Independent Hospital Pricing Authority

Australian Refined Diagnosis Related Groups Version 11.0 Final Report

February 2022

IHPA

Australian Refined Diagnosis Related Groups Version 11.0 Final Report

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Acronyms and Abbreviations

ABF	Activity Based Funding
ACHI	Australian Classification of Health Interventions
ACS	Australian Coding Standards
ADRG	Adjacent Diagnosis Related Group
AR-DRG	Australian Refined Diagnosis Related Groups
CAC	Clinical Advisory Committee
CCAG	Classifications Clinical Advisory Group
DCL	Diagnosis Complexity Level
DRG	Diagnosis Related Group
DTG	DRG Technical Group
ECC	Episode Clinical Complexity
ECCS	Episode Clinical Complexity Score
GIs	General Interventions
ICD-10-AM	International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification
IHPA	Independent Hospital Pricing Authority
MDC	Major Diagnostic Category
RID	Reduction in deviance

Executive Summary

The Independent Hospital Pricing Authority (IHPA) is responsible for the development of the Australian Refined Diagnosis Related Groups (AR-DRGs) classification. AR-DRGs group together treatments and services provided for admitted acute care to enable hospitals to be funded for these services using activity based funding (ABF) arrangements. AR-DRG Version 11.0 (AR-DRG V11.0) has been developed in consultation with clinicians, jurisdictions and other health sector stakeholders.

AR-DRG Version 11.0 has been finalised following clinical and statistical analysis and in consultation with clinicians, jurisdictions and other health sector stakeholders. This report outlines the changes made for AR-DRG V11.0 and details the refinement process and rationale for changes.

Changes for AR-DRG V11.0 include:

- three new Adjacent Diagnosis Related Groups (ADRGs):
  - ADRG B08 *Endovascular clot retrieval*
  - ADRG F25 *Percutaneous Heart Valve Replacement with Bioprosthesis* (including transcatheter aortic valve replacements (TAVIs) and other percutaneous heart valve replacements)
  - ADRG G13 *Peritonectomy for Gastrointestinal Disorders*.
- limiting of the requirement to use sex as a grouping variable
- correction of an anomaly in the grouping of nail and nail bed procedures for hand and foot intervention ADRGs
- standard refinements aimed at updating the classification for currency using the most recent cost and activity data and include refinement of:
  - codes in scope for contributing to complexity
  - the complexity scoring system
  - the splitting of ADRGs into end classes (DRGs) that reflect different levels of complexity
  - the intervention hierarchy, and a review of
  - episodes that group to ADRG 801 *General Interventions Unrelated to Principal Diagnosis* to determine more appropriate grouping where possible.

Several other potential enhancements were investigated for V11.0 but after analysis and consultation with stakeholders, were not progressed.

AR-DRG V11.0 is anticipated to be released in mid-2022 and used to price episodes of admitted acute patient care from 1 July 2023.

The *AR-DRG V11.0 Final Report* outlines the refinement process, analysis undertaken and the rationale for changes made to the classification for AR-DRG V11.0.

1 Introduction

1.1 AR-DRG classification

IHPA has responsibility for the development of the AR-DRG classification, which groups together treatments and services provided for admitted acute care to enable hospitals to be funded for these services using ABF arrangements. The AR-DRG classification is underpinned by the following disease and intervention classifications and standards:

- International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification (ICD-10-AM)
- Australian Classification of Health Interventions (ACHI)
- Australian Coding Standards (ACS)

Collectively these classifications are known as ICD-10-AM/ACHI/ACS and are used to classify diseases and interventions for all admitted patient episodes of care

ICD-10-AM/ACHI/ACS and AR-DRGs are used in public and private hospitals in Australia to classify admitted acute care. These classifications are now updated every three years to balance currency against the need for stability and to reduce the burden of implementation for stakeholders.

The AR-DRG classification consists of approximately 800 end classes, with each admitted acute episode of care being classified based on diagnoses, interventions and other routinely collected data, such as age, sex, mode of separation, length of stay, newborn admission weight and hours of mechanical ventilation. While the AR-DRG classification is instrumental to ABF, it is also used for many other purposes including performance management, benchmarking, epidemiology and research.

It is anticipated that AR-DRG V11.0 will be released in mid-2022 and used to price admitted acute episodes of care from 1 July 2023. ICD-10-AM/ACHI/ACS Twelfth Edition will be implemented on 1 July 2022.

1.2 Classification process

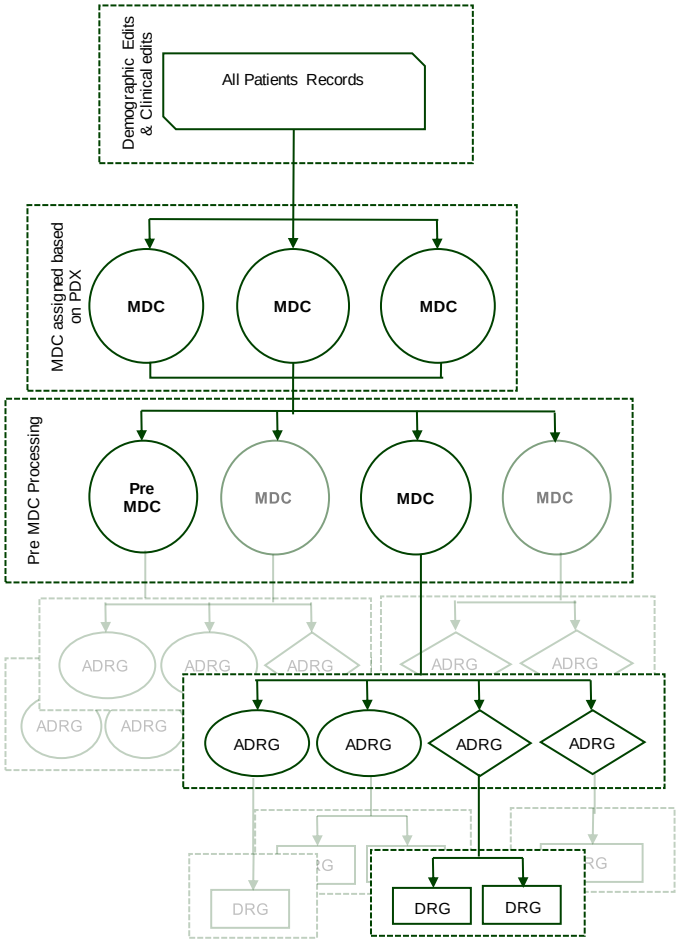
The process of clinical classification, or ‘coding’, involves the translation of information (diagnoses and interventions) from the clinical record of a patient into alphanumeric codes within ICD-10-AM and ACHI.

At the conclusion of a patient’s episode of care, a clinical coder reviews the relevant clinical documentation and abstracts information recorded by clinicians to assign codes for the principal diagnosis, additional diagnoses and interventions performed in accordance with guidelines provided in the ACS and other relevant national coding advice.

The AR-DRG classification uses the ICD-10-AM and ACHI codes along with other routinely collected data from the episode of care, to assign an end class – a diagnosis related group (DRG). Software containing the AR-DRG algorithms uses the information from the episode of care and assigns a DRG – this software is known as a ‘grouper’.

A schematic of the DRG assignment process is at Figure 1.

Figure 1: Schematic diagram for DRG assignment



- **Demographic and clinical edits**: These edits check the validity of the data to be used for grouping and include age, sex, separation mode, length of stay, newborn admission weight, hours of mechanical ventilation and same-day status. The edits also validate all diagnosis (ICD-10-AM) and intervention (ACHI) codes, combined with a patient's age and sex. The principal diagnosis is also checked to validate that it is an acceptable principal diagnosis code.

