



Technical Specifications 2015-16

National Pricing Model

Version 1.0

February 2015

National Pricing Model Technical Specifications 2015-16

© Commonwealth of Australia 2015

This work is copyright. You may download, display, print and reproduce the whole or part of this work in unaltered form for your own personal use or, if you are part of an organisation, for internal use within your organisation, but only if you or your organisation do not use the reproduction for any commercial purpose and retain this copyright notice and all disclaimer notices as part of that reproduction. Apart from rights to use as permitted by the Copyright Act 1968 or allowed by this copyright notice, all other rights are reserved and you are not allowed to reproduce the whole or any part of this work in any way (electronic or otherwise) without first being given the specific written permission from Independent Hospital Pricing Authority to do so.

Table of Contents

Table of Contents	1
Table of acronyms and abbreviations	4
1 Overview of process	5
1.1 Backcasting	9
2 Acute admitted care cost model	12
2.1 General Issues	12
2.1.1 <i>Cost unit</i>	12
2.1.2 <i>In-scope activity</i>	12
2.1.3 <i>In-scope patients</i>	12
2.1.4 <i>Classification</i>	13
2.2 Analysis of costs to derive NWAU for acute admitted care.....	13
2.2.1 <i>Data preparation</i>	14
2.2.2 <i>Stratification and weighting</i>	15
2.2.3 <i>Inlier bounds</i>	15
2.2.4 <i>Classification of patient-level cost data in relevant categories</i>	16
2.2.5 <i>Determine ICU adjustment level and deduct associated costs</i>	17
2.2.6 <i>DRG Inlier/Outlier Model</i>	18
2.2.7 <i>Calculation of additional adjustments</i>	19
2.2.8 <i>Private patient adjustments</i>	20
2.2.9 <i>Incorporation of outlier samples of cost data</i>	21
2.2.10 <i>Price weights and NWAU</i>	21
2.3 Applying the NEP	22
2.4 Assigning NWAU to acute admitted patient data.....	22
2.4.1 <i>Data Preparation and Calculation NWAU</i>	23
2.4.2 <i>Calculation of NWAU</i>	28
3 Mental health care cost model	30
3.1 General issues.....	30
3.1.1 <i>Cost unit</i>	30
3.1.2 <i>Scope</i>	30
3.1.3 <i>Classification</i>	30
3.2 Analysis of costs to derive NWAU for mental health care	30
3.2.4 <i>Data preparation</i>	30
3.2.5 <i>Stratification and weighting</i>	30

3.2.6	<i>Inlier bounds</i>	30
3.2.7	<i>Cost parameters and adjustments</i>	31
3.2.8	<i>Price weights and NWAU</i>	32
3.3	Assigning NWAU to mental health patient data.....	32
4	Subacute and non-acute admitted care cost model	33
4.1	General issues.....	33
4.1.1	<i>Cost Unit</i>	33
4.1.2	<i>Scope</i>	33
4.1.3	<i>Classification</i>	33
4.1.4	<i>New methodology for NEP15</i>	33
4.2	Analysis of costs to derive NWAU for subacute admitted care.....	34
4.2.1	<i>Data preparation</i>	34
4.2.2	<i>Stratification and weighting</i>	34
4.2.3	<i>Determining AN-SNAP Version 3 cost parameters</i>	34
4.2.4	<i>Calculation of additional adjustments</i>	35
4.2.5	<i>Calculation of Paediatric care-type per diem</i>	35
4.2.6	<i>Price weights and NWAU</i>	35
4.3	Applying the NEP.....	35
4.4	Assigning NWAU to subacute and non-acute admitted patient data.....	36
4.4.1	<i>Data Preparation</i>	36
4.4.2	<i>Calculation of NWAU</i>	41
5	Emergency care cost model	43
5.1	General issues.....	43
5.1.1	<i>Cost unit</i>	43
5.1.2	<i>Scope</i>	43
5.1.3	<i>Classification</i>	43
5.2	Analysis of costs to derive NWAU for emergency care.....	43
5.2.1	<i>Data preparation</i>	43
5.2.2	<i>Sample weights</i>	44
5.2.3	<i>Cost parameters and adjustments</i>	44
5.2.4	<i>Price weights and NWAU</i>	44
5.3	Assigning NWAU for emergency care.....	44
5.3.1	<i>Data Preparation and calculation of NWAU</i>	45
6	Non-admitted care cost model	47
6.1	General issues.....	47
6.1.1	<i>Cost unit</i>	47
6.1.2	<i>Scope</i>	47

6.1.3	<i>Classification</i>	47
6.2	Analysis of costs to derive NWAU for non-admitted outpatient care	47
6.2.1	<i>Data preparation</i>	47
6.2.2	<i>Sample weights</i>	48
6.2.3	<i>Cost parameters and adjustments</i>	48
6.2.4	<i>Price weights and NWAU</i>	50
6.3	Assigning NWAU for non-admitted care	50
6.3.1	<i>Data preparation and calculation of NWAU</i>	51
7	Cost model for block funded hospitals	53
7.1	General issues	53
7.1.1	<i>Cost unit</i>	53
7.1.2	<i>Scope</i>	53
7.1.3	<i>Classification</i>	53
7.2	Analysis of costs	54
7.2.1	<i>Data preparation</i>	54
7.2.2	<i>Calculation of cost parameters</i>	57
7.3	Calculation of National Efficient Cost	57
7.3.1	<i>Calculation of the efficient cost for a particular hospital</i>	58
7.3.2	<i>Calculation of the efficient cost of specialist psychiatric and major city hospitals</i>	58
7.4	Indexation of the 2012-13 Model	59
7.5	Backcasting	59

Attachments

Attachment A – Summary of 2012-13 input data	62
Attachment B – Development of the National Pricing Model	63
Attachment C – List of the 21 DRGs to be converted to L1.5H1.5	74
Attachment D – Draft eligibility criteria of block funded hospitals	75
Attachment E – NEC15 Data Preparation	76

Table of acronyms and abbreviations

Acronym/ abbreviation	Description
ABF	Activity Based Funding
ALOS	Average length of stay
AN-SNAP	Australian National Subacute and Non Acute Patient Classification
APC	Admitted Patient Care
AR-DRG	Australian Refined Diagnosis Related Group
ASGS	Australian Statistical Geography Standard
ASNC	Admitted Subacute and Non-acute Care
COAG	Council of Australian Governments
CSO	Community Service Obligation
DoH	Department of Health
DSS	Data Set Specification
DVA	Department of Veterans' Affairs
ED	Emergency Department
HEN	Home Enteral Nutrition
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 Urgency Related Groups
MDC	Major Diagnostic Category, used in AR-DRGs
MPS	Multipurpose 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
NMDS	National Minimum Data Set
NPHEd	National Public Hospital Establishment Database
NWAU	National Weighted Activity Unit
PHI	Private Health Insurance
PICU	Paediatric Intensive Care Unit
SLA	Statistical Local Area
TAC	Technical Advisory Committee
TPN	Total Parenteral Nutrition
TTR	Teaching, Training and Research
UDG	Urgency Disposition Groups
UoW	University of Wollongong
URG	Urgency Related Groups
WAU	Weighted Activity Unit

1 Overview of process

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 Activity Based Funding (ABF). The NHRA specifies that the central component of ABF is an independently determined National Efficient Price (NEP) and National Efficient Cost (NEC), to be used as a reference for the Commonwealth to determine its funding contribution for Australian public hospital services.

The Independent Hospital Pricing Authority (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 determinations. IHPA was established as an independent government agency under Commonwealth legislation on 15 December 2011. It has issued three NEP Determinations for 2012-2013 (NEP12), 2013-14 (NEP13 and NEC13), and 2014-15 (NEP14 and NEC14).

IHPA has now published its fourth NEP and NEC, which sets out the determinations for 2015-16 in relation to each of its legislative functions, namely:

- a. The 2015-16 NEP (NEP15) for health care services provided by public hospitals where the services are funded on an activity basis;
- b. The 2015-16 NEC (NEC15) for health care services provided by public hospitals where the services are funded on a block funded basis;
- c. Development and specification of classification systems for health care and other services provided by public hospitals;
- d. Adjustments to the NEP to reflect legitimate and unavoidable variations in the costs of delivering health care services;
- e. Except where otherwise agreed between the Commonwealth and a state or a territory – the public hospital functions that are to be part funded in that state or territory by the Commonwealth; and
- f. 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.

This document has been produced as an accompaniment to the NEP15 and NEC15 Determinations. It provides the technical specifications for how IHPA developed the ABF models for the service streams to be funded on this basis from 1 July 2015, and provides guidance to hospitals, Local Health Networks (LHN) and state and territory health authorities on how to apply these to hospital activity. It also shows how the NEC is determined for hospitals (such as small rural hospitals) funded on a block funded basis.

Systems for classifying outputs have been applied separately to different ABF service streams. In addition, under the current national application of ABF, a common unit has been developed across all ABF service streams known as a National Weighted Activity Unit (NWAU).

To develop NWAU and to determine the NEP15, IHPA has collated activity and cost data for each of the ABF service streams to be funded on an activity basis in 2015-16, as follows:

- acute admitted;
- admitted mental health care;
- subacute and non-acute admitted;
- emergency care; and

- non-admitted.

In consultation with jurisdictions, IHPA has identified 285 hospitals to make up the ABF price model and 413 hospitals designated for block funding, 16 of these hospitals being treated separately as specialist psychiatric establishments and 12 major city hospitals.¹ The 385 block funded hospitals comprise the cost model which has been significantly redeveloped from the cost model used for NEC14.

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. Table 1 below references relevant sections in the NEP15 and NEC15 Determinations. The classification systems for each service stream and the source of its cost and activity data are shown in Table 2.

¹ For a list of block funded hospitals see Appendix A of the *National Efficient Cost Determination 2015-16*

Table 1: Sections of the NEP15 and NEC15 Determinations

Component	Section of Determination
National Efficient Price	Chapter 2
Acute admitted services - NEP15	
AR-DRG inlier bounds, flags for designated same-day payment AR-DRG and unbundled ICU AR-DRG, National Weighted Activity Unit (NWAU) weights for same-day payment AR-DRGs, short-stay outliers (base and per diem), inliers, long-stay outliers (per diem), Intensive Care Unit (ICU) rates per hour	Appendix A
Adjustments to Price Weights	Chapter 5
List of radiotherapy ICD-10-AM 9th edition codes	Appendix B
List of dialysis ICD-10-AM 9th edition codes	Appendix C
Specified ICUs	Appendix D
Specialised children's hospitals	Appendix E
Private patient adjustments	Appendix F
Provisional weights for very long stay patients	Appendix G
Definition of an eligible ICU or paediatric ICU (PICU)	Glossary
Emergency department services - NEP15	
Urgency Related Groups v1.4 classification and NWAU weights	Appendix L
Urgency Disposition Groups v1.3 classification and NWAU weights	Appendix M
Emergency departments in-scope for ABF	Glossary
Definitions of emergency department role levels	Glossary
Non-admitted services - NEP15	
Tier 2 non-admitted services classification v4.0 weights	Appendix K
Definition of Tier 2 list of non-admitted services classifications v4.0	Glossary
Subacute and non-acute services - NEP15	
AN-SNAP v3.0 weights	Appendix I
Paediatric per diem price weights	Appendix J
Definitions of AN-SNAP v3.0	Glossary
Mental health services - NEP15	
AR-DRG-based inlier bounds, NWAU and adjustment weights	Appendix H
Mental health age adjustments	Chapter 5
Block funded hospital services - NEC15	
NEC weights, Efficient costs for each block funded hospital	Chapter 3

Table 2: Summary of classification systems and sources of cost

Service stream	Classification ²	Cost data	Activity data
Acute admitted care	Australian Refined Diagnosis Related Groups (AR-DRG) version 7.0	National Hospital Cost Data Collection (NHCDC) Round 17 (2012-13).	Admitted Patient Care National Minimum Data Set (APC NMDS)
Emergency department care	Urgency Related Group (URG) version 1.4 Urgency Disposition Groups (UDG) version 1.3	NHCDC Round 17 (2012-13)	<i>Level 3B to 6 emergency departments:</i> Non-admitted Patient Emergency Department Care NMDS (NAP EDC NMDS) <i>Level 1 to 3A emergency departments:</i> Emergency Services ABF DSS (ES ABF DSS)
Non-admitted care	Tier 2 Outpatient Clinic Definitions version 4.0	NHCDC Round 17 (2012-13)	Non-Admitted Patient NMDS and aggregate DSS
Subacute care (and non-acute)	AN-SNAP version 3 Care type	NHCDC Round 17 (2012-13)	Admitted Patient Care NMDS and Admitted Subacute and Non acute Care DSS
Block funded services	IHPA-defined size and Australian Statistical Geography Standards (ASGS) location categorisation on total NWAU for hospital	Expenditure data from the National Public Hospital Establishments Data base (NPHEd) (2012-13) NHCDC Round 17 (2012-13)	Admitted Patient Care (APC) NMDS, NAPED NMDS and NPHEd

A summary of the National Hospital Cost Data (NHCDC) Round 17 cost data received for 2012-13 is at [Attachment A](#).

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 substantial validation process undertaken as the data are received from jurisdictions;
- Matching mothers with unqualified neonates³ to ensure costs are properly attributed to the mothers;
- Linking the NHCDC cost file with the APC activity file at the patient level (which has recorded a success rate of over 99 per cent);
- Identifying any differences in patient characteristics or operational data recorded across the two datasets and reconciling these where appropriate; and
- Where reported, removing blood costs and/or any identified amounts related to Commonwealth pharmaceutical payments.

Classification systems within each service stream are applied uniformly across all available data. Although these systems have been 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.

Once agreement is reached on the cost profiles, adjustments and relative weights of various classes within each service stream, the data are projected to reflect 2015-16 prices and relativities. These data are then fed into the development of the NEP15, as explained in detail in [Attachment B](#).

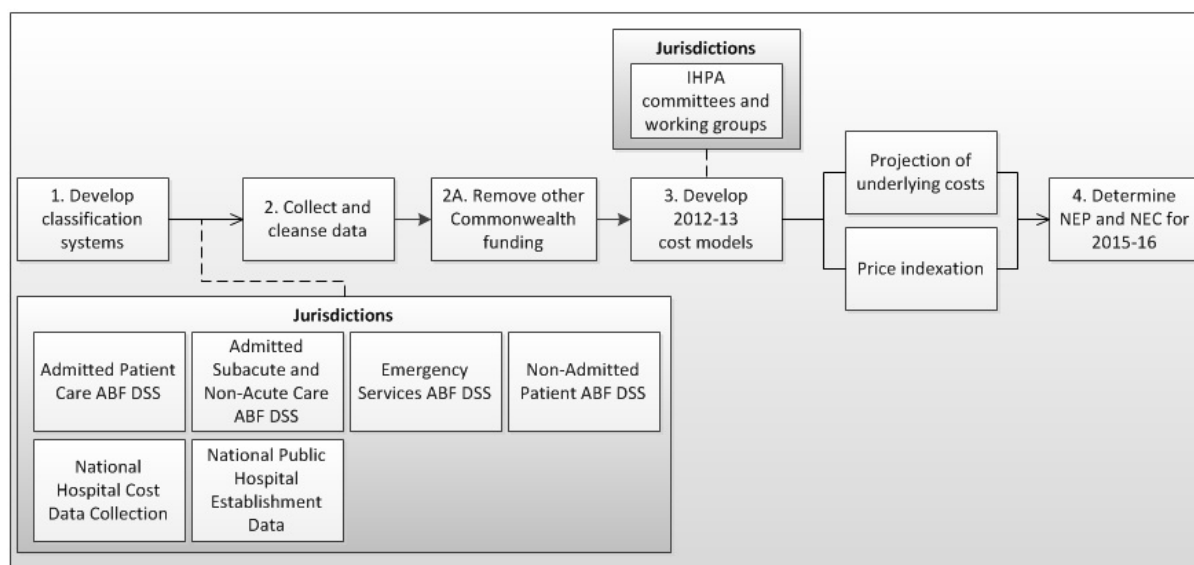
The overall process to determine NEP15 is shown in Figure 1.

² Details of each of the classifications are available from:

<http://www.ihsa.gov.au/internet/ihsa/publishing.nsf/Content/Classifications>

³ See Glossary Item *Newborn qualification status* [METeOR identifier: 327254]

Figure 1: Process to determine the National Efficient Price 2015-16



1.1 Backcasting

National Efficient Price Determination 2015-16 (NEP15)

In accordance with Clauses A34(b) and A40 of the NHRA, the Pricing Authority has applied the methodological changes to NEP14 to determine the back cast NEP14 for the purposes of determining Commonwealth growth funding between 2014-15 and 2015-16. The backcast amount for NEP14 is provided in Chapter 8 of the NEP15 Determination.

Backcasting ABF Volume

IHPA has also estimated the volume impact of methodological changes between NEP14 and NEP15, which can be used for the purpose of estimating movements in volume between NEP14 and NEP15. This is useful for relating NWAU14 activity to NWAU15 targets, and for estimating Commonwealth growth funding prior to actual 2014-15 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 8 of the NEP15 Determination. The backcast volume multipliers for each jurisdiction (for each ABF product category) are calculated from the most recently reported activity data, namely 2013-14, as:

$$VM = \frac{\text{NWAUs delivered by backcast model (NWAU15 calculator)}}{\text{NWAUs delivered by original cost model (NWAU14 calculator)}}$$

The volume multipliers can be applied to estimates of an NWAU count for 2014-15 if actual data is not available.

Backcasting the Efficient Cost of block-funded hospitals

Back-casting of the efficient cost of block-funded hospitals is also required for the NEC cost model because of the substantial changes in the NEC15 methodology. The impact of these methodological changes is measured by applying the NEC14 and NEC15 versions of the

cost model to the latest available data – which is 2012-13 because both cost and activity data are required. The backcast multiplier (BM) for each state is calculated as follows:

$$BM = \frac{\text{Aggregate efficient cost using NEC15 cost model}}{\text{Aggregate efficient cost using NEC14 cost model}}$$

The backcast efficient cost for a particular hospital is calculated by multiplying the BM of the relevant state by the NEC14 efficient cost for that hospital. The implied growth in efficient cost is then determined (most relevant at the state level) by dividing the NEC15 efficient cost by the backcast NEC14 efficient cost.

Backcasting changes across ABF and/or Block funded streams

The following shifts in funding streams have been taken into account:

- a. The shift of the 22 hospitals from block-funding to ABF as a result of the new block-funding criteria;
- b. The shift of those episodes from the subacute to acute stream because there will be no care type weights in 2015-16 and un-SNAPed records will be assigned a care type defining them as an acute patient; and
- c. The pricing of the new non-admitted clinics for home-delivered chronic disease services with funding transferred from block-funded amounts in NEC14.
- d. The treatment of the major city specialist hospitals in NEC15 where their efficient cost is being determined separately from the NEC15 cost model.

