Non-clinical Salaries | 9. Operating Rooms              | 14. Hotel          |
| 4. Pathology             | 10. Supplies                    | 15. Depreciation   |
| 5. Imaging               | 11. Specialist Procedure Suites | 16. Patient Travel |
| 6. Allied Health         |                                 |                    |

Please note that Emergency Department cost bucket is excluded for the private sector NHCDC cost buckets as this collection is for admitted acute only. Additionally, Patient Travel was newly added in Round 22 with the change to Australian Hospital Patient Costing Standards (AHPCS) version 4.0, but had no costs in it, and so was not included in the analysis.

Once each of the cost buckets were calculated for an individual patient, the patient's total cost of care is derived as the sum of the above components.

### AR-DRG grouping

All 112 hospitals submitted data costed in AR-DRG version 9.0.

### Cost weights

A cost weight for a selected AR-DRG is calculated as the average cost for that DRG, expressed as a weight relative to the overall average cost across all AR-DRGs. The national cost weight across all AR-DRGs is equal to 1.00, with higher cost AR-DRGs having a cost weight higher than 1.00. The weight is an indicator of the complexity of the care of the patient and thus the resourcing intensity required. This is often referred to as the casemix of a patient or hospital.

### Costing standards

Costing was performed in compliance with the AHPCS v 4.0.

# Appendix C: Standard error range for the Round 22 private sector NHCDC

Standard errors, reported against DRG cost weights included in Analysis of Top 20 DRGs and Appendix D: Cost weight tables by AR-DRG Version 9.0, give an indication of the reliability of cost weights. A large standard error indicates a high level of variation in the underlying sample data for that particular DRG, and therefore the cost weight presented is a less reliable estimate of the true underlying cost of a separation in that DRG.

Table 13 summarises the reliability of DRG cost weights by grouping the standard errors into a number of ranges. Numbers of DRGs and separations falling into standard error ranges provide insight into the global impact of estimation error on cost weights.

**Table 13. Number of DRGs by standard error range**

Standard error range	Number of DRGs	Separations	Percentage of DRGs (%)	Percentage of total separations (%)
0.000 - 0.039	280	2,986,041	36%	91%
0.040 - 0.099	182	223,263	24%	7%
0.100 - 0.149	79	42,216	10%	1%
0.150 - 0.199	49	14,543	6%	0%
0.200 - 0.399	85	20,743	11%	1%
0.400 +	96	10,374	12%	0%
<b>Total*</b>	<b>771</b>	<b>3,297,180*</b>	<b>100%</b>	<b>100%</b>

\* The standard error for some DRGs cannot be estimated due to low separation counts in the sample.

The results above show that 60 per cent (36 per cent + 24 per cent) of DRGs have cost weight estimates with a standard error range of less than 0.1. Around 98 per cent (91 per cent + 7 per cent) of separations are within the subset of DRGs that have a standard error of less than 0.1.

# Appendix D: Cost weight tables by AR-DRG Version 9.0

Table 14. Round 22 (2017-18) national consolidation cost weight tables – V9.0

Please refer to Excel file for details

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# Appendix E: Cost weight tables by AR-DRG Version 8.0

Table 15. Round 22 (2017-18) national consolidation cost weight tables – V8.0

Please refer to Excel file for details

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# Appendix F: Cost weight tables by AR-DRG Version 7.0

Table 16. Round 22 (2017-18) national consolidation cost weight tables – V7.0

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# Appendix G: Cost weight tables by AR-DRG Version 6.0x

Table 17. Round 22 (2017-18) national consolidation cost weight tables – V6.0x

Please refer to Excel file for details

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## Appendix H: Cost bucket matrix

### Figure 6. Cost bucket matrix

Cost Bucket Matrix		Line Items																					
		SW Nurs	SW AH	SW Other	SW Med	SW VMO	GS	MS	Corp	Imag	Path	Blood	Phrm N PBS	Phrm PBS	Oncsts	Pros	Hotel	Dprc B	Dprc E	Lease	Cap	Exclcd	Pat Trav
Cost Centre Group	Allied	Allied							Allied	Imag	Path	Blood	Phrm N PBS	Phrm PBS	Oncsts	Pros	Hotel	Dprc B	Dprc E	Lease	Cap	Exclcd	Pat Trav
	Clinical	Ward Nurs	Allied	Non Clncl	Ward Med		Ward Spls																
	Imag	Imag							Imag	Path	Imag												
	Path	Path							Path			Path											
	Crtcl	Crtcl							Crtcl	Crtcl													
	OR	OR							OR	OR													
	Phrm	Phrm							Phrm	Phrm													
	ED	ED							ED	ED													
	SPS	SPS							SPS	SPS													
	Other Serv	Non Clncl							Non Clncl	Non Clncl													
	Non-Patient	Ward Nurs	Allied	Non Clncl	Ward Med		Ward Spls		Imag	Path	Phrm												



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