National Casemix Office

The Science of Casemix

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This report may be of interest to members of the public, policy officials and other stakeholders to make local and national comparisons and to monitor the quality and effectiveness of services.

The Science of 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, and
- manageable in number.

From a practical perspective, casemix groups reduce the administrative and analytical burden of those who use them. That said, they will never be accepted in a healthcare setting if clinicians do not recognise the care the groups describe. The key casemix benefits of being able to compare performance, activities and patients will never be realised if the data which underpin them is subject to local definitional changes, or the contents of the groups is so dissimilar as to make any comparison meaningless.
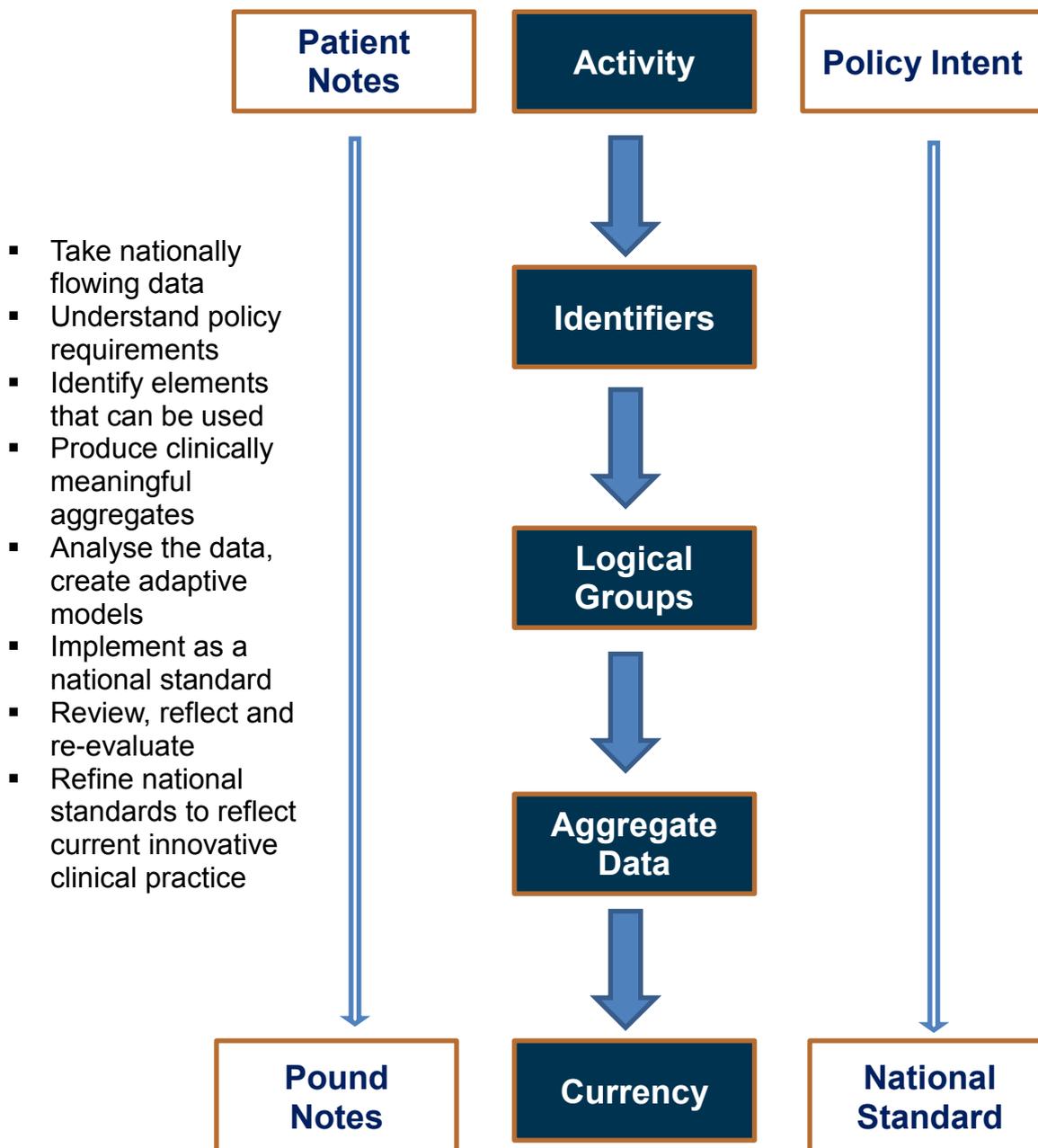
The National Casemix Office