  Potential issues in relation to the validity of the data may result in assignment to one of the three error DRGs:

  - 960Z *Ungroupable*
  - 961Z *Unacceptable Principal Diagnosis*
  - 963Z *Neonatal Diagnosis Not Consistent with Age/Weight*.
- **MDC assignment:** Episodes are assigned to a Major Diagnostic Category (MDC) according to principal diagnosis.
- **Pre MDC processing:** Episodes are assessed as to whether they meet Pre MDC criteria that identifies very high cost episodes and is driven by a specific intervention code that overrides the outcome of the principal diagnosis based MDC assignment.

- **ADRG assignment:** Episodes are assigned to an ADRG mostly according to diagnosis and intervention codes. All MDCs have a hierarchical structure that separates the ADRGs into either the intervention or medical partition.
- **DRG assignment:** Episodes are then assigned to a DRG according to a complexity measure that quantifies relative levels of resource utilisation within each ADRG and is used to split ADRGs into different DRG levels on the basis of resource homogeneity.

1.3 Episode clinical complexity

The AR-DRG classification has a measure in place to estimate the clinical complexity for an episode of care. The Episode Clinical Complexity (ECC) Model was introduced in AR-DRG Version 8.0 and uses ICD-10-AM codes to determine the clinical complexity of an episode. The ECC Model assigns an Episode Clinical Complexity Score (ECCS) to each episode that quantifies relative levels of resource utilisation within each ADRG and is used to split ADRGs into different DRG levels on the basis of resource homogeneity.

The process of deriving an ECCS for each episode begins by assigning a Diagnosis Complexity Level (DCL) value to each diagnosis reported for the episode. DCLs are integers that quantify the levels of resource utilisation associated with each diagnosis, relative to levels within the ADRG to which the episode belongs. DCL values are assigned to principal diagnosis and additional diagnosis codes and range between zero and five.

It should be noted that DCLs measure relative resource utilisation within an ADRG. Therefore, a DCL of zero indicates that the diagnosis is not associated with higher resource utilisation relative to the average level of the ADRG and does not mean that the diagnosis is associated with nil resource use.

In AR-DRG V11.0 there are 11,065 ICD-10-AM codes that are in-scope for receiving a DCL.

Where an ADRG is subdivided, or ‘split’, using a complexity measure, the ECCS determines the DRG an episode of care is assigned to within an ADRG. Occasionally, an ADRG is split using other factors to determine the DRG such as separation mode, length of stay and age.

For example, an episode assigned to ADRG B70 *Stroke and Other Cerebrovascular Disorders* would require an ECCS greater than or equal to 4.0 to be assigned to DRG B70A *Stroke and Other Cerebrovascular Disorders*, *Major Complexity* in AR-DRG V11.0.

DRGs ending in ‘A’ will be the costliest whereas DRGs ending in ‘D’ will be the least costly. For example:

- B70A *Stroke and Other Cerebrovascular Disorders, Major Complexity*
- B70B *Stroke and Other Cerebrovascular Disorders, Intermediate Complexity*
- B70C *Stroke and Other Cerebrovascular Disorders, Minor Complexity*
- B70D *Stroke and Other Cerebrovascular Disorders, Transferred < 5 Days*.

Refer to the *AR-DRG V11.0 Definitions Manual* for ECCS boundaries of ADRGs and the *AR-DRG V11.0 Technical Specifications* for further information regarding the ECC Model and ECCS derivations.

1.4 Additional resources for AR-DRG V11.0

In addition to the *AR-DRG V11.0 Final Report* other resources have been developed to support the use and implementation of AR-DRG V11.0.

1.4.1 AR-DRG V11.0 Technical Specifications

This document accompanies the *AR-DRG V11.0 Final Report*. It provides the methodology and technical specifications used in developing AR-DRG V11.0 including:

- data preparation and modification
- ADRG intervention hierarchy review
- derivation of the ECCS
- ADRG splitting review.

1.4.2 AR-DRG V11.0 Definitions Manual

The *AR-DRG Definitions Manual* is a set of reference documents that details the definition logic for the DRG process performed by the grouper. The manual provides documentation of how particular episodes of care group to DRGs.

While the manual assists with the identification of likely DRG assignments for individual episodes, they are not a substitute for the grouping software that is provided by various vendors under licence from IHPA.

1.4.3 AR-DRG Descriptions File

The *AR-DRG V11.0 Descriptions* can be found on the IHPA website. This includes a full listing of long and short descriptions for MDCs, ADRGs and DRGs.

1.4.4 ICD-10-AM/ACHI/ACS Twelfth Edition

AR-DRG V11.0 is underpinned by ICD-10-AM/ACHI/ACS Twelfth Edition.

2 Development process

2.1 Review of the classification development cycle and processes

In August 2019, IHPA commissioned a review to evaluate the end-to-end processes of the development cycle for the acute care classifications. The key findings of this review have since been published in IHPA's *Consultation and review of the AR-DRG and ICD-10-AM/ACHI/ACS classification systems*[1] and feedback was obtained from the key clinical and technical groups involved in the development of the classifications, along with other jurisdictional representatives and stakeholders who use the classifications.

The review identified that while the classification development cycle was generally functioning adequately, it highlighted four key opportunities for improvement that would provide the most benefit to the health care system and stakeholders that use the classifications:

- extending the development cycle timing
- embedding a principles-based approach to classification development
- streamlining clinical and technical input to the classifications
- enhancing education materials and other materials to support implementation.

In response to the opportunities identified in the review, IHPA has since:

- extended the development cycle from two to three years to balance currency against the need for stability and to reduce the burden of implementation for stakeholders,
- published the *Governance framework for the development of the admitted care classifications*[2] that outlines the principles used to guide the classification development cycle to ensure the classifications are responsive to the needs of the Australian healthcare system,
- explored options to enhance education for the next edition/version of the admitted care classification by developing an engaging, interactive and responsive educational program that has the broadest reach and principally supports the needs of the health information workforce and other users of the classifications.

2.2 Development of work program

In September 2019, IHPA drafted a work program outlining development priorities for AR-DRG V11.0. Stakeholder views on priorities were sought and informed the final work program that was sourced from:

- feedback received from stakeholders on consultations to IHPA's annual Pricing Framework for Australian Public Hospital Services
- areas identified through public submissions

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[1] *Consultation and review of the AR-DRG and ICD-10-AM/ACHI/ACS classification systems* www.ihpa.gov.au/publications/consultation-and-review-ar-drg-and-icd-10-amachiacs-classification-systems

[2] *Governance framework for the development of the admitted care classifications* www.ihpa.gov.au/publications/governance-framework-development-admitted-care-classifications

- issues held over from previous editions of ICD-10-AM/ACHI/ACS and AR-DRG V10.0 development
- issues referred from ICD-10-AM/ACHI/ACS development.

To maintain the clinical currency and robustness of the AR-DRG classification, each new version also includes a standard set of minimum refinements that are key to achieving this goal. These standard reviews follow principles set out in the governance framework, for example diagnosis exclusion, intervention hierarchy and ADRG splitting principles and use the latest activity and cost data to update the AR-DRGs. For AR-DRG V11.0, standard reviews included refinement of:

- codes in scope for contributing to complexity
- the complexity scoring system
- the splitting of ADRGs into end classes (DRGs) that reflect different levels of complexity
- the intervention hierarchy, and a review of
- episodes that group to ADRG 801 *General Interventions Unrelated to Principal Diagnosis* to determine more appropriate grouping where possible.

