National Casemix Office

NHS Digital

Casemix Companion

HRG4+ 2019/20 Engagement Grouper

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Information and technology
for better health and care

Contents

1 Introduction

This document is intended to provide a starting point and general reference for the Casemix Classification system that is widely used by the NHS in England, providing an introduction to:

- Casemix
- Healthcare Resource Groups (HRGs)
- HRG design concepts
- Groupers and grouping logic

At the end of the document (**Section 9**), you will also find useful links to further information about our external partner organisations.

This document can be broken down into a number of layers that build upon each other.

- The first layer, **Section 4 HRG Design Concepts**, explains the underlying design concepts of the classification that have been in use for a number of years
- The second layer, **Section 5 Introduction to HRG4+**, explains the developments that have been made recently to these HRG design concepts
- The third layer, **Section 6 Grouping Logic**, explains how the design concepts and recent developments are built into the software. This section also explains the different stages of grouping patient data

2 What is Casemix

Casemix is a method of classifying patient care based on expected clinical resource use for the provision of that care. HRGs are the main Casemix Classification within the NHS in England and are developed and maintained by the National Casemix Office (NCO) at NHS Digital.

The NCO is an impartial, independent body accountable to the NHS, NHS England, NHS Improvement and the Department of Health. Our remit is to develop and enforce national standards underpinning the monitoring, measurement and improvement of healthcare performance at a local, regional and national level. A rigorous and effective casemix currency can make a significant difference to the health service and can be used to provide the basis for delivering local improvements in patient care.

We actively involve the broadest range of stakeholders possible; NHS England, NHS Improvement, and the Department of Health as well as NHS senior clinicians, finance and information colleagues, who make up our Expert Working Groups (EWGs).

The Casemix design relies on the availability of national data flows, data definitions and data standards. The NCO manages a complex interface between each of these in order to develop and improve our service and maintain our status in the national and international arena.

3 Healthcare Resource Groups

HRGs are clinically meaningful groupings of patient activity derived primarily from procedure (OPCS-4) and diagnosis (ICD-10) codes within patient records. They are used, amongst other things, as a means of determining fair and equitable reimbursement for healthcare services, by providing consistent 'units of currency' to support standardised commissioning across the NHS, at a local, regional and national level.

For further information regarding both OPCS-4 procedure codes and ICD-10 diagnosis codes, please see **Section 9** of this document.

The HRGs are reviewed and enhanced on an annual basis to ensure that the classification keeps pace with clinical advancements. The most current version of the Casemix Classification is HRG4+ (used for the nationally mandated Reference Costs collection from the 2012/13 financial year onwards).

HRGs can also help organisations to better understand their activity, the different types of patients they care for, and the treatments they deliver. They enable activity comparisons within and between organisations, as well as providing an opportunity to benchmark treatments and services, and support trend analysis over time, to underpin informed local decision-making, and improve patient outcomes.

The NHS used HRG4 to cost clinical activity from the 2006/07 financial year to the 2011/12 financial year, and were reimbursed via the HRG4 classification from April 2009. From 1st April 2017, the national reimbursement of NHS services is based on the enhanced HRG4+ classification.

4 HRG Design Concepts

4.1 Casemix Design Framework

Casemix classification design is governed by the Casemix Design Framework which provides comprehensive guidance for stakeholders involved in the design process regarding scope, format, data and HRG performance requirements.

Stakeholders are comprised of representatives from Royal Colleges, clinical professions, NHS Improvement, NHS England, NHS Chief Executives and professional bodies within the independent sector. In brief, the design rules stipulate that:

- HRGs must be clinically meaningful and contain activity with similar expected resource intensity. This not only ensures that HRGs provide a valuable dialogue mechanism between clinical and finance professionals, but that average costs or national tariffs at the HRG level do not systematically under- or over--represent the resource use of the care provided when treating particular groups of patients
- Data used to define HRGs should be routinely available, to minimise the burden of data collection on the NHS
- There should be a manageable number of HRGs to cover all patients, ensuring that the administrative burden of processing and evaluating HRG-level data in terms of costing and reimbursement is curtailed.

4.2 HRG Code Structure

HRGs are identified by a five character code structure:

Chapter/Subchapter	HRG Number	Split
AA	NN	A

- The first alphabetical character **(A)** represents the **HRG Chapter**
- The first two alphabetical characters **together (AA)** represent the **HRG Subchapter**
- The next two numeric characters **(NN)** represent the **HRG Number** within the Subchapter
- The final alphabetical character **(A)** signifies the **Split** applicable to the HRG.

The first four character codes, when combined, are classed as the **HRG root**.

General principles for the HRG design are that:

- HRGs are divided into clinically meaningful sections (chapters and subchapters)
- The lower the HRG Number, the higher the expected resource use of that HRG in relation to other HRGs within the subchapter (though this may not be the case where more-resource intensive HRGs have had to be “slotted in” to an existing Subchapter structure)
- The final character split within the HRG code structure is a single character code which further describes activity, such as patient age, length of stay or complications/comorbidities. Other than the value of ‘Z’, indicating that no split is present, split characters are not standardised across the HRG design

For example, the HRG4+ HRG **GA04C Complex, Hepatobiliary or Pancreatic Procedures, with CC Score 3+** can be broken down into the following component parts:

- Chapter **G** - Hepatobiliary and Pancreatic System
- Subchapter **GA** - Hepatobiliary and Pancreatic System Open and Laparoscopic Procedures
- HRG Number **04** - Complex, Hepatobiliary or Pancreatic Procedures
- HRG split character **C** - with CC Score 3+

The Code to Group Excel file (released with each Grouper product) lists the chapters and subchapters relevant to an individual Grouper product. As the HRG design necessarily changes over time, you should always make sure that the Code to Group Excel file used relates to the same Grouper software in both purpose (Costing / Payment) and financial year.

