

Casemix Companion

HRG4+ 2018/19 Reference Costs Grouper

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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 how the HRG design has been enhanced with the introduction of the latest version of the HRG design, HRG4+.
- The third layer, section **6 Grouping Logic**, explains how the design concepts and recent developments are built into the Grouper 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 and 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.

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 provide an opportunity to benchmark treatments and services, and they 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 1 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 kept to a minimum.

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 following two numeric characters (**NN**) represent the **HRG Number** within the HRG Subchapter.
- The final alphabetical character (**A**) signifies the **Split** applicable to the HRG.

The first four characters together 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 that further describes activity, such as patient age, length of stay or the presence of complications/comorbidities in the patient record. 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 workbook (released with each Grouper product) lists the chapters and subchapters relevant to an individual Grouper product. As the HRG design necessarily changes over time, users must ensure they are using the Code to Group Excel workbook specific to the Grouper software being used. These must match 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 to 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 in the patient record. For outpatient data, HRG derivation 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 one may not always be recorded, meaning that a procedure-driven HRG cannot be generated. In these situations, assuming minimum mandatory information has been 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 within that subchapter, 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 procedure (the procedure with the highest expected resource use) will be used to derive the HRG. Each procedure is assigned a hierarchical value associated with its expected resource consequences (see **section 6.4** for further information). These hierarchical rankings, or PH values, 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 PH value, the first of these procedures recorded 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 patient episode (see **sections 6.9** and **6.10** 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 as a primary diagnosis in a patient record is assigned a hierarchical value associated with its expected resource consequences (see **section 6.5** for further information). These hierarchical rankings reflect the expected relative cost of admissions for 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 value), 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;
- or, where no dominant significant procedure exists within the patient record,
- the primary diagnosis with the first highest diagnosis hierarchy value 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 employing CC splits rely on a subchapter-specific CC list to separate activity. The purpose of each CC list is to identify secondary diagnoses that are expected to result in additional resources being used by patients.

There are exceptions to the use of a CC list to determine a CC value, for example 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 as 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. These may also reflect additional resource usage and will be on CC lists where clinically appropriate.

It is important to note that a particular secondary diagnosis may be a major complication for some procedures or conditions while 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 acknowledged. For secondary diagnoses 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. These injuries are coded in accordance with ICD-10 *Chapter XIX, Injury, poisoning and certain other consequences of external causes (S00 – T98)*.

Body sites have been defined, and a table containing non-superficial trauma injuries relating to each specific body site has been compiled (lists of these injuries can be found in the “Comp_VA_” lists in the Other Lists worksheet 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 traumatic injuries to two or more different body sites (and one of these is the primary diagnosis), a multiple trauma HRG will be generated for that episode of care. Multiple Trauma is a separate concept to Major Trauma: while Major Trauma may involve a single body site, a minimum of two different body sites is required for Multiple Trauma HRG derivation.

Once a patient is determined to be 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.

A multiple trauma HRG will be generated for a spell where the HRG of the first episode of a multi-episode spell is a multiple trauma HRG. For multi-episode spells where the first episode is not assigned a multiple trauma HRG but a later episode is, the spell HRG will not be a multiple trauma HRG.

4.9 Unbundling

To improve the performance of HRGs and to better represent activity and costs, some significant elements of cost and activity are identified separately, that is they are “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 HRG designs (i.e. up to HRG v3.5), each episode of care would derive a single HRG. However, 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 and is generated in addition to a core HRG for the episode or spell of care, or attendance. An unbundled HRG may be event-based, and thus derived from the presence of a specific OPCS-4 code in the patient record, or duration-based, in which case it is 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 has been used as the basis of the National Tariff System (NTS) from the 2017/18 financial year onwards.

The national reimbursement system effective from April 2019 is based on costs collected in 2016/17 by NHS Improvement using the HRG4+ 2016/17 Reference Costs 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 Greater Number of HRGs

The number of HRGs included in the HRG design has increased from 2,879 in the HRG4+ 2017/18 Reference Costs Grouper to 2,892 in the HRG4+ 2018/19 Reference Costs Grouper. The increase in the number of HRGs offers greater granularity in the classification and supports the improved identification of specialist services that are often high cost in nature.