The work program was reviewed by IHPA's advisory committees and a list of priorities for ICD-10-AM/ACHI/ACS Twelfth Edition and AR-DRG V11.0 were finalised.

2.3 Governance and consultation process

IHPA has two groups that provide clinical and technical advice in regard to the refinement and development of AR-DRGs and to ensure broad consultation on major updates:

- Classifications Clinical Advisory Group (CCAG) – provides expert clinical advice on development proposals across the admitted care classifications. CCAG is composed of clinicians with medical, surgical, emergency, nursing and allied health backgrounds, providing advice that facilitates broad canvassing of clinicians to ensure that there is likely to be general acceptance of the developed proposals. The group has two representatives from IHPA's Clinical Advisory Committee (CAC).
- Diagnosis Related Groups Technical Group (DTG) – provides technical input on AR-DRG development. DTG includes representatives from state and territory health departments, the Commonwealth, Australian Government committees, private hospitals, private health insurers and the New Zealand Ministry of Health.

CCAG and DTG review and provide advice on the proposals for AR-DRG V11.0.

Consultation on refinements to the AR-DRG classification also occurs through IHPA's Technical Advisory Committee, Jurisdictional Advisory Committee, Stakeholder Advisory Committee and CAC.

IHPA also undertook a public consultation during May to June 2021 on major refinements proposed for ICD-10-AM/ACHI/ACS Twelfth Edition and AR-DRG V11.0 to ensure the broadest possible consultation. Fourteen submissions were received, and all submissions are published on IHPA's website (except if specified as commercial in confidence)[3].

[3] *Development of admitted care classifications – Public Consultation* www.ihpa.gov.au/past-consultations/development-admitted-care-classifications

2.4 Data used for AR-DRG Version 11.0

Development of AR-DRG V11.0 was based on 2015–16 to 2018–19 costed public hospital activity data provided by Australian jurisdictions.

IHPA explored the possibility of routinely incorporating costed private hospital activity data into AR-DRG development and presented the results to CCAG and DTG. However, due to the absence of specific costs in the costed private hospital activity data (e.g., medical specialist, pathology, and imaging costs) it has not been used to finalise AR-DRG V11.0. IHPA will continue to work with private sector stakeholders to enhance data quality in private hospital activity data collections.

Where possible, IHPA has incorporated costed private hospital activity data into AR-DRG V11.0 development analysis especially for issues more prevalent within the private hospital setting.

3 AR-DRG Version 11.0

3.1 Endovascular clot retrieval

Endovascular clot retrieval (ECR), also known as mechanical thrombectomy, involves the delivery of a clot retrieval device via a catheter into the cerebral arteries to remove the obstructing clot and restore blood flow to the brain. It may be used in the treatment of acute ischaemic stroke for patients who present within a recommended timeframe from the onset of stroke. The ACHI code to identify ECR episode is listed in **Appendix A**.

A submission to the *Consultation paper on the Pricing Framework for Australian public hospital services 2018–19*[4] highlighted that there has been a steady increase in the number of ECR interventions delivered since 2014 and projections indicate that this trend is likely to continue.

During AR-DRG V10.0 development, initial analysis on ECR was conducted. The analysis did not support creation of a separate ADRG for ECR in V10.0 but recommended that further analysis be undertaken for V11.0 given the likely uptake of ECR in the future, particularly with its Medicare Benefit Schedule (MBS) listing.

In AR-DRG V10.0, ECR episodes group to ADRG B02 *Cranial Interventions* within MDC 01 *Diseases and Disorders of Nervous System*. Analysis demonstrated that the volume of ECR episodes is increasing in recent years, from 417 episodes in 2015–16 to 1,713 episodes in 2018–19. ECR episodes appear to be less expensive than non-ECR episodes, especially within the high complexity DRGs B02A and B02B.

A new ADRG B08 *Endovascular Clot Retrieval* is created for ECR episodes within MDC 01 in AR-DRG V11.0. The ADRG splitting review has selected an optimum threshold of 3, resulting in ‘A’ and ‘B’ DRGs. This will prevent the average cost of ADRG B02 being diluted by ECR episodes, improve the statistical performance of ADRG B02 and MDC 01 as a whole.

3.2 Transcatheter aortic valve implantation

Surgical aortic valve replacement is used to treat obstruction of blood flow across the aortic valve, known as aortic stenosis. For patients who are symptomatic with severe aortic stenosis, a transcatheter aortic valve implantation (TAVI) is a lower risk alternative to open chest surgery for patients meeting treatment criteria.

A public submission noted a difference in cost and length of stay when comparing TAVI procedures with open chest surgery, suggesting a new ADRG would be appropriate for investigating.

During AR-DRG V10.0 development, it was identified that TAVI procedures were grouped to the same ADRG as cardiac valve replacement interventions performed using an open approach. While it has always been recognised that the percutaneous nature of TAVI is not consistent with the other valve interventions in this ADRG, it was considered the best fit for resource homogeneity. It recommended a re-assessment of TAVI episodes in V11.0 in light of the potential increased uptake due to its recent MBS listing.

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[4] *Consultation paper on the Pricing Framework for Australian public hospital services 2018–19* www.ihpa.gov.au/consultation/past-consultations/pricing-framework-australian-public-hospital-services-2018-19

During AR-DRG V11.0 development, IHPA reviewed the classification of TAVI and broadened the review to include all other percutaneous cardiac valve replacement (PCVR) interventions. The ACHI codes for PCVR interventions and their corresponding ADRGs in AR-DRG V10.0 are listed in **Appendix A**.

Analysis demonstrated that the volume of percutaneous heart valve replacement episodes using a bioprosthesis has been increasing and exceeds 200 episodes per year from 2015–16 to 2018–19. This warranted the creation of a separate ADRG for these episodes.

Therefore, a new ADRG F25 *Percutaneous Heart Valve Replacement with Bioprosthesis* was created within MDC 05 in AR-DRG V11.0.

3.3 Peritonectomy

Peritonectomy is the complete removal of a tumour from the peritoneal cavity including removal of part of the bowel. Multiple other organs may also need to be removed including the gall bladder, spleen, stomach, kidney as well as the female reproductive organs (including uterus, ovaries and fallopian tubes). Surgery is followed by treating the surface of the abdominal cavity with heated intraperitoneal chemotherapy

Peritonectomy is a treatment that may be considered for pseudmyxoma peritonei, appendix cancer, colorectal cancer, and peritoneal mesothelioma. It may also be considered for ovarian cancer, gastric cancer, and some other rare cancers as a non-standard but potentially therapeutic treatment. The ACHI codes to identify peritonectomy episode is listed in **Appendix A**.

A public submission was received seeking a review of the grouping of peritonectomy within the AR-DRG classification. It specifically highlighted an issue with the grouping of peritonectomy episodes within MDC 06 *Diseases and Disorders of the Digestive System*. Although this is not the only MDC where peritonectomy procedures are classified.

Analysis demonstrated that the volume of peritonectomy episodes has increased in recent years, from 114 episodes in 2016–17 to 379 episodes in 2018–19. The majority of peritonectomy episodes are grouped to MDC 06 *Diseases and Disorders of the Digestive System* and MDC 13 *Diseases and Disorders of the Female Reproductive System*, with those in MDC 06 being significantly more expensive than those in MDC 13.

