**Independent Hospital Pricing Authority** 

# National Pricing Model 2021–22

### **Technical Specifications**

**March 2021** 



#### National Pricing Model 2021-22 – Technical Specifications – March 2021

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### Table of acronyms and abbreviations

Acronym/ abbreviation	Description
ABF	Activity based funding
ABS	Australian Bureau of Statistics
AECC	Australian Emergency Care Classification
ALOS	Average length of stay
AN-SNAP	Australian national subacute and non-acute patient classification
APC	Admitted patient care
APCP	Admitted patient cost proportion
AR-DRG	Australian refined diagnosis related group
ASGS	Australian statistical geography standard
ASNC	Admitted subacute and non-acute care
COAG	Council of Australian Governments
DSS	Data set specification
ED	Emergency department
HCP	Hospital casemix protocol
ICU	Intensive care unit
IHPA	Independent Hospital Pricing Authority
LHN	Local hospital network
LOS	Length of stay
MAPE	Mean absolute percentage error
MBS	Medicare benefits schedule
MDB	Major diagnostic block, used in URGs
MDC	Major diagnostic category, used in AR-DRGS
MHC	Mental health care
MPS	Multi-purpose service
NAPED	Non-admitted patients emergency department
NEC	National efficient cost
NEP	National efficient price
NHCDC	National hospital cost data collection
NHRA	National Health Reform Agreement
NMC	Non-admitted multi-disciplinary clinic
NMDS	National minimum data set
NPHED	National public hospital establishment database
NWAU	National weighted activity unit
OTA	Organ and Tissue Authority
PICU	Paediatric intensive care unit
SA2	Statistical areas level 2
TTR	Teaching, training and research
UDG	Urgency disposition groups
URG	Urgency related groups
WAU	Weighted activity unit

# 1. Overview

#### 1.1. Purpose

This document has been produced as an accompaniment to the National Efficient Price Determination 2021–22 (NEP21) and the National Efficient Cost Determination 2021–22 (NEC21). It provides the technical specifications for how the Independent Hospital Pricing Authority (IHPA) developed the activity based funding (ABF) models for the service streams to be funded on this basis from 1 July 2021, and provides guidance to hospitals, local hospital networks (LHN), and state and territory health authorities on how to apply these to hospital activity. It also shows how the national efficient cost (NEC) is determined for hospitals (such as small rural hospitals) funded on a block funded basis.

#### 1.2. Background

The National Health Reform Agreement (NHRA) sets out the intention of the Australian Government, and state and territory governments to work in partnership to improve health outcomes for all Australians. One of the ways in which the NHRA aims to achieve this is through the implementation of national ABF funding arrangements. The NHRA specifies that the central component of ABF is an independently determined NEP and NEC, to be used as a reference for the Commonwealth to determine its funding contribution for Australian public hospital services.

IHPA is a key element of the NHRA, responsible for the national implementation of an ABF system and in determining the annual NEP and NEC for Australian public hospital services. IHPA was established as an independent government agency under Commonwealth legislation on 15 December 2011. It has issued nine NEP Determinations annually since 2012–13 (NEP12) and eight NEC Determinations since 2013–14 (NEC13).

The published NEP and NEC, sets out the determinations for 2021–22 in relation to each of IHPA's legislative functions, namely:

- The NEP for health care services provided by public hospitals where the services are funded on an activity basis.
- The NEC for health care services provided by public hospitals where the services are funded on a block funded basis.
- The development and specification of classification systems for health care and other services provided by public hospitals.
- Adjustments to the NEP to reflect legitimate and unavoidable variations in the costs of delivering health care services.
- Except where otherwise agreed between the Commonwealth and a state or a territory

   to determine the public hospital functions that are to be part-funded in that state or
   territory by the Commonwealth.
- Publication of a report setting out the NEP and NEC for the coming year and any other information that would support the efficient funding of public hospitals.

#### 1.3. National efficient price 2021–22 process

The figure below outlines the NEP21 process from development of classification systems to publishing the NEP and NEC Determinations for 2021–22.

#### Figure 1: Process to determine the national efficient price 2021–22



#### 1.3.1. Classification systems

One of the first stages is to classify the hospital activity under various systems dependent on the ABF service stream. IHPA has collated activity and cost data for each of the ABF service streams to be funded on an activity basis in 2021–22, as follows:

- o Admitted acute
- o Admitted mental health care
- o Admitted subacute and non-acute
- o Emergency care
- Non-admitted.

Classification systems within each service stream are applied uniformly across all available data. Although these systems are developed in part to explain variation in cost between different outputs within the stream, additional systematic variation still occurs. To account for this, various adjustments are modelled and where justified, implemented into the models. The classification systems for each service stream and the source of its cost and activity data are outlined in **Appendix A**.

#### 1.3.2. Data preparation

An important part of the modelling process is the preliminary preparation of both the costing and activity data. The essential steps in the data preparation process are:

- a. A substantial validation process undertaken as the data are received from jurisdictions.
- b. Linking the National Hospital Cost Data Collection (NHCDC) cost file with the admitted patient care activity file at the patient level (which has recorded a success rate of over 97 per cent).
- c. Matching mothers with unqualified neonates<sup>1</sup> to ensure costs are properly attributed to the mothers.

<sup>&</sup>lt;sup>1</sup> See Glossary Item Newborn qualification status (METeOR identifier: 327254)

- d. Identifying any differences in patient characteristics or operational data recorded across the two data sets and reconciling these where appropriate.
- e. Where reported, removing blood costs and/or any identified amounts related to Commonwealth pharmaceutical payments.

The activity and cost data is sourced by IHPA from various national data collections and is supplemented by additional data provided by the states and territories. In consultation with jurisdictions, IHPA has identified 372 hospitals to make up the ABF price model and 403 hospitals designated for block funding. Of the block-funded hospitals:

- 21 are being treated separately as specialist psychiatric establishments.
- Nine are major city hospitals.
- Three do not fit the cost model structure.
- 370 hospitals comprise the block-funded cost model.<sup>2</sup>

Appendix C provides a summary of the NHCDC Round 23 cost data received for 2018–19.

The next stage in the process is to develop the 2018–19 cost models. This process includes deriving the cost profiles, adjustments and relative weights of classes within each service stream. Development of the individual cost models are explained in further detail in the corresponding sections of this document.

#### 1.3.3. Conversion to a pricing model

There are four steps in the transformation of each year's cost model into its associated pricing model, namely:

- a. Identification and exclusion of costs and activity regarded under the NHRA as out of scope for the purpose of ABF.
- b. Derivation of a reference cost (or standardised mean) used to transform the cost model into a cost weight model.
- c. Derivation of an annual indexation rate used to inflate the cost model to a level reflective of the estimated cost of delivering hospital services in the year of the pricing model.
- d. Transformation of the cost model to the pricing model using the results of the previous three steps.

This is explained in further detail in Section 7.

<sup>&</sup>lt;sup>2</sup> For a list of block funded hospitals see **Appendices A** to **D** of the National Efficient Cost Determination 2021–22

# 2. Admitted acute care cost model

#### 2.1. General issues

#### 2.1.1. Cost unit

An 'episode of admitted patient care' is the cost unit for admitted acute patients. It is 'the period of admitted patient care... characterised by only one care type', and covers the period of care from admission to separation [see Australian Institute of Health and Welfare's Metadata Online Registry (METeOR) identifier 268956].

#### 2.1.2. In-scope activity

There are four care types used to inform the admitted acute cost model<sup>3</sup>:

- o Acute care
- Newborn care
- o Mental health care
- Other admitted patient care.

All episodes from all funding sources are included in the calculation of the cost weights. This approach is taken to ensure that the sample used for the development of national weighted activity unit (NWAU) is maximised and reflects the overall costs for the hospital. Only in-scope admitted acute episodes and associated relevant costs are included in the calculation of the NEP, as described in Section 7.

#### In-scope costs

Factors impacting scope of costs include:

- Costs associated with the admitted episode where a patient is admitted through an emergency department that is within the scope of ABF for emergency care. This component of cost is separated from the acute episode and funded through the emergency care funding model.
- Depreciation and other capital costs (including leases) where reported, are removed.
- Indirect costs for teaching, training and research (TTR) are included, but any direct TTR costs are excluded.
- o Identified blood costs and Commonwealth pharmaceutical payments are removed.

#### 2.1.3. Classification

Australian Refined Diagnosis Related Groups (AR-DRGs) are used to classify admitted acute care. The version applied for pricing in 2021–22 is AR-DRG Version 10.0.

<sup>&</sup>lt;sup>3</sup> See data element Hospital service – care type, code (METeOR identifier 711010)

#### 2.2. Analysis of costs to derive NWAU for admitted acute care

This section provides an overview of the steps involved in developing the NWAU for admitted acute care. Detailed information in relation to each of the components of the model is included below. In summary, the steps involved in developing the NWAU for admitted acute care are:

- a. Prepare data, including the removal of other Commonwealth expenditure (in particular the pharmaceutical and blood programs).
- b. Incorporate posthumous organ donation activity costs.
- c. Incorporate private patient costs from hospital casemix protocol (HCP) data where there is evidence they have not been provided as part of the NHCDC.
- d. Stratify and weight cost data to activity data.
- e. Calculate inlier bounds from activity data.
- f. Classify episodes into relevant categories including inliers, short-stay and long-stay outliers, designated same-day AR-DRGs, paediatric status, Indigenous status and remoteness area status, and establishments reporting radiotherapy procedures.
- g. Determine cost level for intensive care unit (ICU) adjustment and deduct associated costs.
- h. Derive initial parameters for AR-DRG inlier/outlier model and ensure predicted costs align with actual costs by AR-DRG.
- i. Derive paediatric adjustment, specialist psychiatric age adjustment (see Section 3, mental health care cost model), Indigenous adjustment, remoteness adjustment, radiotherapy adjustment and dialysis adjustment.
- j. Derive private patient service adjustment and private patient accommodation adjustment.
- k. Incorporate data trimmed in data preparation process (outlier samples of cost data).
- I. Convert price weights and assign NWAU.
- m. Apply stabilisation of acute weights.

These steps are described in further detail in the following sections.

#### 2.2.1. Data preparation

The 2018–19 NHCDC data are first adjusted to remove those costs associated with spending under other Commonwealth programs. Costs associated with the Commonwealth's pharmaceutical programs are identified by matching the NHCDC at the patient level with a record of the Commonwealth pharmaceutical payments. The residual unmatched payments are apportioned according to the distribution of costs associated with the matched records. All reported blood costs are removed from the NHCDC. The amounts deducted from the reported costs are identified in Chapter 2 of the National Efficient Price Determination 2021–22.

Table 1 shows the trimming stages and the number of episodes trimmed at each stage of the data preparation process.

Trimming stage	Episodes
(a) Initial activity-level cost sample of admitted acute records	6,269,147
Less – Total trimmed episodes	-22,261
(b) Patient level cost data trimmed under jurisdictional advice	0
(c) Episodes from hospital-DRG combinations with extremely high c low cost-to-price ratios	or <b>-6,353</b>
(d) Removal of records with total in-scope costs $\leq$ \$23	-15,293
(e) Observations with extreme outlier costs	-84
(f) Extremely high or low cost ratios removed after deriving the preliminary regression model	-498
(g) Multi-day AR-DRG R63Z episodes	-33
(h) Resulting sample size of separations used to create AR-DRG cost profiles	6,246,886

#### Table 1: Number of episodes trimmed at each data preparation stage

For the financial year 2018–19:

- a. An activity-level cost sample of 6,269,147 admitted acute records (with both the admission and separation dates within this period) were partitioned into two groups for modelling purposes. The first group is evaluated as fit for use to develop AR-DRG cost profiles for the 2018–19 cost model, and a second group identified as not fit for this purpose. The second group is later incorporated into the cost model to calibrate the overall level of costs within the model.
- b. No patient level cost data was removed from the sample based on jurisdictional advice. A preliminary model with length of stay and DRG as explanatory variables of patient cost was derived and applied to the remaining sample.
- c. The 523 hospital-DRG combinations with extremely high or low cost-to-price ratios were also excluded from the patient level modelling.
- d. The sample was further reduced by 15,293 episodes as a result of removing records with total in-scope costs of \$23 or less.
- e. The remaining sample was then analysed by AR-DRG, and observations with extreme outlier costs were identified and removed. This was done by ranking observations by cost and identifying those values that recorded an extreme increase in cost of over 200 per cent (or a decrease in cost of over 75 per cent) from the previous observation. In total, 84 records were removed at this stage.
- f. The extreme outlier identification stage was undertaken by first deriving a preliminary regression model using length of stay and DRG, and analysing the resulting cost ratios. Following this, another 498 individual records with extremely high or low cost ratios were removed.

- g. In this final stage, multi-day chemotherapy AR-DRG R63Z episodes were trimmed out. The Australian Coding Standards state that the principal diagnosis code Z51.1 – Pharmacotherapy session for neoplasm which informs DRG of R63Z may only be assigned to same-day episodes. The 33 multi-day episodes with this code were trimmed from the cost model.
- h. The resulting sample of 6,246,886 separations were identified for use in creating AR-DRG cost profiles.

#### 2.2.2. Posthumous organ donation activity costs

Posthumous organ donation activity was accounted for in the NEP for the first time in NEP16. This followed advice from the Organ and Tissue Authority (OTA) that funding provided from the OTA to jurisdictions contributes towards the cost of preparing a patient for organ donation, but not for all costs incurred thereafter. This advice from the OTA means that some of the costs of posthumous organ donation are not funded by the Commonwealth and should be in-scope for pricing under the NHRA. This has not changed for NEP21.

IHPA takes the costs reported against donors in 'care type 9' and redistributes these costs to recipient transplant AR-DRGs in the admitted acute model. The total cost associated with each organ procurement is accounted for by inflating the in-scope cost of patients in AR-DRGs, which typically involves the transplant of relevant organs. Note there is no mechanism to link donors with recipients or to gauge the outcome of a procurement or transplant.

The total cost reported against posthumous organ donors in 2018–19 is \$9,895,300. This results in a national cost inflation in the admitted acute stream of 0.031 per cent.

#### 2.2.3. Private patient costs

Private patient episodes in-scope for ABF include those episodes occurring in a public hospital with a funding source of either '09 Private health insurance' or '13 self-funded' in the 2018–19 Admitted Patient Care (APC) data sets. The NHRA requires that in setting NEP21, IHPA must take into account the costs of private patients that are met through alternative funding sources. These alternative sources include medical benefits payments by the Australian Government, private health insurance benefits payments, and payments made by patients.

Since NEP14, the HCP dataset, which is reported by private insurance companies, has been used to identify these costs. HCP data identifies both the charges and benefits paid for private patients receiving public hospital services. For NEP21, the private patient records in the HCP dataset were matched with the records in the APC and NHCDC datasets, resulting in a sample of 74.6 per cent match of relevant records. Those private patient records in the NHCDC that were not matched to the HCP data were assumed to have similar characteristics to the matched dataset.

In using the HCP data, a more accurate estimate can be made for the amount of private patient costs not included in the NHCDC data and need a correction factor applied. A correction factor of 1.3 per cent was determined for NEP21.

#### 2.2.4. Stratification and weighting

The sample of costed activity from ABF establishments make up 96.6 per cent of all in-scope admitted acute activity (population). To take account of the un-costed activity, IHPA weights the costed sample to the population. Weighting of the costed sample is applied to ensure a true representation of the entire population. This weighting process is performed in two stages, as outlined below.

## Stage 1 (episodes admitted on or after 1 July 2017 and separated on or before 30 June 2019

The first stage of the weighting process stratified and weighted the ABF sample to reflect the population of all 2018–19 ABF admitted acute activity with an admission date *on or after* 1 July 2017. The stratification is based on establishment state/territory, size, location and paediatric specialty. Establishments are classified by size using 2020–21 admitted acute NWAU, calculated on 2018–19 activity data (that is, NWAU20 calculator applied to 2018–19 data).