The National Casemix Office is based in Leeds as part of the Health and Social Care Information Centre.

It is made up of a team of 28 staff and is led by Virginia ("Ginny") Jordan, one of the founders who introduced casemix classifications into the English healthcare system.

The National Casemix Office (NCO) has been providing world class casemix expertise for more than a decade, covering both Healthcare Resource Group (HRG) design and development, and healthcare activity groupings. HRGs created by the NCO are used in the current costing and reimbursement systems throughout England. In 2012/13 the team introduced the latest design known as HRG4+, which has gained international acknowledgment for its innovative approach to the recognition of specialised care and patient morbidity.

Casemix as a Methodology: Used to Create Currencies for Costing and Funding

Patient Notes	Activity	Policy Intent

- Take nationally flowing data
- Understand policy requirements
- Identify elements that can be used
- Produce clinically meaningful aggregates
- Analyse the data, create adaptive models
- Implement as a national standard
- Review, reflect and re-evaluate
- Refine national standards to reflect current innovative clinical practice

Activity → **Identifiers** → **Logical Groups** → **Aggregate Data** → **Currency**

Pound Notes	Currency	National Standard

How Casemix Designs Work

In the UK, all healthcare activities are coded using information standards relating to diagnoses[i] (what is wrong with a patient) and procedures[ii] (what is done to a patient). In 2015, there are more than 25,000 codes that can be used to describe diagnoses and procedures, and the possible combinations of these that could rightly be recorded in a patient record is vast.

Diagnosis-driven HRG example;

ICD-10: D220,   Melanocytic naevi of lip

HRG4+: JD07E,   Skin Disorders without
                          Interventions, with CC Score 19+

Procedure-driven HRG example;

OPCS: D106,   Revision of mastoidectomy

HRG4+: CA30B, Radical or Revisional, Mastoid Procedures, 18 years
                          and under

As a result, the National Casemix Office are commissioned by Policy to develop and maintain a set of Casemix Groupings, called Healthcare Resource Groups (HRGs), which can be used to provide a clinically-endorsed view of acute healthcare activities undertaken within the English NHS. These Groups are generated via the Casemix Grouper Software, freely available to download from:

http://www.hscic.gov.uk/casemix/downloads

Casemix classifications have existed in the English NHS since the early 1990s, and are used by the NHS to cost their healthcare activities, and by policy to reimburse healthcare providers for the activities they undertake.

A casemix classification needs relatively few inputs in order to work effectively. In principle, it needs some way of differentiating between patients, and some way of measuring difference in resource use.

Identifying subsets of a patient population who are expected to use similar resources, and then comparing the resources actually used in patient care, enables hospitals to start to understand where differences in care provision lie.

Benchmarking and comparison at this level will never explain why care provision apparently differs – only that it does. It therefore provokes, rather than answers, the question.