Further analysis demonstrated that the peritonectomy episodes in MDC 06 are different to those in MDC 13 in that they are generally reported with hyperthermic intraperitoneal chemotherapy (HIPEC) interventions. However, the majority of peritonectomy episodes in MDC 13 do not have those interventions. CCAG confirmed that this indicated the MDC 06 and MDC 13 contained clinically different cohorts.

A new ADRG in the Pre MDC was considered as a solution due to the cost aspect of peritonectomy, but due to the low volume of episodes the complexity splitting methodology was unable to differentiate higher cost episodes (i.e., those from MDC 06) from lower cost episodes (i.e. those from MDC 13). Due to the volume of peritonectomy episodes within MDC 06 exceeding 200 per year in 2017–18 and 2018–19, a specific ADRG within MDC 06 is created - ADRG G13 *Peritonectomy for Gastrointestinal Disorders* in AR-DRG V11.0. The ADRG splitting review has recommended no split for G13 due to the low volume of episodes within the ADRG.

The low volume of peritonectomy episodes in other MDCs did not meet the criteria to create new ADRGs in other MDCs.

3.4 Nail and nail bed procedures for hand and foot

Two public submissions highlighted a grouping anomaly in MDC 08 *Diseases and Disorders of the Musculoskeletal System and Connective Tissue*, whereby episodes that treat conditions of the hand group to ADRG I20 *Other Foot Interventions*.

There are intervention codes in ACHI that reflect the anatomical site for interventions relating to hand and foot. Two of these are not sufficiently granular to appropriately inform grouping:

- 46486-00 [1636] *Primary repair of nail or nail bed*
- 46489-00 [1636] *Secondary repair of nail or nail bed*.

The anomaly occurs when episodes receive a nail or nail bed repair to the hand but do not have a hand specific principal diagnosis.

IHPA assessed the impact of this grouping anomaly and identified 57 episodes within ADRG I20 from 2016–17 to 2018–19 that appear to have only fingernail repair interventions. The ACHI codes for nail repair are expanded to distinguish fingernail and toenail repairs in ACHI Twelfth Edition as outlined in **Appendix A**.

The Twelfth Edition ACHI codes allow episodes with a nail repair intervention to group to an anatomically appropriate ADRG. The definitions of ADRGs that use nail repair interventions were updated to ensure that fingernail repair interventions are used in hand related ADRGs while toenail repair interventions are used in foot related ADRGs.

3.5 Review of sex edits in the admitted care classifications

The concept of sex that has been collected in the health national minimum data sets (NMDS) is described as the characteristics (e.g., chromosomal, gonadal and anatomical characteristics) associated with biological sex. Where an individual has conflicting biological characteristics, the anatomical characteristics are used to determine their sex for reporting purposes[5].

Feedback indicated that sex may be misreported when patients are not aware of an internal organ or chromosomal abnormality that conflicts with their anatomical characteristics of sex, or when patients respond using the sociological concept of gender – a concept distinct from the biological characteristics that define sex. Additionally, during the development cycle stakeholders in national forums indicated an interest in the reduction on the reliance of the sex variable.

IHPA confirmed the feedback with DTG members and investigated the use of the sex variable in AR-DRG V10.0, which includes:

- sex as a classification variable – to inform the grouping of an episode to MDC 12 Diseases and Disorders of the Male Reproductive System and MDC 13 Diseases and Disorders of the Female Reproductive System
- sex conflict test – to change the grouping of episodes that fail the ‘sex conflict test’ to DRG 960Z *Ungroupable* in MDCs 12, 13 and 14 *Pregnancy, Childbirth and the Puerperium*
- sex as an edit variable – to promote data quality, flags are generated to warn the user that a patient’s sex does not match with the biological characteristics of a diagnosis or intervention code.

[5] Australian Institute of Health and Welfare (2017) Metadata Online Registry (METeOR) *Person—sex, code X*, https://meteor.aihw.gov.au/content/index.phtml/itemId/635126

3.5.1 Limiting the requirement to use 'sex' as a classification variable

When 'sex' is misreported, it may impact the grouping of the episode within the AR-DRG classification, especially in MDCs 12 and 13. For AR-DRG V10.0, there are 67 principal diagnosis codes that require the sex variable to determine whether the episode should be assigned to MDC 12 or 13. For example, S38.2 *Traumatic amputation of external genital organs* is used to classify both female and male reproductive system organs.

IHPA has reviewed the 67 principal diagnosis codes to limit the need for sex as a classification variable, and:

- relocated codes that do not relate to the reproductive system to a more appropriate ADRG, for example moving Q96.8 *Turner's syndrome, unspecified* to ADRG Z65 *Congenital Malformations, Chromosomal Abnormalities and Problems Arising in the Neonatal Period*
- developed new codes in ICD-10-AM Twelfth Edition for concepts relating to the reproductive system that are previously unable to distinguish between the male and female reproductive organs.

In AR-DRG V11.0, only one principal diagnosis code (R10.2 *Pelvic and perineal pain*) requires the patient's reported biological sex to group an episode into MDC 12 or 13. IHPA has worked with its technical and clinical working groups to enhance classification guidelines in ICD-10-AM Twelfth Edition in the assignment of R10.2 and will conduct further review in a future development cycle with a view to removing the need for sex as a classification variable altogether.

3.5.2 Sex conflict test causing grouping errors

In AR-DRG V10.0, once an episode is assigned to MDC 12, 13 or 14 by the principal diagnosis, it is subject to the sex conflict test. This requires the sex variable to be a permissible value before it groups to the appropriate ADRG. If the reported sex does not match the sex conflict test for each MDC, then the episode will group to DRG 960Z *Ungroupable*. **Table 1** demonstrates the permissible values for the MDCs where the sex conflict test is applied.

Table 1: MDCs with sex conflict test in AR-DRG V10.0

MDCs with sex conflict test	Permissible values for the sex conflict test in V10.0
MDC 12 *Diseases and Disorders of the Male Reproductive System*	'Male' (1) or 'Other' (3)
MDC 13 *Diseases and Disorders of the Female Reproductive System*	'Female' (2) or 'Other' (3)
MDC 14 *Pregnancy, Childbirth and the Puerperium*	'Female' (2) or 'Other' (3)

IHPA received feedback that the sex conflict test can force an episode to group to an error DRG even when the data for that episode is correct. The sex conflict test would be triggered in certain circumstances. For example, when a male presents for surgery to treat a fallopian tube discovered in a previous surgery. These situations are clinically valid but the sex conflict test has no sensitivity to deal with these rare circumstances.

Following consultation with CCAG and DTG, the sex conflict test has been removed from AR-DRG V11.0 to ensure appropriate grouping of episodes.

3.5.3 Use of 'sex' as an edit variable

There is no change to the use of sex as an edit variable in AR-DRG V11.0. The sex conflict flag continues to be used to warn users where an ICD-10-AM and ACHI code conflicts with the patient's reported sex for measures of data quality. The sex conflict flag is a warning flag only and does not impact the grouping of episodes.

3.6 Alignment of age edits in the admitted care classifications

In the AR-DRG classification, age conflict flag arises when a diagnosis or intervention code is not compatible with the patient's age. The age conflict flag is a warning flag only and does not impact the grouping of episodes.

During the AR-DRG V11.0 development, IHPA reviewed the age edits in the ICD-10-AM Electronic Code Lists (ECLs) and the AR-DRG Definitions Manual and found that while the majority align there are a small percentage of discrepancies between the two.