#### Stage 2 (episodes admitted prior to 1 July 2017)

The second stage of the weighting process weights the 2018–19 activity with an admission date *prior* to 1 July 2017, up to all activity with separation dates within 2017–19. This weighting is done by length of stay quartiles within the AR-DRG. Same-day activity received a weight of 1.0 in this process, as there are no 2018–19 same-day separations with admission dates prior to 1 July 2018.

The resulting sample-to-population weights were used throughout all stages of the cost model development.

#### 2.2.5. Inlier bounds

Admitted episodes with length of stay between one-third and three times the average length of stay for a particular AR-DRG are classed as inliers. This methodology is referred to as L3H3, and results in the vast majority of admitted episodes being classed as inliers.

The L3H3 method is applied to the population of in-scope activity from ABF establishments to identify inlier bounds outside of which are short-stay and long-stay outliers. This is illustrated in Figure 2. The method excludes same-day episodes occurring in AR-DRGs designated for a separate same-day payment, and uses length of stay adjusted to remove ICU days for ICU unbundled AR-DRGs.



#### Figure 2: Inlier bound calculations

The L1.5H1.5 method is used for mental health major diagnostic categories (MDCs) 19 and 20, as well as 13 AR-DRGs that have very high cost long-stay outliers. The list of 13 AR-DRGs where the L1.5H1.5 method is used to determine the inlier bounds is provided in **Appendix D**.

The steps for this process are:

- a. Calculate the national average length of stay for each AR-DRG.
- b. Calculate the inlier lower bound for each AR-DRG. This is based on the calculation: national average length of stay divided by three (1.5 for mental health and the 13 specified AR-DRGs). The inlier lower bound is equal to average length of stay divided by three.
- c. The result is then truncated. This means that it is rounded down to the next lowest integer (for example, if the result was 3.6, the inlier lower bound is set to three).
- d. Calculate the inlier upper bound for each AR-DRG. This is based on the calculation: national average length of stay multiplied by three (1.5 for mental health and the 13 specified AR-DRGs).
- e. The result was rounded to the nearest integer (for example, 10.2 would result in the upper bound being set to 10, whereas 10.7 would result in the upper bound being set to 11).
- f. Episodes with an ICU adjusted length of stay equal to or between the two inlier bounds of the AR-DRG are considered inlier episodes.

Further to the above process, changes to the inlier bounds from the 2018–19 cost model are monitored to ensure they are the result of real change and not due to 'statistical noise'. To evaluate whether a change to an AR-DRG is considered significant or not, 95 per cent confidence intervals around bounds are used. Changes are also evaluated in terms of their materiality (required to affect at least one per cent of an AR-DRG's separations and at least 10 separations).

#### 2.2.6. Classification of patient-level cost data in relevant categories

Prior to analysing costs, episodes are assigned to categories reflecting the relevant adjustments to be made through the 2018–19 cost model. The steps involved are:

- a. Assigning one of the following categories to each episode:
  - same-day separation from an AR-DRG on the designated same-day payment list
  - short-stay outlier
  - inlier
  - long-stay outlier.
- b. Flagging episodes that are eligible for the paediatric adjustment. These are episodes that:
  - Occur in establishments identified as delivering specialised paediatric services (listed in **Appendix E** of the National Efficient Price Determination 2021–22).
  - Have an AR-DRG which is not within MDC 15 (newborns and other neonates).
  - Have patient age at admission of 17 years or less.

- c. Flagging episodes that are eligible for the specialist psychiatric age adjustment. These are episodes that have patient psychiatric care days and fall within the age categories specific to the adjustment (see Section 3, mental health care cost model). Together with all the episodes in MDCs 19 and 20 (mental diseases and disorders, and alcohol/drug use and alcohol/drug induced organic mental disorders respectively), these episodes are considered part of the mental health model and are explained in Section 3.
- d. Flagging episodes that are eligible for the Indigenous adjustment. These are episodes with Indigenous status<sup>4</sup> of Aboriginal and/or Torres Strait Islander origin.
- e. Flagging episodes that are eligible for the patient residential remoteness adjustment. These are episodes where the patient's place of usual residence has been assigned to a remoteness area<sup>5</sup> of:
  - RA2 outer regional Australia
  - RA3 remote Australia
  - RA4 very remote Australia.

Three flags are used: one for outer regional Australia, one for remote Australia and one for very remote Australia. The remoteness area of a patient's usual residence is determined using the following process:

- i) The patient's Australian Statistical Geography Standard (ASGS) Statistical Areas Level 2 (SA2) code is mapped to remoteness area.
- ii) If the supplied SA2 code is missing or invalid, the patient's postcode of usual residence is used.
- iii) If the postcode is missing or invalid, then the remoteness area of the hospital is used. The remoteness code of the hospital is based on the remoteness area of the Australian Bureau of Statistics (ABS) collection district within which the hospital is located.
- f. Flagging episodes that are eligible for the radiotherapy adjustment. These are episodes where the patient is eligible if they have recorded a radiotherapy-related procedure as defined in **Appendix B** of the National Efficient Price Determination 2021–22.
- g. Flagging episodes that are eligible for the dialysis adjustment. These are episodes outside the specified dialysis AR-DRGs L61Z and L68Z, and have recorded a dialysisrelated procedure as defined in **Appendix C** of the National Efficient Price Determination 2021–22.
- h. Flagging episodes that are eligible for the patient treatment remoteness adjustment. These are episodes where the hospital of treatment has a remoteness area of:
  - RA3 remote Australia
  - RA4 very remote Australia.

<sup>&</sup>lt;sup>4</sup> See data element Indigenous status (METeOR identifier: 291036).

<sup>&</sup>lt;sup>5</sup> Remoteness areas are defined in the Australian Standard Geographic Standard (ASGS), which is maintained by the Australian Bureau of Statistics (see: <u>www.abs.gov.au</u>). The 2016 ASGS remoteness area classification was used to classify patients' place of residence and locality of hospitals.

- i. Flagging episodes eligible for the ICU adjustment. These are episodes that occur in hospitals identified by IHPA as eligible for ICU adjustment as defined in **Appendix D** of the National Efficient Price Determination 2021–22 and have an AR-DRG not on the bundled ICU list (that is, not from MDC 15 for newborns and other neonates).
- j. Flagging private episodes. These are episodes with a funding source<sup>6</sup> of '09 Private health insurance' or '13 self-funded'.
- k. Flagging hospital acquired complications (HACs). These are episodes that are identified as having a HAC as specified by the Australian Commission on Safety and Quality in Health Care (ACSQHC) on their <u>website</u>.

#### 2.2.7. Determine ICU adjustment level and deduct associated costs

Patient-level cost data for episodes in hospitals with an eligible ICU or paediatric ICU (PICU) with ICU hours reported are analysed to estimate an average cost per ICU hour. The eligible ICUs and PICUs are those belonging to hospitals that report more than 24,000 ICU hours and have more than 20 per cent of those hours reported with the use of mechanical ventilation. The specified hospitals with eligible ICUs and/or PICUs are listed at **Appendix D** of the National Efficient Price Determination 2021–22. A total sample of 95,707 separations with ICU hours and costs from establishments with eligible ICUs/PICUs were used.

Linear regression by state/territory was used to derive state/territory hourly ICU costs. Difference in Fits (DFFITS) statistics are used to exclude overly influential observations. The weighted mean of the hourly ICU costs taken across states was used to derive a national ICU rate of \$230 per hour.

For ICU-eligible episodes, an ICU adjustment is calculated using the estimated ICU cost per hour and the reported number of whole ICU hours. This amount is deducted from the in-scope costs used for modelling the same-day payment AR-DRG, short-stay outlier, inlier and long-stay outlier costs and associated adjustments, but added back in for the ICU adjustment. Whole ICU days are also removed from each eligible episode's length of stay.

#### 2.2.8. AR-DRG inlier/outlier model

Figure 3 illustrates the general form of the cost model within each AR-DRG. However, an AR-DRG's form may differ depending on whether it has a designated same-day separation category, a short-stay outlier category, or a long-stay outlier category.

<sup>&</sup>lt;sup>6</sup> For activity data before 2012–13 see data element 'Principal source of funding (funding source for hospital patient) (METeOR identifier: 339080), values: 01 Australian Health Care Agreements; 02 private health insurance; 10 Other hospital or public authority (contracted care); 11 reciprocal health care agreements (with other countries); 12 other.



Figure 3: Initial parameters for the assignment of cost weights

Initial parameters are derived for designated same-day payment AR-DRG episodes, short-stay outlier episodes, inlier episodes, and long-stay outlier episodes. The steps involved are as follows:

- a. Designated same-day AR-DRG episodes: calculate the mean cost per episode.
- b. Inlier episodes: calculate the mean cost per episode.
- c. Short-stay outlier episodes: calculate the base cost as the average of total operating room, special procedure suites and prosthesis costs, and then calculate the cost per diem to ensure an even growth in cost to that of the inlier episode.
- d. Long-stay outlier episodes: the mean inlier cost is assigned to each episode as a base amount. A per diem for each outlier day is calculated using one of two methods:
  - In AR-DRGs where the length of stay profile is adequately wide enough and regular to allow robust regression analysis to be undertaken, the per diem cost is taken as the LOS regression coefficient; this process excludes designated sameday episodes and overly influential observations (as determined by the DFFITS statistical measure).
  - In the remaining AR-DRGs, cost buckets are partitioned into 'fixed' and 'variable' (similar to the short-stay outlier process for surgical AR-DRGs), and the per diem cost is taken as the mean variable cost per patient day.

Where there are fewer than 100 separations in an AR-DRG, 2018–19 separations are combined with those from 2017–18, and indexed appropriately to calculate the cost parameter. All AR-DRG parameters are then uniformly calibrated to ensure the modelled costs are equalised against actual costs.

#### 2.2.9. Calculation of additional adjustments

After the AR-DRG inlier/outlier model is derived, the following five sets of adjustments are calculated based on factors considered to have a material impact on the cost of acute services.

#### Paediatric adjustment

A paediatric adjustment is derived by AR-DRG. Specialised paediatric patients are identified as being less than or equal to 17 years of age, from an establishment identified as delivering specialised paediatric services (listed in **Appendix E** of the National Efficient Price Determination 2021–22 as specialised children's hospitals), and excluding AR-DRGs from MDC 15 (newborns and other neonates).

The paediatric adjustment for each AR-DRG is:

- a. Rounded to the nearest whole per cent.
- b. Capped and floored at 2.0 and 0.8 respectively.
- c. Set to one (that is, no adjustment) if the adjustment is less than 0.05 either side of one.

Further to this, the paediatric adjustment for the 2018–19 cost model is compared against that of the 2017–18 cost model and changes are stabilised for AR-DRGs where either of the cost data samples (that is, paediatric or non-paediatric) contain fewer than 500 observations. This stabilisation involves taking the average adjustment across the two years. The paediatric adjustments of the two years must also both be either above or below one, unless the previous year was one or missing.

The cost parameters of each AR-DRG are then calibrated to ensure that the modelled costs, with paediatric adjustment applied, are equal to the actual costs of the AR-DRG.

#### Specialist psychiatric age adjustment

See Section 3 (mental health care cost model).

#### Indigenous adjustment and patient residential remoteness adjustment

These adjustments are derived by the following process:

- a. The remoteness value for each episode is derived from an episode's available geographical information in the following order of preference: SA2, postcode, or the hospital geographical indicator variable.
- b. A multivariate least squares weighted regression model is used to estimate the extent to which the variation in the mean cost per weighted episode is explained by each adjustment factor: specialist psychiatric status, Indigenous status, residential remoteness area, and radiotherapy and dialysis status.
- c. Episodes are weighted to control the level to which the model already explains costs (that is, through the AR-DRG inlier/outlier model together with the paediatric adjustments). The coefficients estimated from this model indicate the extent to which each factor explains residual variation in costs.
- d. The analysis yields an adjustment value for each of the adjustment categories.
- e. The Indigenous adjustment taken as the cost-weighted mean of empirical adjustments taken from the admitted acute calculation above, and similar calculations applied to admitted subacute and non-acute, emergency care, and non-admitted code data.
- f. The adjustments are additive where more than one adjustment applies, for example, where an Indigenous patient resides in a remote area, an adjustment equal to the addition of the Indigenous and remoteness adjustments is applicable.

#### Radiotherapy and dialysis adjustment

The dialysis adjustment is derived in the same way and at the same time as the Indigenous and remoteness adjustments, as described above.

Together with the radiotherapy adjustment, the adjustments compensate for the extra costs of dialysis-related and radiotherapy-related procedures, as specified in **Appendices B** and **Appendix C** of the National Efficient Price Determination 2021–22. These two adjustments are additive with the specialist psychiatric age, Indigenous and remoteness adjustments.

#### Patient treatment remoteness adjustment

The patient treatment remoteness adjustment was introduced in the NEP18 Determination. It is derived using the same methodology as the residential remoteness adjustment, and is designed to explain the residual variation in cost after the other adjustments have been applied. The analysis yields an adjustment for remote and very remote treatment locations.

AR-DRG cost parameters are then uniformly calibrated to ensure cost neutrality of the model (including Indigenous, remoteness, radiotherapy and dialysis adjustments) against actual costs.

#### 2.2.10. Private patient adjustments

Further adjustments are applied to private patients to account for the private benefit received from the Medicare Benefits Schedule (MBS) and private insurers. These adjustments cover the service and accommodation of private patients.

#### Private patient service adjustment

The HCP data provides a more accurate amount of benefits received from MBS and private insurers for medical hospital services and prostheses than provided by the NHCDC. These benefits are used to calculate the private patient service adjustment. The adjustment is calculated at the AR-DRG level for each jurisdiction, although for some AR-DRGs with small samples, the adjustment is derived at a more aggregate level. In the absence of data for a particular state or territory, a national value is used.

The following ratio was taken at the jurisdictional AR-DRG level:

Private patient service adjustment  $(A_{PPS})$  = removed costs / total AR-DRG model costs

It should be noted that the AR-DRG model costs referred to in this document exclude the application of any other adjustments. That is, the private patient service adjustment  $(A_{PPS})$  is calculated in such a way that it excludes any effect on the paediatric, Indigenous, remoteness, and radiotherapy or dialysis adjustments.

The AR-DRG cost parameters are then uniformly calibrated to ensure cost neutrality of the cost model (including the private patient service adjustment and previously derived adjustments) against actual costs.

#### Private patient accommodation adjustment

In addition to medical and prostheses costs, insurers are also charged for accommodation. A private patient accommodation adjustment ( $A_{Acc}$ ) is applied to account for revenue received in relation to these charges. For the purpose of deriving the adjustment associated with NEP21, 2020–21 average default benefits for private health insurers by state/territory are indexed forward one year by 2.25 per cent (that is, by the Consumer Price Index as required by legislation) to 2021–22.

#### 2.2.11. Funding adjustment for HACs

The Addendum to the NHRA signed in March 2017 required IHPA to develop an approach for funding episodes which have a HAC for implementation by 1 July 2018. IHPA developed an additional adjustment to account for a HAC episode included in the calculation of NWAU and is included in the NWAU calculation formula, see Section 2.3.

A detailed explanation of the funding adjustment can be found in the accompanying document 'Pricing and funding for safety and quality – Risk adjustment model for hospital acquired complications' on the IHPA website.

#### 2.2.12. Funding adjustment for avoidable hospital readmissions

The Addendum to the NHRA signed in May 2020, required IHPA to develop a funding adjustment for avoidable hospital readmissions, for implementation from 1 July 2021. IHPA has developed an adjustment to an episode which results in an avoidable hospital readmission.

A detailed explanation of the funding adjustment can be found in the accompanying document 'Pricing and funding for safety and quality – risk adjustment model for avoidable hospital readmissions' on the IHPA website.

#### 2.2.13. Incorporation of outlier samples of cost data

The development of the cost model to this point is based on the sample of patient-level cost data evaluated as fit for use to develop AR-DRG cost profiles. Thus, the sample of patient-level cost data identified as not fit for use at the AR-DRG level have not been used within the cost model.

The following process is used to calibrate the cost model against the entire sample of cost data:

- a. The cost model developed to this point, including all adjustments (except the private patient adjustments) is applied to the entire cost data sample. This process results in model costs across the entire sample of cost data.
- b. The AR-DRG cost parameters are then uniformly adjusted to ensure the resulting total modelled cost across the entire sample is equalised against the total actual costs of the entire sample.