4.3 Setting-independence

Setting-independence means that if a procedure can be performed across different care settings, the same HRG can be derived regardless of setting. For example, an endoscopy would generate the same HRG regardless of whether it was performed as an outpatient, day case or inpatient procedure. It is important to understand that setting-independence applies to procedure-driven HRGs only. It does not apply to diagnosis-driven HRGs, nor HRGs that are derived from data items other than the procedure (OPCS-4) or diagnosis (ICD-10) primary classifications.

4.4 Non-Admitted Consultations (Outpatients)

Non-admitted consultation (Outpatient) HRGs are derived where no significant procedure code, or just an OPCS-4 ***X62.- Assessment*** code is recorded. HRG derivation, for outpatient data, is not dependent on diagnosis as these data are not mandated as part of the Outpatient Commissioning Data Set.

In certain settings, for example outpatient clinics, it is possible that a procedure may not be carried out, or may not always be recorded, meaning that a procedure-driven HRG cannot be generated. In these situations, where minimum mandatory information is recorded, one of the default non-admitted unidisciplinary HRGs within Subchapter **WF, Non-Admitted Consultations** will be assigned. For further information, please refer to the chapter summary for Subchapter WF. Chapter summaries are available for every HRG subchapter and provide an overview of the HRGs, details of changes made from previous Grouper releases and a brief description of the design concepts utilised in the development of the HRGs in the subchapter.

4.5 Procedure Hierarchies

Where a patient has more than one procedure recorded, the dominant (highest expected resource use) procedure will be used to derive the HRG. Each procedure is assigned a hierarchical value associated with its expected resource consequences (see **section 6.2** for

further information). These hierarchical rankings are intended to reflect the expected relative costs of individual procedures.

In the event of two (or more) procedures being recorded within a single patient record with the same procedure hierarchy, the first in the patient record will drive HRG grouping at both the episode and spell level.

In certain circumstances, logic, such as escalation or combination code logic, may be used within the HRG design to generate an HRG that reflects the additional resource usage of procedures coded in addition to the dominant procedure in the same hospital admission. (see **sections 6.7 and 6.8** for further information).

4.6 Diagnosis Hierarchies

Each Admitted Patient Care (APC) Finished Consultant Episode (FCE) will have a primary diagnosis recorded, reflecting the primary reason for care, and as determined by the clinical record for the patient.

Each diagnosis that is valid in the primary position of the patient record is assigned a hierarchical level associated with its expected resource consequences (see **section 6.3** for further information). These hierarchical rankings reflect the expected relative cost of each primary diagnosis.

Where a patient has more than one primary diagnosis in a spell, because that patient spell contains more than a single FCE (as a result of a transfer of consultant responsibility), and the primary diagnoses of the FCEs within that spell differ, it is necessary to determine the primary diagnosis of the spell, before the spell activity can derive an appropriate spell HRG.

For HRG grouping purposes, the primary diagnosis of a spell is therefore deemed to be:

- The primary diagnosis of the episode containing the dominant procedure (the latter as determined by the procedure hierarchy), irrespective of whether that dominant procedure has a maximum length of stay check that results in the record effectively flipping to group off the primary diagnosis of that episode containing the dominant procedure;

  or, where no dominant significant procedure exists within the patient record,

- The primary diagnosis with the first highest diagnosis hierarchy in the patient record.

4.7 Complication and comorbidity splits

Complication and comorbidity (CC) splits are a way of incorporating varying patient severity and complexity levels within the design of the HRGs.

The majority of HRGs are split by complication and comorbidity by use of a CC list. The purpose of each CC list is to identify secondary diagnoses that result in expected additional resources being used by patients.

Exceptions to this use of a CC list to determine a CC value include where a patient's primary diagnosis has an inherent CC explicitly stated in the ICD-10 code, e.g. **K43.1 Incisional hernia with gangrene**, or where the presence of multiple secondary cancers and infections

are used to indicate a proxy CC score, such as when generating the HRG Root **PM45, Paediatric Febrile Neutropenia with Malignancy**.

It is important to attempt to describe severity and complexity as concepts where severity describes the extent of a particular condition and complexity describes the multiple natures of problems and conditions that a patient has. Dual-coded diagnoses often provide a way of describing the severity of a condition and are a principle used in disease staging. CC splits are used in particular in the diagnosis-driven HRGs as a way of indicating varying illness severity for patients with the same primary diagnosis.

The coding of multiple morbidities and complications describes one aspect of patient complexity. The ICD-10 diagnosis coding classification also includes a number of social factors and proxies that may help to describe the wider health needs of a patient, which may also reflect additional resource usage and will be on CC lists as clinically appropriate.

It is important to note that a particular secondary diagnosis may be a major complication for some procedures or conditions whilst not being a relevant complication for others. The relevance and ranking of complications and comorbidities have therefore been assessed at subchapter level by individual Expert Working Groups (EWGs) to ensure that CCs are appropriately allocated. For CCs to be recognised in HRG derivation terms, therefore, they must be both unique and clinically relevant.

