National Casemix Office

NHS Digital

The Casemix Companion

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Information and technology
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Contents

1 Introduction

To understand how today's Casemix Classification works, it's useful to recognise how – and why - the classification has evolved since its inception in the early 1990s.

Key to every Casemix Healthcare Resource Group (HRG) iteration was, and has been ever since, the support of our clinically-led Expert Working Groups, (EWGs) who work with the National Casemix Office (NCO) to design HRGs that effectively represent clinical care, within the boundaries of available, nationally mandated data.

Version 3 HRGs

Although the first versions of the Casemix Classification were developed in the early 1990s, it was not until the creation of Version 3 HRGS that the resource use associated with clinical care could be reliably quantified at a national level, ensuring that NHS spend from public monies had a defined and measurable output for comparison.

Version 3 HRGs were collected in the national Reference Costs collection, established as a result of the 1996 White Paper, The new NHS, which stipulated that "the Government will develop a national schedule of 'reference costs' which will itemise what individual treatments across the NHS cost. By requiring NHS Trusts to publish and benchmark their own costs on the same basis, the new arrangements will give Health Authorities, Primary Care Groups and the NHS Executive a strong lever with which to tackle inefficiency".

The Reference Costs collection utilised version 3.1 HRGs until the 2001/02 financial year, before the move to collecting version 3.5 HRG costs and activity in the 2002/03 financial year. A notable exception to this was the collection of the version 3.2 HRGs for Accident and Emergency Services, which prevailed until the introduction of HRG4 for costing in 2006/07.

The version 3.5 HRGs were used as part of the newly-introduced Payment by Results (PbR) funding policy for the English NHS, with national tariffs for 15 HRGs in 2003/04 and 48 HRGs in 2004/05. The first NHS Foundation Trust applicants moved to a full PbR system in 2005/06, with other NHS Trusts following suit in 2006/07. National tariffs were based on HRGv3.5 for admitted patient care until the end of March 2009, and version 3.2 for Accident and Emergency Services until the end of March 2010.

HRG4

With the introduction of PbR, funding policy moved beyond the admitted patient care confines of the HRG version 3 Casemix Classifications, and in the 2006/07 financial year, HRG4 was collected in Reference Costs for the first time. HRG4 was designed in concert with funding policy and extended the scope beyond (primarily) admitted patient care into other care delivery arenas.

The notable differences between HRG4 and HRGv3.5 included:

An extended scope, to cover Outpatient and Critical Care Services activity, as well as specialist service areas such as Diagnostic Imaging, Chemotherapy, Radiotherapy, Renal Dialysis, Rehabilitation and Specialist Palliative Care

Spell-level and Unbundled Grouping processes, so that the HRG4 Grouper generated HRGs at both Finished Consultant Episode (FCE) and spell level, rather than the episode-only level of v3.5, and unbundled some elements of care from the core HRG, such as High cost drugs, Diagnostic Imaging and Chemotherapy. This meant that a single patient record could generate more than one HRG, rather than the single HRG per episode of version 3.5. As a result, the concept of an HRG hierarchy was

removed from the grouping process, and the HRG of the spell could be different to those of the episodes within it. To facilitate the new grouping process, procedure and diagnosis hierarchies were introduced to determine the key resource drivers of care.

HRG4 grouping processes stated that:

- For surgical HRGs, the dominant procedure used to derive the spell HRG was determined by reviewing all procedures recorded in the spell against a hierarchy of procedures. The primary diagnosis for a surgical spell was the primary diagnosis of the FCE that contained the dominant procedure
- Where a spell contained no procedure, and where a patient had more than one primary diagnosis in a spell (because that patient spell contained more than a single FCE), and the primary diagnoses of the FCEs within that spell differed, the dominant primary diagnosis (as determined by the diagnosis hierarchy) was used to derive the spell HRG
- For both surgical and non-surgical spells, secondary diagnoses were considered as complications and comorbidities (CCs). For multiple FCE spells, valid primary diagnoses from individual FCEs other than that determined to contain the spell primary diagnosis were also considered as CCs for HRG derivation
- For multiple FCE spells, all data was considered to create the spell HRG, therefore the spell HRG was not necessarily the same as one of the FCE HRGs within it