It should be noted again that sample-to-population weights are used throughout all stages in the development of the cost model.

#### 2.2.14. Price weights and NWAU

The final step in the process involves the conversion of the 2018–19 cost model parameters to cost weight values by dividing the cost parameters by a reference cost.

The reference cost used was the 2017–18 reference cost indexed one year by the growth rate in the consecutive years' cost models, where this growth rate is standardised against the 2018–19 activity data. Specifically, the standardised growth rate was derived by applying the 2017–18 and 2018–19 cost models (excluding private patient adjustments) to the 2018–19 activity data, and calculating the change in total modelled costs between the two models.

For NEP21, the standardised growth rate calculation follows the same methodology used to calculate the 2017–18 reference cost from the 2016–17 reference cost.

The resulting cost weights are then converted to the price weights that are used to assign NWAU, as explained further in Section 7.

#### 2.2.15. Stabilisation of acute weights

The National pricing model stability policy (the Stability policy) states that inlier price weight movements between years will be capped to ±20 per cent for AR-DRGs deemed comparable between years where the impact will be minimal.

Stabilisation of inlier weights is done simultaneously. An adjustment factor is calculated for each cost parameter so that the associated price weight is ±20 per cent of the previous year's price weight.

This adjustment factor is then applied to the same-day, short-stay base, and short-stay outlier per diem weights if they exist. Long-stay outlier per-diem weights are not scaled in this way in order to avoid potential unintended extreme cost ratios for very long-stay outliers. The entire cost model is then recalibrated to ensure that the total actual costs and the total modelled costs are equal across the entire sample.

#### 2.3. Applying the NEP

The price of an ABF activity is calculated using the following formula, with adjustments applied as applicable:

#### Price of an admitted acute ABF activity

$= ({[PW \times$	$A_{Paed} \times (1 + A)$	$SPA + A_{Ind} + A$	$A_{Res} + A_{RT} + A_{RT}$	$(1 + A) \times (1 + A)$	$A_{Treat}) + $	(A <sub>ICU</sub> × ICU h	ours)] –
$[(PW + A_{IO})]$	<sub>CU</sub> × ICU hours)	$\times A_{PPS} + LOS$	$\times A_{Acc}]$ - PV	$V \times A_{HAC} - P$	PW <sub>AHR</sub> ×	$R_{AHR}$ ) × NE	Р

Where:

A <sub>Paed</sub>	means the paediatric adjustment
A <sub>SPA</sub>	means the specialist psychiatric age adjustment
A <sub>Res</sub>	means each or any patient residential remoteness area adjustment
A <sub>Ind</sub>	means the Indigenous adjustment
A <sub>RT</sub>	means the radiotherapy adjustment
A <sub>Dia</sub>	means the dialysis adjustment
A <sub>Treat</sub>	means each or any patient treatment remoteness area adjustment
A <sub>ICU</sub>	means the intensive care unit (ICU) adjustment
A <sub>PPS</sub>	means the private patient service adjustment
A <sub>Acc</sub>	means the private patient accommodation adjustment applicable to the state of hospitalisation and length of stay
A <sub>HAC</sub>	means the hospital acquired complications adjustment
R <sub>AHR</sub>	means the avoidable hospital readmission risk adjustment factor
ICU hours	means the number of hours spent by a person within a specified ICU
LOS	means length of stay in hospital (in days)
NEP	means National Efficient Price 2021–22
PW	means the price weight for an ABF activity as set out at <b>Appendix H</b> of the National Efficient Price Determination 2021–22

#### **PW**<sub>AHR</sub> price weight for an ABF activity of a linked avoidable hospital readmission.

In the event that the application of the private patient adjustments return a negative NWAU(21) value for a particular patient, the NWAU(21) value is held to be zero; that is, negative NWAU(21) values are not permitted for any patients under the national pricing model.

Table 2 and Table 3 outline the information required to apply the above formula.

Table 2: Dataset and table	es required for	<sup>,</sup> assignment o	of NWAU to	admitted acute	patient
data					

Input dataset or table	Description
APC NMDS	Dataset based on the 2018–19 Admitted Patient Care National Minimum Data Set (APC NMDS).
ICU Rate and Paediatric Adjustment eligibility table	Table listing establishments with an eligible ICU or PICU, found in the National Efficient Price Determination 2021–22 and Glossary.
Postcode table	Table of postcodes mapped to the 2016 ASGS Remoteness Area classification. Each postcode is mapped to the Remoteness Area category within which the majority of the postcode's population resides. PO Box postcodes are mapped to the Remoteness Area category within which the Post Office is located.
ASGS table	Table of Australian Statistical Geography Standard (ASGS) mapped to the Remoteness Area category within which the majority of the ASGS's population resides.
2021–22 NWAU Price weight table	2021–22 Admitted acute NWAU Price weight table, found in the National Efficient Price Determination 2021–22.
2021–22 NWAU Adjustments	2021–22 Admitted acute NWAU Adjustments, found in the National Efficient Price Determination 2021–22.

#### Table 3: APC NMDS variables used to calculate 2021–22 admitted acute NWAU.

APC NMDS Variable
State Identifier
Establishment Identifier
Hospital geographical Indicator
Sex
Date of Birth
Date of Admission
Date of Separation
Care Туре

#### **APC NMDS Variable**

Admission Mode

Admission Urgency Status

Number of Qualified Days for Newborns

**Total Psychiatric Care Days** 

Indigenous Status

Funding Source<sup>7</sup>

Diagnosis Related Group v10.0

Total leave days

Total Hours spent in Intensive Care Unit

Postcode of patient's usual residence

Australian Statistical Geography Standard (ASGS) of Patient's Usual Residence

Either the identifier signifying radiotherapy treatment/planning or the list of patient's ICD-10-AM procedure codes.

Either the identifier signifying dialysis or the list of patient's ICD-10-AM procedure codes.

The list of patient's ICD-10-AM codes, including diagnoses and condition onset flags.

<sup>&</sup>lt;sup>7</sup> Data Element Concept Episode of care—source of funding (METeOR identifier: 472038)

# 3. Mental health care cost model

#### 3.1. General issues

#### 3.1.1. Cost unit

A 'mental health phase of care'<sup>8</sup> is the cost unit for mental health patients. A phase of care is 'a distinct clinical period which reflects the goal of treatment of mental illness.' It 'begins either when a patient commences an episode of mental health care (MHC) or when the primary goal of care changes in an existing MHC episode'<sup>9</sup> and 'ends either when a patient concludes an episode of MHC or when the primary goal of care changes in an existing mental health care episode.'<sup>10</sup>

#### 3.1.2. In-scope activity

Mental health admitted care is that provided to patients who undergo a facility's formal admission<sup>11</sup> processes where the clinical intent or treatment goal is the provision of acute care. In-scope hospitals and patients are defined the same way as in the admitted acute model (see Section 2.1.2).

Mental health patients receiving emergency department and non-admitted care services are not differentiated in NEP21 and so receive payments as defined for the relevant ABF product category.

#### 3.1.3. Classification

AR-DRGs are used to classify admitted acute care including the mental health acute patients. The version that applies for funding in 2021–22 is AR-DRG Version 10.0.

#### 3.2. Analysis of costs to derive NWAU for mental health care

#### 3.2.1. Data preparation

See Section 2.2.1.

#### 3.2.2. Stratification and weighting

See Section 2.2.4.

#### 3.2.3. Inlier bounds

The inlier bounds for AR-DRGs within MDCs 19 and 20 were set using the L1.5 H1.5 <sup>12</sup> trimming method, as shown in Figure 4, while the majority of other MDCs in the admitted acute cost model remained at L3H3.

<sup>&</sup>lt;sup>8</sup> See object class Mental health phase of care (METeOR identifier: 730867).

<sup>&</sup>lt;sup>9</sup> See data element Mental health phase of care start date (METeOR identifier 575257).

<sup>&</sup>lt;sup>10</sup> See data element Mental health phase of care end date (METeOR identifier 575251).

<sup>&</sup>lt;sup>11</sup> See glossary item Admission (METeOR identifier: 327206).

<sup>&</sup>lt;sup>12</sup> L1.5H1.5 refers to the trimming method in which the low trim point is the average length of stay (ALOS) divided by 1.5, and the high trim point is 1.5 times the ALOS.





Days in hospital (length of stay)

These narrower inlier bounds resulted in a lower proportion of inliers and a corresponding higher proportion of short-stay and long-stay outliers, as shown in Table 4.

	Short-Stay Outlier	Inlier	Long-Stay Outlier
Separations	36%	50%	13%
Patient Days	14%	33%	53%
Actual Costs	17%	34%	49%

Table 4: MDCs 19 and 20 (mental health) – activity and cost distribution

**Note:** Same-day payment separation category has been combined with the short-stay outlier category. Table 5 illustrates the distribution of activity and costs across the medical AR-DRGs.

Tahle	5. Medical	AR-DRGs	excluding M	/DCs 19 :	and 20 _	activity and	rost	distribution
Iavie	5. Meulcal	AK-DKG3		11003 13 (	anu 20 -	activity and	COSL	นเจนเมนแบบ

	Short-Stay Outlier	Inlier	Long-Stay Outlier
Separations	7%	91%	2%
Patient Days	4%	83%	13%
Actual Costs	5%	85%	10%

Note: Same-day payment separation category has been combined with the short-stay outlier category.

Applying the narrower inlier bounds to MDCs 19 and 20 significantly improves the explanatory power of the AR-DRG inlier/outlier model for mental health patients to a level comparable to the model applied across all other activity.

#### 3.2.4. Cost parameters and adjustments

The cost parameters of the AR-DRG inlier/outlier model that apply to mental health activity is calculated in the same way as those for admitted acute patients. The resulting cost parameters for mental health patients differ to the extent that MDCs 19 and 20 use L1.5H1.5 to define the inlier bounds.

The calculation and application of the adjustments are broadly similar to the admitted acute model, with a number of important differences. Empirical evidence was analysed for a number of mental health specific adjustments on the advice of the IHPA Mental Health Working Group. The cost analysis was undertaken in preparation for NEP15 and the age groups have been modified from those used in NEP14. The age groups adopted in NEP15 have been used in NEP21.

The different adjustments for mental health patients are as follows:

- a. Patients with registered psychiatric care days are identified and broken into five age groups, with the following two groups exhibiting significantly higher costs, making them eligible for adjustment:
- b. Less than or equal to 17 years.
- c. Greater than 17 years and not in MDCs 19 and 20.
- d. Patients with age less than or equal to 17 years with registered psychiatric care days are further divided into two groups; those that have received care in one of the nine specialist paediatric hospitals, and those that have not.
- e. Specialist psychiatric age adjustments are derived from the age categories, as set out in Table 2 of the National Efficient Price Determination 2021–22.
- f. Mental health patients also accrue other relevant adjustments that apply to admitted acute patients.

#### 3.2.5. Price weights and NWAU

See Section 2.2.14.

#### 3.2.6. Apply the NEP

See Section 2.3.

# 4. Admitted subacute and nonacute care cost model

#### 4.1. General issues

#### 4.1.1. General issues cost unit

An 'episode of admitted patient care'<sup>13</sup> is the cost unit for admitted subacute and non-acute patients. It is 'the period of admitted patient care... characterised by only one care type' <sup>14</sup>, and covers the period of care from admission to separation.

#### 4.1.2. In-scope activity

Admitted subacute and non-acute care is that provided to patients who undergo a facility's formal admission<sup>15</sup> process, where the clinical intent or treatment goal is the provision of subacute or non-acute care.

In-scope hospitals and patients are defined the same way as admitted acute patients, except that the patients are admitted into a care type for subacute or non-acute care.

#### 4.1.3. Classification

Version 4.0 of the Australian National Subacute and Non-Acute Patient Classification (AN-SNAP) is used to classify admitted subacute and non-acute care. Where data required to assign an AN-SNAP classification is not available, the episodes are moved into the admitted acute care cost model. Episodes without a valid AN-SNAP end class are transferred to the admitted acute care care model and priced according to their AR-DRG classification.

## 4.2. Analysis of costs to derive NWAU for subacute and non-acute admitted care

The following steps are taken in developing the cost parameters and weights for admitted subacute and non-acute care:

- a. Data preparation.
- b. Develop sample-to-population weights.
- c. Classify AN-SNAP episodes into relevant categories: inliers, short-stay and long-stay outliers using the ABF L1.5H1.5 methodology.
- d. Apply Indigenous, radiotherapy, dialysis, and remoteness adjustments inherited from the admitted acute care cost model.
- e. Derive private patient service adjustments for each care type and jurisdiction.

These steps are described in more detail in the following sections.

<sup>14</sup> Ibid.

<sup>&</sup>lt;sup>13</sup> See object class 'episode of admitted patient care' (METeOR identifier: 268956).

<sup>&</sup>lt;sup>15</sup> See glossary item 'admission' (METeOR identifier: 327206).

#### 4.2.1. Data preparation

The 2018–19 admitted subacute and non-acute cost sample consists of the following groups in Table 6.

Table 6:	Admitted	subacute	cost sam	ple breakdown
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Group	Establishments	Total records	Total days
Total National Hospital Cost Data Collection (NHCDC) sample	243	220,592	2,618,126
AN-SNAP classified data	251	215,341	2,600,091

The costs of care associated with other Commonwealth programs for blood costs, pharmaceuticals are removed from NHCDC costs in the same manner described for the admitted acute model in Section 2.2. When costs are reported at the episode level but must be deducted from the reported cost of multiple phases of a palliative care episode, deductions are attributed to each phase according to the proportion of pre-deduction in-scope costs accrued at that phase.

As in the admitted acute care cost model, HCP data is used to correct for the missing private patient costs in the NHCDC, as well as for subsequent estimates of private patient service adjustments (see Section 2.2.10).

The data is trimmed for extreme outliers using similar methodology to the admitted acute care cost model. The following data was not used to derive the AN-SNAP Version 4.0 cost profiles:

- Records that had an in-scope cost of \$0.
- Records with an error AN-SNAP Version 4.0 class.
- Records pertaining to persons under the age of 18 with an AN-SNAP Version 4.0 class within either Psychogeriatric Care or Geriatric Evaluation and Management care types.
- Records that had not been assigned an AN-SNAP Version 4.0 class.
- Extreme cost outliers within an AN-SNAP Version 4.0 class.

#### 4.2.2. Stratification and weighting

The sample of AN-SNAP classified data is weighted to account for the fact that the used sample excludes all activity with an admission date prior to 1 July 2017.

#### 4.2.3. Inlier Bounds

Inlier bounds for each AN-SNAP Version 4.0 class, other than same-day classes, are determined using the L1.5H1.5 methodology described in Section 2.2.5. The inlier bounds of each AN-SNAP Version 4.0 class are subject to the same stabilisation methodology as that which is applied to AR-DRG classes in the admitted acute model. This process limits the degree to which inlier bounds are liable to change as a result of statistical noise. This policy dictates that if the inlier lower bound in NEP20 is within a 95 per cent confidence interval (with respect to a normal distribution) of the lower bound calculated for NEP21 then the lower bound in NEP20 is also used in NEP21. The same rule is applied to the inlier upper bound.

Moreover, even if the previous year's bounds are outside these confidence intervals, changes in bounds are only implemented if doing so is considered material. Changes are considered material if they impact the separation category of at least 1 per cent of separations in a given AN-SNAP class and at least 10 separations in that class.

IHPA's Stability Policy has been applied to limit the change in price weights of each AN-SNAP class between NEP20 and NEP21. This policy applies to every AN-SNAP class with the same inlier bounds in NEP20 and NEP21 and for which fewer than 1,000 separations were used in the admitted subacute model. In line with the Stability Policy, the price weight of such a class must be within 20 per cent of the price weight of the same class in NEP20.