4.8 Multiple Trauma

This grouping mechanism has been defined to identify high resource, complex treatments associated with admissions for multiple trauma cases, i.e. simultaneous traumatic injuries involving more than one body site.

Body sites have been defined, each containing a table of non-superficial trauma injuries relating to a specific body site (which can be found in the “VA_cmpt_*” lists in the “Other Lists” tab of the Code to Group Excel workbook).

The body sites are:

- Abdominal
- Chest
- Head
- Kidney
- Lower Limb
- Upper Limb
- Pelvis or Spine
- Urinary
- Other

If a patient is recorded as requiring treatment for two or more different body sites, this will generate a Multiple Trauma HRG for that episode of care. Multiple Trauma is differentiated from Major Trauma within the HRG design, as Major Trauma may be specific to a single body site, rather than the minimum of two different body sites required for Multiple Trauma HRG derivation.

Once a patient is determined as being a Multiple Trauma patient in HRG design terms, the concepts of primary diagnosis and dominant procedure are no longer relevant. The HRG

design effectively acknowledges all distinct diagnoses and all procedures as being relevant to the resource impact of the healthcare provided, and HRGs are assigned via a matrix scoring system that reflects the breadth of what is clinically wrong with the patient, and the range of procedures undertaken on that patient.

4.9 Unbundling

To improve the performance of HRGs and better represent activity and costs, some significant elements of cost and activity are identified separately, or “unbundled” from the core HRGs that reflect the primary reason for a patient admission or treatment. These unbundled HRGs therefore better describe the elements of care that comprise the patient pathway within a hospital admission or outpatient attendance.

In previous versions of HRGs (i.e. up to HRG v3.5), each episode of care would derive a single HRG. In HRG4, some significant elements of cost and activity were “unbundled” from core HRGs. The impact of this is that a single patient record is assigned more than one HRG if it includes any “unbundled” elements. The “unbundled component” becomes an HRG in its own right as an addition to a core HRG for the episode or spell of care, or attendance. Unbundled HRGs may be event-based, and thus derived from the presence of a specific OPCS-4 code in the patient record, or duration-based, the latter being generated on a per diem basis.

Unbundled HRGs have been developed for:

- Chemotherapy – Regimen Procurement and Delivery
- Radiotherapy – Planning and Treatment
- Diagnostic Imaging and Nuclear Medicine (e.g. MRI/CT/SPECT-CT)
- Rehabilitation
- Renal Dialysis for Acute Kidney Injury
- Critical Care – Adult, Paediatric and Neonatal
- Specialist Palliative Care
- High Cost Drugs

5 Introduction to HRG4+

The latest iteration of the HRG classification, HRG4+, was approved by NHS England, NHS Improvement and the Department of Health to form the basis of the National Reference Costs Collection from the 2012/13 financial year onwards and is used as the basis of the National Tariff System (NTS) from the 2017/18 financial year onwards.

The national reimbursement system which is effective from April 2019 is based on costs collected in 2016/17 by NHS Improvement using the HRG4+ Reference Costs 2016/17 design.

HRG4+ has been developed to support NHS England and NHS improvement's national tariff policy, by providing a classification that remains representative of current clinical practice. It supports service planning, costing and national and local commissioning by providing reliable and consistent activity data to support patient choice and service planning analysis.

HRG4+ supports requirements outlined within the Health and Social Care Act 2012, by allowing for specialised services, provided in tertiary centres and NHS Centres of Excellence, to be distinctly identified and appropriately costed and funded. This enables more effective planning and service redesign within local health economies.

HRG4+ is a significant enhancement to HRG4, and employs a number of new and improved mechanisms to enable differentiation between levels of care complexity.

The enhancements offered as part of the HRG4+ Casemix Classification have been developed in partnership with the clinical community, as represented and endorsed by the Royal Colleges, Associations and Professional Bodies.

The key developments and enhancements introduced into the HRG4+ design are identified below.

5.1 A Greater Number of HRGs

There is an increase in the number of HRGs from 2,782 in the HRG4+ 2018/19 Local Payment Grouper (identical in HRG design terms to its HRG4+ 2017/18 Local Payment Grouper counterpart) to 2,832 in the HRG4+ 2019/20 Engagement Grouper, in order to offer greater granularity in the classification and support the improved identification of specialist services which are often high cost in nature.

5.2 Interactive Complication and Comorbidity (CC) splits

Standard complication and comorbidity splits have been replaced with Interactive complication and comorbidity splits in the majority of HRG4+ subchapters. Interactive CCs are based on summed scores and more appropriately reflect the expected additional resource use of treating patients with multiple comorbidities. The HRG is determined by the summed 'score' of all unique secondary diagnoses which appear on the subchapter-specific CC list. As per Design Framework requirements, major CCs have a nominal value of two and all other CCs have a nominal value of one.

5.3 Procedure Hierarchy Changes

Procedure hierarchy (PH) scores were expanded as part of HRG4+ and reassigned to OPCS-4 codes to more appropriately reflect the expected resource use of procedures across all subchapters, particularly when differentiating between low-cost high-volume procedures. A logarithmic hierarchy range runs from 3 to 41, with a lower resource difference expected between the bands at the lower end than those at the higher.

Procedure hierarchies were also amended to eliminate overlap between HRG ‘categories’. Where multiple procedures are recorded, the procedure with the first highest hierarchy value will drive grouping to the appropriate highest expected resource HRG, unless the HRG design accommodates multiple procedure activity.