Improved recognition of clinical care and patient characteristics, relating to multiple procedures, patient age and complications and comorbidities

The HRG4 design better reflected:

- Multiple procedures, taking account of bilateral procedures, introducing sub-chapter specific escalation logic and introducing the concept of the Multiple Trauma patient
- Patient age as an indicator of expected resource use, introducing age splits to many HRGs to reflect the cost differences between treating adult and paediatric patients, and establishing the “standard” adult / child age splits based on the definitions in the National Service Framework for Children and Young People
- Patient-level Complications and Comorbidities, introducing subchapter-specific CC lists rather than the standard CC list used across the entire HRGv3.5 design, and expanding the ‘with CC’ and ‘without CC’ HRGs in v3.5 to a maximum of three levels that differentiated between not significant, intermediate and major diagnoses

Extended validation of data quality, such that all mandatory fields required for grouping were required to contain valid content, irrespective of whether that field was itself used in HRG generation. Previously, HRG v3.5 grouping would generate an HRG where the fields required for the generation of the specific HRG were valid, irrespective of whether any of the other required fields in the Grouper input failed validation.

HRG4 was first used for the 2009/10 national tariff under PbR policy, although the HRG version 3.2 HRGs continued to be used for Accident and Emergency Services funding until the 2010/11 financial year, which utilised HRG4 proper, across all services within scope.

HRG4 established many of the basic principles still utilised in HRG grouping today, such as the scope of the Casemix Classification, the establishment of procedure and diagnosis hierarchies to facilitate spell-level grouping and unbundling, and the notion of “harsh” validation on mandated grouping fields.

HRG4+

As a result of an increase in the breadth of coding (in part instigated by the introduction of HRG4 for national funding from April 2009), the HRG4+ classification was introduced in Reference Costs for the 2012/13 financial year. Full implementation took until 2014/15, when the third and final phase of HRG4+ was completed.

Whilst the introduction of HRG4+ did not increase the scope of the HRG Casemix Classification, clinical input and experience allowed the HRG4+ classification to acknowledge the additional resource use required when treating patients: who have multiple complications and comorbidities or require multiple procedures within the same admission; who require surgery at a very young age or which utilises new devices; or who require more complex, often specialist (rather than routine) care.

Key changes introduced in HRG4+ included the:

Improved recognition of clinical care, including specialised care, and patient characteristics relating to lower-resource procedures and diagnoses, intervention splits, complications and comorbidities, and patient age.

The HRG4+ design better reflects:

- The expected resource use of procedures across all subchapters, particularly when differentiating between low-cost high-volume procedures, enabled by the expansion of the range of procedure hierarchy (PH) values
- The expected resource use associated with specific diagnoses across all subchapters, enabled by the expansion of diagnosis hierarchy (DH) values
- The concept that Intervention Splits, for a number of diagnosis-driven HRGs in various subchapters, can reflect that HRGs not only include the additional cost/resources associated with performing relatively minor procedures, but may also provide an indication that the patient’s condition is 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
- The complications (of treatment) and comorbidities (existing conditions) of patients, by the introduction of interactive complication and comorbidity splits in the majority of HRG4+ subchapters, replacing standardised subchapter-specific complication and comorbidity splits
- An expanded concept of age splits, introducing paediatric age splits that enable the creation of HRGs specific to a given subset of patients within the child population

HRG4+ was first used for the 2017/18 national tariff under PbR policy and continues to be used for the national prices in the 2022/23 financial year. It supports the Elective Recovery Programme, designed to reduce the waiting lists that have built up over the course of the COVID-19 pandemic.

The remainder of this document provides some rudimentary information on the definitional aspects of Casemix and the uses of HRGs in general, before focusing on how the HRG4+ Casemix Classification works, in terms, of design intent, logic and HRG outputs.