The backcasting multipliers for all ABF streams take account of the 22 transferred hospitals. That is, the 22 hospitals were treated as though they were ABF in 2014-15 for the purposes of the growth calculations. These transferred hospitals are therefore to be completely excluded from the calculations of growth in efficient costs of the block-funded hospitals.

- In order to include these 22 hospitals in the NEP growth calculations, an NWAU count for these hospitals in 2014-15 will need to be calculated.

All subacute records in 2014-15 that do not have a valid AN-SNAP classification in 2014-15 should be treated as acute care separations for the purposes of calculating the growth between 2014-15 and 2015-16. This process has been taken into account in the calculation of the backcasting multipliers for both the acute and subacute care streams.

In summary, the subacute backcasting multipliers apply only to AN-SNAP subacute data and the acute multipliers apply to acute NWAU which will include, by care-type definition, any former subacute patients that cannot be classified under AN-SNAP.

The new non-admitted clinics defined and priced for Home Enteral Nutrition (HEN), Total Parenteral Nutrition (TPN) and home ventilation that were funded as 'Other non-admitted services' block-funded amounts in NEC14 will be treated in the non-admitted price application in NEP15.

- Due to very little activity data being reported in 2013-14 for these services, an implicit NWAU count for 2014-15 was calculated from the block-funded amounts in the NEC14 Determination (by dividing by NEP14 of \$5007). This implicit count of was assumed to be the same in the NWAU14 and NWAU15 calculations (i.e. adding equal amounts to the numerator and denominator of the VM formula on previous page).

The 12 major city hospitals that have been removed from the NEC14 cost model to have their 2015-16 efficient costs determined separately by negotiation are to be considered

separately as well in the growth calculations. These separated hospitals are therefore to be completely excluded from the calculations of growth in efficient costs of the block-funded hospitals.

- Backcasting multipliers have been determined for these hospitals to define the growth in efficient costs between 2014-15 and 2015-16 as 4.9%, which is the indexation rate for other block-funded hospitals in the NEC15 cost model.

2 Acute admitted care cost model

2.1 General Issues

2.1.1 Cost unit

An 'episode of admitted patient care' is the cost unit for acute admitted patients. It is "[t]he period of admitted patient care ... characterised by only one care type"⁴, and covers the period of care from admission to discharge.

2.1.2 In-scope activity

Acute admitted care is that provided to patients who undergo a facility's formal admission processes, where the clinical intent or treatment goal is the provision of acute care, or the patient is a baby born in hospital, or is nine days old or younger at the time of admission⁵ and has been qualified for one or more days⁶.

2.1.3 In-scope patients

National arrangements for ABF apply to a subset of acute admitted episodes defined by the funding source for the patient and the type of hospital in which the episodes occur, as shown in Table 3. In public hospitals, ABF has been taken to apply to patients with a funding source⁷ of 'Health Service Budget (Not covered elsewhere)', 'Health Service Budget (due to Reciprocal Health Care Agreement)', 'private health insurance', 'self-funded', or 'other hospital or public authority contracted care'.

All episodes from all funding sources are included in the calculation of the cost weights. This approach is taken to ensure the sample used for the development of NWAU is maximised and reflects the overall costs for the hospital. Only in-scope patients are included in the calculation of the mean cost used in the development of the NEP. All other episodes (e.g. those funded through the Department of Veterans' Affairs (DVA) and compensable patients) are excluded from the scope of funding.

In-scope hospitals

The NEP15 Determination sets down a definition of hospital services in-scope for the application of ABF for 2015-16.

The list of hospitals to be block funded are based on nominations from jurisdictions on the basis of the revised draft eligibility criteria, which are being referred to the Council of Australian Governments (COAG) Health Council. Based on the 2012-13 datasets and advice from jurisdictions, there are:

- a. 285 ABF hospitals; and
- b. 413 hospitals to be block funded.

In-scope costs

Factors impacting on scope of costs include:

⁴ See object class *Episode of admitted patient care* [METeOR identifier: 268956].

⁵ See data element *Care type* [METeOR identifier: 584408], values: 1 Acute care; 7 Newborn care.

⁶ See data element *Number of qualified days for newborns* [METeOR identifier: 270033].

⁷ See data element *Funding source for hospital patient* [METeOR identifier: 553314].

- 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 related costs (where reported) are removed;
- Indirect costs for teaching, training and research (TTR) are included but any direct TTR costs are excluded and will be block funded; and
- Identified blood costs and Commonwealth pharmaceutical payments are also removed.

Table 3: Acute admitted episodes in scope for ABF

Variable	Episodes that meet the inclusion criteria		
Care type	1 Acute care 7 Newborn care and qualified days > 0		
Funding source/ Election status	Funding Source (2015-16 codes)	Public hospitals	Private hospitals
	01 Health Service Budget (Not covered elsewhere)	Included	Included
	02 Health Service Budget (due to eligibility for Reciprocal Health Care Agreement)	Included	Included
	08 Other hospital or public authority (contracted care)	Included	Included where election status is public
	09 Private Health Insurance	Included	Excluded
	13 Self-funded	Included	Excluded
Hospital size & location	As per the <i>Determination</i> .		
Error AR-DRGs	Episodes with an 'error' AR-DRG are not assigned an NWAU. These include AR-DRGs v7.0 960Z, 961Z, and 963Z.		

2.1.4 Classification

Australian Refined Diagnosis Related Groups (AR-DRGs) are used to classify acute admitted care. The version applying for pricing in 2015-16 is AR-DRG v7.0.

2.2 Analysis of costs to derive NWAU for acute admitted care

This section provides an overview of the steps involved in developing the NWAU for acute admitted 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 acute admitted care are:

- Prepare data including the removal of other Commonwealth expenditure (in particular the pharmaceutical and blood programs).
- Stratify and weight cost data to activity data.
- Calculate inlier bounds from activity data.
- 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 those reporting radiotherapy procedures.

- e. Determine cost level for ICU adjustment and deduct associated costs.
- f. Derive initial parameters for AR-DRG inlier/outlier model and ensure predicted costs align with actual costs by AR-DRG.
- g. Derive paediatric adjustment, specialist psychiatric age adjustment (see Section 3), indigenous adjustment, remoteness adjustment, radiotherapy adjustment and dialysis adjustment.
- h. Derive private patient service adjustment and private patient accommodation adjustment.
- i. Incorporate data trimmed in data preparation process.

These steps are described in further detail below.

2.2.1 Data preparation

The 2012-13 NHCDC cost data was first adjusted to remove those costs associated with the spending under other Commonwealth programs. Costs associated with the Commonwealth's pharmaceutical programs were identified by matching the NHCDC at the patient level with a record of the Commonwealth pharmaceutical payments. The residual unmatched payments were apportioned according to the distribution of costs associated with the matched records. All reported blood costs were removed from the NHCDC. The amounts deducted from the reported costs are identified in Chapter 2 of the NEP15 Determination.

For the financial year 2012-13, an activity-level cost sample of 4,675,397 acute admitted records (with both the admission and separation dates within this period), was partitioned into two groups for modelling purposes. The first group was evaluated as fit for use to develop AR-DRG cost profiles for the 2012-13 cost model and a second group identified as not fit for this purpose.

The second group was later incorporated into the cost model to calibrate the overall level of costs within the model (see Section 2.2.9).

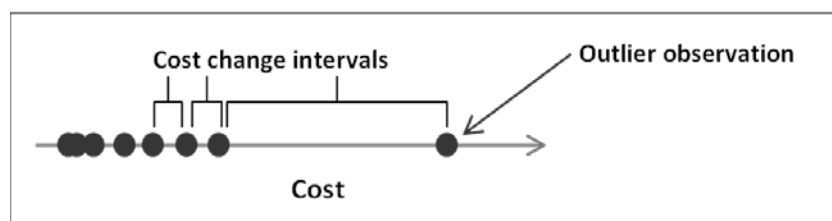
Patient level cost data from four establishments, totalling 27,603 episodes, was removed from the sample, based on jurisdictional advice.

A preliminary model with length of stay and DRG as explanatory variables of patient cost was derived and applied to the remaining sample. The 612 Hospital-DRG combinations with extremely high or low cost to funding ratios were also excluded from the patient level modelling.

The sample was further reduced by 14,495 by restricting the records with total in-scope costs (excluding depreciation and ED costs) greater than \$23.

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 jump in cost over 300 per cent (or a decrease in cost of less than 25 per cent) from the previous observation, as illustrated in Figure 2. In total, 73 records were removed at this stage.

The final stage of extreme outlier identification was undertaken by first deriving a preliminary regression model using length of stay and DRG, and analysing the resulting cost ratios. Following this, another 553 individual records with extremely high or low cost ratios were removed. The resulting sample of 4,627,160 separations was identified for use in creating AR-DRG cost profiles.

Figure 2: Illustration of outlier identification

2.2.2 Stratification and weighting

Weighting of the entire sample of costed activity from ABF establishments up to the population of all in-scope acute admitted activity from ABF establishments occurred in two stages. The two-stage approach was required to account for the cost data sample not including any activity with an admission date prior to 1 July 2012.

The first stage of the weighting process stratified and weighted the ABF sample up to the population of all 2012-13 ABF acute admitted activity with an admission date on or after 1 July 2012. The stratification is based on establishment state/territory, size, location and paediatric specialty. Establishments are classified by size using 2014-15 acute admitted NWAU calculated on 2012-13 activity data (i.e. NWAU14 calculator applied to 2012-13 data).

The second stage of the weighting process weighted the 2012-13 activity with admission date prior to 1 July 2012, up to all activity with separation dates within 2012-13. This weighting is done by length of stay quartiles within AR-DRG. Same-day activity received a weight of 1 in this process, as there are no 2012-13 same-day separations with admission dates prior to 1 July 2012.

Note that the resulting sample-to-population weights are used throughout all stages of the cost model development.

2.2.3 Inlier bounds

The L3H3 method (L1.5H1.5 for Mental Health Major Diagnostic Categories (MDC) 19 and 20 and 21 DRGs that had very high cost long-stay outliers) was 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. 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.

The list of 21 DRGs where the L1.5H1.5 method has been used to determine the inlier bounds is provided at [Attachment C](#).

The steps are:

- a. Calculate the national mean length of stay for each AR-DRG.
- b. Calculate the inlier lower bound for each AR-DRG. This is based on the calculation: national mean length of stay divided by 3 (1.5 for Mental Health and the 21 specified DRGs). The result was truncated. This means that it was rounded down to the next lowest integer (e.g. if the result was 3.6, the inlier lower bound was set to 3).
- c. Calculate the inlier upper bound for each AR-DRG. This is based on the calculation: national mean length of stay multiplied by 3 (1.5 for Mental Health and the 21 specified DRGs). The result was rounded to the nearest integer (e.g. 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).

- d. Episodes with an ICU-adjusted length of stay equal to or between the two inlier bounds of the AR-DRG to which they belong are considered inlier episodes.

Further to the above process, changes with respect to inlier bounds from the 2011-12 cost model were monitored to ensure they were the result of real change and were not due to statistical noise. Wherever an AR-DRG has not been significantly affected by a specific change in methodology, 95 per cent confidence intervals around bounds are used to evaluate changes as significant or not. Changes are also evaluated in terms of their materiality (required to affect at least 1 per cent of an AR-DRG's separations and at least 10 separations).

2.2.4 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 2012-13 cost model. The steps involved include:

- 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 the NEP15 Determination);
 - Have an AR-DRG which is not within MDC 15 (Newborns and other neonates); and
 - 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). These episodes 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) 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 status⁸ of Aboriginal and/or Torres Strait Islander origin.
- e. *Flagging episodes that are eligible for the remoteness adjustment.* These are episodes where the patient's place of usual residence has been assigned to a remoteness area⁹ of:
 - RA2 - Outer Regional Australia;
 - RA3 - Remote Australia; and
 - RA4 - Very Remote Australia.

⁸ See data element *Indigenous status* [METeOR identifier: 291036].

⁹ Remoteness areas are defined in the *Australian Standard Geographic Standard (ASGS)*, which is maintained by the Australian Bureau of Statistics (see: www.abs.gov.au). The 2011 ASGS Remoteness Area classification was used to classify patients' place of residence and locality of hospitals.

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

- The patient's postcode of usual residence is mapped to remoteness areas (see Supplementary Table 1).
 - If the postcode is missing or invalid, then the supplied ASGS code is used (see Supplementary Table 2).
 - If the supplied ASGS code is missing or invalid, then the supplied SLA code is used (see Supplementary Table 3).
 - If the SLA code is also 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 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 NEP15 Determination.
- g. *Flagging episodes that are eligible for the dialysis adjustment.* These are episodes where the patient is eligible if they are outside the specified dialysis AR-DRGs L61Z and L68Z, and have recorded a dialysis-related procedure as defined in Appendix C of the NEP15 Determination.
- h. *Flagging episodes eligible for ICU adjustment.* These are episodes that occur in hospitals identified by IHPA as eligible for ICU adjustment as defined in Appendix D of the NEP15 Determination and have an AR-DRG not on the Bundled ICU list (i.e. not from MDC 15 for newborns and other neonates).
- i. *Flagging private episodes.* These are episodes with a funding source¹⁰ of '09 Private health insurance' or '13 Self-funded'.

2.2.5 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 NEP15 Determination. A total sample of 72,550 separations with ICU hours and costs from establishments with eligible ICUs/PICUs was used.

Linear regression by state/territory was used to derive state/territory hourly ICU costs. 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 \$200.

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.

¹⁰ 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; 03 Self-funded; 10 Other hospital or public authority (contracted care); 11 Reciprocal health care agreements (with other countries); 12 other. See Table 3 for relevant codes in 2015-16.

2.2.6 DRG Inlier/Outlier Model

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, SPS 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 was adequately wide and regular to allow robust regression analysis to be undertaken, the per diem cost was taken as the length of stay regression coefficient; this process excluded designated same-day episodes and overly influential observations (as determined by the DFFITS statistical measure).
 - In the remaining AR-DRGs, cost buckets were partitioned into 'fixed' and 'variable' (similar to the short-stay outlier process for surgical AR-DRGs), and the per diem cost was taken as the mean variable cost per patient day.

Where there are fewer than 100 separations in an AR-DRG the separations are combined with those from 2011-12, 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.

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

Figure 3: Initial parameters for the assignment of cost weights

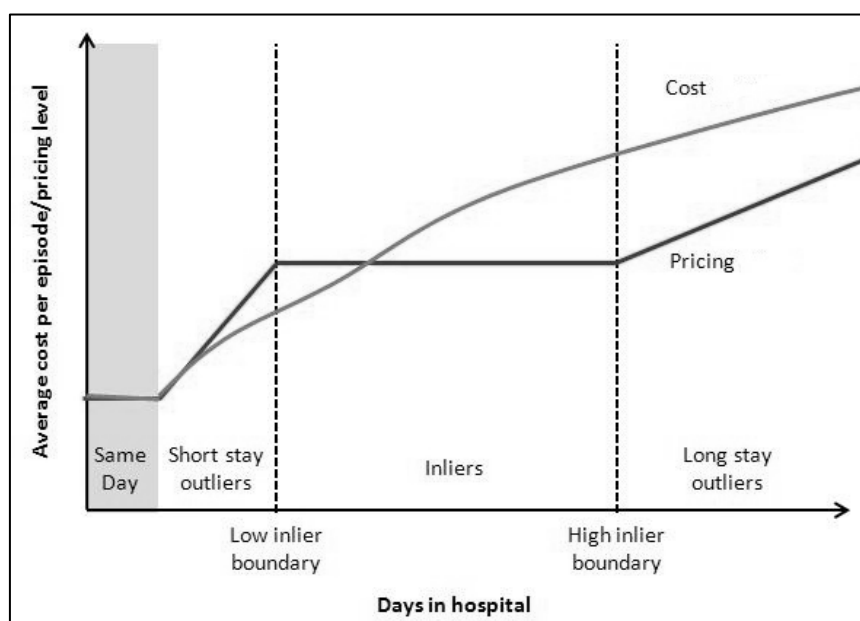
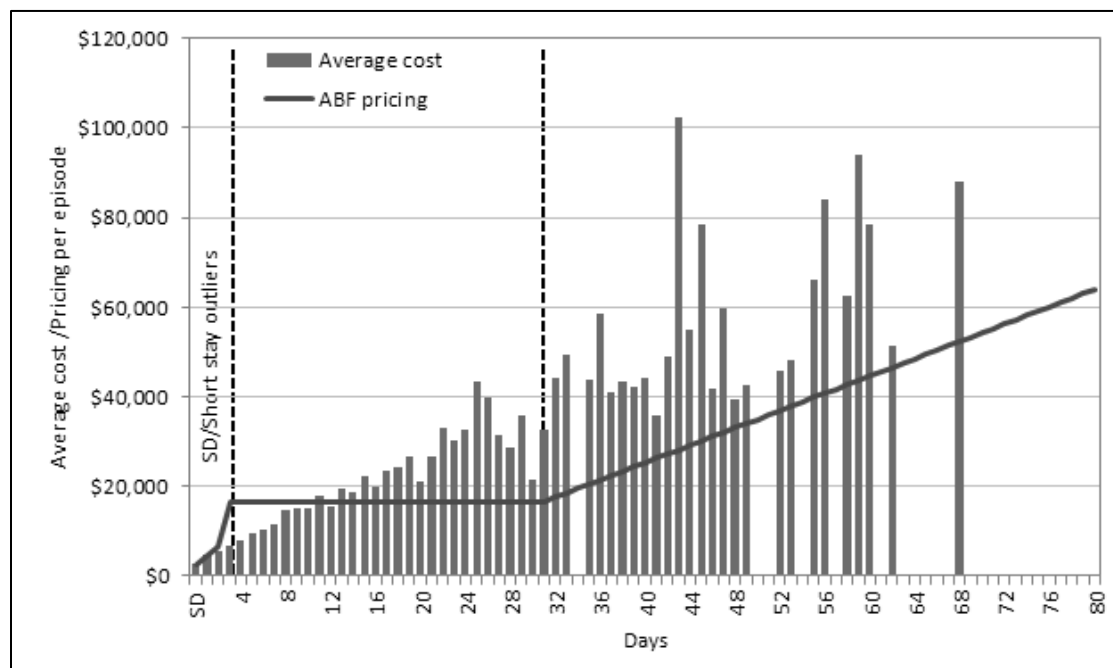


Figure 4 provides an example of the model with a particular AR-DRG, showing the reported mean cost per episode by length of stay, and plots the cost model levels arising from applying the initial parameters.

Figure 4: Example of an AR-DRG - Initial parameters for model and average cost by length of stay



2.2.7 Calculation of additional adjustments

After the AR-DRG inlier/outlier model was derived, the following four sets of adjustments were 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 using a process similar to the 2011-12 acute admitted cost model. 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 NEP15 Determination 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; and
- c. Set to 1 (i.e. no adjustment) if the adjustment was less than 0.05 either side of 1.