5.4 Diagnosis Hierarchy Changes

Diagnosis hierarchy (DH) scores were expanded in HRG4+ and reassigned to ICD-10 codes to better reflect the expected resource use of diagnoses across all subchapters. Diagnosis hierarchies are used to determine the primary diagnosis of a multi-episode spell with multiple different primary diagnoses across the episodes. The logarithmic DH range runs from 5 to 25, with a lower resource difference expected between the bands at the lower end than those at the higher. This review also provides improved foundations on which to implement Interactive CC logics.

5.5 Accommodation of OPCS-4.8

Changes to the primary procedure classification OPCS-4, implemented from 1st April 2017, are incorporated within the HRG4+ design. Where a new code has been added, Expert Working Group advice has been sought to determine the most appropriate HRG(s) to map to. This may also result in the creation of new HRG to more appropriately reflect the clinical care involved.

5.6 Intervention splits have been added to HRGs

Intervention splits have been created for a number of diagnosis-driven HRGs in various subchapters. This split acknowledges that ‘minor interventions’ have been undertaken during a patient admission. The benefit of this approach is two-fold; these HRGs will not only include the additional cost/resources associated with performing these relatively minor procedures, but may also provide an indication that the patient’s condition was more severe, often resulting in more resource-intensive treatment.

The design includes “with Multiple Interventions” and “with Single Intervention” HRGs to more appropriately capture the additional resource use of patients who have multiple minor interventions during their episode or spell.

5.7 Inclusion of Specialised Activity

HRG4+ includes the creation of HRGs specific to specialised activity, such as those for Congenital Cardiac Surgery. HRG4+ also sees the extension of age splits within the child population to reflect the significant resource differentiation that can occur when treating infants rather than children, for example. A significant number of HRGs continue to have a Paediatric (18 years and under)/Adult (19 years and over) age split to recognise the significant resource difference than can occur when treating children rather than adults.

5.8 Data Quality

Quality improvement changes in HRG4+ include cross-chapter “Interventions” list updates and the alignment of HRGs to updated coding rules and guidance. Codes have been remapped and logic amended to more appropriately reflect expected resource use within several subchapters. Full details are provided in the Chapter Summaries that form part of the standard documentation suite that accompanies each Grouper release.

The majority of minor procedure HRGs across all subchapters have maximum length of stay checks. Where length of stay is longer than the set maximum, the primary diagnosis will be used to derive the HRG, rather than the minor procedure. This approach is intended to ensure that HRG grouping accurately reflects the primary reason for the patients’ admission, and reduces the likelihood that procedure-driven HRGs will be derived for patients with long lengths of stay undergoing a relatively minor procedure during that admission, when the length of stay is more reflective of the treatment for their condition. As previously mentioned, however, these relatively minor procedures may themselves then be acknowledged as “Interventions” for a number of diagnosis-driven HRGs, whose grouping has effectively flipped from procedure-driven to diagnosis-driven as a result of exceeding maximum length of stay criteria for the procedure.

6 Grouping Logic

6.1 Groupers

A ‘Grouper’ is a software application that performs validation checks against data input and uses a complex algorithm to determine HRGs for patient records. Grouper output files contain the original input data plus derived HRGs. Grouper output also includes quality files that contain details of any errors or conflicts during the grouping process. For more information about using the grouper application for local grouping, please refer to the Grouper User Manual.

As mentioned previously in this document, HRG4 has been used for Payment by Results (PbR) funding since April 2009 (for financial year 2009/10 onwards), with the tariff for 2009/10 being calculated using the data gathered from the Reference Costs 2006/2007 exercise. Typically, there is a three year time lag between collecting costs and publishing a tariff in order to adequately test the impact of changes to the funding structure. The 2019/20 tariff has been based on the HRG4+ 2016/17 Reference Costs.

6.2 Procedure Hierarchies

Procedure Hierarchies provide a comparison mechanism which reflects the relative complexity of procedures across HRG chapters (see **section 4.5** for further information). If a single procedure is recorded for a patient and its hierarchy value is equal to or greater than 3 (5 for admitted patient care), it will be used for grouping. If multiple procedures are recorded, the dominant procedure is identified based on the procedure hierarchy value. In principle, event-based unbundled HRGs have a hierarchy value of 2, and are output based on each instance of an OPCS-4 code being recorded. Where hierarchy values are equal, the earliest recorded of the highest ranking procedure(s) is used to drive grouping. In the absence of any procedures, or where the only procedure has a hierarchy value of 1 or 2, the grouper will switch to using the primary diagnosis of the episode, or the determined primary diagnosis of the spell, to ascertain the HRG.

How Procedure Hierarchies work in the HRG4+ Engagement 2019/20 Grouper

Each procedure has an associated value reflecting relative expected resource use. Values 0 - 4 identify procedures which cannot be used for grouping or are only used for grouping in specific circumstances. Values 5 - 41 provide a scale of expected relative resource use, where 5 represents the least and 41 represents the most resource intensive procedures:

Value	Description
0	OPCS codes not valid for grouping (such as approach codes and site of operation codes as the only procedures) or poorly coded for Casemix grouping purposes (where the dominant procedure is too vague to generate a clinically meaningful HRG);
1	Non-operative procedures with minimal resource (such as fitting a sling or administering an injection); ignored for grouping
2	Procedures that will generate unbundled HRG(s) Procedure hierarchies are not used to determine event-based unbundled HRGs so every instance of a procedure generates an unbundled HRG. This hierarchy value is thus used only for completeness
3,4	Procedures relating to subchapter WF, Non-admitted Consultations (uni-professional/disciplinary and multi-professional/disciplinary assessments)
5-41	Scale of relative resource use. 5 represents the least and 41 represents the most resource intensive procedures

6.3 Diagnosis Hierarchies

Primary Diagnosis is used to drive grouping when there are no significant procedures in the patient record suitable to drive grouping, or procedure-driven grouping has effectively flipped to diagnosis-driven grouping as a result of exceeding maximum length of stay criteria for the dominant procedure. Every FCE requires a primary diagnosis. Each diagnosis code that is valid in the primary position has a diagnosis hierarchical value associated with its expected resource impact, based on length of stay analysis (see **section 4.6** for further information), though these hierarchies are not used to determine diagnosis-driven FCE HRGs as the primary diagnosis for the FCE is determined by the admitting clinician.