This document is therefore intended to provide a starting point and general reference for the HRG4+ Casemix classification system that is widely used by the NHS in England to understand the healthcare activities they provide to the patient populations they serve.

2 What is Casemix?

The term casemix has a number of meanings, from the literal “mix of cases (patients)” seen by a consultant/hospital/region, to the way in which patient care and treatments are classified into groups. These groups provide a useful measure on which to make performance comparisons, to cost healthcare, or indeed to fund it.

The principles of the development of a Casemix Classification are well-established internationally and have been since the late 1960s. These are generally accepted to require a casemix classification (often referred to as Casemix Groups) to be:

- **Clinically meaningful**
- **Relatively similar at the group level, in resource terms**
- **Based on mandated, standardised, and readily available data**
- **Manageable in number**

The development, maintenance and evolution of a Casemix Classification requires a combination of established rules and principles, specialist expertise and data. All Casemix designs rely on the availability of national data flows, data definitions and data standards, and the National Casemix Office (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.

Casemix classifications are underpinned by consistency, empirical evidence, and a clear focus on what we’re trying to do, and why. In its simplest sense, a classification enables the health care system to understand the healthcare activities it undertakes, the type of patients who benefit from such activities and interventions, and the resource use required to deliver optimal patient care.

Casemix is therefore a method of classifying patient care based on expected clinical resource use for the provision of that care. HRGs are the Casemix Classification within the NHS in England, and are developed and maintained by the NCO, who design and refine the classifications used to describe NHS healthcare activity in England, Since the first versions of our HRG classifications in the early 1990s, there have been various interactions of our casemix design, in order to maintain clinical validity, and reflect changes in clinical practice and technology.

As an impartial, independent body accountable to the NHS, NHS England & Improvement and the Department of Health & Social Care, the remit of the NCO 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.

3 Healthcare Resource Groups

Healthcare Resource Groups (HRGs) are clinically meaningful groupings of patient activity, derived primarily from procedure (OPCS Classification of Interventions and Procedures Version 4.9) and diagnosis (International Statistical Classification of Diseases and Related Health Problems 10th Edition 5th Revision) 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.

An awareness of the rigour employed by the NCO in the development of our HRG classifications can help our users to:

- Understand how HRGs can be used to benchmark healthcare services, within and between providers, and highlight differences in clinical practice, and patient outcomes
- Appreciate how HRGs represents healthcare activity, supporting the development of new patient pathways, accompanied by a clear and quantifiable measure of the resources required for change
- Recognise that HRGs can be used to establish baselines for future performance measurement, which is key to redesigning healthcare services for the future

From the first Reference Costs collection and the first national tariff, which used the HRG version 3 designs, to the expansion of coverage and concepts in HRG4, the HRG Casemix Classification has evolved in order to continue to reflect clinical practice, innovation and changes in care delivery protocols. Our HRGs are also updated for changes in the underlying primary classifications such as OPCS and IICD 10, which are currently updated on a specified three-year cycle.

The HRG4+ Casemix Classification is the most current version of our HRG design. It evolved from the HRG4 classification, retaining the same scope, but developed to better reflect healthcare activities, especially in the world of multiples (complications, comorbidities, procedures), innovation (devices and technology) and complexity (infants, interventions and interdependencies).

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.

The Casemix Design Framework outlines the key principles that are essential to any casemix classification and has evolved with each iteration of our classification. The Framework includes details of the Casemix design fundamentals and editorial rules used when developing our HRG designs, as well as how we measure the performance of our HRGs.

Our stakeholders are comprised of representatives from Royal Colleges, clinical professions and associations, Policy colleagues from NHS England & Improvement, 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**.

Every OPCS-4 procedure code and ICD-10 diagnosis code is mapped to an **HRG root** within the HRG4+ design, with the exception of procedure codes that are ignored for grouping. The base HRG root to which a code is mapped, when all other logic conditions for the code have not been met, can be found in the HRG1 field in the Code to Group tab of the Code to Group Excel workbook that accompanies each Grouper release.