Further to this, the paediatric adjustment is compared against that of the 2011-12 cost model for AR-DRGs and changes are stabilised for AR-DRGs where either of the cost data samples (paediatric or non-paediatric) contain fewer than 500 observations. This stabilisation involves taking the average adjustment across the two years.

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.

Indigenous adjustment and remoteness adjustment

These adjustments are derived in the same way as in the 2009-10, 2010-11 and 2011-12 cost models:

- a. A multivariate least squares weighted regression model is used to estimate the extent to which indigenous status and remoteness of a patient's usual residence explains the variation in the mean cost per weighted episode. Episodes are weighted to control the level to which the model already explains costs (i.e. through the AR-DRG inlier/outlier model together with the paediatric and specialist psychiatric age adjustments). The coefficients estimated from this model indicate the extent to which indigenous status and remoteness of a patient's usual residence explains residual variation in costs.
- b. The analysis yields an adjustment for indigenous patients and three adjustments for patients residing in outer regional, remote and very remote areas.
- c. 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 new for NEP15 and is derived in a similar way and at the same time as the indigenous and remoteness adjustments. Together with the radiotherapy adjustment, the adjustments compensate for the extra costs of dialysis-related and radiotherapy-related procedures, as specified in Appendix B and C of the NEP15 Determination.

These two adjustments are additive with the indigenous and remoteness adjustments.

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.

2.2.8 Private patient adjustments

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 2012-13 data sets.

The NHRA requires that in setting NEP15, IHPA must take into account 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.

A revised methodology was introduced in NEP14 to make use of the Hospital Casemix Protocol (HCP) data set which is reported by private insurance companies. HCP data identifies both the charges and benefits paid for private patients receiving public hospital services.

This method has been used again in the calculation of NEP15. The private patient records in the HCP data were matched with the records in the APC and NHCDC data sets. This process resulted in a sample of about 65 per cent matched records, which is slightly lower than that achieved in NEP14. The lower matching rate is due to the poor quality of data from

some private insurers. Those private patient records in the NHCDC that were not matched to the HCP data were assumed to have similar characteristics to the matched data set.

Using the HCP data, a more accurate estimate could be made of the amount of private patient costs that were not included in the NHCDC costing data and needed a correction factor applied. A correction factor of 1.9 per cent is estimated for NEP15 which is slightly higher than the 1.7 per cent in NEP14 (mainly the result of a higher proportion of private patients in 2012-13).

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.

A private patient service adjustment was then calculated at the AR-DRG level, although for some AR-DRGs with small samples, the adjustment was derived at a more aggregate level. The adjustment was calculated using the following ratio taken at the AR-DRG level:

$$\text{Removed costs} / \text{Total AR-DRG model costs}$$

It should be noted that the AR-DRG model costs referred to here exclude the application of any other adjustments. That is, the private patient service adjustment is calculated in such a way that excludes any effect on the paediatric, specialist psychiatric, indigenous, remoteness, and radiotherapy or dialysis adjustments.

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

In addition to medical and prostheses costs, insurers are also charged for accommodation. A private patient accommodation adjustment is applied to account for revenue received in relation to these charges. For the purpose of deriving the adjustment associated with the 2015-16 NEP, 2014-15 average default benefits for private health insurers by state/territory were indexed forward one year by 2.0 per cent (i.e. by CPI as required by legislation) to 2015-16.

2.2.9 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.

2.2.10 Price weights and NWAU

The final step in the process involves the conversion of the 2012-13 cost model parameters to cost weight values by dividing the cost parameters by a reference cost.

The reference cost used was the 2011-12 reference cost indexed one year by the growth rate in the consecutive years' cost models, where this growth rate is standardised against the 2012-13 activity data. Specifically, the standardised growth rate was derived by applying the 2011-12 and 2012-13 cost models (excluding private patient adjustments) to the 2012-13 activity data, and calculating the change in total modelled costs between the two models.

This is the same methodology used to calculate the 2011-12 reference cost from the 2010-11 reference cost. The resulting cost weights are then converted to the price weights that are used to assign NWAU, as explained further at [Attachment B](#).

2.3 Applying the NEP

As set out in 2015-16 NEP Determination, the price of an ABF Activity is calculated using the following formula, with adjustments applied as applicable:

$$\begin{aligned} &\text{Price of an admitted acute ABF activity} \\ &= \{[\text{PW} \times A_{\text{Paed}} \times (1 + A_{\text{SPA}}) \times (1 + A_{\text{Ind}} + A_{\text{A}} + A_{\text{RT}} + A_{\text{Dia}}) \\ &\quad + (A_{\text{ICU}} \times \text{ICU hours})] - [(\text{PW} + A_{\text{ICU}} \times \text{ICU hours}) \times A_{\text{PPS}} + \text{LOS} \times A_{\text{Acc}}]\} \\ &\quad \times \text{NEP} \end{aligned}$$

Where:

- PW means the Price Weight for an ABF activity as set out at Appendix B of the NEP Determination
- A_{Paed} means the paediatric adjustment
- A_{SPA} means the specialist psychiatric age adjustment
- A_{Ind} means the indigenous adjustment
- A_{A} means the remoteness area adjustment
- A_{RT} means the radiotherapy adjustment
- A_{Dia} means the dialysis adjustment
- A_{ICU} means the ICU adjustment
- ICU hours means the number of hours spent by a person within a Level 3 ICU/PICU
- A_{PPS} means the private patient service adjustment
- A_{Acc} means the private patient accommodation adjustment applicable to the state/territory of hospitalisation and length of stay
- LOS means length of stay in hospital (in days)
- NEP is the National Efficient Price 2015-16

In the event that the application of the private patient adjustments return a negative NWAU(15) value for a particular patient, the NWAU(15) value is held to be zero; that is, negative NWAU(15) values are not permitted for any patients under the National Pricing Model.

Note: the definition of A_{PPS} as the Private Patient Service Adjustment is expressed as a discount as done in NEP14, which equates to $(1 - A_{\text{PPS}})$ in NEP13.

2.4 Assigning NWAU to acute admitted patient data

This section describes how the NWAU resulting from the analysis of costs described in the previous sections can be applied to acute admitted patient activity data to assign NWAU to acute admitted episodes. To enable users to implement the NWAU to activity data, this section gives detailed definitions of the variables required throughout the process of assigning NWAU.

The key steps in determining NWAU for acute admitted activity are:

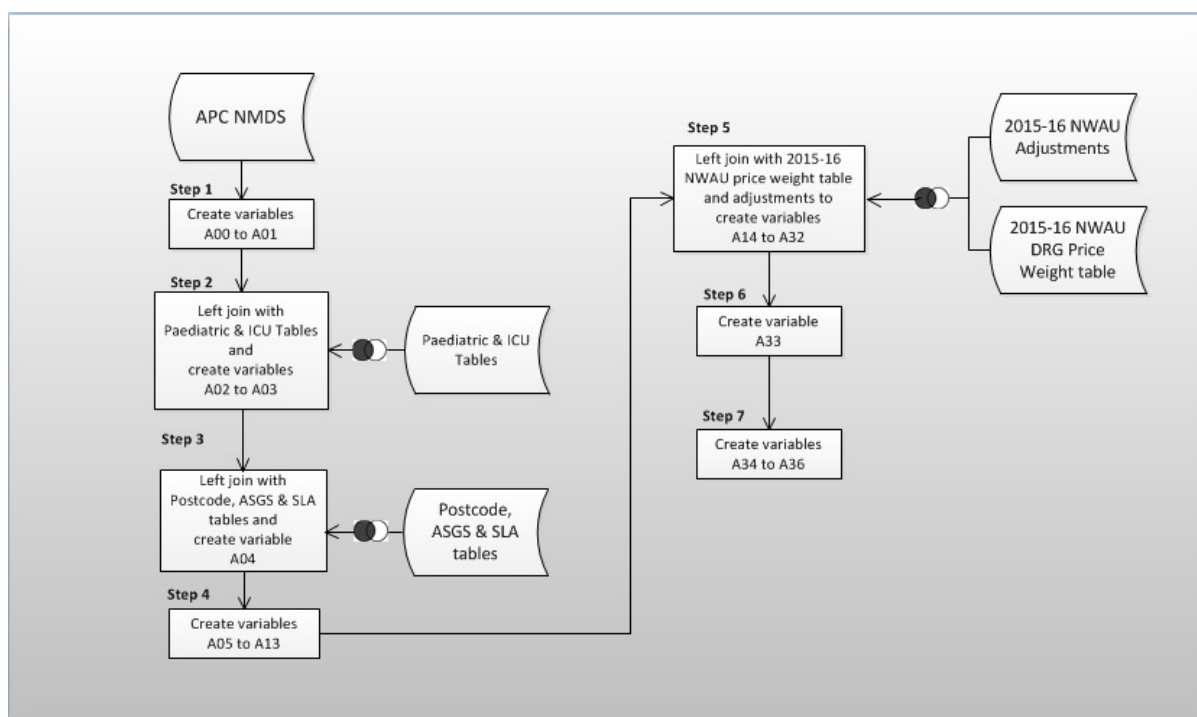
Stage 1: Preparation of acute admitted patient data and creation of variables required for NWAU calculation.

Stage 2: Calculation of NWAU using acute admitted patient data prepared in Stage 1.

2.4.1 Data Preparation and Calculation NWAU

The data preparation stage is illustrated in Figure 5. The process is broken into 7 steps each requiring variables created in previous steps. The resulting dataset is called the ‘prepared acute dataset’.

Figure 5: Acute Data Set Preparation Process – Stage 1



The process requires the seven input datasets or tables referred to in Table 4.

The input APC dataset has 19 variables.

Table 5 lists these variables, which form part of the Admitted Patient Care National Minimum Data Set (APC NMDS), located on the IHPA website.

The variable definitions required in the process are given in Table 6.

Table 4: Dataset and tables required for assignment of NWAU to acute admitted patient data

Input dataset or table	Description
APC NMDS	Dataset based on the 2015-16 Admitted Patient Care National Minimum Data Set (APC NMDS) located on the IHPA website.
Postcode table	Table of postcodes mapped to the 2011 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.
SLA table	Table of Statistical Local Areas (SLAs) mapped to the 2011 ASGS Remoteness Area classification. Each SLA is mapped to the Remoteness Area category within which the majority of the SLA's population resides.
ICU Rate and Paediatric Adjustment eligibility table	Table listing establishments with an eligible ICU or PICU, found in the NEP15 Determination and Glossary.
2015-16 NWAU Price Weight table	2015-16 Acute Admitted NWAU Price Weight table, found in the NEP15 Determination.
2015-16 NWAU Adjustments	2015-16 Acute Admitted NWAU Adjustments, found in the NEP15 Determination.

Table 5: APC NMDS variables used to calculate 2015-16 acute admitted NWAU

APC NMDS Variable
State Identifier
Establishment Identifier
Hospital geographical Indicator
Date of Birth
Date of Admission
Date of Separation
Care Type
Number of Qualified Days for Newborns
Total Psychiatric Care Days
Indigenous Status
Funding Source ¹¹
Diagnosis Related Group v7.0
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
Statistical Local Area of Patient's Usual Residence
Either the identifier signifying radiotherapy treatment/planning or the list of patient's ICD-10-AM 9 th Edition procedure codes.
Either the identifier signifying dialysis or the list of patient's ICD-10-AM 9 th Edition procedure codes.

¹¹ Data element *Funding source for hospital patient* [METeOR identifier: 553314]

Table 6: Assigning NWAU to acute admitted patient data – Stage 1 – Data Preparation – variable definitions

Step	Variable	Name	Description	Definition
Step 1	A00	_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.
	A01	_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.
Step 2	A02	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.
	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.
Step 3	A04	_pat_remoteness	Patient Remoteness Area	2011 ASGS Remoteness Area category of the establishment location taken from the hospital geographical indicator variable, where: 0 = Major City; 1 = Inner Regional; 2 = Outer Regional; 3 = Remote; and 4 = Very Remote.
Step 4	A05	_pat_acute_flag	Acute patient flag	1 if (Care Type = 1) or (Care Type = 7 and Number of Qualified Days for Newborns > 0); else 0.
	A06	_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.
	A07	_pat_sameday_flag	Same-day flag	1 if Date of Admission = Date of Separation; else 0.
	A08	_pat_age_years	Age at admission (in years)	total whole years from Date of Birth to Date of Admission.
	A09	_pat_eligible_paed_flag	Paediatric Adjustment eligible patient	est_eligible_paed_flag * pat_0to17years_flag.
	A10	_pat_ind_flag	Indigenous patient flag	1 if Patient Indigenous Status = 1, 2 or 3; else 0.
	A11	_pat_private_flag	Private patient flag	1 if Funding Source = 9 or 13 for 2012-13 data and later. ¹²
	A12	_pat_public_flag	Public patient flag	1 if Funding Source = 1, 2 or 8 for 2012-13 data and later. ¹³

¹² Or 1 if Funding Source = 2 or 3 for 2011-12 data or earlier.¹³ Or 1 if Funding Source = 1, 10 or 11 for 2011-12 data or earlier.

National Pricing Model Technical Specifications 2015-16

Step	Variable	Name	Description	Definition
	A13	_pat_spa_category	Patient specialist psychiatric category. All patients classified have positive psychiatric care days.	<ul style="list-style-type: none"> 0: if not a specialist psychiatric patient 1.1: if 0 to 17 years from establishment not eligible for Paediatric Adjustment and in MDC 19 or 20 1.2: : 0 to 17 years from establishment eligible for Paediatric Adjustment and in MDC 19 or 20 2.1: if 0 to 17 years from establishment not eligible for Paediatric Adjustment and not in MDC 19 or 20 2.2: : 0 to 17 years from establishment eligible for Paediatric Adjustment and not in MDC 19 or 20 3: : Greater than 17 years not in MDC 19 or 20
Step 5	A14	drg_samedaylist_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.
	A15	drg_bundled_icu_flag	Bundled ICU flag	1 if Bundled ICU variable from joined NWAU AR-DRG Price Weight table equals 'Yes'; else 0.
	A16	drg_inlier_lb	Inlier lower bound	inlier lower bound from NWAU AR-DRG Price Weight table.
	A17	drg_inlier_ub	Inlier upper bound	inlier upper bound from NWAU AR-DRG Price Weight table.
	A18	drg_pw_sd	Same-Day Price Weight	same-day price weight from joined NWAU AR-DRG Price Weight table if not missing; else 0.
	A19	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.
	A20	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.
	A21	drg_pw_inlier	Inlier Price Weight	inlier price weight from joined NWAU AR-DRG Price Weight table.
	A22	drg_pw_iso_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.
	A23	drg_adj_paed	Paediatric adjustment	paediatric adjustment from joined NWAU AR-DRG Price Weight table.
A24	drg_adj_privpat_serv	Private patient service adjustment	private patient service adjustment from joined NWAU AR-DRG Price Weight table.	

National Pricing Model Technical Specifications 2015-16

Step	Variable	Name	Description	Definition
	A25	_drg_inscope_flag	DRG inscope flag	1 if DRG is in scope; else 0
	A26	adj_spa	See definition	Specialist Psychiatric Age adjustment
	A27	adj_indigenous	See definition	indigenous adjustment.
	A28	adj_remoteness	See definition	remoteness adjustment.
	A29	adj_radiotherapy	See definition	radiotherapy adjustment.
	A30	adj_dialysis	See definition	dialysis adjustment.
	A31	state_adj_privpat_accomm_sd	See definition	private patient accommodation adjustment: same-day rate (state-specific adjustment).
	A32	state_adj_privpat_accomm_on	See definition	private patient accommodation adjustment: overnight per diem rate (state-specific adjustment).
Step 6	A33	Error_Code	See definition	Outlines Errors in calculations
Step 7	A34	_pat_eligible_icu_hours	Whole eligible hours spent in ICU	total whole Hours Spent in Intensive Care Unit if hours are greater than or equal to 1; else 0, for unbundled DRGs and eligible establishments
	A35	_pat_lost_icu_removed	See Definition	Patient length of stay with ICU hours removed
	A36	_pat_separation_category	See definition	Patient separation category: 1: Sameday patients 2: Short Stay outlier patients 3: Inlier patients 4: Long stay outlier patients

2.4.2 Calculation of NWAU

The NWAU calculation stage is illustrated in Figure 6, with the last step (Step 8) resulting in a variable containing the 2015-16 NWAU.

Figure 6: Assigning NWAU to acute admitted patient data – Stage 2 – NWAU calculation

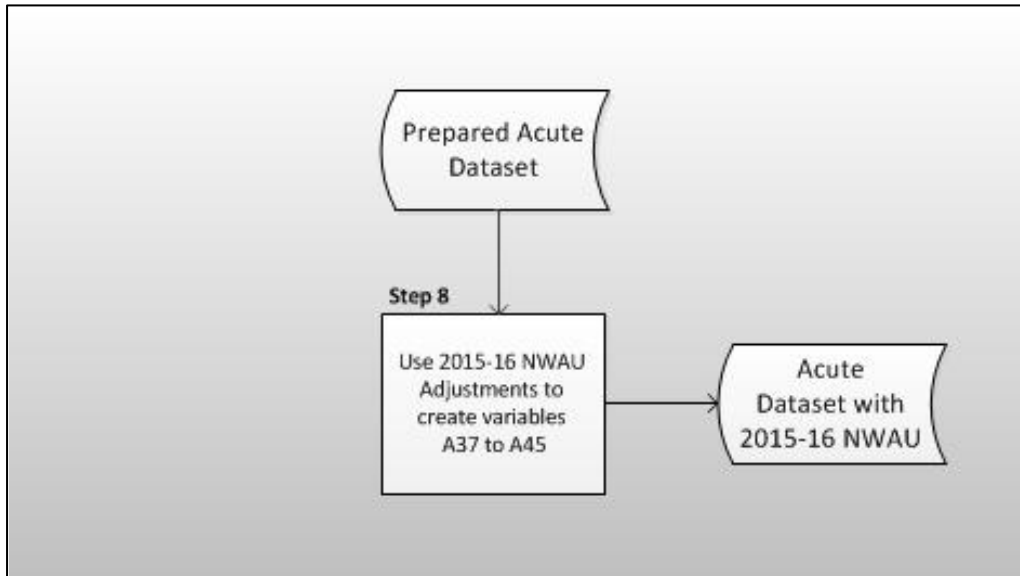


Table 7 details the variables created in Step 8.