If a multi-episode spell contains multiple primary diagnoses, and no significant procedures, the primary diagnosis with the first highest ranking hierarchy value becomes the spell primary diagnosis and is used to drive spell-level diagnosis-driven grouping.

How Diagnosis Hierarchies work in the HRG4+ Engagement 2019/20 Grouper

There are 21 bands which run from 5 to 25 where 5 represents the lowest and 25 represents the most resource intensive primary diagnoses:

Value	Description
0	ICD-10 code not valid for grouping (i.e. fails to meet national coding standards)
5-25	Scale of relative resource use in which 5 represents the lowest and 25 represents the most resource intensive primary diagnoses

6.4 Table of Coding Equivalence (TOCE)

Upon introduction of a new primary classification, such as a new version of OPCS-4 or an ICD-10 update, the HRG design must accommodate new codes within a Local Payment Grouper that did not exist in the costing grouper on which that Payment Grouper is based. Following the TOCE preparation methodology, the new codes are accommodated within the HRG design.

TOCE Preparation Methodology

- The Clinical Classification Service provides TOCE mappings used, if appropriate, as a proposed base
- The National Casemix Office then seeks clinical input for the suitability of a proposed HRG mapping for the new primary classification codes
- If the Clinical Classification Service mapping was considered unsuitable for HRG grouping purposes, or the new codes map to multiple codes, a ‘best fit’ HRG root is identified
- Appropriate flags and logic will be checked in the Grouper to ensure correct derivation of the HRG. This may include adding new codes onto CC lists, intervention lists, etc.
- Finally, coding guidance is evaluated against the created mappings to ensure compliance with nationally published clinical coding guidance.

New primary classification codes are utilised directly, rather than accommodated, in a Reference Costs HRG design. This may mean that new codes will be used to create new HRGs for surgical procedures that previously could not be adequately captured within the OPCS classification or new strains of a disease can be rightly acknowledged within the HRG design and/or the subchapter-specific CC lists.

6.5 Complication and Comorbidity (CC) Splits

Complication and comorbidity splits are derived from all unique secondary diagnoses within an episode or spell, with the exception of unspecified four-digit ICD-10 codes where the same three-digit ICD-10 code has been determined as the primary diagnosis of the episode or spell. For example, ICD-10 code **A02.9 Salmonella infection, unspecified**, cannot be

considered as a CC on a primary diagnosis of **A02.0, Salmonella enteritis**, although the converse is not true. Hence **A02.0 Salmonella enteritis** can rightly be considered as a CC on a primary diagnosis of **A02.9 Salmonella Infection** as **A02.0** provides greater clinical specificity.

In very specific circumstances, the primary diagnosis may contain an implicit CC which may contribute to CC scoring, and in accordance with national coding standards, unlike all other CC lists, the obstetric delivery HRGs utilise all diagnoses, including the primary diagnosis, to calculate the CC score

CCs therefore provide a method of incorporating and recognising varying levels of severity and complexity within the HRG design (see **section 4.7** and **section 5.2** for further information).

It is important to remember that diagnosis is not a mandatory item in the Outpatient Commissioning Data Set. The grouping process does not, therefore, use diagnosis for Non-Admitted Consultation treatments even where present in the outpatient record; hence CC splits are not currently applicable for outpatient-based care.

6.6 Multi-Episode Spells

In a multi-episode spell, all diagnoses are evaluated as potential complications and comorbidities, with the exception of the spell primary diagnosis, determined as either the primary diagnosis of the episode containing the dominant procedure or the primary diagnosis with the first highest diagnosis hierarchy, where no dominant procedure is recorded. As previously stated, duplicate diagnoses within a spell and four-digit ICD-10 codes that end in .9 (unspecified) where the same three-digit ICD-10 code has been determined as the primary diagnosis of the spell do not contribute towards CC scoring at either the spell or episode level.

It is important to note that the spell HRG may be different to any of the FCE HRGs within the spell, due to the above processing of spell activity. For example, ALL valid secondary diagnoses of the spell, including primary diagnoses of episodes that are not deemed to be the primary diagnosis of the spell, are “summed” to generate Complication and Comorbidity splits. Also, the length of stay for the Spell will be different (longer) than each individual FCE length of stay.

For example, in the HRG4+ design:

The following Spell has two Finished Consultant Episodes for a patient aged 25 with an overall spell length of stay of 11 days:

The first Episode with length of stay 10 days has a procedure and two diagnosis codes, one indicating congenital heart disease, within the FCE and groups to **HRG EC14C (Intermediate Procedures for Congenital Heart Disease with CC Score 0-3**).