5.2 Interactive CC Splits

Standard complication and comorbidity splits have been replaced with interactive complication and comorbidity splits in the majority of HRG4+ subchapters. Interactive CC splits rely on summed scores and more appropriately reflect the expected additional resource use of treating patients with multiple complications and/or comorbidities than standard CC splits. When determining the HRG for a given FCE, the HRG Grouper produces a summed score based on all unique secondary diagnoses recorded in the patient record. To determine the value of each secondary diagnosis, the Grouper refers to the CC list specific to the relevant subchapter. As per Design Framework requirements, major CCs have a nominal value of 2 and all other CCs have a nominal value of 1. If a diagnosis is not included in the relevant CC list, it is considered to have a value of 0.

5.3 Procedure Hierarchy Changes

The range of procedure hierarchy (PH) values was expanded as part of the move to HRG4+ to enable the design to more appropriately reflect the expected resource use of procedures across all subchapters, particularly when differentiating between low-cost high-volume procedures. As part of this change, each OPCS-4 procedure code valid for driving grouping was reassigned a PH value. A logarithmic hierarchy range runs from 3 to 41, with a lower resource difference expected between the values at the lower end of the range than those at the higher end. PH values 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 for that area accommodates multiple-procedure activity.

5.4 Diagnosis Hierarchy Changes

The range of diagnosis hierarchy (DH) values was expanded as part of the move to HRG4+ to enable the design to better reflect the expected resource use associated with specific diagnoses across all subchapters. As part of this change, each ICD-10 code valid for driving grouping was reassigned a DH value. DH values 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 values at the lower end of the range than those at the higher end. This change also provided 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 1 April 2017, are incorporated within the HRG4+ design. Where a new code has been added as part of the OPCS-4.8 update, Expert Working Group advice has been sought to determine the most appropriate HRG(s) to which to map the new code. In some cases, the introduction of a new OPCS-4 code has led to the creation of new HRGs that more appropriately reflect the clinical care involved.

5.6 Intervention Splits

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 twofold: these HRGs will not only include the additional cost/resources associated with performing these relatively minor procedures, but they 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+ introduced HRGs specific to specialised activity, such as those for congenital cardiac surgery. HRG4+ also expanded the concept of age splits by introducing paediatric age splits that enable the creation of HRGs specific to a given subset of patients within the child population. Paediatric age splits can be employed to separate activity where there is a significant difference in expected resource use, for example between treating infants and treating older children. 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 that 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 document that forms 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 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. The Grouper also outputs quality files that contain details of any errors or conflicts encountered during the grouping process. For more information about using the grouper application for local grouping, please refer to the Grouper User Manual.

6.2 Basic Grouping Logic

Following **validation** of the mandated grouper fields, there are five types of core logic used in Admitted Patient Care grouping that enable certain types of patients to be identified.

- **Core 4** logic is used to determine whether a patient is a Multiple Trauma patient. Only where a patient has a primary diagnosis of traumatic injury plus a secondary diagnosis of traumatic injury to a different body site will Core 4 logic be triggered. Core 4 logic allows Multiple Trauma patients to be identified prior to HRG generation via a diagnosis/procedure scoring grid.
- **Core 7** logic is used to identify patients with second- or third-degree burns. Burns logic is driven by a diagnosis of a second- or third-degree burn in any diagnosis position (not necessarily primary). Note that **Core 3** logic is escalation logic specific to these types of burns and is used to escalate the final HRG based on specific patient criteria such as degree of burns, age and CC score.
- **Core 1** logic is standard grouping logic for all other types of patients, for both procedure-driven and diagnosis-driven activity. Core 1 procedure logic is driven by the dominant procedure in the patient record.
- **Core 5** global exception logic follows Core 1 procedure logic but precedes Core 1 diagnosis logic within the grouping process. This allows things such as planned procedures not carried out (recorded via ICD-10 diagnosis codes) to take precedence over grouping diagnosis-only activity. Core 1 diagnosis logic is driven by the patient’s primary diagnosis for the episode or by the derived primary diagnosis of the spell.