Table 7: Assigning NWAU to acute admitted patient data – Stage 2 – NWAU calculation – variable definitions

Step	Variable	Name	Description	Definition
Step 8	A37	_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_iso_perdiem
	A38	_w02	Application of the paediatric adjustment	$_w01 * (1 + _pat_eligible_paed_flag * (drg_adj_paed - 1))$.
	A39	_w03	Application of the specialist psychiatric age adjustment	$_w02 * (1 + adj_spa)$.
	A40	_w04	Application of the indigenous, remoteness and radiotherapy adjustments	$_w03 * (1 + adj_indigenous + adj_remoteness + adj + adj_radiotherapy + adj_dialysis)$
	A41	_adj_icu	Application of the ICU rate adjustment	$_pat_eligible_icu_hours * icu_rate$.
	A42	GWAU15	Gross Weighted Activity Unit 15	$_w04 + _adj_icu$
	A43	_adj_privpat_serv	Private Patient Service adjustment	$_pat_private_flag * drg_adj_privapat_serv * (_w01 + _adj_icu)$
	A44	_adj_privpat_accom	Private Patient Accommodation adjustment	$_pat_private_flag * (_pat_sameday_flag * state_adj_private_accom_sd + (1 - _pat_sameday_flag) * _pat_los * state_adj_privpat_accomm_on)$
	A45	NWAU15	National Weighted Activity Unit	Max(0, GWAU15 - _adj_privpat_serv - _adj_privpat_accomm) for only inscope funding sources

3 Mental health care cost model

3.1 General issues

3.1.1 Cost unit

An 'episode of admitted patient care'¹⁴ is the cost unit for mental health patients. As was done in NEP14, mental health patients are specifically defined as only those acute admitted patients that are in MDCs 19 and 20 (Mental Diseases and Disorders, and Alcohol/Drug Use and Alcohol/Drug Induced Organic Mental Disorders respectively) and those patients in other MDCs that have recorded psychiatric care days.

As such, acute admitted mental health patients are a subset of acute admitted patients and are analysed under the Acute Cost Model.

Mental health patients receiving ED and non-admitted care services are not differentiated in the 2015-16 NEP and so receive payments as defined for the relevant ABF product category.

3.1.2 Scope

Mental health admitted care is that provided to patients who undergo a facility's formal admission¹⁵ processes where the clinical intent or treatment goal is the provision of acute care.

In scope hospitals and patients are as defined for acute admitted, as outlined in Section 2.

3.1.3 Classification

AR-DRGs are used to classify acute admitted care including the mental health acute patients. The version applying for funding in 2015-16 is AR-DRG v7.0.

3.2 Analysis of costs to derive NWAU for mental health care

3.2.4 Data preparation

See Section 2.2.1.

3.2.5 Stratification and weighting

See Section 2.2.2.

3.2.6 Inlier bounds

The inlier bounds for AR-DRGs within MDCs 19 and 20 were set using the L1.5 H1.5 method while the majority of other MDCs in the Acute Cost Model remained at L3H3 (see Section 2.2.3).

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 8.

¹⁴ See object class *Episode of admitted patient care* [METeOR identifier: 268956].

¹⁵ See glossary item *Admission* [METeOR identifier: 327206].

Table 8: MDCs 19 & 20 (Mental health) – activity and cost distribution

	Short-Stay Outlier	Inlier	Long-Stay Outlier
Separations	34%	54%	12%
Patient Days	14%	33%	53%
Actual Costs	16%	34%	50%

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

Table 9 shows the corresponding distribution of activity and costs across the medical AR-DRGs (which are classified under the L3H3 inlier bounds policy, with the exception of the 21 AR-DRGs provided at [Attachment C](#)).

Table 9: Medical AR-DRGs excluding MDC 19 & 20 – activity and cost distribution

	Short-Stay Outlier	Inlier	Long-Stay Outlier
Separations	8%	90%	2%
Patient Days	4%	79%	17%
Actual Costs	6%	82%	12%

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 (mental health) 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.

3.2.7 Cost parameters and adjustments

The cost parameters of the AR-DRG inlier/outlier model that apply to mental health patients are calculated in the same way as those for acute patients (see Sections 2.2.3 to 2.2.6). 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 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 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:
 - Less than or equal to 17 years; and
 - Greater than 17 years and not in MDCs 19 and 20.
- b. 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 ten specialist paediatric hospitals and those that have not.
- c. Specialist psychiatric age adjustments are derived from the age categories, as set out in Table 1 of the NEP15 Determination.

- d. Mental health patients also accrue other relevant adjustments that apply to acute admitted patients.

3.2.8 Price weights and NWAU

See Section 2.2.10.

3.3 Assigning NWAU to mental health patient data

See Sections 2.3 and 2.4.

4 Subacute and non-acute admitted care cost model

4.1 General issues

4.1.1 Cost Unit

An 'episode of admitted patient care'¹⁶ is the cost unit for subacute and non-acute admitted patients. It is "[t]he period of admitted patient care ... characterised by only one care type"¹⁷, and covers the period of care from admission to separation.

4.1.2 Scope

Subacute and non-acute admitted care is that provided to patients who undergo a facility's formal admission¹⁸ processes, where the clinical intent or treatment goal is the provision of subacute or non-acute care.

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

4.1.3 Classification

Version 3 of Australian National Sub and Non-Acute Patient Classification (AN-SNAP v3) is used to classify subacute and non-acute admitted care. Where data on AN-SNAP classification is not available, the episodes are moved into the acute admitted care cost model (with the exception of NSW same-day unsnapped episodes).

4.1.4 New methodology for NEP15

NEP14 subacute price weights were based on the University of Wollongong (UoW) AN-SNAP v3 cost weights calibrated to NHCDC Round 16 cost data. This year the subacute price weights have been calculated directly from the NHCDC Round 17 cost data. This approach was taken in response to widespread criticism that the UoW cost weight relativities were outdated (based on data going back to the 1990s). Further, it was found that a new construction of inlier payments similar to those used in the ABF model for acute admitted actually resulted in a better fit than the UoW methodology, which used episode payments and inlier per diems.

The only difference from the acute admitted cost model was that the ABF L1.5H1.5 methodology was used for all AN-SNAP classes. A further variation in NEP15 is that there are no longer care-type per diems. All episodes without a legitimate AN-SNAP classification have been transferred to the acute care model and paid according to their DRG classification.

This means that only episodes with valid AN-SNAP classes were used in the subacute cost model which meant that there were far fewer episodes in the 2012-13 cost model. It was recognised that there are no paediatric classifications in AN-SNAP v3, but there will be in AN-SNAP v4 to be introduced in 2016-17. It was therefore decided that the paediatric episodes were to be left in the subacute stream and paediatric care-type per diems were calculated specifically for this subacute group.

¹⁶ See object class *Episode of admitted patient care* [METeOR identifier: 268956].

¹⁷ Ibid.

¹⁸ See glossary item *Admission* [METeOR identifier: 327206].

4.2 Analysis of costs to derive NWAU for subacute admitted care

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

- Data preparation.
- Develop sample-to-population weights.
- Classify AN-SNAP episodes into relevant categories: inliers, short-stay and long-stay outliers using the ABF L1.5H1.5 methodology.
- Derive indigenous and remoteness adjustments.
- Derive private patient service adjustments for each care type.
- Assign the calibrated AN-SNAP v2 cost parameters to the matching AN-SNAP v3 classes.

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

4.2.1 Data preparation

The 2012-13 subacute cost sample consists of the following groups:

- a. Patient level care type or AN-SNAP classified data
 - 217 establishments reported patient level cost data comprising of 182,855 records involving 2,490,010 records days; and
- b. AN-SNAP classified data with admission and separation dates for the 2012-13 financial year– a subset (a)
 - 154 establishments reported AN-SNAP classified data comprising of 103,393 records involving 1,490,205 record days.

As in the acute model, HCP data was used to correct for the missing private patient costs in the NHDCDC, as well as for subsequent estimates of private patient service adjustments (see Section 2.2.8).

For NEP15, the data was trimmed for extreme outliers using similar methodology to the acute admitted care cost model. The following data was not used to derive the AN-SNAP v3 cost profiles:

- Paediatric Records
- Records that had an inscope cost of \$0
- Records with an Error or Ungroupable AN-SNAP v3 class
- Non Phase palliative care separations
- Extreme cost outliers within an AN-SNAP v3 class.

4.2.2 Stratification and weighting

The sample of AN-SNAP classified data was weighted to account for the fact that the used sample excludes all activity with an admission date prior to 1 July 2012 (see Section 2.2.2).

4.2.3 Determining AN-SNAP Version 3 cost parameters

The AN-SNAP cost model parameters comprise the following:

- a. *Same Day price weight*: applicable to records within a Same Day Snap class or admitted and discharged on the same day in a palliative care type.

- b. *Short Stay Outlier Per Diem rate*: applicable to records that are not same day and have a length of stay shorter than the lower bound.
- c. *Inlier Episodic Rate*: applicable to records with a length of stay within the upper and lower bound of the specific AN-SNAP v3 class.
- d. *Long stay Outlier Per Diem Rate*: applicable to records with a length of stay longer than the specified upper bound.

4.2.4 Calculation of additional adjustments

The following adjustments were derived within the subacute cost model:

- a. *Indigenous adjustment and remoteness adjustment*: These adjustments are calculated in the same way as for the acute model. The three components of the remoteness adjustment and indigenous adjustment are harmonised and set to be equal to their counterparts in the acute admitted model. This is because they all differed from their acute counterpart only by a very small margin.
- b. *Private patient service adjustment*: This adjustment is calculated by care type in the same way as it is calculated by AR-DRG within the acute admitted cost model.
- c. *Private patient accommodation adjustment*: This adjustment is identical to that of the acute admitted cost model (see Section 2.2.8).

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

- a. The indigenous adjustment applied to 1.4% of subacute activity.
- b. The remoteness adjustment applied to 4.7% of subacute activity.
- c. The private patient adjustments applied to 20.6% of subacute activity.

The cost model (including all adjustments except the private patient adjustments) was then calibrated to ensure model costs are equalised against actual costs.

4.2.5 Calculation of Paediatric care-type per diem

The paediatric care type rates comprise of the following:

- a. *Same Day price rate*: determined by the average cost of the same day paediatric separations within the specified care type.
- b. *Overnight price rate*: determined by taking the average cost divided by the average length of stay for overnight paediatric separations within the specified care type.

4.2.6 Price weights and NWAU

The conversion of cost parameters to price weights involves dividing the dollar-valued cost parameters by the reference cost (from the acute care cost model) to obtain cost weights. The same reference cost is used across all streams of activity and is discussed in Section 2.2.10.

4.3 Applying the NEP

As set out in the 2015-16 NEP Determination, the price of an ABF subacute activity is calculated using the following formula, with adjustments applied as applicable:

$$\begin{aligned} &\text{Price of an admitted subacute ABF activity} \\ &= \{[PW \times (1 + A_{\text{Ind}} + A_A)] - [PW \times A_{\text{PPS}} + LOS \times A_{\text{Acc}}]\} \times \text{NEP} \end{aligned}$$

Where:

- PW means the Price Weight for an ABF Activity as set out at Appendix B of the NEP13 Determination.
- A_{Ind} means the Indigenous adjustment
- A_A means each or any remoteness area adjustment
- A_{PPS} means the private patient service adjustment
- A_{Acc} means the private patient accommodation adjustment applicable to the state/territory of hospitalisation and length of stay
- LOS means length of stay in hospital (in days)
- NEP is the 2015-16 National Efficient Price

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, the NWAU value is held to be zero, as negative NWAU values are not permitted for any patients under the National Pricing Model.

Note: the definition of APPS as the Private Patient Service Adjustment is now expressed as a discount and equates to $(1 - APPS)$ in NEP13.

4.4 Assigning NWAU to subacute and non-acute admitted patient data

This section describes how the cost parameters calculated in the previous section can be applied to subacute and non-acute patient activity data to calculate NWAU for each episode. The process is broken into two stages:

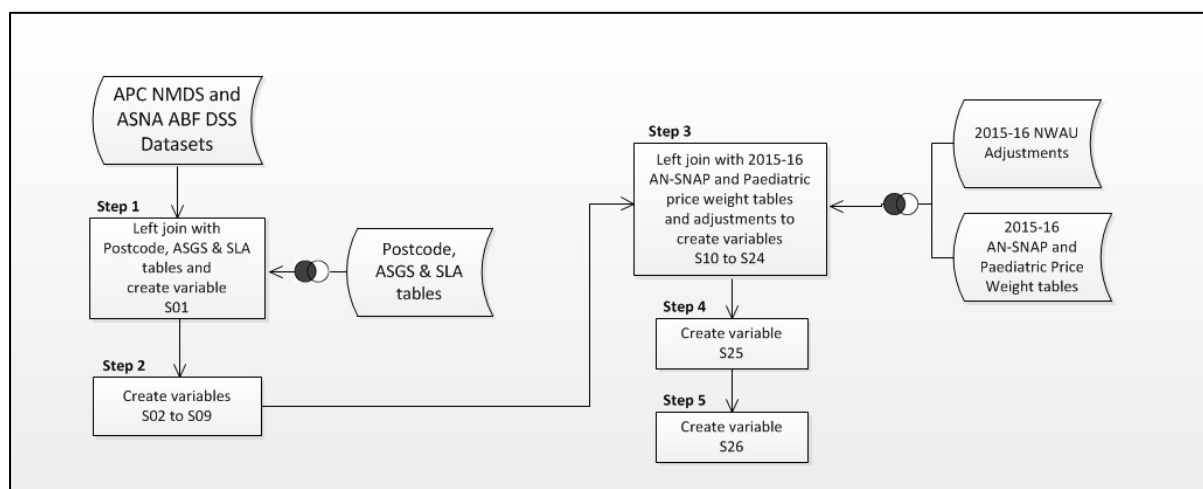
Stage 1: Preparation of subacute and non-acute admitted patient data and creation of variables required for NWAU calculation.

Stage 2: Calculation of NWAU using subacute and non-acute admitted patient data (from Stage 1).

4.4.1 Data Preparation

The data preparation stage is illustrated in Figure 7.

Figure 7: Assigning NWAU to subacute and non-acute admitted patient data – Stage 1 – Data Preparation



The process is broken into eleven steps, each requiring variables created in previous steps. There are two resulting datasets one containing data grouped to AN-SNAP version 3 and the other containing only Care Type information.

The process requires the five input datasets or tables referred to in Table 10.

Fifteen variables are required to form the input APC dataset. These variables form part of the APC and ASNC ABF Data Set Specifications on the IHPA website and are listed in Table 11.

The variable definitions required to apply the Stage 1 process are given in Table 12.

Table 10: Datasets and tables used for assignment of NWAU to subacute admitted patient data

Input dataset or table	Description
APC NMDS & ASNC ABF DSS	Dataset based on the 2015-16 Admitted Patient Care National Minimum Data Set (APC NMDS), with extra AN-SNAP information from the Admitted Subacute and Non-acute hospital care DSS (ASNAHC DSS), where available. Dataset specifications are located on the IHPA website.
Postcode table	Table of postcodes mapped to the 2010 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.
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.
SLA table	Table of Statistical Local Areas (SLAs) mapped to the 2011 ASGS Remoteness Area classifications. Each SLA is mapped to the Remoteness Area category within which the majority of the SLA's population reside.
2015-16 NWAU Price Weight tables	2015-16 NWAU Subacute and Non-Acute Admitted AN-SNAP and Care Type Same Day and Overnight Per Diem Price Weight tables, found in the NEP15 Determination.
2015-16 NWAU Adjustments	2015-16 NWAU Subacute and Non-Acute Admitted Adjustments, found in the NEP15 Determination.

Table 11: APC & ASNC ABF DSS variables used to calculate 2015-16 subacute admitted 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 of Patient's usual Residence
	Statistical Local Area of Patient's Usual Residence
ASNA ABF DSS	AN-SNAP Class (Version 3)

Table 12: Assigning NWAU to subacute and non-acute admitted patient data – Stage 1 – Data Preparation – variable definitions

Step	Variable	Name	Description	Definition
Step 1	S01	_pat_remoteness	Patient Remoteness Area	2011 ASGS Remoteness Area category of the establishment location taken from patient postcode, ASGS, SLA, or the hospital geographical indicator variable, where: 0 = Major City; 1 = Inner Regional; 2 = Outer Regional; 3 = Remote; and 4 = Very Remote.
Step 2	S02	_pat_subacute_flag	Subacute and non-acute patient flag	1 if Care Type = 2, 3, 4, 5, 6 or 8; else 0.
	S03	_pat_los	Length of stay	Max (1, (Date of Separation) - (Date of Admission) - (Total Leave Days)).
	S04	_pat_sameday_flag	Patient same-day flag	1 if Date of Admission = Date of Separation; else 0.
	S05	_pat_age_years	Age at admission (in years)	total whole years from Date of Birth to Date of Admission.
	S06	_pat_eligible_paed_flag	Paediatric Adjustment eligible patient	Patients with age less than or equal to 17 and in a Palliative, Rehabilitation or maintenance care type.
	S07	_pat_ind_flag	Indigenous patient flag	1 if Patient Indigenous Status = 1, 2 or 3; else 0.
	S08	pat_private_flag	Private patient flag	1 if Funding Source = 9 or 13 for 2012-13 data and later. ¹⁹
	S09	pat_public_flag	Public patient flag	1 if Funding Source = 1, 2, 3 or 8 for 2012-13 data and later. ²⁰
Step 3	S10	ansnap_type	see definition	AN-SNAP class type
	S11	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.
	S12	ansnap_inlier_lb	Inlier lower bound	inlier lower bound from NWAU AN-SNAP Price Weight table.
	S13	ansnap_inlier_ub	Inlier upper bound	inlier upper bound from NWAU AN-SNAP Price Weight table.
	S14	ansnap_pw_sd	Same Day Price Weight	(same day price weight from joined NWAU AN-SNAP Price Weight table) if not missing; else missing.

¹⁹ Or 1 if Funding Source = 2 or 3 for 2011-12 data or earlier.²⁰ Or 1 if Funding Source = 1, 10 or 11 for 2011-12 data or earlier.

National Pricing Model Technical Specifications 2015-16

Step	Variable	Name	Description	Definition
	S15	ansnap_sso_perdiem	Short Stay Outlier Per Diem Price Weight	(short stay outlier price weight from joined NWAU AN-SNAP Price Weight table) if not missing; else missing.
	S16	ansnap_pw_inlier	Inlier Price Weight	(inlier price weight from joined NWAU AN-SNAP Price Weight table) if not missing; else missing.
	S17	ansnap_pw_lso_perdiem	Long Stay Outlier Per Diem Price Weight	(long stay outlier price weight from joined NWAU AN-SNAP Price Weight table) if not missing; missing.
	S18	paed_pw_sameday	Same day price weight for paediatric patients	(paediatric same day price weight from joined care type Price Weight table) if not missing; else missing.
	S19	paed_pw_overnight	Overnight price weight for paediatric patients	(paediatric overnight price weight from joined care type Price Weight table) if not missing; else 0.
	S20	adj_indigenous	See definition	indigenous adjustment.
	S21	adj_remoteness	See definition	remoteness adjustment.
	S22	caretype_adj_privpat_serv	See definition	private patient service adjustment (care type specific adjustment).
	S23	state_adj_privpat_accomm_sd	See definition	private patient accommodation adjustment: same-day rate (state-specific adjustment).
	S24	state_adj_privpat_accomm_on	See definition	private patient accommodation adjustment: overnight per diem rate (state-specific adjustment).
Step 4	S25	Error_code	See definition	Outlines Errors in calculations
Step 5	S26	_pat_separation_category	See definition	Patient separation category: 0: Valid Paediatric patients 1: Same day patients 2: Short Stay outlier patients 3: Inlier patients 4: Long stay outlier patients

4.4.2 Calculation of NWAU

The NWAU calculation stage is illustrated in Figure 8 and is performed in Step 6.