However, the second Episode with length of stay 1 day has a procedure plus a significant number of ICD-10 codes and groups to HRG **FF53A (Minor Therapeutic or Diagnostic, General Abdominal Procedures, 19 years and over)**

RG takes into consideration all of the diagnosis codes in the Spell and groups to HRG **EC14A (Intermediate Procedures for Congenital Heart Disease with CC Score 9+)**

6.7 Accommodating Multiple Procedures

In the majority of cases, the dominant procedure (as determined by the procedure hierarchy) is used to derive the HRG. However certain subchapters contain specific multiple procedure logic, designed to determine the HRG using more than one procedure.

Where there are a relatively small number of procedures that can be performed in combination with one another, flags may be used to derive the HRG, dependent on what other procedures are recorded with the dominant procedure.

For example, in the HRG4+ design:

If **P23.2 Anterior colporrhaphy NEC** is recorded with no other procedures present, and no secondary diagnoses are recorded, then HRG **MA04D Intermediate Open Lower Genital Tract Procedures with CC Score 0-2** will be generated.

If **M53.3 Introduction of tension-free vaginal tape** is recorded with no other procedures present and no secondary diagnoses are recorded, then HRG **LB51B Vaginal Tape Operations for Urinary Incontinence, with CC Score 0-1** will be generated.

However, if these procedures are both performed and recorded and either is the dominant procedure, with no secondary diagnoses, then the HRG generated will be **MA03D Major Open Lower Genital Tract Procedures with CC Score 0-2**.

Both procedures have an associated flag attached which requires the grouper to reference a list containing the other procedure. Where both procedures are identified within the record an HRG is generated which considers both significant procedures, in order to appropriately reflect the additional resource use of undertaking both procedures at the same time.

Escalator logic can drive grouping to a higher HRG to reflect additional complexity. If a procedure is performed in conjunction with another procedure from a specified list, an HRG will be derived representing higher resource use than for either procedure on its own.

For example:

If **W47.1 Primary prosthetic replacement of head of femur not using cement** is recorded as the dominant procedure with no other procedures present, then HRG **HN12F Very Major Hip Procedures for Non-Trauma with CC Score 0-1** will be assigned.

However, if a procedure from any other HN ‘Very Major’ Category HRG is also recorded such as **W04.2 Triple fusion of joints of hindfoot** (which as a dominant procedure would map to **HN32C Very Major Foot Procedures for Non-Trauma with CC Score 0-1**) then this is escalated to the ‘Complex’ category HRG, in this case **HN81E Complex, Hip or Knee Procedures for Non-Trauma, with CC Score 0-1**.

6.8 Subsidiary procedure-qualified HRGs

Some of the procedure-based HRGs require a subsidiary code qualifier. This means that the OPCS-4 code detailed in the patient record requires an additional OPCS-4 subsidiary code denoting the method of operation. The list of OPCS-4 subsidiary codes are designed to enhance codes from the individual body system procedure codes in the main OPCS-4

classification and includes (but are not limited to) approach codes, staged and minimal access procedures.

6.9 Diagnosis-qualified HRGs

Some of the procedure-based HRGs have ICD-10 diagnosis qualification logic. This means that the ICD-10 code reported against the record will influence the procedure-based HRG that is derived. This concept ensures that the HRG captures the additional expected resource associated with the patient's diagnosis, where it is deemed to be clinically important. Examples include the obesity check to derive some bariatric surgery HRGs or a cancer check to derive specific treatment of malignancy HRGs in gynaecology.

6.10 Unbundling

Unbundling is the first step in the grouping process, following data. Unbundled procedures are processed separately to derive unbundled HRGs. The grouper then (usually) ignores these unbundled components when deriving the core HRG for an episode or spell.

When all significant procedures in an admitted patient care record are unbundled, the primary diagnosis is used to derive a core HRG for the episode. For non-admitted care, if all procedures are unbundled the attendance is allocated one of the default non-admitted care attendance WF* HRGs as a core HRG (see **section 4.9** for further information).

7 Design Concepts – Worked Examples

This section includes worked examples for all of the design concepts mentioned throughout the document. The examples relate to the HRG4+ design specific to the 2019/20 Engagement grouper.

7.1 Interactive Complications/Comorbidities

Cases A to **D** illustrate how CC summation works within the non-malignant disorder HRG roots to map to four different levels of CC split based on the summed value of all the secondary diagnoses recorded:

Note that secondary diagnoses not on the Subchapter GC CC list will not contribute towards CC scoring for HRGs within Subchapter GC

Case	Age	Length of Stay (days)	Primary Diagnosis (ICD-10)	Secondary Diagnoses (ICD-10)	HRG4+
A	45	2	B17.1 Acute hepatitis C	R18.X Ascites *(CC value = 1)*	GC17K Non-Malignant, Hepatobiliary or Pancreatic Disorders, without Interventions, with CC Score 0-1
B	45	5	B17.1 Acute hepatitis C	R18.X Ascites *(CC value = 1)* A41.9 Septicaemia, unspecified *(CC value = 2)*	GC17J Non-Malignant, Hepatobiliary or Pancreatic Disorders, without Interventions, with CC Score 2-4
C	45	8	B17.1 Acute hepatitis C	R18.X Ascites *(CC value = 1)* A41.9 Septicaemia, unspecified *(CC value = 2)* F03.X Unspecified dementia *(CC value =1)* E87.7 Fluid overload *(CC value = 1)*	GC17H Non-Malignant, Hepatobiliary or Pancreatic Disorders, without Interventions, with CC Score 5-7
D	45	15	B17.1 Acute hepatitis C	R18.X Ascites *(CC value = 1)* A41.9 Septicaemia, unspecified *(CC value = 2)* F03.X Unspecified dementia *(CC value =1)* E87.7 Fluid overload *(CC value = 1)* J18.9 Pneumonia, unspecified *(CC value = 2)* I20.0 Unstable Angina *(CC value = 2)*	GC17G Non-Malignant, Hepatobiliary or Pancreatic Disorders, without Interventions, with CC Score 8+

7.2 Multiple Procedure Logic

Cases A to **D** illustrate how the multiple procedure logic works within a subchapter, mapping activity to different HRGs depending on the secondary procedures recorded in addition to the dominant procedure.