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. Split characters do not however have to be standardised across the HRG design
- A value of “Z” as the last character indicates that no split is present

For example, the 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 Complication/Comorbidity (CC) Score 3+

The Code to Group Excel workbook provides details of constituent elements that contribute to HRG grouping. It contains reference data, such as the ICD-10 and OPCS-4 codes used in the design, procedure and diagnosis hierarchies relevant to a specific design, and the Complication and Comorbidities lists for HRG subchapters. It also includes a list of chapters and subchapters relevant to an individual Grouper product, as well as a comprehensive list of HRG codes and labels.

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 is recorded in the patient record, or where the only code recorded is from OPCS-4 code category ***X62.- Assessment***. For outpatient data, HRG derivation is not dependent on diagnosis as these data are not yet mandated in 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

Each procedure is assigned a hierarchical value associated with its expected resource consequences. These hierarchical rankings are intended to reflect the expected relative costs of individual procedures and provide a mechanism by which the relative complexity of procedures can be compared across HRG chapters.

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. The 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 complexity categories.

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 (subject to length of stay criteria for minor procedures).

If multiple procedures are recorded, the procedure code classifying the dominant procedure is identified using the procedure hierarchy. In the event of two (or more) procedures being recorded within a single patient record with the same procedure hierarchy value, the first of these procedures recorded in the patient record will drive HRG grouping at both the episode and spell level.

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, grouping will flip to using the primary diagnosis of the episode, or the derived primary diagnosis of the spell, to determine the HRG.

In summary, 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

The following table provides additional examples of the types of OPCS-4 codes and their hierarchies.

PH 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

4.6 Diagnosis Hierarchies

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

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.

Each diagnosis that is valid as a primary diagnosis in a patient record is assigned a hierarchical value associated with its expected resource consequences. These hierarchical rankings reflect the expected relative cost of admissions for each primary diagnosis.

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.

DH values are not used to determine diagnosis-driven FCE HRGs, as the primary diagnosis for an FCE is determined by the admitting clinician.

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 PH 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 DH value in the patient record

In summary, within the DH there are 21 bands running from 5 to 25, where 5 represents the least resource-intensive primary diagnosis and 25 represents the most resource intensive primary diagnosis:

The following table provides additional examples of the types of ICD-10 codes and their hierarchies.

DH 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

4.7 Complication and Comorbidity Splits

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

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.

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 unique secondary diagnoses that are expected to result in additional resources being used by patients.

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 CCs are assessed at subchapter level by individual EWGs to ensure that the CCs are appropriately acknowledged. For secondary diagnoses to be recognised in HRG derivation terms, they must therefore be both unique, and clinically relevant.

There are specific 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**.

Standard CC splits were replaced with interactive CC splits in HRG4+. 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.

To understand how the Grouper determines CC scores, please see section 5 of this document.

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**, e.g. **Comp_VA_Upper**, 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 Intervention Splits

Intervention splits are included 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.

4.10 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, where greater subdivision within the child population is not clinically relevant.

4.11 Minor Procedures and Length of Stay Maxima

The majority of minor procedure HRGs across all subchapters have maximum length of stay checks. Where the 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. It 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, where 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.

4.12 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, from HRG4 onwards, 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 or ICD-10 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 (derived from the Critical Care Minimum Data Sets)
- Specialist Palliative Care
- High Cost Drugs

5 Grouping Logic

5.1 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 published with each Grouper release.

5.2 Basic Grouping Logic

The first stage of the grouping process is **validation**, which ensures that the Grouper input data and record content is appropriate for grouping to HRGs other than the **UZ01Z Data Invalid for Grouping** HRG.

The single HRG in **Subchapter UZ Undefined Groups** is generated where a patient record is not valid for grouping to one of the other subchapters.

Further information on the Grouper validation process and the 11 underlying U Error categories is available in the Grouper User Manual, and the Chapter Summaries.