Table 13 details the variables created in each of the steps, with the last step (Step 19) resulting in a variable containing the 2015-16 NWAU.

Figure 8: Assigning NWAU to subacute and non-acute admitted patient data – Stage 2 - NWAU calculation

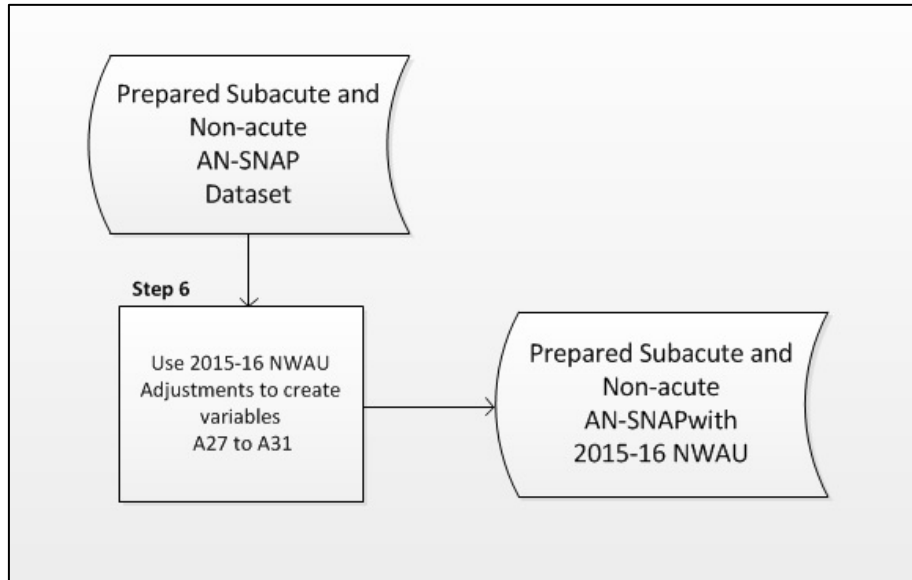


Table 13: Assigning NWAU to subacute and non-acute admitted patient data – Stage 2 – NWAU calculation – variable definitions

Step	Variable	Name	Description	Definition
Step 6	S27	_w01	AN-SNAP inlier/outlier weight	Based off _pat_separation_category: 0: _pat_sameday_flag*paed_pw_sameday+(1-_pat_sameday_flag)*_pat_los*paed_pw_overnight 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
	S28	GWAU15	Gross weighted activity Unit	_w01*(1+adj_indigenous+adj_remoteness)
	S29	_adj_privpat_serv	Private Patient Service adjustment	_pat_private_flag *caretype_adj_privpat_serv*(_w01)
	S30	_adj_privpat_accom	Private Patient Accommodation adjustment	_pat_private_flag*(_pat_sameday_flag*state_adj_private_accom_sd+(1-_pat_sameday_flag)*_pat_los*state_adj_privpat_accomm_on)
	S31	NWAU15	National weighted activity unit	max(0, GWAU15 - _adj_privpat_serv-_adj_privpat_accomm) for only inscope funding sources

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'²¹ or presentation. It includes stays for patients who are treated and go home, and ones that 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 department clinician. Patients, who leave the emergency department after being triaged and advised of alternative treatment options, are also considered in scope.

All patients in the Emergency Department Care ABF DSS (EDC ABF DSS) and ABF Emergency Services Care DSS (ABF ESC DSS) are in scope.

Patients being treated in emergency departments may subsequently become 'admitted'. 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 of these services from 1 July 2014: Urgency Related Groups (URGs) Version 1.4 and Urgency Disposition Groups (UDGs) Version 1.3. The former applies to level 3B to 6 emergency departments, and the latter to all others (i.e. levels 1 to 3A). The levels are defined in the NEP Determination (Glossary).

5.2 Analysis of costs to derive NWAU for emergency care

5.2.1 Data preparation

NHCDC Round 17 reported 6,185,012 presentations in 166 ABF establishments with patient-level cost data. This represents 90 per cent of the total emergency care population as reported in the ABF DSS datasets and NPHEd.

The initial data preparation processes were similar to that used for NEP14. The cleansed data is episode level data grouped by URG or UDG. The following data was not used in deriving relativities across URGs and UDGs, but was used to calibrate the overall cost level of the model. This was done in a similar way to the integration of aggregate-level cost data in the acute admitted model:

- a. Aggregate data provided at the establishment level in NHCDC Round 17 such as for cost modelled sites;
- b. Presentations that grouped to error URGs and UDGs due to missing or invalid data fields;
- c. Presentations that were less than \$5; and

²¹ See *Emergency department stay – presentation date*, DDMMYYYY [METeOR identifier: 471886].

- d. Extreme cost outliers within each UDG class.

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/territory.

5.2.3 Cost parameters and adjustments

Data enters the cost model at one of three levels: by URG, by UDG, or aggregated to an establishment level. URG data was used to derive an initial set of URG cost parameters. The URG and UDG data was combined to obtain cost parameters across UDGs, and the URG parameters were then calibrated against the UDG parameters. Finally, the URG and UDG datasets were combined with the aggregate data (controlled for UDG casemix) to obtain an overall cost level across the entire sample. The URG and UDG cost parameters are calibrated against this cost level.

This process ensures that the URG and UDG cost parameters are aligned and the overall model costs are equalled to actual costs.

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 URG and UDG cost parameters by the reference cost for the acute admitted cost model. These cost weights are then converted to the price weights used to calculate NWAU.

As set out in the NEP15 Determination, the price of an ED ABF activity is calculated using the following formula with adjustments as applicable.

Price of an emergency department or emergency service ABF Activity =

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

Where:

A_{Ind}	means the <i>Indigenous Adjustment</i>
NEP	National Efficient Price 2015-16
PW	means the Price Weight for an ABF Activity as set out in the NEP15 Determination Appendix H (for admitted acute), Appendix I and J (for admitted subacute and non-acute), Appendix K (for non-admitted), Appendix L (for emergency department) or Appendix M (for emergency services)

5.3 Assigning NWAU for emergency care

NWAU are assigned to emergency care activity on the basis of a URG or a UDG. The former is applied to level 3B to 6 emergency departments, and the latter to Level 1 to 3A emergency services.

The steps involved in assigning NWAU to emergency department presentations are illustrated in Figure 9 below. The two stages of data preparation and NWAU calculation are combined in the following section.

5.3.1 Data Preparation and calculation of NWAU

This section details how to assign NWAU to emergency department patient data. The data preparation and NWAU calculation stages are illustrated in Figure 9. The process is broken into five steps, each requiring variables created in previous steps, with the final step (Step 5) resulting in a variable containing the 2015-16 NWAU.

The process requires the three input datasets or tables referred to in Table 14.

Six variables are required to form the input ED dataset:

- a. Establishment Identifier;
- b. Indigenous status;
- c. Episode end status;
- d. Type of visit to Emergency Department;
- e. Triage category; and
- f. URG (version 1.4) or UDG (version 1.3).

These variables form part of the Emergency Department Care ABF DSS on the IHPA website.

Table 15 details the variables created in the process of assigning NWAU to emergency department patient data.

Figure 9: Assigning NWAU to emergency department patient data

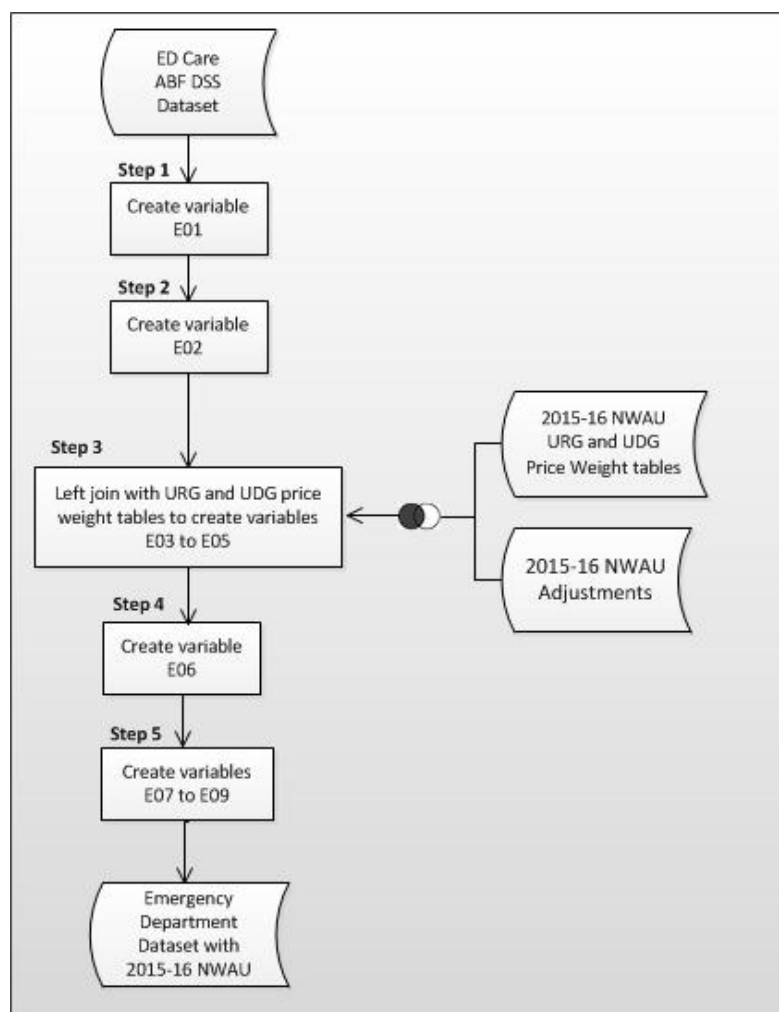


Table 14: Dataset and tables required for assignment of NWAU to emergency department patient data

Input dataset or table	Description
NAP EDC NMDS	Dataset based on the 2015-16 Non-Admitted Patient Emergency Department Care National Minimum Data Set (NAP EDC NMDS) located on the IHPA website.
2015-16 NWAU Price Weight tables	2015-16 Emergency Department NWAU URG and UDG Price Weight tables, found in the NEP15 Determination.
2015-16 NWAU Adjustments	2015-16 Emergency Department NWAU Adjustments, found in the NEP15 Determination.

Table 15: Assigning NWAU to emergency department patient data – variable definitions

Step	Variable	Name	Description	Definition
Step 1	E01	_UDG	UDG v1.3	Either supplied directly or derived from DSS variables: type of visit to Emergency Department, triage category, and episode end status. See IHPA website for details.
Step 2	E02	_pat_ind_flag	Indigenous patient flag	1 if Patient Indigenous Status = 1, 2 or 3; else 0.
Step 3	E03	UDG_PW	See definition	UDG price weight, taken from NWAU Price Weight table.
	E04	URG_PW	See definition	URG price weight, taken from NWAU Price Weight table.
	E05	adj_indigenous	See definition	Indigenous adjustment from NWAU Adjustment table.
Step 4	E06	Error_Code	See definition	Outlines Errors in calculations
Step 5	E07	_w01	Base predicted	Adopt URG_PW if available else UDG_PW
	E08	GWAU15	Gross Weighted Activity Unit	$_w01 * (1 + \text{adj_indigenous})$
	E09	NWAU15	National Weighted Activity Unit	GWAU15 for inscope patients only (i.e. non DVA and Compensable patients)

6 Non-admitted care cost model

6.1 General issues

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*”²².

6.1.2 Scope

The scope of non-admitted care includes service events occurring in outpatient clinics in ABF hospitals and in the community, as explained in the Pricing Framework.

6.1.3 Classification

The NHCDC Tier 2 clinics v4.0 is used to classify non-admitted care for the purposes of ABF as explained in the Pricing Framework and set out in the *NEP15 Determination*.

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

6.2.1 Data preparation

Non-admitted patient cost data was received for seven jurisdictions. NHCDC Round 17 included non-admitted data for 161 ABF establishments and 136 Tier 2 Clinics. This compares to 78 ABF establishments and 106 Tier 2 Clinics in 2011-12.

In NEP14, the cost weights were largely determined using the IHPA 2013 Costing Study for non-admitted patient care. The cost weights for NEP 15 are based on the same data but were calibrated against NHCDC Round 17 costs in the same way that NEP14 cost weights were calibrated against Round 16 data.

This year, the results of the 2014 costing studies were used to derive the cost weights for home-delivered dialysis, enteral nutrition, total parenteral nutrition and home ventilation. The cost weights were based on only the direct costs reported in these costing studies excluding the extreme costs of a few hospitals. The direct costs were calibrated to the overall NHCDC cost level in the same manner as was done to derive the cost weights from the 2013 costing study.

The main purpose therefore of the NHCDC Round 17 data was to serve as a benchmark for calibration. Specifically, the total spend based on parameters from varying sources was calibrated to the total spend in the trimmed NHCDC. The data preparation of Round 17 cost data was carried out in a similar way to NEP14.

Conservative outlier exclusion was carried out using statistical methods at both the establishment/clinic level and at record level. Establishment/clinic combinations were excluded if they had (1) too few records, (2) very high influence on calculation of the overall clinic mean, (3) a mean considerably higher or lower than other establishments for that clinic, or (4) a cost ratio statistically different from other establishments within that clinic. Clinic specific outlier exclusion rules developed in 2013 were also applied. Whole establishments were then excluded if their cost ratios across clinics remained consistently

²² See object class *Non-admitted patient service event* [METeOR identifier: 583996].

high. Conservative record level trimming within clinics followed to exclude records with costs less than \$5 or statistically different from the majority.

6.2.2 Sample weights

The cost weights calculated from the non-admitted costing study were calibrated against the trimmed data sample from NHCDC Round 17. The majority of cost parameters were created using costing study data where it was sufficient, followed in order of preference by (1) logical links to other clinics, (2) NHCDC data (3) logical links to acute data, and finally (4) the average of the relevant series. Table 16 gives the number of clinics costed by each method. New clinics introduced via the Tier 2 classification v4.0 were either costed via linkage with similar clinics or block funded.

Table 16: Summary of data sources used to determine 2012-13 Non-Admitted Price Weights

Source	No. of Clinics
Victorian Radiotherapy Costs	2
Costing Study 2013	104
Costing Study 2014	5
NHCDC Round 17	13
Acute Admitted	1
Average of series	1
Total	126

6.2.3 Cost parameters and adjustments

The non-admitted care model calculates the mean direct cost for the relevant data in each Tier 2 clinic sourced from the costing study or Victorian radiotherapy data. These means for the direct costs for each clinic are then calibrated along with the few clinics being costed from the NHCDC Round 17 data to ensure the total predicted costs for the NHCDC Round 17 non-admitted data adds up to the total actual costs.

The following adjustments and changes in the approach to pricing non-admitted services for NEP15 are outlined as follows:

- a. *New women's health clinics*: Two new women's health Tier 2 clinics have been created for NEP15:
 - Obstetrics – management of complex pregnancy (Clinic 20.53); and
 - Maternal fetal medicine (Clinic 20.54).

In addition, Clinic 20.40 is renamed as Obstetrics – management of pregnancy without complications. Clinic 20.40 contains both complex and uncomplicated obstetric patients.

The direct costs for Clinic 20.53 and 20.54 are based on patients in the costing study with a consultation duration of 30 minutes or more which represents the top 10% of costs in this clinic. The remaining 90% of costs are then used to calculate the direct cost of the uncomplicated clinic (20.40).

The direct costs are then included in the calibration with the direct costs from all the other clinics based on the 2013 costing study.

- b. *Telehealth clinics*: The patient end of a non-admitted telehealth service will be priced in NEP15. The price weights will be determined using the following steps:
- The average amount of time spent on telehealth services is calculated separately for those service events involving doctors and those involving nurses.
 - These average times are multiplied respectively by the senior medical practitioner and registered nurse cost rates used in the costing study.
 - The resulting average direct costs are then calibrated to NHCDC Round 17 cost levels in the same manner as the rest of the clinics based on the costing study.
 - The resulting average cost (in 2012-13) for the two telehealth services are:
 - I. \$112 (based on 34 minutes on average) for telehealth services involving medical practitioners at the patient end (i.e. Series 20 clinic); and
 - II. \$53 (based on 44 minutes on average) for telehealth services involving nurses at the patient end.
- c. *Multi-disciplinary Clinic adjustment*. An adjustment has been introduced for multi-provider service events in NEP15. The adjustment is to be applied to all non-admitted service events where three or more health care specialities are present in a single service event (such as different speciality doctors, nurses or allied health professionals). The calculation of the adjustment was based on the direct cost of the episodes in the 2013 study that reported three different disciplines. The direct costs were then included in the calibration to the NHCDC Round 17 cost levels.
- d. *Temporal care bundling of home delivered chronic disease services*: temporal care bundled direct costs for Home Enteral Nutrition (HEN), Total Parenteral Nutrition (TPN), home-delivered dialysis and home ventilation have been developed for NEP15.²³ In using the direct costs as reported in the costing study four (three for HEN and one for HV) hospitals with extreme values were trimmed before calculating the average direct cost for each clinic. These direct costs were then included in the calibration to the NHCDC Round 17 cost levels.

For example, the price weight for HEN was calculated as follows:

- I. Costing study mean total cost per 28 days - \$817
(excluding patient contributions)
- II. Costing study mean total cost per 28 days - \$1148
(including patient contributions)
- III. Costing study mean direct cost per 28 days - \$1,009
(including patient contributions)
- IV. Trimmed direct cost per 28 days - \$630
- V. Trimmed direct cost per calendar month in 2012-13 prices - \$661
- VI. Calibrated total cost per calendar month in 2012-13 prices - \$1,081
(including equalisation of total actual and predicted costs)
- VII. Adjusted mean cost parameter (after adjustments) - \$1,061
(i.e. Indigenous and Multidisciplinary adjustments)
- VIII. 2012-13 cost weight per calendar month - 0.23313
(divided by Reference cost)

²³ A service event in these bundled home-delivered services is defined as when the patient receives at least one day of services within the calendar month and is only counted once within that calendar month. The published price weights in the NEP15 Determination are for bundled care over one calendar month.