Case E illustrates the effect of a subsidiary code indicating the procedure was bilateral.

Case	Age	Length of Stay (days)	Primary Diagnosis (ICD-10)	Dominant Procedure (OPCS-4)	Secondary Procedures (OPCS-4)	HRG4+
A	45	5	N20.0 Calculus of kidney	M10.2 Endoscopic pyeloplasty		LB65E Major Endoscopic, Kidney or Ureter Procedures, 19 years and over, with CC Score 0-2
B	45	5	N20.0 Calculus of kidney	M10.2 Endoscopic pyeloplasty	M28.1 Endoscopic laser fragmentation of calculus of ureter NEC *(from list LB_Major_End)*	LB64E Complex Endoscopic, Kidney or Ureter Procedures, 19 years and over, with CC Score 0-1
C	45	5	N20.0 Calculus of kidney	M10.2 Endoscopic pyeloplasty	M13.2 Percutaneous drainage of kidney (from list LB_Int_Open)	LB64E Complex Endoscopic, Kidney or Ureter Procedures, 19 years and over, with CC Score 0-1
D	45	5	N20.0 Calculus of kidney	M10.2 Endoscopic pyeloplasty	M29.4 Endoscopic dilation of ureter + M67.3 Endoscopic drainage of prostate (both from list LB_Int_End)	LB64E Complex Endoscopic, Kidney or Ureter Procedures, 19 years and over, with CC Score 0-1
E	45	5	N20.0 Calculus of kidney	M10.2 Endoscopic pyeloplasty	Z94.1 Bilateral operation	LB64E Complex Endoscopic, Kidney or Ureter Procedures, 19 years and over, with CC Score 0-1

7.3 Intervention Splits

Cases A and **B** illustrate how minor "interventions" are taken into account within the HRG root **GC01 Liver Failure Disorders**

*Note that **L91. 2 Insertion of central venous catheter NEC** will only drive procedure grouping when length of stay is two days or less*

Case	Age	Length of Stay (days)	Primary Diagnosis (ICD-10)	Procedure (OPCS-4)	HRG4+
A	45	3	K70.4 Alcoholic hepatic failure		GC01F Liver Failure Disorders without Interventions, with CC Score 0-4
B	45	5	K70.4 Alcoholic hepatic failure	L91.2 Insertion of central venous catheter NEC	GC01D Liver Failure Disorders with Single Intervention

7.4 Age Splits

Cases A and **B** highlight the different HRGs generated for patients with the same primary diagnosis, and procedure but for patients of different ages:

*Note that **A84.1 Electroencephalography NEC** will only drive procedure grouping when length of stay is one day or less*

Case	Age	Length of Stay (days)	Primary Diagnosis (ICD-10)	Procedure (OPCS-4)	HRG4+
A	25	3	G41.1 Petit mal status epilepticus	A84.1 Electroencephalography NEC	AA26H Muscular, Balance, Cranial or Peripheral Nerve Disorders, Epilepsy or Head Injury, with CC Score 0-2
B	14	3	G41.1 Petit mal status epilepticus	A84.1 Electroencephalography NEC	PR02C Paediatric Epilepsy Syndrome with CC Score 0

7.5 Length of Stay Splits

Cases A and **B** illustrate the effect of length of stay on HRG derivation, in this example for chronic kidney disease:

Case	Age	Length of Stay (days)	Primary Diagnosis (ICD-10)	Secondary Diagnoses (ICD-10)	Dominant Procedure (OPCS-4)	HRG4+
A	62	3	Z75.5 Holiday relief care			WH20C Respite Care with length of stay 4 days or less
B	62	9	Z75.5 Holiday relief care			WH20A Respite Care with length of stay 9 days or more

7.6 Diagnosis-Qualified

Cases A and **B** highlight the different HRGs generated for patients with the same dominant procedure, but different primary diagnoses:

Case	Age	Length of Stay (days)	Primary Diagnosis (ICD-10)	Dominant Procedure (OPCS-4)	HRG4+
A	32	15	K59.0 Constipation	A48.3 Insertion of neurostimulator adjacent to spinal cord	FF47Z Insertion of Neurostimulator for Treatment of Faecal Incontinence
B	45	10	R33X Retention of urine	A48.3 Insertion of neurostimulator adjacent to spinal cord	LB79Z Insertion of Neurostimulator for Treatment of Urinary Incontinence

7.7 Subsidiary Procedure-Qualified

Cases A and **B** highlight the value of recording a subsidiary procedure code i.e. indicating approach or site (including laterality), where appropriate:

Case	Age	Length of Stay (days)	Primary Diagnosis (ICD-10)	Dominant Procedure (OPCS-4)	Secondary Procedures (OPCS-4)	HRG4+
A	45	0	H18.6 Keratoconus	C46.3 Penetrating graft to cornea	Z94.2 Right sided operation	BZ61B Complex, Cornea or Sclera Procedures, with CC Score 0-1
B	45	0	H18.6 Keratoconus	C46.3 Penetrating graft to cornea	Z94.1 Bilateral operation	BZ60B Very Complex, Cornea or Sclera Procedures, with CC Score 0-1

8 Stakeholder Engagement

Casemix classification design is underpinned by a wealth of clinical input and development. The National Casemix Office is committed to an iterative process of stakeholder consultation. Each subchapter has at least one Expert Working Group (EWG), who advise on current and developmental classifications. Expert Reference Panels and Steering Groups provide a cross-chapter interface in areas such as rehabilitation and high cost drugs. These groups provide invaluable medical, financial and allied health professional guidance, all of which are essential in ensuring continued classification transparency, accuracy and credibility.

Casemix classifications are updated annually to ensure continued clinical relevance and design accuracy. The key role played by EWGs and other advisory bodies continues through on-going maintenance and development, by reviewing and where necessary revising design parameters, and assessing HRG performance. The National Casemix Office gratefully acknowledges the support of the following organisations whose representation through EWGs is central to ensuring clinical accuracy and reflection of current working practice.

- Association of British Neurologists
- Society of British Neurological Surgeons
- Royal College of Anaesthetists
- British Pain Society
- Royal College of Ophthalmologists
- British Association of Otorhinolaryngologists, Head and Neck Surgeons
- Royal College of Surgeons of England - Faculty of Dental Surgery
- British Thoracic Society
- Society of Cardiothoracic Surgeons
- British Cardiovascular Society
- Royal College of Surgeons
- British Society of Gastroenterology
- British Association of Rheumatology
- British Geriatrics Society
- British Orthopaedic Association
- Association of Breast Surgery
- British Association of Surgical Oncologists
- British Burns Association
- British Association of Plastic Surgeons
- British Association of Dermatologists
- British Society of Allergy and Clinical Immunology
- Association of Genito-urinary Medicine
- Diabetes UK
- British Diabetic Association
- British Association of Urological Surgeons
- Renal Association
- Royal College of Obstetricians and Gynaecologists
- Royal College of Paediatrics and Child Health
- The Clinical Genetics Society
- Royal College of Emergency Medicine
- British Society for Rehabilitation Medicine

- British Association for Sexual Health and HIV
- British Association of Perinatal Medicine
- Vascular Society
- Royal College of Radiologists
- British Nuclear Medicine Society
- British Society of Haematologists
- Faculty of Clinical Oncology
- Joint Collegiate Committee of Oncology

9 Further Information

NHS Digital http://content.digital.nhs.uk/casemix

Helpdesk: 0300 303 5678

Email: enquiries@nhsdigital.nhs.uk

NHS Digital is the trusted national provider of high-quality information, data and IT systems for health and social care.

OPCS https://isd.digital.nhs.uk/trud3/user/guest/group/0/pack/10

The clinical classification OPCS-4 is mandatory for Admitted Patient Care Commissioning Data Sets (CDS) and wherever there is a national requirement to support secondary uses. The classification may also be used locally for operational uses.

World Health Organisation http://www.who.int/

WHO is the directing and coordinating authority for health within the United Nations system. It is responsible for providing leadership on global health matters, shaping the health research agenda, setting norms and standards, articulating evidence-based policy options, providing technical support to countries and monitoring and assessing health trends.

ICD-10 www.who.int/classifications/icd

The International Classification of Diseases (ICD) is the standard diagnostic tool for epidemiology, health management and clinical purposes, including analysis of the general health of population groups and monitoring diseases and other health problems.

NHS Improvement https://improvement.nhs.uk/

NHS England https://www.england.nhs.uk/

NHS Improvement and NHS England are working together to design a comprehensive NHS payment system that will deliver better quality services for patients at a cost that is sustainable

The Documentation Suite

Below is a list of the various documents which are available to download from the National Casemix Office website http://content.digital.nhs.uk/casemix/downloads.

This Documentation Suite provides a comprehensive resource to enable users to understand design concepts and logic, as well as practical use of the Grouper.

- The **Casemix Companion** is a starting point and general reference guide for anyone interested in learning about the casemix classification system used by the NHS in England. The document provides an introduction to HRGs, groupers, HRG4+ design concepts and grouping logic, and it contains links to additional resources
- The **Grouper User Manual** provides instructions on how to prepare and group data using the Grouper software application. Sample data with expected results is provided. This document is updated with every grouper release.
- The **Summary of Changes** document provides an overview of the main differences between the current grouper design and its relevant predecessor.
- The **Chapter Summaries** document provides an overview of the scope, composition and relevant grouping logic of individual HRG subchapters, and highlights significant changes to the latest HRG design.
- The **Code to Group Workbook** is a spreadsheet that embodies the casemix design. It provides details of the constituent elements that contribute to HRG grouping, and it contains reference data such as the ICD-10 and OPCS-4 codes utilised in the design. It contains the procedure and diagnosis hierarchies pertinent to a specific design, and the Complication and Comorbidities lists for HRG subchapters. The spreadsheet also includes information on Programme Budgeting Category (PBC) mapping, as well as a comprehensive list of HRG codes and labels.
- The **Best Practice Guide** is a spreadsheet that contains details about how the grouper allocates specific identification flags relating to best practice. Best Practice Flags usually result in an adjustment to the tariff. The spreadsheet also provides details of these specific tariff adjustments