Core 5 global exception logic allows HRG grouping to override HRG derivation in specific circumstances to allow the generation of HRGs that identify patients who:

- Are admitted or attend solely for radiotherapy treatment and have a length of stay of zero days
- Are admitted or attend solely for chemotherapy treatment and have a length of stay of zero days
- Are admitted or attend solely for nuclear medicine investigations under Treatment Function Code 812, Diagnostic Imaging and have a length of stay of zero days
- Are admitted or attend solely for diagnostic imaging investigations under Treatment Function Code 812, Diagnostic Imaging and have a length of stay of zero days

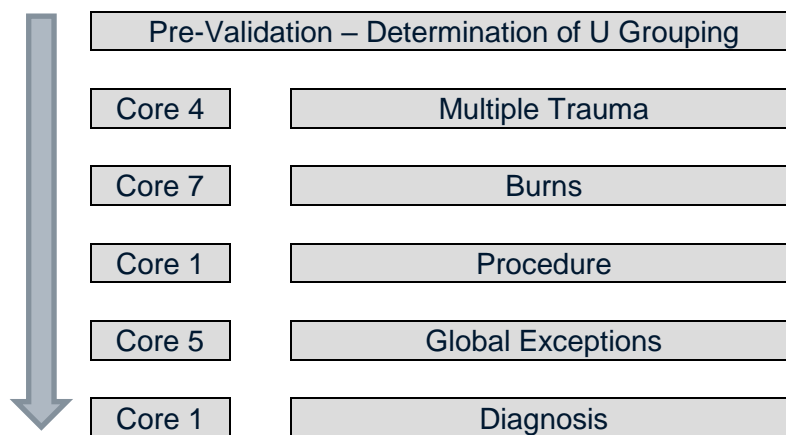
- Are admitted or attend solely for diagnostic imaging or nuclear medicine investigations under Treatment Function Code 812, Diagnostic Imaging and are examined under general anaesthetic
- Are admitted but on whom a procedure is not carried out (identified by the presence of an ICD-10 diagnosis code indicating procedure not carried out in a secondary position), irrespective of whether this is for a patient, clinical or administrative reason, and irrespective of the patient’s primary diagnosis or length of stay

Non-admitted Patient Care grouping utilises Core 1 and Core 5 logic only (or outpatient default logic) as diagnoses are not used for grouping in this care setting.

Other commissioning data sets, such as those for emergency medicine or critical care, use grouping logic specific to their data set.

6.3 The Grouping Process

For Inpatient core HRG grouping, the grouping process can be simplified as follows:



For a given patient record, the design logic trips through various stages to determine the HRG.

The Single Spell Grouper (and Batch process grouper outputs) will detail which Grouping Method has been employed in the **Grouping Method Flag** field.

The table below lists the different Grouping Method Flags:

Grouping Method Flag	B	Burns driven
Grouping Method Flag	D	Diagnosis driven
Grouping Method Flag	G	Global exception
Grouping Method Flag	M	Multiple trauma
Grouping Method Flag	O	Outpatient default
Grouping Method Flag	P	Procedure driven
Grouping Method Flag	U	Error

Grouping of outpatient activity follows the same process but ignores the elements that require diagnosis coding, as diagnosis is not taken into account for outpatient grouping

Further information regarding Groupers and respective grouper outputs can be found in the Grouper User Manual that accompanies each Grouper product release.

6.4 Procedure Hierarchy

The procedure hierarchy employed by the Grouper provides a mechanism by which the relative complexity of procedures can be compared across HRG chapters (see **section 4.5** for further information). If a single procedure code 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 procedure code classifying the dominant procedure is identified using the procedure hierarchy. Where multiple procedures with the same hierarchy value are recorded, the earliest recorded of the highest ranking procedures is used to drive grouping. 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. In the absence of any procedures, or where the only procedure code recorded 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 Hierarchy values work in the HRG4+ 2018/19 Reference Costs Grouper

Each procedure code has an associated value reflecting its relative expected resource use. Values 0–4 identify procedure codes that 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 resource-intensive procedures and 41 represents the most resource-intensive procedures:

Value	Description
0	OPCS-4 codes not valid for grouping (such as approach codes or site of operation codes recorded without a procedure code) or considered poorly coded for Casemix grouping purposes (where the dominant procedure is too vague to generate a clinically meaningful HRG)
1	OPCS-4 codes classifying a non-operative procedure with minimal resource (such as fitting a sling or administering an injection); ignored for grouping Where this is the only remaining procedure in an Admitted Patient Care record (after unbundled HRGs have been generated), grouping will be diagnosis-driven; where this is the only procedure in an outpatient attendance (after unbundled HRGs have been generated), a WF* Outpatient Consultation HRG will be generated
2	OPCS-4 codes that will generate an unbundled HRG(s) Procedure hierarchy values are not used to generate event-based unbundled HRGs; every instance of an unbundled procedure code generates an unbundled HRG. Thus, this hierarchy value is used only for completeness
3–4	OPCS-4 codes relating to Subchapter WF Non-admitted Consultations (uni-professional/disciplinary and multi-professional/disciplinary assessments)
5–41	Scale of relative resource use. A value of 5 is assigned to the least resource-intensive procedures, while a value of 41 is assigned to the most resource-intensive procedures

6.5 Diagnosis Hierarchy

Primary diagnosis is used to drive grouping when there are no significant procedures in the patient record suitable to drive grouping, or where 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 ICD-10 diagnosis code that is valid to drive grouping has a diagnosis hierarchy value associated with its expected resource impact based on length of stay analysis (see **section 4.6** for further information); however, these hierarchy values are not used to determine diagnosis-driven FCE HRGs, as the primary diagnosis for an 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 diagnosis hierarchy value becomes the spell primary diagnosis and is used to drive spell-level diagnosis-driven grouping.

How Diagnosis Hierarchy values work in the HRG4+ 2018/19 Reference Costs Grouper

Within the diagnosis hierarchy, there are 21 bands running from 5 to 25, where 5 represents the least resource-intensive primary diagnoses 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, or too vague to determine anticipated resource use from a Casemix perspective)
5–25	Scale of relative resource use in which 5 represents the least resource-intensive primary diagnoses and 25 represents the most resource-intensive primary diagnoses

6.6 Interactive 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 a CC for an episode or spell with a primary diagnosis of **A02.0 Salmonella enteritis**, although the converse is not true. Hence **A02.0 Salmonella enteritis** can rightly be considered a CC for an episode or spell with 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 that may contribute to CC scoring. In addition, in accordance with national coding standards and 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.

6.7 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:

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)**.

The Grouper 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+)**.

6.8 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 which other procedures are recorded with the dominant procedure.

For example:

If **P23.2 Anterior colporrhaphy NEC** is recorded with no other procedures present and no secondary diagnoses, 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, 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 if either is the dominant procedure, with no secondary diagnoses recorded, then the HRG generated will be **MA03D Major Open Lower Genital Tract Procedures with CC Score 0-2**.

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

Escalation logic can drive grouping to a higher resource HRG to reflect additional complexity. If a procedure is performed in conjunction with another procedure from a specified list, a higher resource HRG will be derived for the episode than would be derived for an episode in which either procedure were recorded on its own.

For example:

If **W47.1 Primary prosthetic replacement of head of femur not using cement** is recorded as the dominant procedure, and no other procedure code is present in the patient record, 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**), the episode will be escalated to the “Complex” category HRG, in this case **HN81E Complex, Hip or Knee Procedures for Non-Trauma, with CC Score 0-1**.

6.9 Subsidiary Procedure-Qualified HRGs

Some of the procedure-based HRGs require a subsidiary code qualifier. This means that the OPCS-4 code recorded 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 chapters in the main OPCS-4 classification and includes (but is not limited to) approach codes, staged and minimal access procedures.

6.10 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 where the patient’s diagnosis is deemed to be clinically important, the procedure-driven HRG captures the additional expected resource associated with that diagnosis. Examples include the obesity check used to derive some bariatric surgery HRGs or a cancer check used to derive specific treatment of malignancy HRGs in gynaecology.

6.11 Unbundling

Unbundling is the first step in the grouping process, following data input. 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 2018/19 Reference Costs Grouper.

7.1 Interactive CC Splits

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 secondary diagnoses recorded in the patient record.

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 <i>(from list LB_Major_End)</i>	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 <i>(from list LB_Int_Open)</i>	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 <i>(both from list LB_Int_End)</i>	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 with 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 respite care.

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 with 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 NCO is committed to an iterative process of stakeholder consultation. Each subchapter has at least one Expert Working Group (EWG) that advises 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 by assessing HRG performance. The NCO gratefully acknowledges the support of the following organisations, whose representation through EWGs is central to ensuring clinical accuracy and reflection of current working practice.