IX.Note: the main calibration factor to calibrate the cost study direct costs to the NHCDC Round 17 cost levels was 1.63, which comprised 26 per cent for NHCDC overheads and 30 per cent to reflect the higher cost levels (i.e. more costs) in the NHCDC compared to the costing studies.

The resulting cost parameters were then calibrated to national figures using the NHCDC Round 17 cost data. In this calibration, all cost weights moved together maintaining relativities between clinic cost weights. As there was no comprehensive cost dataset on non-admitted activity in 2012-13, it was not possible to do a weighting of the cost sample in the same way that was done for acute separations and ED presentations.

The non-admitted cost parameters for 2012-13 are very similar and highly correlated to the NEP14 price weights. The 2011-12 and 2012-13 cost parameters are considered to be more representative of the actual costs and variability of costs of the Tier 2 Clinics because their measurement is based on empirical data of time and resources actually expended to provide the services.

The fit of the 2012-13 non-admitted cost model to the NHCDC data cost weights is still low. That is, the r-squared statistic is low and reflects the considerable variation in the NHCDC non-admitted cost data.

The NEP15 indigenous adjustment was applied to non-admitted episodes in the same way as for ED presentations. The NEP15 Multi-disciplinary clinic adjustment is applied together with, and is additive to, the Indigenous adjustment.

6.2.4 Price weights and NWAU

The cost parameters are converted to cost weights by dividing each by the reference cost for the acute admitted cost model. These cost weights are then converted to the price weights used to assign NWAU.

As set out in the NEP15 Determination, the price of an ABF non-admitted activity is calculated using the following formula with adjustments as applicable.

Price of a non-admitted ABF Activity =

$$\{PW \times (1 + A_{Ind} + A_{NMC})\} \times NEP$$

Where:

A_{Ind}	means the <i>Indigenous Adjustment</i>
A_{NMC}	means the non-admitted <i>Multidisciplinary Clinic Adjustment</i>
NEP	National Efficient Price 2015-16
PW	means the Price Weight for an ABF Activity as set out in the Appendix H (for admitted acute), Appendix I and J (for admitted subacute and non-acute), Appendix K (for non-admitted), Appendix L (for emergency department) or Appendix M (for emergency services)

6.3 Assigning NWAU for non-admitted care

NWAU are assigned to non-admitted care on the basis of the Tier 2 clinic providing the care.

The steps involved in assigning NWAU to non-admitted activity are illustrated in Figure 10. The data preparation and NWAU calculation stages are combined together in the following section.

6.3.1 Data preparation and calculation of NWAU

This section details how to assign NWAU to in-scope non-admitted patient data. The data preparation and NWAU calculation process is illustrated in Figure 10.

The process is broken into four steps, each requiring variables created in previous steps, with the final step resulting in a variable containing the 2015-16 NWAU. The process requires the three input datasets or tables referred to in Table 17.

Figure 10: Assigning NWAU to non-admitted patient data

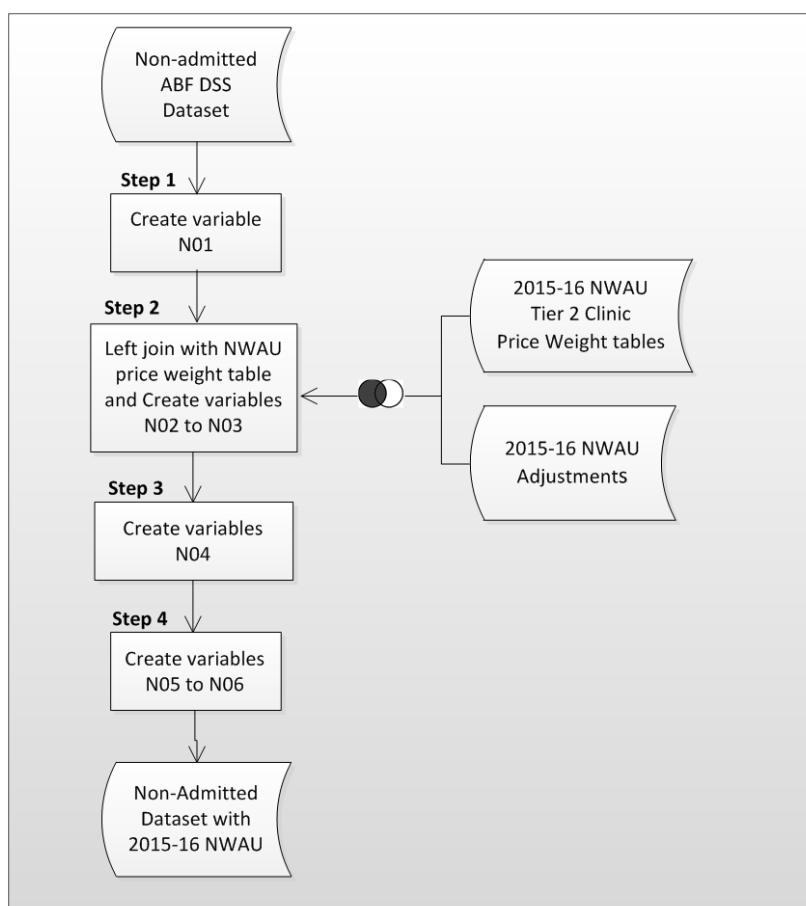


Table 17: Dataset and tables required for assignment of NWAU to non-admitted patient data

Input dataset or table	Description
Non-admitted patient ABF DSS Dataset	Dataset based on the 2015-16 Non-admitted patient ABF Data Set Specifications located on the IHPA website.
2015-16 NWAU Price Weight table	2015-16 Non-Admitted NWAU Price Weight table, found in the NEP15 Determination.
2015-16 NWAU Adjustments	2015-16 Non-Admitted NWAU Adjustments, found in the NEP15 Determination.

Five variables are required to form the input non-admitted dataset:

- a. Establishment Identifier;
- b. Indigenous status;
- c. Multiple health care provider indicator (see NEP15 Determination);

- d. Outpatient clinic type Tier 2 (Version 4.0); and the
- e. Funding source.

These variables form part of the Non-Admitted Patient ABF Data Set Specifications on the IHPA website.

Table 18 details the variables created in the process of assigning NWAU to non-admitted patient data.

Table 18: Assigning NWAU to non-admitted patient data – variable definitions

Step	Variable	Name	Description	Definition
Step 1	N01	_pat_ind_flag	Indigenous patient flag	1 if Patient Indigenous Status = 1, 2 or 3; else 0.
Step 2	N02	clinic_pw	See definition	Tier 2 Clinic price weight, taken from NWAU Price Weight table.
	N03	adj_indigenous	See definition	Indigenous adjustment from NWAU Adjustment table.
Step 3	N04	Error_Code	See definition	Outlines Errors in calculations
Step 4	N05	GWAU15	Gross Weighted Activity Unit	$clinic_pw * (1 + adj_indigenous + adj_multiprov^*)$
	N06	NWAU15	National Weighted Activity Unit	GWAU15 for inscope funding sources

* Multidisciplinary adjustment from NWAU Adjustment table.

7 Cost model for block funded hospitals

7.1 General issues

7.1.1 Cost unit

The cost unit is a hospital.

7.1.2 Scope

Hospitals are in-scope if they have been nominated by a jurisdiction and meet the criteria for block funded hospitals.

The draft criteria has been amended this year to define the threshold for small rural hospitals as 3500 total NWAU, rather than as 3500 inpatient NWAU per annum, as was for 2014-15 (NEC14).

The draft criteria for block funded hospitals ([Attachment D](#)) are being submitted to the COAG Health Council for approval.

7.1.3 Classification

For both the 2013-14 NEC (NEC13) and NEC14, the cost model assigned a size-location cell to each of the nominated block funded hospitals based on the average three year total NWAU and the Australian Statistical Geography Standard (ASGS) Remoteness Area. The cost model for NEC15 excludes 22 hospitals which have been transferred to the ABF price model. The 12 major city and 16 specialist psychiatric hospitals are to be block funded on a separate basis. The remaining 385 small rural hospitals comprise the cost model which has been developed in a different way to the cost model used for NEC14. The key features of the revised cost model are as follows:

- a. A re-defined number of size groups with different thresholds:
 - Group 0: Less than \$0.5 million
 - Group A: 0 - 259.9 NWAU
 - Group B: 260 – 459.9 NWAU
 - Group C: 460 – 659.9 NWAU
 - Group D: 660 – 1049.9 NWAU
 - Group E: 1050 – 1699.9 NWAU
 - Group F: 1070 – 2499.9 NWAU
 - Group G: 2500 – 3500.0 NWAU
- b. A reduced number of locality groups to two regions:
 - Region 1: inner regional, outer regional, remote
 - Region 2: very remote.
- c. Introduction of three hospital-type groups:
 - Type A: hospitals with more than 30 NWAUs of either surgical or obstetric episodes.
 - Type B: hospitals not in Type A that have more than 30% of their total NWAU as acute admitted activity.

- Type C: Other hospitals in Region 1 but not in Types A or B.
- d. Using regression analysis to determine the cost weights.

7.2 Analysis of costs

7.2.1 Data preparation

The approach underpinning IHPA's data preparation process for NEC15 is broadly the same as that used for NEC14, and basically involves:

- a. Extraction of activity data from the IHPA ABF DSS and NPHEd for each block funded hospital and conversion of that data into in-scope NWAUs.
- b. Extraction of patient and aggregate establishment cost data from the NHCDC and aggregate establishment expenditure data from NPHEd.
- c. Pre-modelling the data to determine total in-scope expenditure and to calculate missing values for in-scope block funded hospitals.

The establishment data required to populate the similar 2012-13 cost model table are:

- a. Latest 3-year average of acute admitted and total in-scope NWAU per annum (2010-11 to 2012-13).
- b. Total in-scope establishment expenditure in 2012-13.
- c. Latest 3-year average NWAU assigned to surgical and obstetric delivery DRGs.

The first step is to check the eligibility of hospitals for block funding by ensuring that the latest three-year average of total NWAU is less than 3,500 NWAU per annum for rural hospitals and the acute admitted activity for city hospitals is less than 1800 NWAU per annum.

The NWAU activity measure is calculated first and then the best estimate of 2012-13 in scope expenditure is derived, as set out below. To ensure that only in-scope activity and expenditure are included and the out-of-scope expenditure is excluded, it is necessary to calculate the in-scope activity per ABF product stream first and then estimate the in-scope expenditure for each of those product streams ([Attachment E](#)).

For NEC15, hospitals missing expenditure data are assigned their published NEC14 value (for 2011-12) indexed up one year using the year-on-year growth between 2011-12 and 2012-13 of 4.6 per cent.

These hospitals are then treated in the same way as those hospitals with both cost and activity data for the purposes of determining its 2012-13 model average cost and 2015-16 establishment efficient cost, discussed in Section 7.3.

In-scope Activity

Acute and subacute admitted NWAU

Patient-level admitted data is available for all but a few hospitals in the IHPA ABF DSS.

The patient-level admitted data has been fed through the NEP14 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 2012 in order to determine the NWAU associated to the portion of the episodes occurring in 2012-13.

For the few hospitals that do not supply patient level admitted data, the NWAU needs to be calculated from NPHEd establishment level data. The only available information on admitted activity is the inpatient fraction (I-frac) which when multiplied by the total NPHEd expenditure gives the estimated expenditure on admitted activity. The number of admitted NWAU is calculated by multiplying this amount by the acute multiplier of 0.000175 NWAU per in-scope admitted dollars.

- The acute multiplier is derived by the regression slope of a plot of NWAUs (using the NEP14 NWAU calculator) versus I-frac dollar amount for block funded hospitals that have patient-level data.

ED in-scope NWAU

Less than one per cent of block funded hospitals with ED activity reported at the patient level. Approximately 51 per cent report aggregate presentation information at the UDG level and where available, these data are used to determine NWAU values utilising the NEP14 price weights.

Where ED data is not available from the IHPA datasets for a particular hospital, the establishment level count of ED presentations is extracted from the NPHEd. The NWAU for a particular hospital is calculated by multiplying the count of ED presentations by the ED multiplier of 0.0925 NWAU per NPHEd ED presentation.

The ED multiplier is derived by the regression slope of a plot of NWAUs (using the NEP14 NWAU calculator) versus NPHEd ED presentation for all those many hospitals that have patient-level or UDG-level data.

The ED multiplier can be calculated with a high-level of statistical confidence because the sample size still comprises about half the total number of block funded hospitals.

Non-admitted in-scope NWAU

About 14 per cent of block funded hospitals with non-admitted activity reported at the patient level. About 73 per cent report aggregate service event information at the clinic level and where available, these data are used to determine NWAU values utilising the NEP14 price weights.

Where non-admitted data is not available from the IHPA datasets for a particular hospital, the establishment level counts of non-admitted occasions of service are extracted from the NPHEd. The NWAU for a particular hospital is calculated by multiplying the count of non-admitted occasions of service by the non-admitted multiplier of 0.026 NWAU per NPHEd non-admitted occasion of service.

The non-admitted multiplier is derived by the regression slope of a plot of NWAUs (using the NEP14 NWAU calculator) versus NPHEd non-admitted occasions of service for those hospitals (about half the total) that have patient-level or clinic-level data.

The non-admitted multiplier can be calculated with a high level of statistical confidence because the sample size still comprises 87 per cent of the total number of block funded hospitals.

In-scope Expenditure

Depreciation is excluded from both the NHCDC and NPHEd reports of expenditure.

Multipurpose Services (MPS) expenditure is excluded from the NPHEd total expenditure except where the jurisdictions have advised that MPS amounts were already excluded in the NPHEd reported expenditure.

Acute and subacute admitted expenditure

A key principle adopted in the calculation of in-scope expenditure is to rely primarily on the NPHEd reported expenditure. The expenditure against admitted activity is calculated by multiplying the I-frac by the adjusted total NPHEd expenditure.

The private patient adjustments and the exclusion of DVA and compensables expenditure are calculated using the patient level data. These adjustments are only enacted to the extent that the patients can be identified.

ED and non-admitted in-scope expenditure

The ED and non-admitted in-scope expenditure is also taken primarily from the NPHEd expenditure data. The non-inpatient fraction of total NPHEd expenditure comprises:

- a. In-scope ED expenditure;
- b. In-scope non-admitted expenditure; and
- c. Out-of-scope expenditure.

The challenge is to separate out the out-of-scope expenditure. In the main, the identification of out-of-scope expenditure is done indirectly by estimating the amount of in-scope ED and non-admitted expenditure based on their level of activity. The calculation takes the presumption that the non-inpatient fraction of expenditure is likely to be in respect of only in-scope activity and tests for the fact that it may be substantially over-priced activity. It does this by employing a so-called reasonableness test as follows.

The average \$/public patient equivalent NWAU or WAU (Weighted Activity Unit) for ED and non-admitted for block funded hospitals is calculated on the basis of the in-scope expenditure and WAU14 for those hospitals (involving 94 such block funded hospitals) that have reported in the 2012-13 NHCDC. As most of the block-funded hospitals reporting in the NHCDC are from Queensland, the catchment of hospitals was broadened to include smaller ABF hospitals with less than 15,000 admitted separations. As a consequence, roughly 50 per cent of hospitals used to calculate the \$ per WAU for non-admitted multiplier are from Queensland.

For a particular establishment, the count of ED and non-admitted WAU is multiplied by the respective average \$/WAU amounts to come up with a total \$ amount for the hospital.

- a. If \$ amount based on WAUs is less than 25% of the non-inpatient fraction of total NPHEd expenditure, then only 25% of the latter amount is regarded as ED and NA expenditure.
- b. If \$ amount based on WAUs is less than 50% of the non-inpatient fraction of total NPHEd expenditure, then only 50% of the latter amount is regarded as ED and NA expenditure.
- c. If \$ amount based on WAUs is less than 75% of the non-inpatient fraction of total NPHEd expenditure, then only 75% of the latter amount is regarded as ED and NA expenditure.
- d. If \$ amount based on WAUs is greater than 75% of the non-inpatient fraction of total NPHEd expenditure, then it is all regarded as ED and NA expenditure.

The resulting \$ figure represents total expenditure of in-scope non-admitted services. Private patient adjustments and the exclusion of DVA and compensables expenditure are accounted for on an establishment level using the establishments NWAU/WAU ratio.

This approach results in determining that the NPHED reported expenditure for some 50 per cent of all block funded hospitals is solely in respect of only NHRA in-scope hospital services, as shown in Table 19.

Table 19: Results of determining out-of-scope expenditure by hospital

% on in-scope services	% on out-of-scope services	Count of establishments	% of establishments
25%	75%	49	13%
50%	50%	75	19%
75%	25%	70	18%
100%	0%	191	50%

7.2.2 Calculation of cost parameters

The placement of a hospital in a group is based on the average total NWAU over the three years from 2010-11 to 2012-13; namely, the sum of the NWAU for all acute admitted, subacute, ED, and non-admitted in-scope hospital services, as calculated above.

For NEC15, 385 hospitals have been designated as block funded, with 16 of these hospitals being treated separately as specialist psychiatric establishments and 12 major city hospitals. The 385 block funded hospitals have been grouped by size, type and locality in the NEC15 cost model for the specification of availability and service capacity elements to determine NEC15. The distribution of these 385 hospitals is shown in Table 20.

Table 20: Distribution of block funded hospitals across size-locality cells

Region Group	Type	Volume Group							
		Group 0	Group A	Group B	Group C	Group D	Group E	Group F	Group G
1	A	0	0	0	8	11	22	26	10
	B	0	0	51	34	33	17	5	2
	C	7	68	19	9	5	6	1	0
2		3	6	12	8	9	8	3	2

7.3 Calculation of National Efficient Cost

As previously outlined, the block funded model for NEC15 uses a different size, type and locality model structure than that used for NEC14.

Outliers are treated the same in NEC15 as they were NEC14, as explained in Section 7.3.2.

The NEC15 average model cost for the year is given as a simple average of total expenditure across all model in-scope hospitals. This is reported as the NEC per block funded hospital in the NEC15 Determination. This value is lower than the NEC14 amount principally because the 22 largest rural hospitals have been transferred to the ABF pricing model. Inlier bounds

As for NEC14, the inlier range was limited to those hospitals whose cost ratios sat between the symmetrical boundary points 0.56 and 1.8 inclusive. The thresholds are symmetrical so that a hospital that is twice the cost of the mean gets treated in a similar way to a hospital that has a cost of half the mean.

7.3.1 Calculation of the efficient cost for a particular hospital

The efficient cost of an inlier, in-scope block funded hospital is given by the availability payment for the hospital's size-type cell. This cost is determined by a regression of the form

$$\ln(\text{inscope expenditure}) = s + t,$$

for each region, where s and t are parameters associated to each hospital's size and type respectively.