#### 4.2.4. Determining AN-SNAP Version 4.0 cost parameters

The AN-SNAP cost model parameters comprise the following:

- o Same-day price weight: applicable to records within a same-day AN-SNAP class.
- Short-stay outlier per diem rate: applicable to records which do not belong to a sameday AN-SNAP Version 4.0 class and have a length of stay shorter than the inlier lower bound.
- Inlier episodic rate: applicable to records which do not belong to a same-day AN-SNAP Version 4.0 class and which have a length of stay greater than or equal to the inlier lower bound for their AN-SNAP Version 4.0 class.
- Long-stay outlier per diem rate: applicable to records which do not belong to a sameday AN-SNAP Version 4.0 class and which have a length of stay longer than the inlier upper bound for their AN-SNAP Version 4.0 class.

#### 4.2.5. Calculation of additional adjustments

The following adjustments are derived within the admitted subacute cost model:

- Private patient service adjustment: This adjustment is calculated by care type and jurisdiction in the same manner as that which is calculated for AR-DRGs within the admitted acute cost model.
- The following adjustments are derived within the admitted acute cost model and applied in the subacute stream:
  - a. Indigenous
  - b. residential remoteness
  - c. radiotherapy
  - d. dialysis
  - e. treatment remoteness.

The proportion of NHCDC activity for which the adjustments apply are as follows:

- The Indigenous adjustment applied to 2.1 per cent of subacute activity.
- The residential remoteness adjustment applied to 7.3 per cent of subacute activity.
- The radiotherapy adjustment applied to 0.6 per cent of subacute activity.
- The dialysis adjustment applied to 0.6 per cent of subacute activity.
- The treatment remoteness adjustment applied to 0.2 per cent of subacute activity.
- The private patient adjustments applied to 22.4 per cent of subacute activity.

The cost model (including all adjustments except the private patient adjustments) is then calibrated to ensure that the sum of model costs in the subacute cohort is the same as that of in-scope costs.

#### 4.2.6. Subacute and non-acute stabilisation

Refer to Section 2.2.14 for information about the stabilisation process. The same methodology has been applied to the admitted subacute and non-acute cost model.

#### 4.2.7. Price weights and NWAU

Price weights are obtained by dividing the dollar-valued cost parameters by the reference cost (from the admitted acute care cost model) to obtain cost weights. The same reference cost is used across all streams of activity and is discussed in Chapter 7.

#### 4.2.8. Applying the NEP

As set out in the National Efficient Price Determination 2021–22, the price of an ABF admitted subacute activity is calculated using the following formula, with adjustments applied as applicable:

#### Price of an admitted subacute ABF activity

 $= \{ [PW \times (1 + A_{Ind} + A_{Res} + A_{RT} + A_{Dia}) \times (1 + A_{Treat})] - [PW \times A_{PPS} + LOS \times A_{Acc}] \} \times NEP$ Where:

AInd	means the Indigenous adjustment
A <sub>Res</sub>	means each or any patient residential remoteness area adjustment
A <sub>RT</sub>	means the radiotherapy adjustment
A <sub>Dia</sub>	means the dialysis adjustment
A <sub>Treat</sub>	means each or any patient treatment remoteness area adjustment
A <sub>PPS</sub>	means the private patient service adjustment, determined by care type and state of hospitalisation.
A <sub>Acc</sub>	means the private patient accommodation adjustment determined by the state of hospitalisation and length of stay
LOS	means length of stay in hospital (in days)
NEP	means National Efficient Price 2021–22
PW	means the price weight for an ABF activity as set out in <b>Appendix I</b> of the National Efficient Price Determination 2021–22

In the event that the application of the private patient accommodation adjustment and the private patient service adjustment returns a negative NWAU value for a patient then an NWAU of zero is assigned to that patient.

Table 7 outlines the required information in order to apply the above formula.

## Table 7: Datasets and tables used for assignment of NWAU to admitted subacute patient data

Input dataset or table	Description
APC NMDS and ASNHC DSS	Dataset based on the Admitted Patient Care National Minimum Data Set (APC NMDS), with extra AN-SNAP information from the Admitted Subacute and Non-acute hospital care DSS (ASNHC DSS), where available. Dataset specifications are located on the IHPA website.
Postcode table	Table of postcodes mapped to the 2016 Australian Statistical Geography Standard (ASGS) remoteness area classification. Each postcode is mapped to the remoteness area category within which the majority of the postcode's population reside. PO Box postcodes are mapped to the remoteness area category within which the Post Office is located.

Input dataset or table	Description
ASGS table	Table of ASGS codes mapped to the remoteness area category within which the majority of the population of the ASGS resides.
2021–22 NWAU price weight tables	2021–22 NWAU admitted subacute and non-acute AN-SNAP and care type same-day and overnight per diem price weight tables, found in the National Efficient Price Determination 2021–22.
2021–22 NWAU adjustments	2021–22 NWAU admitted subacute and non-acute adjustments, found in the National Efficient Price Determination 2021–22.

Fourteen variables are required to form the input APC dataset. These variables form part of the APC NMDS and the ASNHC DSS are on the IHPA website and are listed in Table 8.

### Table 8: APC and ASNHC DSS variables used to calculate 2021–22 admitted subacute NWAU

Dataset	Variable		
APC NMDS	State identifier		
	Hospital geographical indicator		
	Date of birth		
	Date of admission		
	Date of separation		
	Care type		
	Indigenous status		
	Funding source		
	Total leave days		
	Postcode of patient's usual residence		
	Australian Statistical Geography Standard (ASGS) of patient's usual residence		
ASNHC DSS	AN-SNAP class (Version 4.0)		
	Palliative phase of care start date		
	Palliative phase of care end date		

# 5. Emergency care cost model

#### 5.1. General issues

#### 5.1.1. Cost unit

The cost unit for ABF for emergency care is an 'emergency department stay'<sup>16</sup> or presentation. It includes stays for patients who are treated and go home, and ones who are subsequently admitted to hospital or transferred to another facility for further care.

#### 5.1.2. Scope

Emergency care is that provided to patients registered for care in an emergency department within a selected public hospital. Patients declared dead on arrival are considered in-scope if the death is certified by an emergency care clinician. Patients who leave emergency care after being triaged and advised of alternative treatment options, are also considered in-scope. All patients in the ABF emergency services care (ESC) data set specification (ABF ESC DSS) are in-scope.

Patients being treated in emergency departments may subsequently undergo a formal admission process. All patients remain in-scope for ABF for emergency care until they are recorded as having physically departed the emergency department, regardless of whether they have been admitted.

#### 5.1.3. Classification

Two systems are used to classify emergency care for the purposes of ABF: Australian Emergency Care Classification (AECC) Version 1.0 and Urgency Disposition Groups (UDGs) Version 1.3. The former applies to level 3B to six emergency departments, and the latter to emergency services (that is, levels 1 to 3A). The levels are defined in the National Efficient Price Determination 2021–22 – Online Glossary.

#### 5.2. Analysis of costs to derive NWAU for emergency care

#### 5.2.1. Data preparation

NHCDC Round 23 reported 7,844,369 presentations in 193 ABF establishments with patientlevel cost data. This represents 96 per cent of the total emergency care population as reported in the ABF DSS datasets and NHCDC.

IHPA undertook an initial data preparation processes in line with that employed for NEP20. The cleansed data is episode level data grouped by AECC or UDG. The following data were not used in deriving relativities across AECCs and UDGs, but was used to calibrate the overall cost level of the model:

- Presentations that grouped to error AECCs due to missing or invalid data fields.
- Presentations that were less than \$5.
- Extreme cost outliers within each AECC class.
- Presentations at establishments with an extreme cost ratio.

<sup>&</sup>lt;sup>16</sup> See Emergency department stay – presentation date, DDMMYYYY (METeOR identifier: 684848).

#### 5.2.2. Sample weights

The NHCDC provides a sample of emergency care activity in public hospitals. To ensure the resulting calculations for the NWAU are appropriate for the full population of emergency care activity, observations from the NHCDC are weighted up to reflect the entire population of emergency care activity by state or territory.

#### 5.2.3. Cost parameters and adjustments

Data enters the cost model in three levels, by presentation at the AECC level and UDG level, and at an aggregate UDG level. It is possible for an episode to have an AECC and a UDG associated to it. The AECC data is combined, and price weights are calculated. The same process is used for UDGs. Price weights are calibrated to ensure that AECC and UDG cost models return total actual costs at a national level.

The approach to pricing emergency care services incorporates an adjustment for Indigenous status, patient remoteness, and treatment remoteness. The Indigenous adjustment is a weighted average calculated across the admitted acute, admitted subacute and non-acute care, emergency department and non-admitted streams. The patient residential area remoteness adjustment is a single adjustment derived and applied to patients assigned to remote and very remote locations, and the patient treatment remoteness area adjustment is calculated and applied in a similar manner.

The Stability Policy requires that the year to year movements in price weights are capped at 20 per cent. For NEP21 the AECC price weights were compared to the price weights published for the NEP20 shadow model. There were no AECC weights that met this threshold for NEP21, but the price weight movement of *UDG13 – Transfer presentation* was sufficient to warrant stabilisation.

#### 5.2.4. Price weights and NWAU

The final step of the process involves the conversion of cost parameters to cost weights. This is done by dividing the AECC and UDG cost parameters by the reference cost for the admitted acute cost model. These cost weights are then converted to the price weights used to calculate the NWAU.

 $= \{PW \times (1 + A_{Ind} + A_{Res}) \times (1 + A_{Treat})\} \times NEP$ 

The price of an emergency care ABF activity is calculated using the following formula with adjustments as applicable.

#### Price of an emergency care or emergency service ABF activity

Where:	
AInd	means the Indigenous adjustment (emergency departments only)
A <sub>Res</sub>	means each or any patient residential remoteness area adjustment (emergency departments only)
A <sub>Treat</sub>	means each or any patient treatment remoteness area adjustment
NEP	means National Efficient Price 2021–22
PW	means the price weight for an ABF activity as set out in <b>Appendix L</b> (for emergency department) or <b>Appendix M</b> (for emergency services) of the National Efficient Price Determination 2021–22.

Table 9 outlines the required information in order to apply the above formula.

## Table 9: Dataset and tables required for assignment of NWAU to emergency department patient data

Input dataset or table	Description
NAPEDC NMDS	Non-admitted patient emergency department care national minimum data set (NAP EDC NMDS).
2021–22 NWAU price weight tables	2021–22 emergency care NWAU AECC and UDG price weight tables, found in the National Efficient Price Determination 2021–22.
2021–22 NWAU adjustments	2021–22 emergency care NWAU adjustments, found in the National Efficient Price Determination 2021–22.

The variables in Table 10 are required to form the input emergency care dataset.

#### Table 10: NAPEDC NMDS variables used to calculate the 2021-22 NWAU

NAPEDC NMDS variable
State Identifier
Establishment identifier
Hospital geographical indicator
Postcode of patient's usual residence
ASGS of patient's usual residence
Indigenous status
Date of admission
Date of birth
Episode end status
Type of visit to emergency care
Triage category
AECC (Version 1.0) or UDG (Version 1.3).

# 6. Non-admitted care cost model

#### 6.1. Overview

#### 6.1.1. Cost unit

The cost unit for non-admitted care is a non-admitted patient service event. This is 'an interaction between one or more healthcare provider(s) with one non-admitted patient, which must contain therapeutic/clinical content and result in a dated entry in the patient's medical record.' <sup>17</sup>

#### 6.1.2. Scope

The scope of non-admitted care includes service events occurring in outpatient clinics in activity based funding (ABF) hospitals and in the community (by ABF hospitals).

#### 6.1.3. Classification

The Tier 2 Non-admitted Care Services Classification Version 7.0 is used to classify non-admitted care for the purposes of ABF.

#### 6.2. Analysis of costs to derive NWAU for non-admitted care

This section provides an overview of the steps involved in developing the NWAU for nonadmitted (outpatient) care. The steps are included below.

#### 6.2.1. Adoption of the NHCDC

Historically, the non-admitted cost model relied heavily on the 2012 Ernst and Young Nonadmitted and Subacute Care Costing Study (the EY Costing Study) due to the limited quality and stability of NHCDC reporting. With the improvement in reporting and quality of the NHCDC, the cost weights from NEP17 onwards have shifted to adopt the NHCDC.

Table 11 illustrates the shift in hierarchy for non-admitted cost weight selection.

<sup>&</sup>lt;sup>17</sup> See object class Non-admitted patient service event (METeOR identifier: 652089).

#### Table 11: Non-admitted cost weight selection hierarchy

Cost weight selection hierarchy			
	NEP16	NEP17	NEP18, NEP19, NEP20 and NEP21
Stage 1	Logical links to acute clinics or other clinics	Logical links to acute clinics	Logical links to acute clinics
Stage 2	Adopt EY Costing Study or other Costing studies	Adopt NHCDC (provided adequate sample and stable across two years)	Adopt NHCDC (provided adequate sample and stable across three years)
Stage 3	Adopt NHCDC	Adopt EY Costing Study or other costing studies	Adopt EY Costing Study or other Costing studies

Table 12 provides a breakdown for each class by the source data.

#### Table 12: Non-admitted data source breakdown

Source	Number of clinics for NEP20	Number of clinics for NEP21
Victorian radiotherapy costs	1	
EY Costing Study	15	12
Home Enteral Nutrition, Total Parenteral Nutrition and Home Ventilation Services Costing Study	4	4
NHCDC Round 21 and 22	102	108
Harmonised with admitted acute	2	2
Manual treatment	1	1
Total	125	127

The non-admitted model imposes a three-year time period for the evaluation of stability. The determination of stability in the NHCDC now necessitates the difference in average price between the current data period and previous data collection to be within the 20 per cent threshold, as well as the difference in average price between the last data period and two years ago.

In NEP21, four clinics transitioned from being priced using the EY Costing Study to being priced using the NHCDC. Additionally, one class transitioned from using the Victorian Radiotherapy costing study to being priced using the NHCDC.

Additionally, the Stability Policy requires that the year-to-year movement in price weights be restricted to a maximum of 20 per cent. In NEP21, this restriction will not apply to three clinics with identified year-to-year price weight movements greater than 20 per cent as these clinics are transitioning from being priced using the EY Costing Study to the NHCDC.

In NEP21, seven clinics were stabilised in adherence to the Stability Policy. Table 13 provides the stabilised classes broken down to a series level.
Series	Number of stabilised clinics
10: Procedure	2
20: Medical	3
40: Allied	2

#### Table 13: Non-admitted stabilised classes by series

#### 6.2.2. Data preparation

Non-admitted patient cost data was received for eight jurisdictions. NHCDC Round 23 (2018–19) included non-admitted data for 235 ABF establishments and 139 Tier 2 classes, compared to 238 ABF establishments and 139 Tier 2 classes in NHCDC Round 21 (2017–18).

In NEP20, the cost weights for some clinics were determined using the 2012 EY Costing Study. The direct costs collected were inflated to 2018–19 in-scope costs using a combination of an historical inflation factor of 1.25 to account for overheads, and the current NEP indexation rate.

Establishment and class combinations were excluded based on jurisdictional advice and cost ratios being significantly different from the population.

Class specific outlier exclusion rules developed for NEP18 were again included in the NEP21 model. Whole establishments were excluded if their cost ratios across clinics remained consistently high. At the service event level, conservative record level trimming within clinics was undertaken to exclude records with:

- Costs less than \$5.
- Events with high-cost thresholds after ranking of events by cost.
- o Cost ratios being significantly different from the population.

For class 40.43 (hepatobiliary) a targeted approach was used to remove costs associated with Commonwealth pharmaceutical programs. The cost of new medicines introduced in March 2016 (used in the hepatobiliary clinic) were found to not be accurately excluded in IHPA's pharmaceutical claim linking process. Consequently, the direct pharmacy cost bucket values for episodes separated after March 2016 were adjusted to align with the pre-March 2016 average cost of \$118 (adjusted for inflation).

Tier 2 non-admitted services classification version 5.0 was priced for NEP20. Since then, version 6.0 was released which added classes for COVID-19 response (20.57, 30.09, and 40.63). The 20 and 40 series COVID-19 responses class prices are pegged to the infectious diseases classes (20.44 and 40.38 respectively). The 30 series class is diagnostic, and is not priced.