In response, IHPA has aligned the age edits for ICD-10-AM and ACHI Twelfth Edition with AR-DRG V11.0. A more comprehensive review of all the edits associated with AR-DRG may be conducted in a future development cycle.

3.7 Standard AR-DRG refinements

3.7.1 Diagnoses in-scope for receiving a Diagnosis Complexity Level

To maintain clinical currency and robustness of the AR-DRG classification system, a review of diagnosis codes in-scope for contributing to episode complexity is conducted for every new version of the AR-DRG classification. **Table 2** details the approach to review the in-scope codes during V8.0 and V10.0 development.

Table 2: Historical developments on diagnoses in-scope for receiving a Diagnosis Complexity Level

Version	Development
AR-DRG V8.0	A number of diagnosis codes were excluded from receiving a Diagnosis Complexity Level (DCL) in the Episode Clinical Complexity Model (ECC Model) based on the guiding principles formalised during development. These guiding principles aimed to characterise the scope of the ECC Model in terms of diagnoses considered relevant for Diagnosis Related Group (DRG) classification purposes. However, clinical determination of exclusions for all diagnosis codes was not possible during the development of AR-DRG V8.0.
AR-DRG V10.0	IHPA refined and expanded the guiding principles for diagnosis exclusion. A comprehensive review of all in-scope codes informed by the new guiding principles was undertaken in consultation with CCAG and the DTG in the ECC Model for V10.0, with 1,511 additional codes excluded from receiving a DCL.

IHPA developed a method to analyse the assignment of diagnosis codes over time to identify codes with an unexpected increase in recent years for assessment against the guiding principles for diagnosis exclusion.

All valid diagnosis codes in ICD-10-AM Eleventh Edition were reviewed. This method identified 50 diagnosis codes warranting further assessment. Each of these diagnosis codes was

assessed independently against the guiding principles for diagnosis exclusions in the AR-DRG complexity model. These principles are specified in the *Governance framework for the development of the admitted care classifications*.

The codes proposed for exclusion following the assessment were supported by CCAG. Following feedback from DTG and public consultation, further analysis was conducted to assess the clinical and cost profile of the proposed diagnosis exclusions, as well as the potential impact of excluding those codes from complexity calculation.

Further consultation was conducted with CCAG and the Australian and New Zealand Neonatal Network (ANZNN) specifically in relation to two proposed diagnosis exclusions. To ensure that the proposed diagnosis exclusions did not have a detrimental impact on the complexity model, analysis was also performed to compare the statistical performance of ADRGs containing episodes with the proposed diagnosis exclusions in AR-DRG V10.0 and V11.0.

Based on the combination of impact analysis and clinical advice, 47 ICD-10-AM codes were further excluded from the complexity model in AR-DRG V11.0. These are listed in **Appendix A**.

The four ICD-10-AM Twelfth Edition emergency use codes for coronavirus disease 2019 (COVID-19) were also included in the complexity model in AR-DRG V11.0. They are listed in **Appendix A**.

In total, 11,065 codes are in-scope for receiving a DCL in AR-DRG V11.0, as compared to 11,038 codes in AR-DRG V10.0.

The full list of Diagnosis Complexity Level unconditional and conditional exclusion codes[6] can be found in Appendix C of the *AR-DRG V11.0 Definitions Manual*.

3.7.2 ADRG intervention hierarchy review

Within each MDC in the AR-DRG classification, episodes are allocated to an ADRG in a specific hierarchical order. The hierarchy of the intervention partition is important as episodes have the potential to meet multiple intervention ADRG criteria. When an episode meets multiple intervention ADRG criteria, the episode will be allocated to the first ADRG where it meets the intervention criterion in the ADRG intervention hierarchy.

For example, when an episode is assigned to MDC 01 *Diseases and Disorders of the Nervous System* and meets intervention ADRG criteria for both ADRGs B02 *Cranial Interventions* and B08 *Endovascular Clot Retrieval*, the episode will be allocated to ADRG B02 as B02 is ranked higher than B08 in the ADRG intervention hierarchy.

The intervention hierarchy is generally based on cost, with high cost ADRGs higher in the hierarchy. However, cost is not the only determinant. Other factors are also considered such as specific ADRGs being positioned higher than non-specific ADRGs and treatment intervention ADRGs being positioned higher than diagnostic intervention ADRGs.

An intervention hierarchy review was undertaken for AR-DRG V11.0 according to the intervention hierarchy principles. These principles are specified in the *Governance framework or the development of the admitted care classifications*.

The review resulted in no change to the intervention hierarchy in AR-DRG V11.0 but informed the positions of ADRGs created in AR-DRG V11.0, as outlined in **Table 3** below.

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[6] Unconditional exclusion codes are diagnosis codes that have been excluded from consideration in the ECC Model. Conditional exclusion codes are diagnosis codes that are excluded conditionally, depending on other diagnoses assigned in the episode.

Table 3: Position of new ADRGs in the intervention hierarchy in AR-DRG V11.0

MDC	ADRG	Position in intervention hierarchy
01 *Diseases and Disorders of the Nervous System*	B08 *Endovascular Clot Retrieval*	2
05 *Diseases and Disorders of the Circulatory System*	F25 *Percutaneous Heart Valve Replacement with Bioprosthesis*	13
06 *Diseases and Disorders of the Digestive System*	G13 *Peritonectomy for Gastrointestinal Disorders*	1

3.7.3 ADRG splitting review

An episode of care is initially assigned to an ADRG which broadly groups episodes with the same diagnosis and intervention profiles. The final stage is to subdivide (or 'split') each ADRG into individual DRGs based on the ECCS and occasionally other factors such as separation mode, length of stay and age.

An ADRG splitting review was undertaken for AR-DRG V11.0 according to principles specified in the *Governance framework for the development of the admitted care classifications*.

The outcome of the review is detailed in **Table 4**.

Table 4: Comparison of ADRG splitting profile

Number of splits	AR-DRG V10.0	AR-DRG V11.0
0 (Z)	87	87
1 (A, B)	227	230
2 (A, B, C)	78	78
3 (A, B, C, D)	5	5
Total	**397**	**400**

Of the 400 ADRGs in V11.0, 230 ADRGs have one split (A, B). Of these, 397 ADRGs are directly comparable to V10.0. **Table 5** provides a summary of these comparable ADRGs.

Table 5: Comparable ADRGs by number of splits in V10.0 and V11.0

Number of Splits		AR-DRG V10.0				
		0	1	2	3	Total
AR-DRG V11.0	0	86	0	0	0	**86**
	1	1	227	0	0	**228**
	2	0	0	78	0	**78**
	3	0	0	0	5	**4**
	Total	**87**	**227**	**78**	**5**	**397**

Of the 397 comparable ADRGs, 396 have the same number of splits as in V10.0. One ADRG (M04 *Testes Interventions*) has changed from having no split in V10.0 to one split in V11.0.

The AR-DRG V11.0 Technical Specifications provide further details as to the methodology and outcomes of the ADRG intervention hierarchy and splitting refinements for AR-DRG V11.0.

3.7.4 Review of ADRG 801 *General Interventions (GIs) unrelated to principal diagnosis*

ADRG 801 is valid for circumstances where the principal diagnosis does not relate to a GI performed during the episode, such as instances where patients are admitted for medical treatment and subsequently have treatment for an unrelated complication.

IHPA received 11 public submissions regarding grouping anomalies in the AR-DRG classification where submissions demonstrated the principal diagnosis and GI were related.