Outliers and specialist psychiatric hospitals are treated separately to the 385 rural hospitals within the model and are addressed further in Sections 7.3.3.

Outliers

Hospitals with cost ratios that fall outside the prescribed cost ratio boundaries, 0.56 and 1.8, referred to as cost outliers, and are prescribed capped cost ratios.

Hospitals with a cost ratio greater than 1.8 are assigned an efficient cost equal to its actual cost divided by 1.8.

$$CR > 1.8 \quad \text{efficient cost} = \frac{\text{actual Cost}}{1.8}$$

Hospitals with a cost ratio less than 0.56 are assigned an efficient cost equal to its actual cost multiplied by 1.8 (or divided by 0.56).

$$CR < 0.56 \quad \text{efficient cost} = \text{actual cost} \times 1.8$$

Hospitals missing data

Hospitals missing activity and/or cost data are also accounted for in the model based on the following rules:

- Hospitals missing activity data are prescribed a group that most closely matches their reported cost, where available.
- Hospitals missing cost data are assigned their NEC14 equivalent 2012-13 cost.

These hospitals are then treated in the same way as hospitals reporting adequate data for the purposes of determining their 2012-13 and 2015-16 efficient costs.

7.3.2 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 the NEC14 efficient cost has been escalated by the NEC15 indexation rate to become the NEC15 efficient cost for each of these hospitals.

For the purposes of NEC15, these hospitals are priced after consultation with jurisdictions. Subject to this advice, their prices are set at their actual cost for 2012-13 or 2013-14, and are indexed at the same rate applied to the in-scope hospitals in the 2012-13 cost model for NEC15. Indexation is described in further detail in Section 7.4.

The 2015-16 efficient costs for the 12 major city hospitals will be determined separately in a similar way, following consultation with jurisdictions.

7.4 Indexation of the 2012-13 Model

Given the three year time lag in data collection from the year the NEC is being calculated, cost model results for 2012-13 must be appropriately indexed over three years to give a price model for 2015-16.

The indexation to grow the 2012-13 cost model to the 2015-16 price model used to determine NEC15 has been calculated following a broadly similar methodology as that used for NEC14 (and NEP13, NEP14 and NEP15).

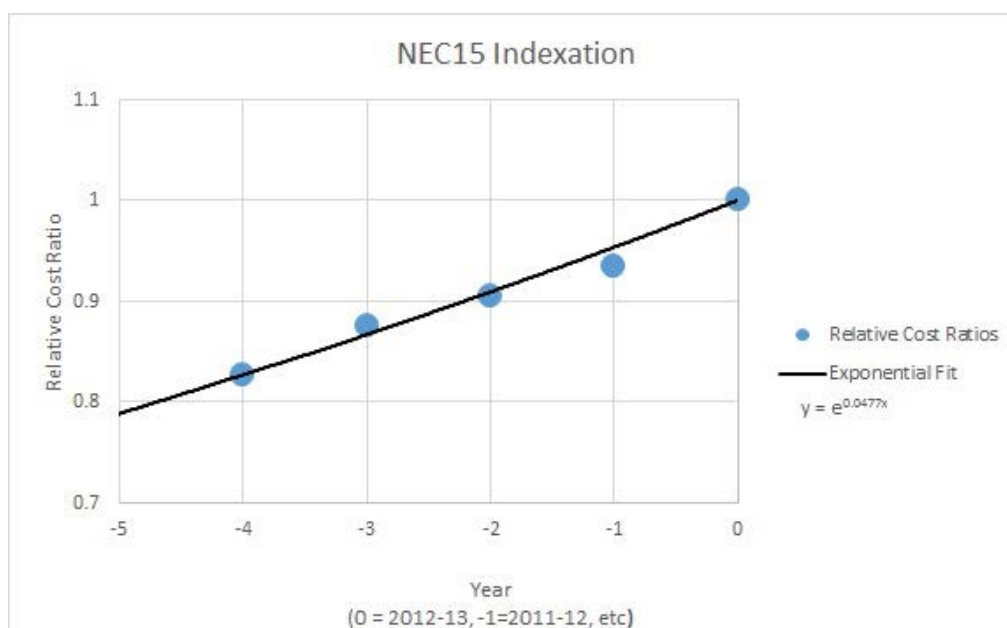
Of note, the indexation of the model is based on the growth of the NPHEd I-frac of expenditure of all block funded hospitals (rather than total in-scope expenditure) which has been reasonably stable over past years. This also takes into account that almost all inpatient activity reported is in-scope (after removal of MPS-related expenditure). The I-frac of expenditure has been approximately 60 per cent of the total in-scope expenditure of block funded hospitals.

Using the I-frac of the NPHEd expenditure to calculate the historical growth experienced by block funded hospitals mirrors the methodology used in determining the indexation of the NEP from the acute admitted program. Except where NEP patient-level input data is used, hospital level data is used for the purposes of the NEC.

The indexation rate is given by the slope of the exponential line of best-fit at Figure 11.

The overall 2012-13 model average-spend was projected to 2015-16 using the annual indexation factor as specified in the NEC15 Determination.

Figure 11: NEC15 Indexation



7.5 Backcasting

IHPA's backcasting policy states that IHPA will determine backcasting multipliers for each service category (i.e. admitted, subacute etc.) and for each state/territory.

Backcasting applies when there has been a significant change in the classification or costing methodologies used to determine the NEC from the previous year. For NEC15, the need to backcast was substantiated by the number of significant changes to the methodology used in its determination.

These changes are:

- a. The transfer of the 22 largest rural hospitals to the ABF cost model. In the calculation of growth these hospitals are excluded from the backcast NEC14 as their growth is calculated within the ABF stream (see Section 1.1).
- b. Substantial methodological changes to the cost model (e.g. regression modelling etc.) (see Section 7.3).
- c. Updating the NWAU13 calculator to the NWAU14 calculator.
- d. Introduction of NWAU adjustments to take account of work-in-progress to estimate NWAUs for services delivered in the financial year.
- e. Removal of New South Wales ED-only separations from the acute admitted stream.

State/territory-specific backcasting multipliers for the changes above are derived by applying the NEC14 methodology to the NEC15 data.

The draft backcasting multiplier for each state/territory is provided in the NEC15 Determination and is used to calculate the growth in efficient cost for the 385 block funded hospitals in the cost model. The 12 major city block funded hospitals and the 16 specialist psychiatric hospitals are excluded from the backcasting process explained in this section. The calculation of growth in efficient cost for these hospitals is merely the difference between the 2014-15 agreed cost and the 2015-16 agreed cost.

Attachments

Attachment A – Summary of 2012-13 input data	62
Attachment B – Development of the National Pricing Model	63
Attachment C – List of the 21 DRGs to be converted to L1.5H1.5	74
Attachment D – Draft eligibility criteria of block funded hospitals	75
Attachment E – NEC15 Data Preparation	76

Attachment A – Summary of 2012-13 input data

Table 1. Summary of 2011-12 and 2012-13 Patient-Costed NHCDC data (ABF hospitals)

	Establishments			Activity (Separations/Episodes)			Total Reported In-scope Cost		
	2011-12	2012-13	% Change	2011-12	2012-13	% Change	2011-12	2012-13	% Change
Acute Admitted	194	211	8.8%	4.3M	4.6M	6.6%	\$19.9B	\$21.4B	7.4%
Emergency	136	152	11.8%	5.3M	5.7M	7.4%	\$3.1B	\$3.3B	5.4%
Non-admitted	83	149	79.5%	9.4M	11.9M	26.4%	\$3.0B	\$3.7B	20.4%
Subacute	182	206	13.2%	151,272	159,992	5.8%	\$1.9B	\$2.0B	7.4%

Note: Only the NHCDC activity is used in the non-admitted Cost Model.

Table 2. Summary of 2011-12 and 2012-13 Population data (ABF hospitals)

	Establishments			Activity (Separations/Episodes)		
	2011-12	2012-13	% Change	2011-12	2012-13	% Change
Acute Admitted	242	240	-0.8%	5.0M	4.8M	-2.8%
Emergency	151	156	3.3%	5.8M	6.0M	3.8%
Non-admitted						
Subacute	232	229	-1.3%	166,766	176,549	5.9%

Table 3. Costed (NHCDC) sample as proportion of total population

	Establishments		Activity (Separations)	
	2011-12	2012-13	2011-12	2012-13
Acute Admitted	80.2%	87.9%	87.2%	95.6%
Emergency	90.1%	97.4%	91.7%	94.9%
Non-admitted				
Subacute	78.4%	90.0%	90.7%	90.6%

Note: Only the NHCDC activity is used in the non-admitted Cost Model.

Attachment B – Development of the National Pricing Model

Contents

1. Purpose.....	64
2. Overview.....	64
3. Identification of out of scope costs	65
4. Derivation of a reference cost	65
5. Indexation	67
6. Transformation of cost model to pricing model	72

1. Purpose

The purpose of this Attachment is to explain the steps undertaken to transform the historical cost and activity data into the National Pricing Model, which includes the National Efficient Price (NEP), Price Weights and Adjustments.

2. Overview

The 2015-16 National Pricing Model is the fourth annual pricing model that IHPA has produced. Each pricing model comprises a National Efficient Price (NEP), Price Weights and Adjustments, and each is based on cost and activity data from three years prior: the 2015-16 pricing model is based on 2012-13 cost and activity data.

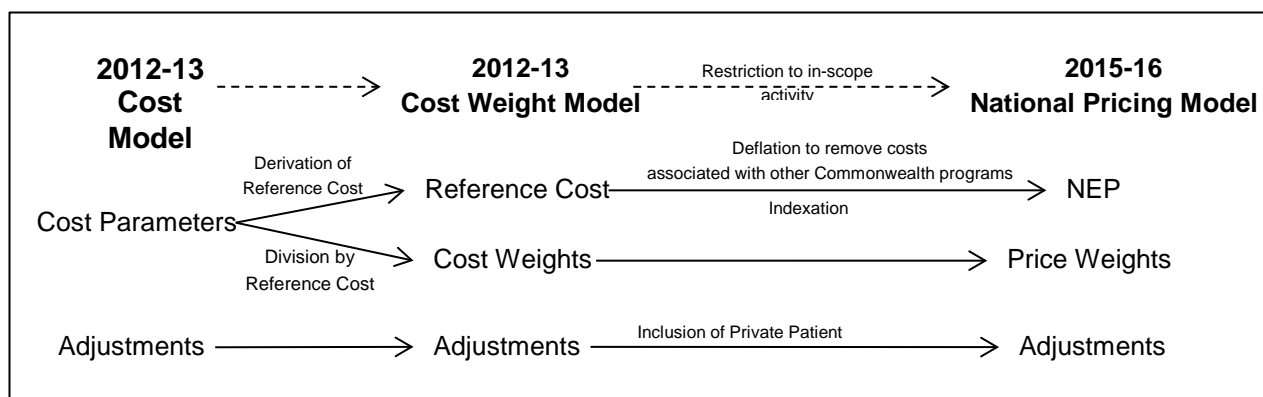
The cost and activity data for each of the historical years are used to derive a cost model for that year, with only those costs and activity from activity based funding (ABF) establishments being used. The cost model is designed to ensure that the total model costs are equalised with the estimated total 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 ICU adjustment, but excluding 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 3).

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

1. Identification and exclusion of costs and activity regarded under the National Health Reform Agreement as out of scope for the purpose of ABF.
2. Derivation of a reference cost (or standardised mean) used to transform the cost model into a cost weight model.
3. 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.
4. Transformation of the cost model to the pricing model using the results of the previous three steps.

Figure 1 summarises this process of transforming the 2012-13 Cost Model to the 2015-16 National Pricing Model.

Figure 1: Process of transforming the 2012-13 Cost Model to the 2015-16 National Pricing Model

3. Identification of out of scope costs

The first step in the process of transforming cost model to pricing model involves the identification of out of scope costs, such as those associated with programs covered entirely or in part by other Commonwealth funding. These out of scope costs can be separated into three groups:

1. Costs associated with out of scope activity, including activity delivered to out of scope patient types such as DVA, Defence and Compensable, and activity not regarded as from an in-scope service type, such as that delivered through out of scope non-admitted Tier 2 Clinics.
2. Those proportions of costs associated with private patients that are offset by non-government and Commonwealth revenue.
3. Costs associated with other Commonwealth programs that are inherent within the cost data but not identifiable at a patient level, such as the Highly Specialised Drugs program and Pharmacy Reform Agreements.

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

1. Group 1 costs are excluded by simply restricting the cost model to in-scope activity.
2. Group 2 costs are excluded through the implementation of the private patient service adjustment and private patient accommodation adjustment within the pricing model.
3. Group 3 costs are excluded by first calculating the costs as a percentage of estimated total costs, and then deflating the cost model by this percentage.

4. 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 acute admitted activity in-scope for ABF. In particular, this activity excludes the Group 1 out of scope costs discussed in Section 3.

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 acute admitted 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 (i.e. case-mix 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 case-mix between 2009-10 and 2010-11. Similarly, the 2012-13 reference cost represents the change in unit cost between the 2011-12 and 2012-13 cost models, excluding the effect of any changes in case-mix between 2011-12 and 2012-13.

To exclude the external effects of case-mix change between years, the two cost models are compared by first applying them to a common set of activity, namely 2012-13 acute admitted 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. 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 2011-12 and 2012-13 cost models is standardised against 2012-13 activity.

Table 1 shows the mean model costs of each model based on their application to the 2012-13 ABF activity along with the resulting standardised growth rate.

Table 1: Mean model costs when each cost model is applied to 2012-13 in-scope acute admitted activity data, and resulting standardised growth rate

2011-12 cost model	2012-13 cost model	Standardised growth rate
\$4,556	\$4643	1.9%

Finally, the 2012-13 reference cost is defined as the 2011-12 reference cost indexed by the standardised growth rate; that is, the 2012-13 reference cost:

$$\begin{aligned}
 &= (2011-12 \text{ reference cost}) \times (\text{standardised growth rate}) \\
 &= \$4,464 \times 101.9\% \\
 &= \$4,549
 \end{aligned}$$

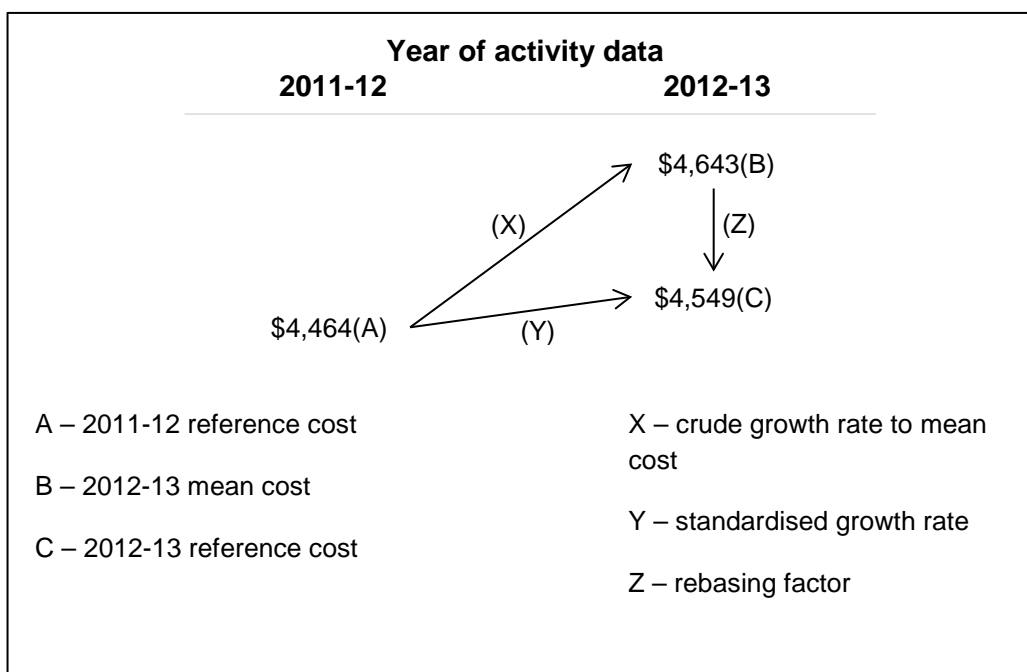
Both 2011-12 and 2012-13 reference costs are given in Table 2.

Table 2: Reference costs for 2011-12 and 2012-13 cost models

2011-12 cost model	2012-13 cost model
\$4,464	\$4,549

The conversion of the 2012-13 unadjusted mean model cost given in Table 1 to the 2012-13 reference cost given in Table 2 (i.e. \$4,643→\$4,549) is often referred to as ‘rebasing’. Figure 2 illustrates this rebasing process in the context of the derivation of the 2012-13 reference cost.

Figure 2: Derivation of 2010-11 reference cost



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

1. The change in reference costs represents change in unit costs excluding the effect of any changes in case-mix; and
2. The 2011-12 and 2012-13 cost weight models give the same total weighted volume when applied to the 2012-13 activity data on which the standardised growth rate is derived.

5. 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 2015-16 pricing model, the objective is to derive an annual indexation rate that is used to inflate the 2012-13 cost model over three years to a level reflective of estimated 2015-16 costs.

To derive this rate, the 2012-13 cost model is applied retrospectively to the five years of patient costed acute admitted activity data²⁴ up to 2012-13, and comparisons are made between actual and model costs to determine the scaling of the 2012-13 cost model required to equalise each

²⁴ That is, activity from patient costed sites within the National Hospital Cost Data Collection (NHCDC).

year’s model costs and actual costs. The trend of these scaling factors from 2008-09 to 2012-13 is then projected to model the indexation rate for the following three years.