Following **validation** of the mandated Grouper fields, there are four 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 subsequent HRG generation via the 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

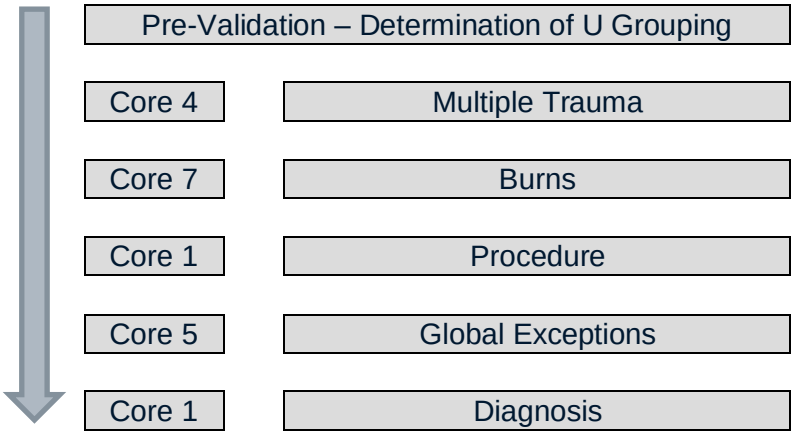
- Are admitted or attend solely for nuclear medicine investigations under Treatment Function Code **812 Diagnostic Imaging Service** or **371 Nuclear Medicine Service**.
- Are admitted or attend solely for diagnostic imaging investigations under Treatment Function Code **812 Diagnostic Imaging Service**
- Are admitted but a procedure has not been carried out, coded using ICD-10 diagnosis codes in a secondary position, irrespective of whether this is for a patient, clinical or administrative reason, irrespective of the patient's primary diagnosis or length of stay

Outpatient activity grouping utilises Core 1 and Core 5 logic, as diagnoses are not used for grouping in this care setting. Outpatient activity grouping also employs **Core 6** logic, which is used to determine the "attendance HRG" (for Local Payment Grouper products), in support of the National Reimbursement System, and represents the attendance HRG (**WF01A/B** or **WF02A/B**) paid when the core (non WF*) outpatient HRG does not have a tariff price.

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

5.3 The Grouping Process

For admitted patient care 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 (2nd or 3rd degree)
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 yet taken into account for outpatient grouping

Further information regarding Groupers and respective Grouper outputs can be found in the Grouper User Manual.

5.4 Multi-Episode Spells and Interactive Complications and Comorbidity Splits

In a multi-episode spell, all unique diagnoses are evaluated as potential CCs, 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.

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. 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, unspecified** as **A02.0** provides greater clinical specificity

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 on a CC list will have a nominal value of 2 and all other CCs on the list will 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.

The obstetric delivery HRGs are an exception to this rule, however, as in accordance with national coding standards and unlike all other CC lists, they utilise all diagnoses, including the primary diagnosis, to calculate the CC score.

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

However, the second FCE, 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+)**.

As diagnosis is not yet a mandatory item in the Outpatient Commissioning Data Set, the grouping process does not yet use diagnosis for Non-Admitted Consultation treatments even where present in the outpatient record. CC splits are therefore not currently applicable for outpatient-based care.

5.5 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, grouping logic flags may be used to derive the HRG, dependent on which other procedures are recorded alongside 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. If W47.1 Primary prosthetic replacement of head of femur not using cement is recorded.

However if a procedure from any other very major HN 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 relevant complex HN HRG, in this case **HN81E Complex, Hip or Knee Procedures for Non-Trauma, with CC Score 0-1.**

5.6 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.

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

	Age	Length of Stay (days)	Primary Diagnosis (ICD-10)	Dominant Procedure (OPCS-4)	Secondary Procedures (OPCS-4)	HRG
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

5.7 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.

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

	Age	Length of Stay (days)	Primary Diagnosis (ICD-10)	Dominant Procedure (OPCS-4)	HRG
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

5.8 Grouping Unbundled Activity

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

6 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.