Potential grouping alternatives were proposed for each scenario. Analysis on cost profile, episode movement and grouping alternatives was conducted to inform more appropriate grouping. These alternative groupings were confirmed in consultation with clinical and technical advisory groups and will ensure more appropriate grouping in AR-DRG V11.0.

Seven public submissions were able to be grouped to an appropriate ADRG within the same MDC:

- Excision of arteriovenous malformation of the spine
- Repair of postprocedural chyle leak
- Oesophageal stenting for varices
- Repair of diastasis recti
- Orbital reconstruction (post-orbital exenteration) with osseointegration
- Treatment of bladder outlet obstruction with hyperplasia of the prostate
- Injury of iliac blood vessels with embolisation

Four public submissions required relocating to a different MDC in order to group to an appropriate ADRG:

- Cerebral amyloid angiopathy with biopsy of the brain
- Endoscopic replacement of device from the stomach
- Infected corneal graft with reoperation keratoplasty

One public submission was not progressed due to the potential impact on episode shifting. The scenario described in this public submission, mechanical thrombectomy of pulmonary embolism, will continue to group to ADRG 801 in Version 11.0.

3.8 Coronavirus disease 2019 (COVID-19)

COVID-19 is the disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). COVID-19 was first reported in national minimum data sets in the 2019-20 financial year and so was not used in the development of AR-DRG V11.0 that has been developed using data from 2015–16 to 2018–19.

Although COVID-19 activity and cost data has not been included in the data that informed AR-DRG development, like other new codes incorporated within new AR-DRG versions, ICD-10-AM codes for COVID-19 will receive a DCL value. Refer to the AR-DRG V11.0 Technical Specifications for illustrations as to how DCL values are derived.

The World Health Organization issued emergency use codes to capture COVID-19 related concepts that were incorporated in ICD-10-AM Twelfth Edition. The emergency use codes relating to COVID-19 that are acceptable as principal diagnosis from Twelfth Edition are listed in **Table 6** with a corresponding ADRGs.

Table 6: ICD-10-AM principal diagnosis codes related to COVID-19 with V11.0 ADRG.

ICD-10-AM Twelfth Edition code	V11.0 ADRG
U07.1- *Coronavirus disease 2019 [COVID-19], virus identified*	T63 *Viral illnesses*
U07.2 *Coronavirus disease 2019 [COVID-19], virus not identified*	T63 *Viral illnesses*
U07.5 *Multisystem inflammatory syndrome associated with coronavirus disease 2019 [COVID-19]*	I66 *Inflammatory Musculoskeletal Disorders*

3.9 Areas assessed and not progressed for AR-DRG V11.0

Several other potential refinements were reviewed for AR-DRG V11.0, however, following analysis and consultation through IHPA's clinical and technical advisory committees and the public consultation, they have not been progressed for inclusion in AR-DRG V11.0.

3.9.1 Neurostimulators

Neurostimulation, also called neuromodulation, is an intervention where nerves are stimulated and can be performed invasively or non-invasively. Neurostimulators are a treatment option for several neurological conditions including Parkinson's disease, essential tremor, chronic pain and urinary and faecal incontinence.

Episodes for insertion of neurostimulators previously grouped to a Pre MDC ADRG in AR-DRG Versions 6.0 to 8.0. In AR-DRG V9.0, a review of the Pre MDC processing was conducted, that highlighted that neurostimulator episodes were clinically disparate and not inherently high cost. Therefore, the Pre MDC ADRG for insertion of neurostimulators was removed and the intervention for insertion of neurostimulators was added to the definitions of several intervention ADRGs across a range of MDCs.

Submissions were subsequently received to reinstate a single ADRG for all neurostimulators located in the Pre MDC ADRG due to the perceived consequences on funding.

Analysis indicated that neurostimulator episodes are allocated across 14 MDCs with the majority grouping to only 5 MDCs. CCAG confirmed that the clinical indications for the insertion of a neurostimulator are different and have various sites of insertion depending on the indication.

Analysis of cost profiles demonstrated that prosthesis costs contribute to over half of the total cost for neurostimulator episodes, which is much higher compared to the average across all episodes in these ADRGs. The results reinforced the decision to remove the Pre MDC ADRG for insertion of neurostimulators in AR-DRG V9.0.

After analysis and consultation, no change was made to the grouping of neurostimulators in AR-DRG V11.0.

3.9.2 Socioeconomic factors

In feedback from the *Consultation paper on the Pricing Framework for Australian public hospital services 2019–20*[7], it was suggested that socioeconomic factors, such as issues related to housing, economic and psychosocial circumstances, add to the cost and complexity of an episode of care and should be considered in the AR-DRG complexity model.

During the development of the ECC Model in AR-DRG V8.0, socioeconomic factors were excluded from the complexity model as they were not considered to contribute to the clinical complexity of an admitted acute episode.

Rather, they were considered to be a pre-disposing factor in leading to an admission or in delaying discharge and sometimes also reflected a lack of services available to discharge a patient safely, but this was not seen to make the episodes clinically more complex.

IHPA reviewed the cost profile of episodes of care that contained one or more socioeconomic ICD-10-AM codes taken from Chapter 21 *Factors influencing health status and contact with*

[7] *Consultation paper on the Pricing Framework for Australian public hospital services 2019–20* www.ihpa.gov.au/consultation/past-consultations/consultation-paper-on-the-pricing-framework-australian-public-hospital-services-2019-20

health services. Analysis demonstrated that episodes that included socioeconomic factors are only marginally more expensive than other episodes within the same DRGs.

Further analysis by care type demonstrated that socioeconomic factors are more prominent within the mental health care type. As mental health admitted episodes will be captured under the Australian Mental Health Care Classification (AMHCC) in future ABF arrangements, IHPA has decided not to implement any change in AR-DRG V11.0 with respect to socioeconomic factors.

However, to support further research in this area, an Australian Coding Standard has been created for Twelfth Edition to guide in the capture of socioeconomic codes for admitted patient care.

3.9.3 Traumatic spinal cord injury

A submission received in response to the *Consultation Paper on the Pricing Framework for Australian public hospital services 2020–21*[8] requested a review of the funding adequacy for traumatic spinal cord injury (TSCI) episodes. The submission highlighted a research study that stated TSCI episodes in NSW are on average underfunded, including health services with specialist spinal cord injury units.

IHPA analysed TSCI episodes using ICD-10-AM codes confirmed by CCAG members to identify relevant episodes of care. The analysis demonstrated that TSCI episodes group to various MDCs and ADRGs based on interventions and diagnoses. The costs of TSCI episodes vary significantly across ADRGs and therefore do not meet the criteria for assignment to a Pre MDC due to the large variation in cost distribution and the fact that they are not defined by a particular intervention.

Overall, TSCI episodes appear to be more expensive than episodes within the same DRGs. However, after taking into account pricing adjustments (such as short-stay and long-stay outliers, and Intensive Care Unit hours) TSCI episodes are not significantly more costly than other episodes.

Analysis of administrative variables such as episodes in specialist hospitals, transfers and type change separations were relatively more expensive. However, following a previous review of administrative variables in AR-DRGs, it was not considered desirable to create additional ADRG splits using these variables. Therefore, no change has been made in relation to the grouping of TSCI episodes in AR-DRG V11.0.

3.9.4 Diagnosis Complexity Level precision

In AR-DRG V10.0, DCLs are derived by defaulting to the three-character level of the ICD-10-AM codes that belong to the same medical ADRG. This level of precision, at the three-character level, was adopted to balance against sample variation and ensure stability over time.