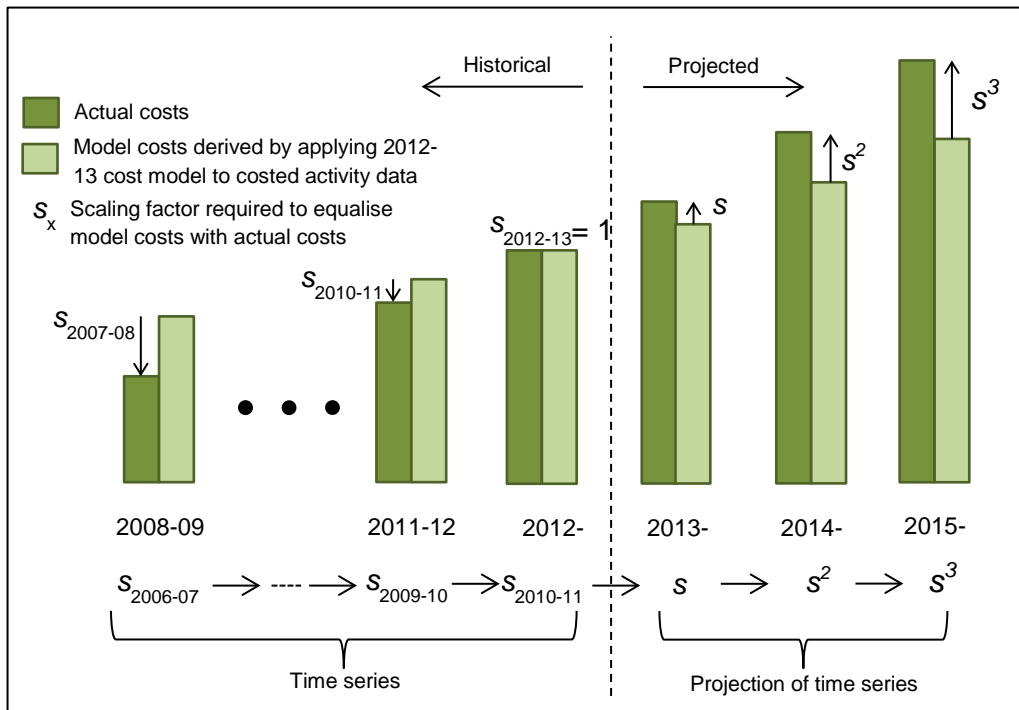
Figure 3 illustrates the 2012-13 cost model applied to patient costed acute admitted activity data and shows the scaling factors required to ensure the model costs are equalised with actual costs. Since the 2012-13 cost model itself is equalised against 2012-13 actual costs, the scaling factor for 2012-13 is equal to 1 (i.e. no scaling required). Going back through the prior four years of cost data, scaling factors of less than 1 are required to deflate the modelled costs down to the level of the actual costs. This time series of scaling factors

$$S_{2008-09} \rightarrow \dots \rightarrow S_{2012-13}$$

is then used to model an annual scaling factor, denoted s , which would inflate the 2012-13 cost model up to 2015-16 projected actual costs. The indexation rate is then based on this annual scaling factor.

Figure 3 also illustrates the projected annual scaling factor s together with projected actual and model costs. The 2015-16 projected scaling factor of s^3 is pictured alongside projected actual and model costs to illustrate that the 2012-13 cost model would require scaling by s^3 to ensure that the resulting ‘ s^3 -scaled 2012-13 cost model’, when applied to 2015-16 patient costed activity, would estimate the actual costs of the activity.

Figure 3: Illustration of scaling factors required to equalise model and actual costs



Denoting the historical total actual costs of the activity by

$$C_{2008-09, \dots, C_{2012-13}}$$

and denoting the total model costs associated with the 2012-13 cost model applied to each year's costed activity by

$$M_{2008-09, \dots, M_{2012-13},}$$

each year's scaling factor r_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 2012-13 reference cost of \$4549 converts the $\{s_x\}$ time series to the time series of costs per weighted separation, where the weighted separations are determined by 2012-13 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 2012-13 cost ratio of 1.000). 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).

Table 3 shows the year to year changes in cost ratio calculated by applying the 2012-13 cost model to pairs of consecutive years' cost data, ensuring a common set of establishments are present in each pairwise comparison.

Table 3: Year to year changes in cost ratio

2008-09 to 2009-10	2009-10 to 2010-11	2010-11 to 2011-12	2011-12 to 2012-13
107.2%	102.0%	103.3%	100.0%

Table 4 shows the resulting cost ratio time series derived by backcasting the 2012-13 cost ratio of 1.000 using the inverse of the year to year changes given in Table 3. Table 4 also shows the equivalent cost per weighted separation time series, and Figure 4 illustrates the two time series graphically.

Table 4: Cost ratios and costs per weighted separation time series derived by applying the 2012-13 cost model and cost weight model to historical patient costed activity data

	2008-09	2009-10	2010-11	2011-12	2012-13
Cost ratio	0.884	0.948	0.967	1.000	1.000
Cost per weighted separation	\$4,023	\$4,312	\$4,400	\$4,548	\$4549

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 3.

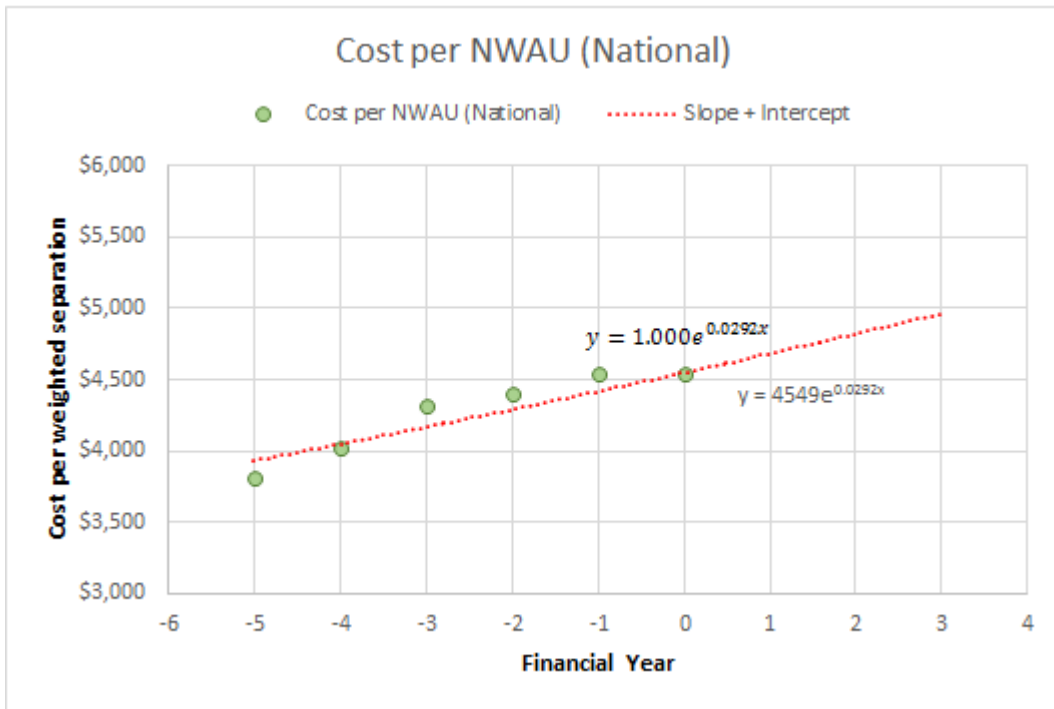
Given that the inflation factor s being modelled is an annual growth rate (i.e. $s \approx s_{x+1} / s_x$) as opposed to an arithmetic change each year (i.e. $s_{x+1} - s_x$), the line of best fit is taken to have an exponential form. In other words, an exponential form is chosen because exponential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

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

The exponential line of best fit is also modelled so that it passes through the 2012-13 observation to ensure that the resulting annual scaling factor applies to the 2012-13 cost ratio of 1 (or equivalently, to the 2012-13 reference cost of \$4549).

The time series and associated exponential line of best fit are shown in Figure 4. The two equations displayed in Figure 4 represent the exponential line expressed in terms of the cost ratio time series and the cost per weighted separation time series.

Figure 4: Time series of cost ratio and cost per weighted separation with exponential line of best fit



Note that although the two equations in Figure 4 have different coefficients multiplying the exponential function (i.e. 1.000 and \$4549), both have precisely the same coefficient inside the exponential function (i.e. 0.0292). The two different coefficients multiplying the exponential function represent the estimated cost ratio and cost per weighted separation in ‘year zero’ (i.e. $x = 0$), which is 2012-13. That is, the regression modelled cost ratio for 2012-13 is 1.000 and the modelled cost per weighted separation for 2012-13 is \$4549.

The regression modelled estimates of cost ratio and cost per weighted separation for each of the years from 2007-08 to 2012-13 are given by substituting $x = -4, \dots, 0$ into the equations. For example, substituting $x = 0$ into the equations results in the 2012-13 cost ratio and cost per weighted separation:

$$\begin{aligned}
 2012 - 13 &= (2012 - 13 \text{ reference cost}) \times (\text{standardised growth rate}) \\
 &= \$4549 \times 103.0\% \\
 &= \$4685
 \end{aligned}$$

And

$$\begin{aligned}
 2012 - 13 \text{ Cost per Weighted Separation} &= \$4549 \times e^{(0.0292 \times 1)} \\
 &= \$4549e^{0.0292} \\
 &= \$4684
 \end{aligned}$$

Finally, the annual scaling factor (i.e. s in Figure 3) 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 $s = e^{0.0292}$, which is equal to 1.030, or 103.0 per cent. Therefore the indexation rate is 3.0 per cent.

Transformation of cost model to pricing model

The final step in the process of developing the pricing models uses the three steps detailed in Sections 3, 4 and 5 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 5 with those out of scope costs defined in Section 3 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 4 plays its role.

To describe the process in the context of the 2015-16 National Pricing Model first the 2012-13 cost model is transformed into a cost weight model by dividing it through by the 2012-13 reference cost of \$4,549 (see Section 4). The 2012-13 cost model is then represented by a reference cost, cost weights and adjustments.

The inflation of the 2012-13 cost model to estimated 2015-16 costs is then undertaken by inflating the 2012-13 reference cost by the annual indexation rate defined in Section 5 and keeping the cost weights and adjustments fixed. The indexed 2012-13 reference cost is \$4971.

The indexed 2012-13 reference cost together with the 2012-13 cost weights and adjustments then represent the estimated 2015-16 cost model. Example 1 demonstrates how this process of indexing the reference cost and keeping the cost weights fixed has the same effect as indexing the entire cost model, as is done in Section 5.

Example 1: Two equivalent methods to derive estimated 2015-16 costs - DRG E42C - Bronchoscopy, Same day

The 2012-13 cost parameter associated with E42C is \$1,765. Applying the annual indexation rate of 3.0% to the 2012-13 cost, the estimated cost of E42C in 2015-16 is given by

$$\begin{aligned} \text{2015-16 estimated cost of E42C} &= (\text{2012-13 estimated cost}) \times (\text{indexation}) \\ &= \$1,765 \times (103.0\%)^3 \\ &= \$1928. \end{aligned}$$

On the other hand, the cost weight associated with E42C is 0.3879 (= \$1,765 / \$4,579). Applying the annual indexation rate to the 2012-13 reference cost, the resulting estimated cost of E42C in 2015-16 is given by

$$\begin{aligned} \text{2015-16 estimated cost of E42C} &= (\text{2012-13 cost weight}) \times (\text{indexed reference cost}) \\ &= 0.3879 \times (\$4,549 \times (103.0\%)^3) \\ &= 0.3879 \times \$4971 \\ &= \$1928. \end{aligned}$$

The final step in transforming the 2012-13 cost model to the 2015-16 National Pricing Model is the removal of the out of scope costs. As detailed in Section 3, there are three ways in which these costs are removed: restriction of the pricing model to in-scope activity and application of the private patient service and accommodation adjustments.

The exclusion of the first group of out of scope costs, which involves the restriction of the pricing model to in-scope activity, places conditions on how the pricing model is applied and does not play a direct role in the transformation of the cost model to pricing model.

The exclusion of the second group of out of scope costs, which involves the application of the private patient service and accommodation adjustments, transforms the cost model to a pricing model by extending the set of adjustments that apply in the cost model to include these two adjustments.

Attachment C – List of the 21 DRGs to be converted to L1.5H1.5

DRG	DRG Description
A01Z	Liver Transplant
A06A	Tracheostomy W Ventilation >=96hrs W Catastrophic CC
A06B	Ventilation >=96hrs and OR Proc (W/O Tracheostomy or W/O Cat CC)
A06C	Tracheostomy W/O Ventilation >=96hrs, or Ventilation >=96hrs W/O OR Proc
A10Z	Insertion of Ventricular Assist Device
B61A	Spinal Cord Conditions W or W/O OR Procedures W Catastrophic or Severe CC
B82B	Chronic and Unspec Para/Quadriplegia W or W/O OR Proc W Cat CC
E42A	Bronchoscopy W Catastrophic CC
F40A	Circulatory Disorders W Ventilator Support
I01A	Bilateral and Multiple Major Joint Proc of Lower Limb W Revision or W Cat CC
I12A	Misc Musculoskeletal Procs for Infect/Inflam of Bone/Joint W Cat CC
J60A	Skin Ulcers W Catastrophic CC
P02Z	Cardiothoracic and Vascular Procedures for Neonates
P04A	Neonate, AdmWt 1500-1999g W Significant OR Proc W Multiple Major Problems
P05A	Neonate, AdmWt 2000-2499g W Significant OR Proc W Multiple Major Problems
P06A	Neonate, AdmWt >=2500g W Significant OR Procedure W Multiple Major Problems
P06B	Neonate, AdmWt >=2500g W Significant OR Procedure W/O Multiple Major Problems
P61Z	Neonate, AdmWt <750g W/O Significant OR Procedure
R01A	Lymphoma and Leukaemia W Major OR Procedures W Catastrophic or Severe CC
R02A	Other Neoplastic Disorders W Major OR Procedures W Catastrophic CC
R60A	Acute Leukaemia W Catastrophic CC

Attachment D – Draft eligibility criteria of block funded hospitals

The following draft eligibility criteria for block funded hospitals have been submitted to COAG for consideration.

Public hospitals, or public hospital services, will be eligible for block grant funding if:

- a) The technical requirements for applying activity based funding (ABF) are not able to be satisfied; and/or
- b) There is an absence of economies of scale that mean some services would not be financially viable under ABF.

Examples of circumstances which may meet the criteria proposed above include, for each of the criteria:

Inability to satisfy technical requirements

ABF may be impractical in situations where there is:

- No or poor product specification/classification, meaning that there is no basis for differentiating/describing the 'product' that is to be priced; and/or
- No or poor costs associated with any product classification, or where there is no cost homogeneity of the product classification; and/or
- No suitable 'unit of output' for counting and funding the product, such as a well-defined occasion of service, episode of care, or bed-day, amongst others.

Absence of economies of scale/lack of financial viability

ABF may be impractical in situations where there is:

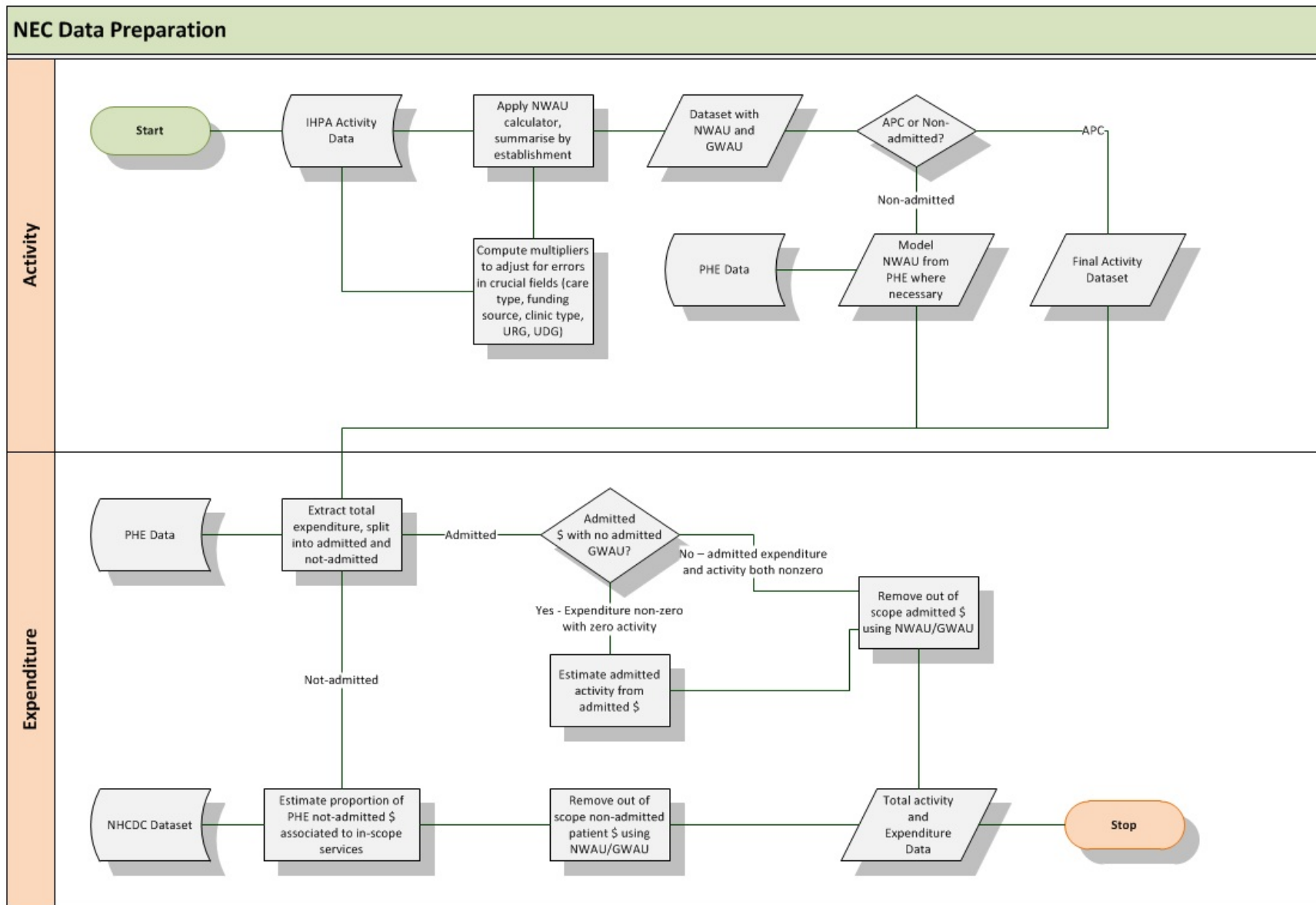
- A low volume of services, with an outcome being that the costs of keeping the health service open and 'available' exceed the funding that would be able to be achieved under ABF payments;
- Instability or unpredictability in service volumes, accompanied by an inability to manage input costs in accordance with changing service patterns; and
- A skewed profile of services and/or costs.

Other considerations

IHPA is also releasing some indicative guidelines on 'low volume' thresholds that might form part of draft Block Funding Criteria for use from 2013-14. Under these thresholds, hospitals may be eligible for block funding if:

- They are in a metropolitan area (defined as 'major city' in the Australian Statistical Geography Standard) and they provide $\leq 1,800$ inpatient National Weighted Activity Units (NWAU) per annum; or
- They are in a rural area (defined as all remaining areas, including 'inner regional', 'outer regional', 'remote' and 'very remote' in the Australian Statistical Geography Standard and they provide $\leq 3,500$ total NWAU per annum.

Attachment E – NEC15 Data Preparation





IHPA

Independent Hospital Pricing Authority

Level 6, 1 Oxford Street Sydney NSW 2000 PO Box 483 Darlinghurst NSW 1300

P +61 2 8215 1100 F +61 2 8215 1111