- [Royal College of Surgeons of England](#)
- [Association of British Neurologists](#)
- [Society of British Neurological Surgeons](#)
- [British Society for Clinical Neurophysiology](#)
- [Association of Neurophysiological Scientists](#)
- [Royal College of Anaesthetists](#)
- [British Pain Society](#)
- [Royal College of Ophthalmologists](#)
- [British Association of Otorhinolaryngology - Head and Neck Surgery](#)
- [British Association of Oral & Maxillofacial Surgeons](#)
- [British Association of Audiovestibular Physicians](#)
- [British Association of Prosthetists and Orthotists](#)
- [Royal College of Surgeons of England - Faculty of Dental Surgery](#)
- [Restorative Dentistry-UK](#)
- [British Thoracic Society](#)
- [Society for Cardiothoracic Surgery in Great Britain and Ireland](#)
- [Association of Chartered Physiotherapists in Respiratory Care](#)
- [British Cardiovascular Society](#)
- [British Cardiovascular Society - British Congenital Cardiac Association](#)
- [British Cardiovascular Intervention Society](#)
- [British Society of Echocardiography](#)
- [British Heart Rhythm Society](#)
- [Royal College of Physicians](#)
- [British Society of Gastroenterology](#)
- [Association of Upper GI Surgeons of Great Britain and Ireland](#)
- [Association of Coloproctology of Great Britain and Ireland](#)
- [British Obesity & Metabolic Surgery Society](#)
- [British Society for Rheumatology](#)
- [British Orthopaedic Association](#)
- [British Society for Children's Orthopaedic Surgery](#)
- [British Association of Spinal Surgeons](#)
- [British Scoliosis Society](#)
- [Orthopaedic Trauma Society](#)
- [British Society for Surgery of the Hand](#)
- [British Hip Society](#)

- British Association of Surgery of the Knee
- British Orthopaedic Foot and Ankle Society
- Association of Breast Surgery
- British Association of Surgical Oncology
- British Burn Association
- British Association of Dermatologists
- British Association of Plastic Reconstructive and Aesthetic Surgeons
- Royal College of Surgeons of England - British Association of Aesthetic Plastic Surgeons
- Diabetes UK
- British Association of Urological Surgeons
- Renal Association
- Renal Association - British Association for Paediatric Nephrology
- Royal College of Obstetricians and Gynaecologists
- British Gynaecological Cancer Society
- British and Irish Association of Robotic Gynaecological Surgeons
- British Society for Colposcopy and Cervical Pathology
- British Society for Gynaecological Endoscopy
- British Menopause Society
- British Society of Abortion Care Providers
- Royal College of Nursing
- Association of Early Pregnancy Units
- British Fertility Society
- British Society of Gynaecological Imaging
- Royal College of Paediatrics and Child Health
- Paediatric Intensive Care Society
- British Association of Perinatal Medicine
- Paediatric Intensive Care Society
- Vascular Society
- Royal College of Radiologists
- Royal College of Radiologists - Faculty of Clinical Oncology
- Royal College of Radiologists - Joint Collegiate Committee for Oncology
- British Nuclear Medicine Society
- British Society of Blood and Marrow Transplantation
- British Society for Haematology
- Royal College of Emergency Medicine
- British Society for Rehabilitation Medicine
- British Society of Interventional Radiology
- British Society of Thoracic Imaging
- British Society of Skeletal Radiologists

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 OPCS-4 clinical classification 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: <https://digital.nhs.uk/services/national-casemix-office/downloads-groupers-and-tools>.

This documentation suite provides a comprehensive resource intended to help users understand HRG design concepts and logic as well as use 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. This 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 each 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 it highlights significant changes made in the latest HRG design.
- The **Code to Group Workbook** is an Excel workbook 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, the procedure and diagnosis hierarchies pertinent to a specific design, and the Complication and Comorbidities (CC) lists for HRG subchapters. The workbook also includes information on Programme Budgeting Category (PBC) mapping as well as a comprehensive list of HRG codes and labels.
- The **Trimpoints Workbook** identifies the episode and spell-level trimpoints used to collect reference costs for each HRG in a given year. This workbook is published alongside the Trimpoint Methodology document.