However, calculating DCLs at the three-character level does not utilise the differentiation of severity existing at the fourth or fifth-character level where they exist in ICD-10-AM codes. DCL precision refers to the process of deriving DCLs at the fourth or fifth character level of the ICD-10-AM codes where severity is comparable at these more granular levels.

For example, E66 *Obesity and overweight* has subdivisions that differentiate severity via Body Mass Index at the fifth-character level:

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[8] *Consultation Paper on the Pricing Framework for Australian public hospital services 2020–21* www.ihpa.gov.au/consultation/past-consultations/consultation-paper-pricing-framework-australian-public-hospital-services-2020-21-0

- E66.1**0** *Drug-induced obesity, body mass index [BMI] not elsewhere classified*
- E66.1**1** *Drug-induced obesity, body mass index [BMI] 30 kg/m^2 to 34.99 kg/m^2*
- E66.1**2** *Drug-induced obesity, body mass index [BMI] 35 kg/m^2 to 39.99 kg/m^2*
- E66.1**3** *Drug-induced obesity, body mass index [BMI] 40 kg/m^2 or more*

It was thought that DCL precisioning may support assignment of DCLs to a more refined level of granularity where such severity levels exist. Feedback on the AR-DRG V11.0 work program suggested 46 potential code categories for DCL precision.

IHPA developed a methodology to assess whether the 46 code categories were better able to differentiate higher cost episodes from lower cost episodes by utilising the codes from the fourth or fifth character level. Of these, 11 code categories resulted in clear and logical cluster selections that were progressed for further analysis, that is, by calculating DCLs at the fourth or fifth character level. The remaining code categories were not progressed due to insufficient sample size, insignificant cost differentials or because the codes at the fourth or fifth character level that indicated severity were not allocated to the same medical ADRG.

The 11 code categories that were progressed for further analysis in AR-DRG V11.0 are listed in **Appendix A.**

While DCL precision may improve clinical validity of the complexity model, it assumes severity is equivalent to higher cost as a proxy for complexity. However, this assumption is not always the case as a more severe condition is sometimes less costly due to poorer outcomes with shorter lengths of stay. Furthermore, DCL precisioning of the 11 code categories resulted in only a marginally improved statistical performance. Following input from CCAG and DTG, IHPA did not progress DCL precision in AR-DRG V11.0.

3.9.5 Analysis of gestational age for neonates

In AR-DRG V10.0, admission weight is used as the main driver of most ADRGs within MDC 15 *Newborns and Other Neonates*, while gestational age is only used in combination with admission weight in two ADRGs.

A public submission was received from the Australian and New Zealand Neonatal Network (ANZNN) suggesting that gestational age is a better predictor of clinical complexity in the neonatal MDC than admission weight.

Gestational age is currently not collected as a separate variable within the national activity data collection for admitted patients. However, the concept of gestational age is collected using the following ICD-10-AM codes for preterm neonates:

- P07.21 *Extreme immaturity, less than 24 completed weeks*
- P07.22 *Extreme immaturity, 24 or more completed weeks but less than 28 completed weeks*
- P07.31 *Preterm infant, 28 or more completed weeks but less than 32 completed weeks*
- P07.32 *Preterm infant, 32 or more completed weeks but less than 37 completed weeks*
- P07.30 *Preterm infant, unspecified.*

Using the ICD-10-AM codes for preterm neonates, IHPA compared admission weight and gestational age in classifying neonatal episodes. The results demonstrated that gestational age performs slightly better than admission weight in explaining cost variations and there is potential for gestational age to provide additional predictive power for cost variation within the same admission weight groups.

The code category P07 *Disorders related to short gestation and low birth weight, not elsewhere classified* was considered in DCL precision as described in **Section 3.8.4**. However, based on the DCL precision results, IHPA has decided not to progress DCL precision (including code category P07) in AR-DRG V11.0.

However, to support further research in this area, additional ICD-10-AM codes have been created in Twelfth Edition to enable a more granular level of gestational age to be captured.

4 AR-DRG V11.0 Overview

4.1 ADRG Summary

There is a total of 400 ADRGs on AR-DRG V11.0. **Table 7** provides a breakdown of these ADRGs.

Table 7: AR-DRG V11.0 ADRG breakdown

Categories	Number of ADRGs
New ADRGs	3
Comparable ADRGs	
ADRGs with same number of splits as V10.0	396
Error ADRGs (960, 961 and 963)	3
ADRGs with GIs unrelated to principal diagnosis (801)	1
ADRGs using administrative variables	6
ADRGs with manual splits to support stability	8
ADRGs with manual splits due to failure to select an optimum threshold	17
Other ADRGs with same number of splits as V10.0	361
ADRG with different number of splits to V10.0	1
Total	400

The three new ADRGs are detailed in **Table 8**.

Table 8: New ADRGs

ADRG	Description
B08	*Endovascular Clot Retrieval*
F25	*Percutaneous Heart Valve Replacement with Bioprosthesis*
G13	*Peritonectomy for Gastrointestinal Disorders*

4.2 DRG Summary

There are a total of 801 DRGs.

4.3 Statistical Performance

The performance of the AR-DRG classification has historically been measured using the Reduction in Deviance (RID) statistic. RID measures how much of the variability in cost is explained by the AR-DRG classification. The higher the percentage value, the higher percentage of cost variation is explained by the classification

The overall statistical performance of AR-DRG V11.0 is an RID of 64.2 per cent, which is comparable to the AR-DRG V10.0 RID of 64.1 per cent[9].

[9] The RID of AR-DRG V10.0 is slightly different from that reported in AR-DRG V10.0 Final Report. This is because the RID in AR-DRG V10.0 Final Report was calculated using data from 2013–14 to 2015–16, while the RID in AR-DRG V11.0 Final Report was calculated using data from 2015–16 to 2018–19.

Appendix A: ICD-10-AM and ACHI code references

Table A1: ACHI code references for Section 3.1 *Endovascular clot retrieval*

Concept	ACHI code(s) with description
Endovascular clot retrieval (ECR)	35414-00 [702] *Embolectomy or thrombectomy of intracranial artery*

Table A2: ACHI code references for Section 3.2 *Transcatheter aortic valve implantation*

AR-DRG Version	ACHI code references
Version 10.0	ACHI Eleventh Edition codes for F03 *Cardiac Valve Interventions with CPB pump with Invasive Cardiac Investigation* and F04 *Cardiac Valve Interventions with CPB pump without Invasive Cardiac Investigation*: 38488-08 [623] *Percutaneous replacement of aortic valve with bioprosthesis* 38488-09 [628] *Percutaneous replacement of mitral valve with bioprosthesis* 38488-10 [634] *Percutaneous replacement of tricuspid valve with bioprosthesis* 38488-11 [637] *Percutaneous replacement of pulmonary valve with bioprosthesis* ACHI Eleventh Edition codes for F05 *Coronary Bypass with Invasive Cardiac Investigation,* F06 *Coronary Bypass without Cardiac Investigation** and F19 *Trans-Vascular Percutaneous Cardiac Interventions:* 38270-01 [622] *Percutaneous balloon aortic valvuloplasty* 38270-02 [626] *Percutaneous balloon mitral valvuloplasty* 38270-03 [637] *Percutaneous balloon pulmonary valvuloplasty* 96222-00 [626] *Percutaneous mitral valvuloplasty using closure device* * *Used within the ADRG as a NOT definition*
Version 11.0	ACHI Twelfth Edition codes for F25 *Percutaneous Heart Valve Replacement with Bioprosthesis* 38488-08 [623] *Percutaneous replacement of aortic valve with bioprosthesis* 38488-09 [628] *Percutaneous replacement of mitral valve with bioprosthesis* 38488-10 [634] *Percutaneous replacement of tricuspid valve with bioprosthesis*