In NEP21, the Tier 2 non-admitted services classification version 7.0 is priced, which adds class *40.64 Chronic pain management*. In the absence of activity or cost data for this class collected in 2018-19, the price was determined by combining data from other classes, based on jurisdictional advice.

#### 6.2.3. Adjustments

An additional adjustment was introduced for NEP20, that is, the paediatric adjustment for Tier 2 classes priced using the NHCDC only. Adjustments in the non-admitted model are calculated following the admitted acute methodology described in Section 2.2.9.

The application of the paediatric adjustment mirrors the methodology of the acute model as follows:

- a. specialist paediatric patients are identified as being less than or equal to 17 years of age, from an establishment identified as delivering specialised paediatric services (listed in Appendix E of the National Efficient Price Determination 2021–22 as specialised children's hospitals).
- b. The paediatric adjustment for each Tier 2 class is:
  - Rounded to the nearest whole per cent.
  - Capped and floored at 200 per cent and 80 per cent respectively.
  - Set to one (that is, no adjustment) if the adjustment was within 5 per cent either side of 100 per cent, or the calculated adjustment has changed to be less than or greater than 100 per cent from the adjustments calculated for NEP20.
- c. The cost parameters of each Tier 2 class are then calibrated to ensure that the modelled costs, with the paediatric adjustment applied, are equal to the actual costs of the Tier 2 class.

The adjustments for non-admitted multi-disciplinary clinics (NMC), patient residential area remoteness and Indigenous adjustments are calculated in a single step. The NMC value was calculated by averaging across three years of empirical values, in accordance with IHPA's Stability Policy, to produce the adopted NMC adjustment.

The Indigenous adjustment value is a cost-weighted average value based on all stream data. The patient residential remoteness and patient treatment remoteness values are adopted from the corresponding adjustments in the admitted acute model.

The application of the adjustment parameters mirror the methodology of the acute model as follows:

- a. The stabilised NMC adjustment is applied to all multi-disciplinary clinic records, and concurrently, the Indigenous adjustment and patient remoteness adjustment are applied to all Indigenous and/or regional patient records; the class means are then calibrated.
- b. The patient treatment remoteness adjustment is applied to all regional patient records and then class means are calibrated.

#### 6.2.4. Price weights and NWAU

#### Price of a non-admitted ABF activity

 $= \{PW \times A_{Paed} \times (1 + A_{NMC} + A_{Ind} + A_{Res}) \times (1 + A_{Treat})\} \times NEP$ 

Where:

APaed	means the paediatric adjustment
A <sub>NMC</sub>	means the non-admitted multi-disciplinary clinic adjustment
A <sub>Ind</sub>	means the Indigenous adjustment
A <sub>Res</sub>	means each or any patient residential remoteness area adjustment
A <sub>Treat</sub>	means each or any patient treatment remoteness area adjustment
NEP	means National Efficient Price 2021–22
PW	means the price weight for an ABF activity as set out in <b>Appendix K</b> of the accompanying National Efficient Price Determination 2020–21

Table 14 outlines the required information in order to apply the above formula.

# Table 14: Dataset and tables required for assignment of NWAU to non-admitted patient data

Input dataset or table	Description
ABF NAP NBEDS	Non-admitted patient National Best Endeavours Data Set (ABF NAP NBEDS)
2021–22 NWAU price weight table	2021–22 non-admitted NWAU price weight table found in the National Efficient Price Determination 2021–22.
2021–22 NWAU adjustments	2021–22 non-admitted NWAU adjustments found in the National Efficient Price Determination 2021–22.

Ten variables are required to form the input non-admitted dataset as shown in Table 15.

#### Table 15: Non-admitted patient ABF DSS variables used to calculate NWAU

Non-admitted patient ABF DSS variables
Establishment identifier
Indigenous status
Date of birth
Non-admitted patient service event – service date
Multiple healthcare provider indicator (see National Efficient Price Determination 2021-22)
Tier 2 non-admitted service class (Version 7.0)
Postcode of patient's usual residence
ASGS of patient's usual residence
Hospital geographical indicator
Funding source

# 7. Conversion to a pricing model

#### 7.1. Overview

The 2021–22 national pricing model is the tenth annual pricing model that IHPA has produced. Each pricing model comprises an NEP, price weights and adjustments, and each is based on cost and activity data from three years prior; the 2021–22 pricing model is based on 2018–19 cost and activity data.

The cost and activity data for each of the historical years are used to derive a cost model for that year, with only those costs and activity from ABF establishments being used. The cost model is designed to ensure that the total modelled costs are equalised with the estimated total actual costs across the ABF establishments.

The cost model is made up of cost parameters and adjustments, including the paediatric adjustment, specialist mental health age adjustment, Indigenous adjustment, remoteness area adjustment and intensive care unit adjustment, but it excludes the private patient service adjustment and private patient accommodation adjustment. The latter two adjustments are introduced in the pricing model to remove out-of-scope patient costs associated with private patients (see Section 2.2.3 and 2.2.10).

There are four steps in the transformation of each year's cost model into its associated pricing model, namely:

- a. Identification and exclusion of costs and activity regarded under the NHRA as out-ofscope for the purpose of ABF.
- b. Derivation of a reference cost (or standardised mean) used to transform the cost model into a cost weight model.
- c. Derivation of an annual indexation rate used to inflate the cost model to a level reflective of the estimated cost of delivering hospital services in the year of the pricing model.
- d. Transformation of the cost model to the pricing model using the results of the previous three steps.

The process of transforming the 2018–19 cost model to the 2021–22 national pricing model is illustrated in Figure 6.

Figure 6: Process of transforming the 2018–19 cost model to the 2021–22 national pricing model



#### 7.2. Identification of out-of-scope costs

The first step in the process of transforming cost model to pricing model involves the identification of costs, such as those associated with programs covered entirely, or in part, by other funding sources (for example, Commonwealth or private health insurance). These are referred to as out-of-scope costs, and can be separated into three groups:

- Group 1 activity funded by other sources. For example:
  - Private patient episodes in private hospitals.
  - o Department of Veterans' Affairs, defence and compensable episodes.
  - Activity which does not meet the criteria on the General List of In-scope Services (the General List), as defined in the National Efficient Price Determination 2021–22, such as Tier 2 class not listed in Category A or Category B of the General List.
- Group 2 those proportions of costs associated with private patients that are offset by non-government and Commonwealth revenue.
- Group 3 costs associated with other Commonwealth programs that are inherent within the cost data such as the Highly Specialised Drugs Program and Pharmacy Reform Agreements. Although 2018-19 data is used to set the price, the updated wholesale mark-up arrangements introduced in 1 January 2020 in the 7<sup>th</sup> Community Pharmacy Agreement have been accounted for in the source data.

Exclusion of these costs from the cost model is undertaken as follows:

- Group 1 costs are excluded by restricting the cost model to in-scope activity.
- Group 2 costs are excluded through the implementation of the private patient service adjustment and private patient accommodation adjustment within the pricing model (Section 2.2.10).
- Group 3 costs are excluded by matching at the patient level where possible, otherwise by first calculating the costs as a percentage of estimated total costs, and then deflating the cost model by this percentage.

#### 7.3. Derivation of a reference cost

The second step in the transformation of cost model to pricing model is the derivation of a reference cost (or a mean standardised to ensure the measure of an NWAU remains constant over time) that is used to convert the cost model into a cost weight model. Put simply, the parameters of the cost model are divided by this reference cost, converting the parameters to cost weights.

A separate reference cost is derived for each year's cost model based on the modelled costs of admitted acute activity in-scope for ABF. In particular, this activity excludes the Group 1 out-of-scope costs discussed in Section 7.2.

The 2009–10 reference cost associated with IHPA's first national pricing model is defined as the mean model cost taken across all 2009–10 admitted acute activity in-scope for ABF. This mean model cost is \$4,260.

From 2010–11 onward, the reference cost is defined so that change in the reference cost over time reflects change in unit costs, excluding any influence of underlying changes in activity profiles between years (that is, casemix change). So, the 2010–11 reference cost is defined so that the change from the 2009–10 reference cost represents change in unit costs of an NWAU between the 2009–10 and 2010–11 cost models, excluding the effect of any changes in casemix between years. Similarly, the 2018–19 reference cost represents the change in unit cost between the 2017–18 and 2018–19 cost models, excluding the effect of any changes in casemix between years.

To exclude the external effects of casemix change between years, the two cost models are compared by first applying them to a common set of activity, namely 2018–19 admitted acute activity in-scope for ABF. Once applied to this activity, the resulting pair of mean model costs is calculated, and the change between the two cost models is defined as the change in these two mean values, as shown in Table 17. This is referred to as the standardised change in cost models, with the associated growth referred to as the standardised growth rate. In other words, the growth between the 2017–18 and 2018–19 cost models is standardised against 2018–19 activity.

Table 16 shows the mean model costs of each model based on their application to the 2018–19 ABF activity along with the resulting standardised growth rate.

### Table 16: Mean model costs when each cost model is applied to 2018–19 in-scope admitted acute activity data, and resulting standardised growth rate

2017–18 cost model	2018–19 cost model	Standardised growth rate
\$4,856	\$5,021	3.4%

Finally, the 2018–19 reference cost is defined as the 2017–18 reference cost indexed by the standardised growth rate; that is, the 2018–19 reference cost:

= (2017–18 reference cost) × (standardised growth rate)

Both 2017–18 and 2018–19 reference costs are given in Table 17.

#### Table 17: Reference costs for 2017–18 and 2018–19 cost models.

2017–18 cost model	2018–19 cost model
\$4,998	\$5,167

The conversion of the 2018–19 unadjusted mean model cost given in Table 17 to the 2018–19 reference cost given in Table 18 (that is,  $4,998 \rightarrow 5,167$ ) is referred to as 'rebasing'.

Figure 7 illustrates this rebasing process in the context of the derivation of the 2018–19 reference cost.

Figure 7: Derivation of 2018–19 reference cost



There are two intended consequences of the selection of the reference costs:

- The change in reference costs represents change in unit costs excluding the effect of any changes in casemix.
- The 2017-18 and 2018–19 cost weight models give the same total weighted volume when applied to the 2018–19 activity data on which the standardised growth rate is derived.

#### 7.4. Indexation

The final step in the transformation of the cost model to pricing model is the indexation of costs to estimate those in the year of the pricing model. Describing the methodology in the context of the 2021–22 pricing model, the objective is to derive an annual indexation rate that is used to inflate the 2018–19 cost model over three years to a level reflective of estimated 2021–22 costs.

To derive this rate, the 2018–19 cost model is applied retrospectively to the five years of patient costed admitted acute activity data<sup>18</sup> prior to 2018–19, and comparisons are made between actual and modelled costs to determine the scaling of the 2018–19 cost model required to equalise each year's modelled costs and actual costs. The trend of these scaling factors from 2011–12 to 2018–19 is then projected to model the indexation rate for the following three years.

Figure 8 illustrates the 2018–19 cost model applied to patient costed admitted acute activity data and shows the scaling factors required to ensure the model costs are equalised with actual costs. Since the 2018–19 cost model itself is equalised against 2018–19 actual costs, the scaling factor for 2018–19 is equal to 1 (that is, no scaling is required). Going back through the prior five years of cost data, scaling factors of less than one are required to deflate the modelled costs down to the level of the actual costs. This time series of scaling factors is given by:

$$S_{2013-14} \rightarrow \cdots \rightarrow S_{2018-19},$$

This is then used to model an annual scaling factor, denoted s, which would inflate the 2018–19 cost model up to 2021–22 projected actual costs. The indexation rate is then based on this annual scaling factor.

Figure 8 also illustrates the projected annual scaling factor, *s*, together with projected actual and model costs. The 2021–22 projected scaling factor of  $s^3$  is pictured alongside projected actual and model costs to illustrate that the 2018–19 cost model would require scaling by  $s^3$  to ensure that the resulting ' $s^3$ -scaled 2018–19 cost model', when applied to 2021–22 patient costed activity, would estimate the actual costs of the activity.



#### Figure 8: Illustration of scaling factors required to equalise model and actual costs

<sup>&</sup>lt;sup>18</sup> That is, activity from patient costed sites within the National Hospital Cost Data Collection.

Denoting the historical total actual costs of the activity by:

$$C_{2013-14}, \dots, C_{2018-19},$$

And denoting the total model costs associated with the 2018–19 cost model applied to each year's costed activity by:

$$M_{2013-14}, \dots, M_{2018-19},$$

Each year's scaling factor  $s_x$  is given by:

$$S_x = C_x / M_x$$

This ratio is referred to as the 'cost ratio'.

It is worth noting that multiplying each year's cost ratio by the 2018–19 reference cost of \$5,140 converts the  $\{s_x\}$  time series to the time series of costs per weighted separation, where the weighted separations are determined by 2018–19 cost weight model.

A crucial requirement of the cost ratio time series is comparability over time. One way to ensure this occurs is to restrict the data on which the ratios are calculated to the set of establishments for which data is present across all five years (that is, to ensure that all five ratios are calculated across a common set of establishments). While this approach ensures comparability over time, it places significant restrictions on the sample of data.

Instead, an alternate method is used that greatly increases the data sample while maintaining comparability of the ratios over time. This method relies on the fact that any time series of ratios can be equivalently represented as the time series of year to year changes in ratios together with a single value of the time series (in this case, the 2017–18 to 2018–19 change in cost ratio of 3.2 per cent). This method only requires that each year-to-year comparison uses a common set of establishments (rather than requiring the establishments to be common across all five years).

The indexation rate relies on the 2018–19 admitted acute cost model only, which is based on AR-DRG Version 10.0.

Table 18 shows the year-to-year changes in cost ratio, calculated by applying the 2018–19 cost model to pairs of consecutive years' cost data, ensuring a common set of establishments are present in each pairwise comparison.

2013-14 to	2014-15 to	2015-16 to	2016-17 to	2017-18 to
2014-15	2015-16	2016-17	2017-18	2018-19
2.2%	1.8%	1.8%	3.4%	3.3%

Table 18: Year-to-year changes in cost ratio

Table 19 shows the resulting cost ratio time series derived by back-casting the 2018–19 cost ratio of 1.000 using the inverse of the year-to-year changes given in Table 18. Table 19 also shows the equivalent cost per weighted separation time series, and Figure 9 illustrates the two-time series graphically.

Table 19: Cost ratios and costs per weighted separation time series derived by applying the 2018–19 cost model and cost weight model to historical patient costed activity data

	2013–14	2014–15	2015-16	2016–17	2017–18	2018-19
Cost ratio	0.8835	0.9033	0.9197	0.9363	0.9685	1.0000
Cost per weighted separation	\$4,565	\$4,667	\$4,752	\$4,838	\$5,004	\$5,167

The next step in the process of deriving an annual indexation rate is to model a line of best fit against the time series of cost ratios (or equivalently, against the time series of costs per weighted separation). This line of best fit is used to estimate the projected annual inflation factor, *s*, shown in Figure 9.

Given that the inflation factor, *s*, being modelled is an annual growth rate (that is,  $s \approx s_{x+1} / s_x$ ) as opposed to an arithmetic change each year (that is,  $s_{x+1} - s_x$ ), the line of best fit is taken to have an exponential form. In other words, an exponential form is chosen because exponential functions  $Ae^{Bx}$  have the characteristic that their annual growth rate is constant:

$$Ae^{B(x+1)} / Ae^{Bx} = e^{B} = constant$$

The exponential line of best fit is also modelled so that it passes through the 2018–19 observation to ensure that the resulting annual scaling factor applies to the 2018–19 cost ratio of 1.000 (or equivalently, to the 2018–19 reference cost of \$5,167).

The time series and associated exponential line of best fit are shown in Figure 9. The two equations displayed in Figure 9 represent the exponential line expressed in terms of the cost ratio time series and the cost per weighted separation time series.





Note: that although the two equations in Figure 9 have different coefficients multiplying the exponential function (that is, one and \$5,167), both have precisely the same coefficient inside the exponential function (that is, 0.0262). The two different coefficients multiplying the exponential function represent the estimated cost ratio and cost per weighted separation in 'year zero' (that is, x = 0), which is 2018–19. That is, the regression modelled cost ratio for 2018–19 is 1.000 and the modelled cost per weighted separation for 2018–19 is \$5,167.