The HRG4+ classification, like its international counterparts, makes use of the following patient and care attributes to differentiate healthcare activity:
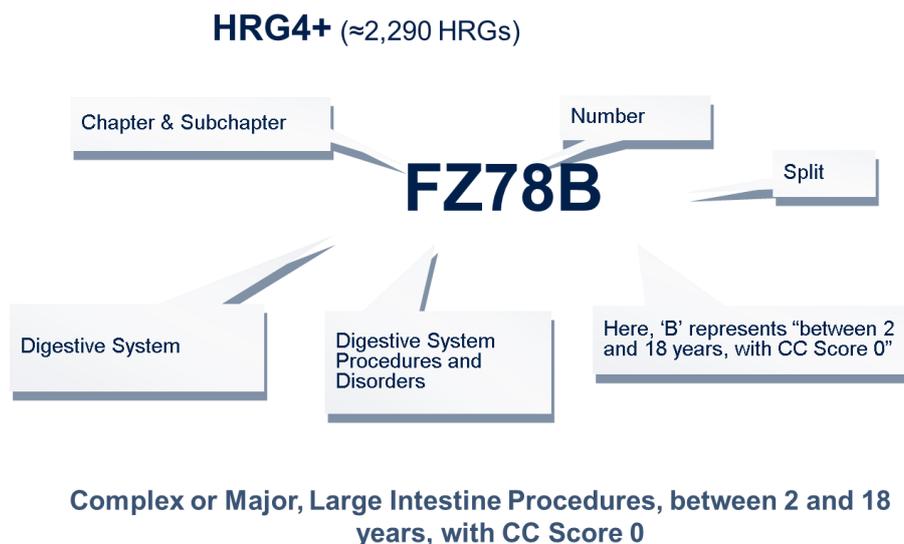
- primary diagnoses
- procedures and interventions
- age, especially to differentiate between child and adult patients
- length of stay
- the presence of additional morbidity (such as existing conditions that will affect the resources required to treat patients) care setting, where the data are specific to a particular care setting such as Accident and Emergency
- source of patient admission or method of patient discharge.

Full details of the Casemix Design Framework which governs how casemix classifications are developed in England are available at **http://www.hscic.gov.uk/casemix/general**

The HRG4+ classification is therefore entirely reliant upon the contents of a patient record in order to generate its Casemix Groups. Inaccurate data will lead to spurious and illogical HRG outputs; truly inaccurate data may lead to a misrepresentation of the service provided, the costs of that provision or the income a provider receives for the care it provides.

And this is because every single decision about the design or evolution of HRGs, the reported cost of NHS services or the reimbursement of those services under a national tariff model is based upon the data recorded by NHS hospitals in their Patient Administration Systems (PAS).

The Format of an HRG

HRG4+ (≈2,290 HRGs)

Chapter & Subchapter   Number   Split

FZ78B

Digestive System

Digestive System Procedures and Disorders

Here, 'B' represents "between 2 and 18 years, with CC Score 0"

Complex or Major, Large Intestine Procedures, between 2 and 18 years, with CC Score 0

*The first four digits of an HRG are known as the **HRG Root**, thus FZ78 in the example above. HRG Roots allow comparison of activity at an aggregate HRG level, and identify casemix "share" that differs from a "norm".*

The Operating Environment
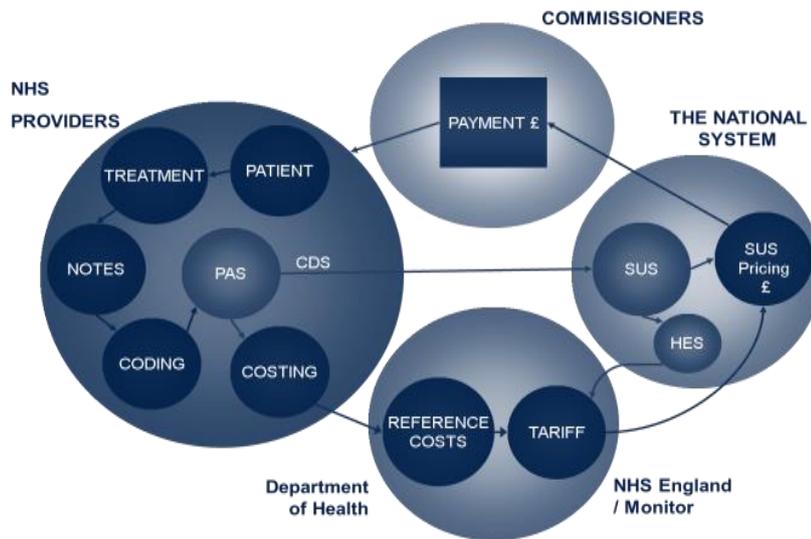
Casemix Implementation in England

In short, there are data standards[iii] regarding the information that healthcare providers must legally record about their patients, and rules governing what they must submit via the Commissioning Data Sets (CDS)[iv] to the HSCIC for central collection and processing.