AR-DRG Version	ACHI code references
	38488-11 [637] *Percutaneous replacement of pulmonary valve with bioprosthesis* ACHI Twelfth Edition codes removed from F05 *Coronary Bypass with Invasive Cardiac Investigation* and F06 *Coronary Bypass without Cardiac Investigation* 38270-01 [622] *Percutaneous balloon aortic valvuloplasty* 38270-02 [626] *Percutaneous balloon mitral valvuloplasty* 38270-03 [637] *Percutaneous balloon pulmonary valvuloplasty* 96222-00 [626] *Percutaneous mitral valvuloplasty using closure device*

Table A3: ACHI code references for Section 3.3 *Peritonectomy*

Concept	ACHI code(s) with description
Peritonectomy	96211-00 [989] *Peritonectomy*
Hyperthermic intraperitoneal chemotherapy (HIPEC) interventions	96201-00 [1920] *Intracavitary administration of pharmacological agent, antineoplastic agent* 92178-00 [1880] *Heat therapy*

Table A4: ACHI code references for Section 3.4 *Nail and nail bed procedures for hand and foot*

Concept	ACHI code(s) with description
ACHI Eleventh Edition codes	46486-00 [1636] *Primary repair of nail or nail bed* 46489-00 [1636] *Secondary repair of nail or nail bed*
ACHI Twelfth Edition codes with additional anatomy specified	46486-01 [1636] *Primary repair of fingernail* 46489-01 [1636] *Secondary repair of fingernail* 46486-02 [1636] *Primary repair of toenail* 46489-02 [1636] *Secondary repair of toenail*

Table A5: ICD-10-AM code references for Section 3.7.1 *Diagnoses in-scope for receiving Diagnosis Complexity Level*

Concept	ICD-10-AM code(s) with description
Codes newly excluded from AR-DRG V11.0 complexity model	D89.82 *Immunocompromised status* D89.89 *Other specified disorders involving the immune mechanism, not elsewhere classified* E53.8 *Deficiency of other specified B group vitamins* E61.1 *Iron deficiency*

Concept	ICD-10-AM code(s) with description
	M62.50 *Muscle wasting and atrophy, not elsewhere classified, multiple sites* Z14–Z16 *Resistance to antimicrobial drugs* U93 *Extended spectrum beta-lactamase [ESBL] producing organism*
ICD-10-AM Twelfth Edition COVID-19 emergency use codes included in the AR-DRG V11.0 complexity model:	U07.11 *Coronavirus disease 2019 [COVID-19], virus identified, asymptomatic* U07.12 *Coronavirus disease 2019 [COVID-19], virus identified, symptomatic* U07.2 *Coronavirus disease 2019 [COVID-19], virus not identified* U07.5 *Multisystem inflammatory syndrome associated with COVID-19*

Table A6: ACHI code references for Section 3.9.1 *Neurostimulators*

Concept	ACHI code(s) with description
Neurostimulator insertion	39134-01 [1604] *Insertion of subcutaneously implanted neurostimulator*

Table A7: ICD-10-AM code references for Section 3.9.2 *Socioeconomic factors*

Concept	ICD-10-AM code(s) with description	
Socioeconomic and psychosocial factors	Z55	*Problems related to education and literacy*
	Z56	*Problems related to employment and unemployment*
	Z57	*Occupational exposure to risk-factors*
	Z58	*Problems related to physical environment*
	Z59	*Problems related to housing and economic circumstances*
	Z60	*Problems related to social environment*
	Z61	*Problems related to negative life events in childhood*
	Z62	*Other problems related to upbringing*
	Z63	*Other problems related to primary support group, including family circumstances*
	Z64	*Problems related to certain psychosocial circumstances*
	Z65	*Problems related to other psychosocial circumstances*
	Z74	*Problems related to care-provider dependency*
	Z76	*Persons encountering health services in other circumstances*

Table A8: ICD-10-AM code references for Section 3.9.3 *Traumatic spinal cord injury*

Concept	ICD-10-AM code(s) with description	
Traumatic spinal cord injuries	S14.0	*Concussion and oedema of cervical spinal cord*
	S14.10	*Injury of cervical spinal cord, unspecified*
	S14.11	*Complete lesion of cervical spinal cord*
	S14.12	*Central cord syndrome (incomplete cord injury) of cervical spinal cord*
	S14.13	*Other incomplete cord syndrome of cervical spinal cord*
	S14.70	*Functional spinal cord injury, cervical level unspecified*
	S14.71	*Functional spinal cord injury, C1*
	S14.72	*Functional spinal cord injury, C2*
	S14.73	*Functional spinal cord injury, C3*
	S14.74	*Functional spinal cord injury, C4*
	S14.75	*Functional spinal cord injury, C5*
	S14.76	*Functional spinal cord injury, C6*
	S14.77	*Functional spinal cord injury, C7*
	S14.78	*Functional spinal cord injury, C8*
	S24.0	*Concussion and oedema of thoracic spinal cord*
	S24.10	*Injury of thoracic spinal cord unspecified*
	S24.11	*Complete lesion of thoracic spinal cord*
	S24.12	*Incomplete cord syndrome of thoracic spinal cord*
	S24.70	*Functional spinal cord injury, thoracic level unspecified*
	S24.71	*Functional spinal cord injury, T1*
	S24.72	*Functional spinal cord injury, T2/T3*
	S24.73	*Functional spinal cord injury, T4/T5*
	S24.74	*Functional spinal cord injury, T6/T7*
	S24.75	*Functional spinal cord injury, T8/T9*
	S24.76	*Functional spinal cord injury, T10/T11*
	S24.77	*Functional spinal cord injury, T12*
	S34.0	*Concussion and oedema of lumbar spinal cord [conus medullaris]*
	S34.1	*Other injury of lumbar spinal cord [conus medullaris]*
	S34.3	*Injury of cauda equina*
	S34.70	*Functional spinal cord injury, lumbar level unspecified*
	S34.71	*Functional spinal cord injury, L1*
	S34.72	*Functional spinal cord injury, L2*
	S34.73	*Functional spinal cord injury, L3*
	S34.74	*Functional spinal cord injury, L4*
	S34.75	*Functional spinal cord injury, L5*
	S34.76	*Functional spinal cord injury, sacrum*
	T06.0	*Injuries of brain and cranial nerves with injuries of nerves and spinal cord at neck level*
	T06.1	*Injuries of nerves and spinal cord involving other multiple body regions*
	T09.3	*Injury of spinal cord, level unspecified*

Table A9: ICD-10-AM code references for Section 3.9.4 *DCL precision*

Concept	ICD-10-AM code(s) with description	
ICD-10-AM Eleventh Edition code category candidates progressed for analysis	D57	*Sickle-cell disorders*
	E66	*Obesity and overweight*
	F04	*Organic amnesic syndrome, not induced by alcohol and other psychoactive substances*
	I70	*Atherosclerosis*
	I83	*Varicose veins of lower extremities*
	J96	*Respiratory failure, not elsewhere classified*
	K25	*Gastric ulcer*
	K26	*Duodenal ulcer*
	K43	*Ventral hernia*
	N45	*Orchitis and epididymitis*
	P07	*Disorders related to short gestation and low birth weight, not elsewhere classified*

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