The regression modelled estimates of cost ratio and cost per weighted separation for each of the years from 2012-13 to 2018-19 are given by substituting x = -5...0 into the equations.

For example, substituting x = 0 into the equations results in the 2017–18 cost ratio and cost per weighted separation:

 $2018 - 19 \text{ cost ratio} = 1.000 \times e^{(0.0262 \times 0)}$ = 1.000 $e^{0}$ = 1.000

And,

 $2018 - 19 \text{ cost per weighted separation} = $5,167 \times e^{(0.0262 \times 0)}$ = \$5,167 $e^{0}$ = \$5,167

Finally, the annual scaling factor (that is, *s* in Figure 8) is then defined as the annual rate of change associated with the exponential line of best fit, and the indexation rate is the growth rate of this annual scaling factor. The annual rate of change of the exponential line is  $s = e^{0.0262}$ , which is equal to 1.027, or 102.7 per cent. Therefore, the indexation rate is 2.7 per cent.

#### 7.5. Transformation of cost model to pricing model

The final step in the process of developing the pricing models uses the three steps detailed in the previous sections to transform each cost model to the corresponding pricing model.

Each year's pricing model is designed to reflect estimated total in-scope costs associated ABF activity in the year of the pricing model. The pricing model is therefore given by the inflated cost model defined in Section 7.4 with those out of scope costs defined in Section 2 removed. However, the pricing model is represented by the NEP together with price weights and adjustments. This splitting of prices into an NEP component and a price weight component is where the reference cost defined in Section 7.3 plays its role.

To describe the process in the context of the 2021–22 national pricing model, first the 2018–19 cost model is transformed into a cost weight model by dividing it through by the 2018–19 reference cost of \$5,167 (see Section 7.3). The 2018–19 cost model is then represented by a reference cost, cost weights and adjustments.

The inflation of the 2018–19 cost model to estimated 2021–22 costs is then undertaken by inflating the 2018–19 reference cost by the annual indexation rate (defined in Section 7.4) and keeping the cost weights and adjustments fixed. The indexed 2018–19 reference cost is \$5,597.

The indexed 2018–19 reference cost, together with the 2018–19 cost weights and adjustments, then represents the estimated 2021–22 cost model. The following example demonstrates how the process of indexing the reference cost and keeping the cost weights fixed, has the same effect as indexing the entire cost model.

For example, there are two equivalent methods to derive estimated 2021–22 costs for same-day episodes for AR-DRG E42B - bronchoscopy, intermediate complexity.

The 2018–19 same-day cost parameter associated with E42B is \$2,852.18. Applying the annual indexation rate of 2.7 per cent to the 2018–19 cost, the estimated same-day cost of E42B in 2021–22 is given by:

2021–22 estimated same-day cost of  $E42B = (2018-19 \text{ estimated cost}) \times (\text{indexation})$ 

= \$2,852.18× (102.7%) <sup>3</sup>

= \$3,089.50

On the other hand, the same-day cost weight associated with E42B is 0.5520 (= \$2,852.18/ \$5,167). Applying the annual indexation rate to the 2018–19 reference cost, the resulting estimated cost of a same-day episode in E42B in 2021–22 is given by:

2021–22 estimated same-day cost of  $E42B = (2018-19 \text{ cost weight}) \times (\text{indexed reference cost})$ 

$$= 0.5520 \times (\$5,167 \times (102.7\%)^{3})$$
$$= 0.5520 \times \$5,597$$
$$= \$3,089.54$$

Note there is a minor difference in final result due to rounding of the price weight.

#### 7.6. Back-casting for ABF

Back-casting is the process by which the effect of significant changes to the ABF classification systems or costing methodologies are reflected in the pricing model the year prior to implementation, for the purpose of the calculation of the Commonwealth's funding for each ABF service category.

In accordance with Clauses A34(b) and A41 of the NHRA, the Pricing Authority has applied the methodological changes made in NEP21 to NEP20 to determine the back-cast NEP20 for the purposes of determining Commonwealth growth funding between 2020–21 and 2021–22. The back-cast amount for NEP20 is provided in Chapter 10 of the National Efficient Price Determination 2021–22.

#### 7.6.1. Back-casting ABF volume

IHPA has also estimated the volume impact of methodological changes between NEP20 and NEP21, which can be used for the purpose of estimating movements in volume between NEP20 and NEP21. This is useful for relating NWAU20 activity to NWAU21 targets, and for estimating Commonwealth growth funding prior to actual 2021–22 activity data being available.

The volume multipliers (VM) are calculated for each jurisdiction for each particular ABF service category stream and are provided in Chapter 10 of the National Efficient Price Determination 2021–22. The back-cast volume multipliers for each jurisdiction (for each ABF product category) are calculated from the most recently reported activity data, namely 2019–20, as:

 $VM = \frac{NWAUs \text{ delivered by backcast model (NWAU21 calculator)}}{NWAUs \text{ delivered by original cost model (NWAU20 calculator)}}$ 

The volume multipliers can be applied to estimates of an NWAU count for 2021–22 if actual data is not available.

For the draft admitted acute back-casting multipliers, 2018–19 data was used as Medicare PIN is required to apply the readmissions funding adjustment, which at the time of release was only available for 2018–19 activity.

# 8. Block-funded hospitals

#### 8.1. General issues

#### 8.1.1. Cost unit

The cost unit is a hospital.

#### 8.1.2. Scope

Hospitals are in-scope if they have been nominated by a jurisdiction and meet the criteria for block-funded hospitals. The criteria that defines a block-funded hospital is less than or equal to 3,500 total NWAU per annum for rural hospitals and less than or equal to 1,800 admitted patient NWAU per annum for city hospitals.

#### 8.1.3. Classification

The cost model for National Efficient Cost Determination 2021–22 (NEC21) comprises of 370 small rural hospitals, three less than NEC20. Of these, 367 were used in the modelling, while another three hospitals were manually added after being excluded from modelling due to incomplete data or high-outlier status. There are nine major city hospitals, 22 specialist psychiatric and three other hospitals that are block funded on a separate basis. The initial data preparation of the NEC21 model remains largely unchanged from NEC20, involving the estimation of in-scope activity and expenditure within the admitted, emergency and non-admitted streams.

Similar to the NEC20 cost model, the NEC21 model does not have hospital size and type groups and implements a continuous regression model based on NWAU. The intercept of the initial regression is used to identify low-outlier establishments which report little activity but demonstrate high cost variability. The threshold for low-outliers is the activity level (NWAU) corresponding to a variable component equating to half the initial intercept. In NEC21, there were 57 low-outlier hospitals, with the remaining 310 hospitals used to develop the cost model. The fixed-plus-variable model, includes a:

- Variable component, which is dependent on the hospital's total activity level and calculated using a dollars-per-NWAU rate based on the corresponding year's NEP. For NEC21 this was \$5,167 per-NWAU.
- Fixed component, which represents the fixed costs of the hospital where they are not suitably covered through the variable component. The fixed component is dampened based on hospital size: smaller hospitals receive a greater fixed component while the large NEC hospitals, close to the block-funding eligibility threshold of 3,500 NWAU, receive a smaller fixed component.

The modelled cost under the fixed-plus-variable model is the sum of the fixed and variable components. Hospitals identified as low-outliers have their modelled cost set at the fixed component with no dampening or remoteness adjustment applied.

The fixed-plus-variable model continues to recognise two levels of remoteness in the form of:

- o remoteness category 1: inner regional, outer regional, remote
- o remoteness category 2: very remote.

A remoteness adjustment of 30.2 per cent is applied to the fixed component of very remote hospitals.

#### 8.2. Analysis of costs

#### 8.2.1. Data preparation

The methodology for NEC21 has been maintained since the data preparation process was updated in NEC17 in line with an update to the national public hospital establishment database (NPHED) in 2014–15. There was another update to the NPHED in 2018-19, which is discussed further in Section 8.2.3. The data preparation process involves:

- Extraction of activity data from the IHPA ABF DSS for each block-funded hospital and conversion of that data into in-scope NWAUs.
- Extraction of in-scope establishment expenditure data from the NPHED.

The establishment data required to populate the 2018–19 cost model table are:

- Total in-scope NWAU per annum for 2018-19.
- Total in-scope establishment expenditure in 2018-19.

In line with the NEC20 model, the NEC21 model uses a single year of activity data only. This has been done to provide greater model responsiveness and remove the memory effect of a rolling three-year average used in models prior to NEC20.

The eligibility of hospitals for block-funding is determined by ensuring that the latest year's total NWAU is less than or equal to 3,500 NWAU per annum for rural hospitals, and the admitted patient activity for city hospitals is less than or equal to 1,800 NWAU per annum.

The NWAU activity measure is calculated first and then the best estimate of 2018-19 in-scope expenditure is derived, as set out below. A guide to the process used to prepare data for NEC21 is set out in **Appendix E**.

#### 8.2.2. In-scope activity

#### Admitted acute and subacute NWAU

Patient-level admitted data was available from approximately 96 per cent of hospitals in the APC stream.

The patient-level admitted data has been fed through the NEP20 NWAU calculator to calculate the in-scope NWAU and public patient equivalent NWAU of all in-scope hospital activity. A slightly modified version of the calculator is used for episodes with an admission date prior to 1 July 2018 in order to determine the NWAU associated to the portion of the episodes occurring in 2018-19. This is discussed further under the 'work-in-progress episodes' section below.

For the few hospitals that do not supply patient level admitted data, admitted NWAU is estimated based on the sum of the reported in-scope admitted acute, subacute, other admitted and mental health care expenditure from the NPHED. The number of admitted NWAU is calculated by multiplying the total reported in-scope admitted expenditure by 0.000141.

The admitted multiplier is the parameter estimate from a linear regression of NWAU (using the NEP20 NWAU calculator) versus total reported in-scope admitted expenditure for small hospitals (total public patient equivalent NWAU less than 5,000) that have admitted activity data. Due to known issues in separating admitted and emergency expenditure in Victorian block-funded hospital data, establishments from Victoria were excluded as reference data for this modelling process.

#### Work-in-progress episodes

The block-funded cost model is used to calculate the expected in-scope cost of a block-funded hospital for a single financial year. The patient-level admitted activity data contains episodes separated in the financial year, in some cases having been admitted up to 15 years prior.

Using the NWAU calculator as it stands would assign 15 years of activity to this single patient, resulting in incomparable cost and activity calculations. On the other hand, there may be episodes admitted during the financial year that have not yet been discharged, and thus do not appear in the activity data. Episodes admitted before the beginning of the financial year or separated after the financial year are referred to as 'work-in-progress' (WIP) patients.

To address this issue, WIP patients who have been separated during the financial year have their total weighted activity reduced so that only NWAU associated to the current financial year are included. To account for WIP patients not yet discharged, each establishment's total NWAU is scaled up based on state-level ratios calculated. The ratios used for NEC21 are shown in Table 20.

State	WIP adjustment
NSW	1.7%
Vic	2.7%
Qld	1.9%
SA	2.3%
WA	1.4%
Tas	2.7%

#### Table 20: State-level admitted WIP ratios

#### Emergency care NWAU

Approximately 46 per cent of block-funded hospitals reported emergency activity at the patient level, and 33 per cent reported aggregate presentation information at the UDG level. Also, 16 per cent of block-funded establishments reported basic summary counts and activity estimates. Where available, these data are used to determine NWAU values utilising the NEP20 price weights.

For hospitals that do not supply emergency activity data, emergency NWAU is estimated based on the reported in-scope emergency expenditure from the NPHED. The number of emergency NWAU is calculated by multiplying the total reported in-scope emergency expenditure by 0.000177.

The emergency multiplier is the parameter estimate from a linear regression of NWAU (using the NEP20 NWAU calculator) versus total reported in-scope emergency expenditure for small hospitals (total public patient equivalent NWAU less than 5,000) that have emergency activity data. Due to data quality issues, all establishments from Victoria were excluded as reference data for the modelling process.

#### Non-admitted NWAU

Approximately 45 per cent of block-funded hospitals reported non-admitted activity at the patient level, and 86 per cent reported aggregate service event information at the class level. Where available, these data are used to determine NWAU values utilising the NEP20 price weights.

For the hospitals that do not supply non-admitted activity, non-admitted NWAU is estimated based on reported in-scope non-admitted expenditure from the NPHED. The number of non-admitted NWAU is calculated by multiplying the total reported in-scope non-admitted expenditure by 0.000090.

The non-admitted multiplier is the parameter estimate from a linear regression of NWAU (using the NEP20 NWAU calculator) versus total in-scope non-admitted expenditure for small hospitals (total public patient equivalent NWAU less than 5,000) that have non-admitted activity data. Due to data quality issues, two establishments from Victoria were excluded as reference data for the modelling process.

#### 8.2.3. Out-of-scope expenditure

In 2018-19, the NPHED was updated to introduce six new product streams to capture total recurrent expenditure in areas out-of-scope for the NHRA including:

- o admitted acute care (excluding mental health care) (out-of-scope for the NHRA)
- admitted subacute and non-acute care (excluding mental health care) (out-of-scope for the NHRA)
- o other admitted care (excluding mental health care) (out-of-scope for the NHRA)
- o admitted mental health care (out-of-scope for the NHRA)
- emergency care services (out-of-scope for the NHRA)
- o depreciation.

In previous years, where out-of-scope expenditure was not separately identified in the NPHED, an establishment's in-scope proportion of expenditure was estimated based on the share of inscope activity data. This aimed to account for any expenditure against services not in-scope under the NHRA. With the introduction of out-of-scope expenditure streams, the NEC21 data preparation process has been updated to use the NPHED reported in-scope expenditure at a stream level. This updated in-scope expenditure calculation has been adopted for all jurisdictions except Victoria where the prior methodology of estimating the in-scope amount has been retained.

In addition to the aforementioned new out-of-scope product streams, the following NPHED total recurrent expenditure product streams are also treated as out-of-scope in the NEC21 data preparation process:

- direct teaching, training and research
- Commonwealth funded aged care
- other aged care
- non-admitted care (excluding emergency care) (out-of-scope for the NHRA)
- other expenditure (out-of-scope for the NHRA).

#### 8.2.4. Calculation of cost parameters

Application of the fixed-plus-variable model and consideration of the low outlier hospitals provided the cost parameters shown in Table 21.

Cost parameter	Value	
National efficient price 2021–22	\$5,167 per NWAU	
Initial intercept	\$1,935,021	
Low-outlier threshold	187 NWAU	
Low-outlier hospitals	57	
Fixed cost base (inner regional, outer regional and remote)	\$1,971,760	
Fixed cost base (very remote)	\$2,567,136	
Fixed cost dampening rate	0.029% per NWAU	
National efficient cost 2021–22 very remote adjustment	30.2%	

#### Table 21: Cost parameters of the fixed-plus-variable model and low-outlier establishments

The NEC very remote adjustment and dampening only apply to the fixed component and not the variable component or low-outlier hospitals.

The dampening rate is calculated such that the fixed component is fully applied at zero NWAU and is completely dampened at 3,500 NWAU, which marks the transition point between block funding and ABF. The purpose of dampening is to gradually reduce the contribution of the fixed component to the overall modelled cost of individual establishments as their activity increases and their variable component, based on the NEP, increases. This is implemented via the use of a multiplier applied to the base fixed component amount:

Dampening factor = 
$$\begin{cases} \frac{3500 - \text{Total NWAU}}{3500}, \text{ where Total NWAU} \le 3,500 \text{ NWAU} \\ 0, \text{ where Total NWAU} > 3,500 \text{ NWAU} \end{cases}$$

For NEC21, 370 small rural hospitals have been designated as block funded including the lowoutlier hospitals and establishments excluded from the development of the model. These hospitals were categorised by remoteness to determine NEC21.

#### 8.3. Calculation of national efficient cost

The efficient cost of a small rural hospital is the sum of the fixed cost component and variable cost component.