- Association of Breast Surgery
- Association of Early Pregnancy Units
- Association of Neurophysiological Scientists
- Association of Upper GI Surgeons
- BLISS
- British & Irish Association of Robotic Gynaecological Surgeons
- British Association for Parenteral and Enteral Nutrition
- British Association of Aesthetics Plastic Surgeons
- British Association of Audiovestibular Medicine
- British Association of Dermatologists
- British Association of Endocrine and Thyroid Surgeons
- British Association of Knee Surgeons
- British Association of Oral & Maxillofacial Surgeons
- British Association of Oral Surgery
- British Association of Paediatric Endoscopic Surgeons
- British Association of Paediatric Medicine
- British Association of Paediatric Nephrologists
- British Association of Paediatric Otolaryngologists
- British Association of Paediatric Surgeons
- British Association of Perinatal Medicine
- British Association of Plastic, Reconstructive & Aesthetic Surgeons
- British Association of Spinal Surgeons
- British Association of Surgery of the Knee
- British Association of Urological Surgeons
- British Burn Association
- British Cardiovascular Intervention Society
- British Cardiovascular Society
- British Congenital Cardiac Association
- British Gynaecological Cancer Society
- British Heart Rhythm Society
- British Hip Society
- British Laryngoloy Association
- British Menopause Society
- British Myology Society
- British Nuclear Medicine Society
- British Orthopaedic Association
- British Orthopaedic Foot and Ankle Society
- British Paediatric Neurology Association
- British Paediatric Neurosurgery Group
- British Pain Society
- British Scoliosis Society
- British Society for Children's Orthopaedic Surgery
- British Society for Clinical Electrophysiology of Vision
- British Society for Clinical Neurophysiology
- British Society for Colposcopy and Cervical Pathology
- British Society for Gynaecological Endoscopy
- British Society for Haematology
- British Society for Rheumatology
- British Society for Surgery of the Hand
- British Society of Abortion Care Providers
- British Society of Breast Radiology
- British Society of Cardiac Computed Tomography
- British Society of Cardiovascular Imaging
- British Society of Cardiovascular Magnetic Resonance
- British Society of Clinical Neurophysiology
- British Society of Dental and Maxillofacial Radiology

British Society of Echocardiography
British Society of Gastroenterology
British Society of Gynaecological Imaging
British Society of Interventional Radiologists
British Society of Neuroradiologists
British Society of Paediatric Gastroenterology Hepatology & Nutrition
British Society of Rehabilitation Medicine
British Society of Rheumatology
British Society of Skeletal Radiologists
British Society of Thoracic Imaging
British Society of Urogynaecology
British Thoracic Society
Critical Care Network
ENT UK
Interventional Oncology UK
Joint Societies Committee (Diabetes and Endocrinology)
Neonatal Operational Delivery Network
Non Medical Prescribers Network
Orthopaedic Trauma Society
Paediatric Intensive Care Society
Paediatric Interventional Radiology UK
Royal College of Emergency Medicine
Royal College of Nursing
Royal College of Obstetricians and Gynaecologists
Royal College of Ophthalmologists
Royal College of Paediatrics and Child Health
Royal College of Physicians
Royal College of Radiologists
Royal College of Surgeons
Royal College of Surgeons-Faculty of Dental Surgery
Royal Society of Medicine (Pain Section)
Society for Cardiothoracic Surgery
Society for Computing and Technology in Anaesthesia
Society of British Neurological Surgeons
The Association of Coloproctology of Great Britain & Ireland
The British Society of Dental and Maxillofacial Radiology
The Renal Association
The Royal College of Obstetricians and Gynaecologists
UK Forum on Haemoglobin Disorders
UK Neurointerventional Group
The Vascular Society of Great Britain & Ireland

7 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 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 England and NHS Improvement www.england.nhs.uk

NHS England and NHS Improvement have come together as a single organisation. This organisation aims to better support the NHS and help improve care for patients.