#### 8.3.1. Calculation of the efficient cost for a particular hospital

The efficient cost of an inlier, in-scope block-funded hospital is given according to:

Modelled cost = Base fixed component × Dampening factor × (1 + Very remote adjustment) + NEP21 reference cost × Total NWAU Where "Total NWAU" is a measure of total in-scope activity by the establishment, and all other terms are as defined in Section 8.2.4. Non-routine hospitals included:

#### (a) Low outliers

- The fixed-plus-variable model is not applied to low-outlier hospitals which have activity below a calculated activity threshold of 187 NWAU.
- The efficient cost of these hospitals is determined as the fixed component with no dampening or very remote adjustment applied.

#### (b) High outliers

- One hospital exhibited notably higher costs when compared to similarly sized hospitals, whilst also being much larger than hospitals in the low outlier set described above.
- This hospital had a disproportionate impact on model parameters, and thus it was removed from the NEC21 model development.
- The efficient cost of this hospital is determined using the fixed-plus-variable model.

#### (c) Hospitals with missing data

 Jurisdictional advice was sought on hospitals with missing activity or cost data. Where appropriate, new data received from jurisdictions was incorporated into existing datasets for these hospitals. They are then treated in the same way as hospitals reporting adequate data for the purposes of determining the 2018-19 total cost and NEC21.

In addition to the above, standalone hospitals including specialist psychiatric and major city hospitals are treated separately and are addressed further below.

#### 8.4. Indexation of the 2018–19 model

Due to the three-year time lag in data collection, cost model results for 2018–19 were indexed over three years to give a price model for 2021–22. The indexation of the model is based on the growth of in-scope expenditure for block-funded hospitals.

Figure 10 illustrates that the indexation rate is given by the slope of the exponential line of best-fit across five years. The overall 2018–19 model spend was projected to 2021–22 using the annual indexation factor of 3.7 per cent per annum, as specified in the National Efficient Cost Determination 2021–22.

#### Figure 10: NEC21 Indexation



#### 8.5. Back-casting for block-funded hospitals

In accordance with the guiding principles of the NEC cost model, the Pricing Authority has applied the methodological changes made in NEC21 to NEC20 to determine the back-cast NEC20 for the purposes of determining Commonwealth growth funding between 2020–21 and 2021-22. The back-cast multiplier for NEC20 is provided in Chapter 7 of the National Efficient Cost Determination 2021-22.

 $Back-cast multiplier = \frac{Predicted cost for 2020-21 based on NEC21 modelled cost}{Predicted cost for 2020-21 based on NEC20 modelled cost}$ 

A back-cast NEC20 is calculated to estimate growth between 2020–21 and 2021–22. The back-cast NEC20 is calculated by taking the in-scope cost for NEC21 and indexing it forward two years based on the latest indexation methodology.

# 8.5.1. Calculation of the efficient cost of specialist psychiatric and major city hospitals

Specialist mental health hospitals are excluded from the model from the outset. These hospitals are assigned model costs based on advice from jurisdictions. Where advice was not received from jurisdictions, reported 2018–19 NPHED data or the NEC20 efficient cost has been escalated by the NEC21 indexation rate to become the NEC21 efficient cost for each of these hospitals.

For the purposes of NEC21, these hospitals are priced after consultation with jurisdictions. Subject to this advice, their prices are set at their actual cost for 2018–19, and are indexed at the same rate applied to the in-scope hospitals in the 2018–19 cost model for NEC21. Indexation is described in further detail in Section 7.4.

The 2021–22 efficient costs for the nine major city hospitals, as well as the three other standalone hospitals, will be determined separately in a similar way, following consultation with jurisdictions.

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# **Appendix A: Reference tables**

#### Table 22: Sections of the NEP21 and NEC21 Determinations

Component	Section of Determination
National efficient price	Chapter 2
Admitted acute services - NEP21	
AR-DRG inlier bounds, flags for designated same-day payment AR-DRG and unbundled ICU AR-DRG, national weighted activity unit weights for same- day payment AR-DRGs, short-stay outliers (base and per diem), inliers, long- stay outliers (per diem), intensive care unit rates per hour	Appendix H
Adjustments to price weights	Chapter 5
List of radiotherapy codes	Appendix B
List of dialysis codes	Appendix C
Specified intensive care units	Appendix D
Specialised children's hospitals	Appendix E
Private patient adjustments	Appendix F
Provisional weights for very long stay patients	Appendix G
Funding adjustments for hospital acquired complications	Appendix M
Risk adjustment factors for avoidable hospital readmissions	Appendix N
Definition of an eligible ICU or paediatric ICU	Glossary
Emergency department services - NEP21	
AECC Version 1.0 weights	Appendix K
UDG Version 1.3 classification eights	Appendix L
Emergency care in-scope for ABF	Online Glossary
Definitions of emergency care role levels	Online Glossary
Non-admitted services - NEP21	
Tier 2 Non-Admitted Services Classification Version 7.0 weights, paediatric adjustments and Shadow priced clinic 40.62 Multidisciplinary case conference - patient not present	Appendix J
Definition of Tier 2 list of non-admitted services classifications Version 7.0	Online Glossary
Subacute and non-acute services - NEP21	
AN-SNAP Version 4.0 weights	Appendix I
Definitions of AN-SNAP Version 4.0	Online Glossary
Mental health services - NEP21	
AR-DRG-based inlier bounds, NWAU and adjustment weights	Appendix H

Component	Section of Determination		
Mental health age adjustments	Chapter 5		
Block-funded hospital services - NEC21			
The efficient costs for each block-funded hospital	Chapter 3		

#### Table 23: Summary of classification systems and sources of cost

Service stream	Classification <sup>19</sup>	Cost data	Activity data
Admitted acute care	Australian Refined Diagnosis Related Groups Version 10.0	National Hospital Cost Data Collection (NHCDC) Round 23 (2018–19)	Admitted patient care national minimum data set (APC NMDS)
Emergency care	AECC Version 1.0 Urgency Disposition Groups Version 1.3	NHCDC Round 23 (2018–19)	Emergency service care NMDS
Non-admitted care	Tier 2 Outpatient Class Definitions Version 7.0	NHCDC Round 23 (2018–19)	ABF Non-admitted patient (NAP) NBEDS and ABF NAP care aggregate NBEDS
Subacute care (and non-acute)	AN-SNAP Version 4.0 care type	NHCDC Round 23 (2018–19)	APC NMDS and admitted subacute and non-acute hospital care NBEDS
Block-funded services	IHPA-defined size and Australian Statistical Geography Standards location categorisation on total NWAU for hospital	Expenditure data from the national public hospital establishments database (2018– 19 financial year) NHCDC Round 23 (2018–19 financial year)	APC NMDS, NAPEDC NMDS, ABF ES DSS, NPHED, non-admitted patient and aggregate DSS.

<sup>&</sup>lt;sup>19</sup> Details of each of the classifications are available from: https://www.ihpa.gov.au/what-we-do/data-specifications/dss-2018-19

# **Appendix B: Application of NWAU variables**

#### Table 24: Acute admitted patients: variable definitions

Variable	Name	Description	Definition
A00	_pat_covid_flag	Patient has diagnosis U071 or U072	1 if patient had a COVID19 diagnosis; else 0.
		Either supplied in the input dataset or derived from the list of supplied diagnosis codes.	
A01	_pat_radiotherapy_flag	Radiotherapy eligible separation. Either supplied in the input dataset or derived from the list of supplied procedure codes.	1 if patient had radiotherapy related treatment or planning procedure; else 0.
A02	_pat_dialysis_flag	Dialysis eligible separation. Either supplied in the input dataset or derived from the list of supplied procedure codes.	1 if patient had a dialysis procedure and is not in AR-DRG L61Z or L68Z; else 0.
A03	est_eligible_paed_flag	Paediatric adjustment eligible establishment, derived from ICU paediatric eligibility table	1 if establishment is designated as eligible for paediatric adjustment; else 0.
A04	est_eligible_icu_flag	ICU rate adjustment eligible establishment, derived from ICU and paediatric eligibility table	1 if establishment is designated as eligible for ICU rate adjustment; else 0.
A05	_pat_remoteness	Patient residential remoteness Area	2016 ASGS remoteness area category of the patient location taken from the episode's geographical information in ranked order of preference: SA2, postcode or the hospital geographical indicator variable where: 0 = major city
			1 = inner regional
			2 = outer regional
			3 = remote
			4 = very remote.
A06	_treat_remoteness	Patient treatment remoteness Area	2016 ASGS remoteness area category of the patient treatment location taken from the hospitals geographic location information, where: 0 = major city
			1 = inner regional
			2 = outer regional
			3 = remote
			4 = very remote.
A07	_pat_acute_flag	Acute patient flag	1 if (care type = 1 or 11) or (care type = 7 and number of qualified days for newborns > 0); else 0.
A08	_pat_los	Length of stay	Max (1, (date of separation) - (date of admission) - (total leave days)) if care type = 1; else total qualified days if care type = 7.

Variable	Name	Description	Definition
A09	_pat_same-day_flag	Same-day flag	1 if date of admission = date of separation; else 0.
A10	_pat_age_years	Age at admission (in years)	Total whole years from date of birth to date of admission.
A11	_pat_eligible_paed_flag	Paediatric adjustment eligible patient	1 if (_pat_age_years between 0 and 17) and (est_eligible_paed_flag=1); else 0.
A12	_pat_ind_flag	Indigenous patient flag	1 if patient Indigenous status = 1, 2 or 3; else 0.
A13	_pat_private_flag	Private patient flag	1 if funding source = 9 or 13 for 2012-13 data and later. <sup>20</sup>
A14	_pat_public_flag	Public patient flag	1 if funding source = 1, 2 or 8 for 2012-13 data and later. <sup>21</sup>
A15	_pat_spa_category	Patient specialist psychiatric category. All patients classified have positive psychiatric care days.	<ul> <li>0: if not a specialist psychiatric patient</li> <li>1.1: if 0 to 17 years from establishment not eligible for paediatric adjustment and in MDC 19 or 20</li> <li>1.2: 0 to 17 years from establishment eligible for paediatric adjustment and in MDC 19 or 20</li> <li>2.1: if 0 to 17 years from establishment not eligible for paediatric adjustment and not in MDC 19 or 20</li> <li>2.2: 0 to 17 years from establishment eligible for Paediatric Adjustment and not in MDC 19 or 20</li> <li>2.2: 0 to 17 years from establishment eligible for Paediatric Adjustment and not in MDC 19 or 20</li> <li>3: greater than 17 years not in MDC 19 or 20</li> </ul>
A16	drg_same-daylist_flag	Same-day price list flag	1 if same-day price list variable from joined NWAU AR- DRG price weight table equals 'Yes'; else 0.
A17	drg_bundled_icu_flag	Bundled ICU flag	1 if bundled ICU variable from joined NWAU AR-DRG price weight table equals 'Yes'; else 0.
A18	drg_inlier_lb	Inlier lower bound	Inlier lower bound from NWAU AR-DRG price weight table.
A19	drg_inlier_ub	Inlier upper bound	Inlier upper bound from NWAU AR-DRG price weight table.
A20	drg_pw_sd	Same-day price weight	Same-day price weight from joined NWAU AR-DRG price weight table if not missing; else 0.
A21	drg_pw_sso_base	Short-stay outlier base price weight	Short-stay outlier base price weight from joined NWAU AR- DRG price weight table if not missing; else 0.
A22	drg_pw_sso_perdiem	Short-stay outlier per diem price weight	Short-stay outlier per diem price weight from joined NWAU AR-DRG price weight table if not missing; else 0.

 $<sup>^{20}</sup>$  Or 1 if funding source = 2 or 3 for 2011-12 data or earlier.  $^{21}$  Or 1 if funding source = 1, 10 or 11 for 2011-12 data or earlier.

Variable	Name	Description	Definition
A23	drg_pw_inlier	Inlier price weight	Inlier price weight from joined NWAU AR-DRG price weight table.
A24	drg_pw_lso_perdiem	Long-stay outlier per diem price weight	Long-stay outlier per diem price weight from joined NWAU AR-DRG price weight table if not missing; else 0.
A25	drg_adj_paed	Paediatric adjustment	Paediatric adjustment from joined NWAU AR-DRG price weight table.
A26	drg_adj_privpat_serv	Private patient service adjustment	Private patient service adjustment from joined NWAU AR- DRG price weight table.
A27	_drg_inscope_flag	DRG in-scope flag	1 if DRG is in-scope; else 0.
A28	adj_spa	See definition	Specialist psychiatric age adjustment
A29	adj_indigenous	See definition	Indigenous adjustment.
A30	adj_remoteness	See definition	Remoteness adjustment.
A31	adj_treat_remoteness	See definition	Patient treatment remoteness adjustment.
A32	adj_radiotherapy	See definition	Radiotherapy adjustment.
A33	adj_dialysis	See definition	Dialysis adjustment.
A34	state_adj_privpat_acco mm_sd	See definition	Private patient accommodation adjustment: same-day rate (state-specific adjustment).
A35	state_adj_privpat_acco mm_on	See definition	Private patient accommodation adjustment: overnight per diem rate (state-specific adjustment).
A36	_pat_eligible_icu_hours	Whole eligible hours spent in ICU	Total whole hours spent in intensive care (including below level 3 ICU if _pat_covid_flag = 1) unit if hours are greater than or equal to 1; else 0, for unbundled DRGs and eligible establishments
A37	_pat_los_icu_removed	See definition	Patient length of stay with ICU hours removed
A38	_pat_separation_catego ry	See definition	Patient separation category: 1: Same-day patients 2: Short-stay outlier patients 3: Inlier patients 4: Long-stay outlier patients
A39	_w01	DRG by inlier/outlier weight	Based off _pat_separation_category: 1: drg_pw_sd 2: drg_pw_sso_base + drg_pw_sso_perdiem * pat_los_icu_removed 3: drg_pw_inlier 4: drg_pw_inlier + (pat_los_icu_removed - drg_inlier_ub) * drg_pw_lso_perdiem

Variable	Name	Description	Definition
A40	_w02	Application of the paediatric adjustment	_w01 * (1 + _pat_eligible_paed_flag * (drg_adj_paed - 1))
A41	_w03	Application of the Indigenous and remoteness adjustment	_w02 * (1 + adj_indigenous + adj_remoteness + adj_radiotherapy + adj_dialysis) * (1 + adj_treat_remoteness)
A42	_adj_icu	Application of the ICU rate adjustment	_pat_eligible_icu_hours * icu_rate.
A43	An10mdc_ra	MDC v10.0	Major Diagnostic Category v10.0
A44-A81	catXXpY	HAC Categories and subcategory flags	e.g. cat01p1 = HAC 1.1 = Stage III Pressure Injury
A82	DRG10_Type	AR-DRG v10.0 Type	Intervention or Medical
A83	agegroupc	Age Group	Age group in 5 year bands (e.g. Age 20-24)
A84	flag_ICUHours	See definition.	1 if episode has ICU Hours; else 0.
A85	flag_AdmTransfer	See definition	1 if episode is has admission mode = 'transfer'; else 0.
A86	Charlson_score	See definition.	Charlson Score
A87	Instrument_use_flag	See definition.	Instrument used during delivery
A88	Primiparity_flag	See definition	First pregnancy for woman under age of 16 or over 35
A89	PPOP_flag	See definition.	Persistent posterior occiput position of fetus
A90	Foetal_distress_flag	See definition.	Foetal distress during delivery
A91	Flag_emergency	See definition.	1 if episode has emergency admission urgency; else 0.
A92	Agegroup_rm	Age Group	Age group in 10 year bands (e.g. Age 20-29)
A93	flag_icu24	See definition.	Episode has more than 24 hours in ICU
A94	Homeless	See definition.	Diagnosis code is present: Z590
A95	Post_transplant	See definition.	Diagnosis code starting with Z94 is present
A96	Gender	Sex of the patient	1 if male, otherwise 2
A97	Pacemaker	See definition.	Diagnosis code starting with Z95 is present
A98	Ventilator	See definition.	Diagnosis code is present: Z991
A99	Drug_use	See definition.	Diagnosis code Z722 present and either a diagnosis codestarting with F or code R4581 is present
A100	Malnutrition	See definition.	Once of the following diagnosis codes is present: E40, E41, E42, E43, E440, E441, E45, E46
A101	Adm_past_year	See definition.	Number of times the patient has been admitted in the past year

Variable	Name	Description	Definition
A102	Count_proc	See definition.	Number of procedure codes in the episodes procedure array
A103	Low_los_flag	See definition.	Length of stay is below the inlier lower bound for this episode's DRG
A104	cc_*	Chronic condition and comorbidity flags	See avoidable readmission technical specifications for details
A105- A120	age_XXg	Age group for HACXX	The age group relevant for risk adjustment of HACXX.
A121- A136	mdc_XXg	MDC group for HACXX	The MDC group relevant for risk adjustment of HACXX.
A137- A152	cc_XXg	Charlson Comorbidity group for HACXX	The Charlson Comorbidity score group relevant for risk adjustment of HACXX.
A153- A168	pointsXX	See definition	Total complexity score for HACXX.
A169- A184	groupXX	See definition	Complexity group relevant to HACXX.
A185- A200	riskadj_XX	See definition	Funding adjustment relative to HACXX.
A201	HAC_adj	Adopted funding adjustment	Max(riskadj_01 – riskadj_14)
A202	Error_Code	See definition	Outlines Errors in calculations
A203	hacflag	See definition	1 if episode has a HAC; else 0.
A204	hacgroup	See definition	HAC group adopted for funding adjustment.
A205	complexity	See definition	Complexity score associated to A204
A206	complexityGroup	See definition	Complexity group associated to A204
A207- A219	readm_pointsXX	See definition	Total complexity score for READXX.
A220- A232	readm_risk_categoryXX	See definition	Complexity group relevant to READXX.
A233- A245	readm_adjXX	See definition	Funding adjustment relative to READMXX.
A246	readmflag	See definition	1 if episode has is the index episode for an avoidable readmission; else 0.
A247	w01_readm	A39 of the readmissions associated with this index episode	See A39
A248	GWAU21	Gross weighted Activity Unit	_w04 + _adj_icu
A249	_adj_privpat_serv	Private patient service adjustment	_pat_private_flag * drg_adj_privapat_serv*(_w01+_adj_icu)

Variable	Name	Description	Definition
A250	_adj_privpat_accom	Private Patient Accommodation adjustment	_pat_private_flag*(_pat_same- day_flag*state_adj_private_accom_sd+ (1pat_same- day_flag)*_pat_los*state_adj_privpat_accomm_on)
A251	riskAdjustment_hac	NWAU deduction from HAC	A39 * A201
A252	riskAdjustment_readm	NWAU deduction from readmission index episode	A39 * max(A233 - A245)
A253	NWAU21	National Weighted Activity Unit	Max(0,A248-A249-A250-A251-A252) for only in-scope funding sources, set as necessary in the template.

#### Table 25: Subacute admitted patients: variable definitions

Variable	Name	Description	Definition
S01	_pat_radiotherapy_flag	Flag indicating a patient with a radiotherapy procedure code. Either supplied in the input dataset or derived from the list of supplied procedure codes.	1 if patient had radiotherapy related treatment or planning procedure; else 0.
S02	_pat_dialysis_flag	Flag indicating a patient with dialysis procedure code. Either supplied in the input dataset or derived from the list of supplied procedure codes.	1 if patient had a dialysis procedure; else 0.
S03	_treat_remoteness	Patient treatment remoteness area	2016 ASGS remoteness area category of the patient treatment location taken from the hospitals geographic location information, where: 0 = major city
			1 = inner regional
			2 = outer regional
			3 = remote
			4 = very remote.
S04	_pat_remoteness	Patient remoteness area	2016 ASGS remoteness area category of the patient location taken from the episode's geographical information in ranked order of preference: SA2, postcode, or the hospital geographical indicator variable where: 0 = major city
			1 = inner regional
			2 = outer regional
			3 = remote
			4 = very remote.
S05	_pat_subacute_flag	Subacute and non-acute patient flag	1 if care type = 2, 3, 4, 5 6 or 88, else 0.
S06	_pat_los	Length of stay	Max (1, (date of separation) - (date of admission) - (total leave days) ).
S07	_pat_sameday_flag	Patient same-day flag	1 if date of admission = date of separation; else 0.

Variable	Name	Description	Definition
S08	_pat_age_years	Age at admission (in years)	Total whole years from date of birth to date of admission.
S09	_pat_ind_flag	Indigenous patient flag	1 if patient Indigenous status = 1, 2 or 3; else 0.
S10	_pat_private_flag	Private patient flag	1 if funding source = 9 or 13 for 2013–14 data and later. <sup>22</sup>
S11	_pat_public_flag	Public patient flag	1 if funding source = 1, 2, 3 or 8 for 2013–14 data and later. <sup>23</sup>
S12	ansnap_type	See definition	AN-SNAP class type, as set out in <b>Appendix I</b> of the <i>National Efficient Price Determination 2020–21.</i>
S13	ansnap_samedaylist_flag	Same-day price list flag	1 if same-day price list variable from joined NWAU AN-SNAP price weight table equals 'Yes'; else 0.
S14	ansnap_inlier_lb	Inlier lower bound	Inlier lower bound from NWAU AN-SNAP price weight table.
S15	ansnap_inlier_ub	Inlier upper bound	Inlier upper bound from NWAU AN-SNAP price weight table.
S16	ansnap_pw_sd	Same-day price Weight	If the patient belongs to a same-day AN-SNAP Version 4.0 class then this is the same-day price weight obtained from the NWAU AN-SNAP price weight table. If the patient does not belong to such a class then this value is missing.
S17	ansnap_pw_sso_perdiem	Short-stay outlier per diem price weight	If the patient does not belong to a same-day AN- SNAP Version 4.0 class then this is the short-stay outlier price weight obtained from the NWAU AN- SNAP price weight table. If the patient does belong to such a class then this value is missing.
S18	ansnap_pw_inlier	Inlier price weight	If the patient does not belong to a same-day AN- SNAP Version 4.0 class then this is the inlier price weight obtained from the NWAU AN-SNAP price weight table. If the patient does belong to such a class then this value is missing.
S19	ansnap_pw_lso_perdiem	Long-stay outlier per diem price weight	If the patient does not belong to a same-day AN- SNAP Version 4.0 class then this is long-stay outlier price weight obtained from the NWAU AN-SNAP price weight table. If the patient does belong to such a class then this value is missing.
S20	adj_indigenous	See definition	Indigenous adjustment.
S21	adj_remoteness	See definition	Remoteness adjustment.
S22	adj_treat_remoteness	See definition	Hospital treatment remoteness adjustment.
S23	adj_radiotherapy	See definition	Radiotherapy adjustment

 $<sup>^{22}</sup>$  Or 1 if funding source = 2 or 3 for 2011-12 data or earlier.  $^{23}$  Or 1 if funding source = 1, 10 or 11 for 2011-12 data or earlier.

Variable	Name	Description	Definition
S24	adj_dialysis	See definition	Dialysis adjustment
S25	caretype_adj_privpat_serv	See definition	Private patient service adjustment (adjustment specific to care type and state).
S26	caretype_adj_privpat_serv _state	See definition	Private patient service adjustment (adjustment specific to care type and state).
S27	state_adj_privpat_accomm _sd	See definition	Private patient accommodation adjustment: same-day rate (state-specific adjustment).
S28	state_adj_privpat_accomm _on	See definition	Private patient accommodation adjustment: overnight per diem rate (state-specific adjustment)
S29	Error_code	See definition	Outlines errors in calculations
S30	_pat_separation_category	See definition	Patient separation category:
			1: Patients belonging to a same day AN-SNAP Version 4.0 class.
			2: Short-stay outlier patients
			3: Inlier patients
			4: Long-stay outlier patients
S31	_w01	AN-SNAP inlier/outlier weight	Based off _pat_separation_category:
			1: ansnap_pw_sd
			2: ansnap_pw_sso_perdiem * pat_los
			3: ansnap_pw_inlier
			4: ansnap_pw_inlier + ( pat_los - ansnap_inlier_ub ) * ansnap_pw_lso_perdiem
S32	GWAU21	Gross weighted activity unit	_w01*(1+adj_indigenous+adj_remoteness+adj_radiot herapy+adj_dialysis)*
			(1+adj_treat_remoteness)
S33	_adj_privpat_serv	Private patient service adjustment	_pat_private_flag *caretype_adj_privpat_serv*(_w01)
S34	_adj_privpat_accom	Private patient accommodation adjustment	_pat_private_flag*(_pat_same- day_flag*state_adj_private_accom_sd+
			(1pat_same- day_flag)*_pat_los*state_adj_privpat_accomm_on)
S35	NWAU21	National weighted activity unit	Max( 0, GWAU21adj_privpat_serv- _adj_privpat_accomm) for only in-scope funding sources, set as necessary in the template.

#### Table 26: Emergency department: variable definitions

Variabl e	Name	Description	Definition
E01	_treat_remoteness	Patient treatment remoteness area	2016 ASGS remoteness area category of the patient treatment location taken from the hospitals geographic location information, where: 0 = major city
			1 = inner regional
			2 = outer regional
			3 = remote
			4 = very remote.
E02	_pat_remoteness	Patient Remoteness Area	2016 ASGS remoteness area category of the establishment location taken from patient postcode, ASGS, or the hospital geographical indicator variable, where: 0 = major city
			1 = inner regional
			2 = outer regional
			3 = remote
			4 = very remote.
E03	_UDG	UDG Version 1.3	A classification system which may be used to assign a price weight to an emergency department episode of care. This variable may either be supplied by the user or derived from DSS variables: type of visit to emergency care, triage category, and episode end status. See IHPA website for details.
E04	AECC	AECC Version 1.0	A classification system which may be used to assign a price weight to an emergency department episode of care. This variable must be supplied by the user.
E05	_pat_ind_flag	Indigenous patient flag	1 if patient identifies as being of Aboriginal or Torres Strait Islander origin. Otherwise 0.
E06	UDG_PW	Price weight depending on choice of classification	UDG price weight, taken from the draft NWAU UDG price weight table.
E07	AECC_PW		Shadow Australian Emergency Care Classification (AECC) Version 1.0 price weight, taken from the draft NWAU AECC price weight table.
E08	adj_indigenous	See definition	Indigenous adjustment from NEP adjustment table.
E09	adj_remoteness	See definition	Patient residence remoteness adjustment.
E10	adj_treat_remoteness	See definition	Patient treatment remoteness adjustment.
E11	Error_Code	See definition	Outlines errors in calculations.
E12	_w01	Base predicted	Adopt UDG_PW, or AECC_PW depending on classification selection.
E13	GWAU21	Gross weighted activity unit	_w01*(1+adj_indigenous+adj_remoteness + adj_age)*(1+adj_treat_remoteness).
E14	NWAU21	National weighted activity unit	GWAU21 for in-scope patients only (that is, non Department of Veterans' Affairs and compensable patients).

Table 27: Non-admitted: varia	able definitions
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Variable	Name	Description	Definition
N01	clinic_pw	See definition	Tier 2 class price weight, taken from NWAU price weight table.
N02	Tier2_adj_paed	Paediatric loading	Tier 2 class paediatric loading, taken from NWAU price weight table.
N03	_treat_remoteness	Patient treatment remoteness area	2016 ASGS remoteness area category of the patient treatment location taken from the hospitals geographic location information, where: 0 = major city
			1 = inner regional
			2 = outer regional
			3 = remote
			4 = very remote.
N04	adj_treat_remoteness	See definition	Patient treatment remoteness adjustment.
N05	_pat_remoteness	Patient residential remoteness area	2016 ASGS remoteness area category of the patient's residence as inferred from the following variables, ranked in descending order of preference: SA2, postcode, _treat_remoteness. The values of this variable are:
			0 = major city
			1 = inner regional
			2 = outer regional
			3 = remote
			4 = very remote.
N06	_est_eligible_paed_flag	Specialist paediatric flag	1 if the hospital is on the specialist paediatric list, as per the NEP Determination, else 0.
N07	_pat_eligible_paed_flag	Patient paediatric flag	1 if N03 is 1 and patient age < 18, else 0.
N08	_pat_ind_flag	Indigenous patient flag	1 if patient identifies as being of Aboriginal or Torres Strait Islander origin. Otherwise 0.
N09	adj_indigenous	See definition	Indigenous adjustment from NWAU Adjustment table.
N10	adj_remoteness	See definition	Patient residence remoteness adjustment.
N11	Error_code	See definition	Outlines errors in calculations.
N12	GWAU21	Gross weighted activity unit	clinic_pw*tier2_adj_paed*(1 + adj_indigenous + adj_remoteness + adj_multiprov)*(1 + adj_treat_remoteness)
			Where tier2_adj_paed only applies when N05 = 1, and adj_multiprov only applies when event has multiprovider indicator.
N13	NWAU21	National weighted activity unit	GWAU21 for in-scope funding sources set as necessary in the template.

# **Appendix C: Summary of input data**

Table 28: Summary of 2017–18 and 2018-19 patient-costed NHCDC data (Hospitals used for cost modelling)

	Establishments			(Separations/episodes)*			Total reported in-scope cost		
	2017– 18	2018– 19	% Change	2017– 18	2018– 19	% Change	2017– 18	2018– 19	% Change
Acute	240	248	3.3%	6.0M	6.3M	3.8%	\$30.7B	\$33.2B	8.2%
Emergency	189	193	2.1%	7.5M	7.8M	5.0%	\$5.3B	\$5.8B	9.8%
Non-admitted	230	235	2.2%	20.7M	20.3M	-1.6%	\$6.5B	\$6.7B	3.9%
Subacute	233	246	5.6%	167.K	180.2K	7.9%	\$2.5B	\$2.8B	13.2%

Note: Only the NHCDC activity is used in the non-admitted cost model.

# Table 29: Summary of 2017–18 and 2018-19 population data (Hospitals used for cost modelling)

		Establishme	ents	Activity (separations/episodes)*			
	2017–18	2018–19	% Change	2017–18	2018–19	% Change	
Admitted acute	276	282	2.2%	6.2M	6.4M	3.9%	
Emergency	194	201	3.6%	7.8M	8.1M	4.9%	
Non-admitted							
Subacute	253	259	2.4%	189.6K	195.7K	3.2%	

#### Table 30: Costed (NHCDC) sample as proportion of total population

	Establis	shments	Activity (separations)		
	2017–18	2018–19	2017–18	2018–19	
Admitted acute	87.0%	87.9%	97.0%	97.0%	
Emergency	97.4%	96.0%	96.2%	96.3%	
Non-admitted					
Subacute	92.1%	95.0%	88.1%	92.1%	

Note: Only the NHCDC activity is used in the non-admitted cost model.

# Appendix D: List of DRGs adopting the L1.5 H1.5 methodology

#### Table 31: List of DRGs adopting the L1.5 H1.5 methodology

DRG	DRG description
801A	GIs unrelated to principal diagnosis, major complexity
B83A	Acute paraplegia and quadriplegia and spinal cord conditions, major complexity
E01A	Major chest interventions, major complexity
101A	Bilateral and multiple major joint interventions of lower limb, major complexity
102A	Microvascular tissue transfers or skin grafts, excluding hand, major complexity
P06A	Neonate, AdmWt >= 2500g with significant GI/vent >= 96 hrs, major complexity
P06B	Neonate, AdmWt >= 2500g with significant GI/vent >= 96 hrs, minor complexity
P67A	Neonate, AdmWt >= 2500g without significant Gl/vent >= 96 hrs, < 37 Comp Wks gest, Ext. complexity
R03A	Lymphoma and leukaemia with other GIs, major complexity
R05A	Allogeneic bone marrow transplant, age <= 16 years or major complexity
W04A	Multiple significant trauma with other GIs, major complexity
X02A	Microvascular tissue transfer and skin grafts for injuries to hand, major complexity
X07A	Skin grafts for injuries excluding hand, major complexity

### **Appendix E: NEC21 data preparation**

Table 32: National Efficient Cost 2021-22 data preparation

### **NEC Data Preparation**


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