Patient notes need to be accurate for a variety of reasons, most importantly to facilitate optimal patient care. Badly written or incomplete notes will negate the ability of coders to translate clinician's notes into standardised codes (for diagnoses and procedures) for patient management, internal review, or indeed onward transmission to the HSCIC.

Poor local administration systems may result in an inability to accurately capture additional information about a patient which may be vital for establishing where a patient came from, where they went or what happened to them whilst they were under the care of a consultant. They may also lead to an inaccurate representation of the costs of the care provided.

Many NHS providers in England use the PAS as a basis for counting the activity they cost under the Department of Health's mandated, annual Reference Costs[v] collection. These costs, in turn, currently form the basis of the national tariff[vi], meaning that poor data recording at a trust level can not only affect a national cost collection, but also the future funding of the NHS on which a national tariff, as set jointly by NHS England[vii] and Monitor[viii], is based.

Although costing evolution, in the form of Patient Level Costing Systems, should provide a greater level of granularity in terms of the resource requirements of patient care, the benefits of any costing enhancement will be undermined should providers be unable to effectively count what they did in the first instance. This therefore continues to remain an unmoveable precursor to understanding whether patient needs, or desired outcomes, were fulfilled.

Coding and data capture that is as relevant, accurate and reflective of the patient care actually provided as possible thus underpins the entire national tariff structure currently employed in the English NHS.

It also ensures that the HRGs function as designed, and appropriately reflect the intent of those clinicians who developed them**.**

Clinical Input

HRGs are designed by clinicians to represent clinical care, within the boundaries of available, nationally mandated, data.

Clinical Leads on Casemix Expert Working Groups (EWGs) are nominated representatives of the Royal Colleges and Professional Bodies within the UK, and are joined on EWGs by Finance and Informatics professionals to ensure that the HRGs can be practically implemented within the current national structure. They not only represent specialist hospitals, but also those providers that undertake less complex, more routine care. EWG members are not reimbursed for the time or expertise they provide.

Given that the HRG structure is currently aligned with patient body-systems, for both surgical and medical activities, there are in excess of thirty EWGs that input into the development of the HRG Casemix Classification.

Future enhancements for the development of Community Health Groups[ix] will expand this number. The re-establishment of a Casemix Cancer Expert Reference Panel to ensure that the HRG Casemix Classification remains clinically relevant in light of moves to new funding arrangements for NHS care will similarly broaden the remit of the EWGs.

Recent developments have assured that the interface between NHS England's Clinical Reference Groups[x] and the Casemix EWGs has been formally acknowledged at a national level. Whilst the remit of the former is necessarily focused on national commissioning – the "Who Pays" conundrum - the intention of EWG and CRG members remains clear: how best to represent clinical care such that provision can be understood and patient need not only assessed, but met.

In summary, clinical input and experience has allowed the current HRG4+ classification to acknowledge the additional resource use required when treating patients who:

- have multiple complications and comorbidities that affect the clinical input for their care
- require surgery at a very young age
- require multiple procedures to be undertaken at the same time, within the same hospital admission or attendance
- require surgery that utilises new devices, or innovation in traditional clinical approach
- require more complex, rather than routine, care.

Full details of the most recent Casemix Classification (HRG4+, Reference Costs 2013/14) can be found at **http://www.hscic.gov.uk/casemix/costing**

Such developments ensure that the HRG Casemix Classification not only retains its clinical relevance and viability within the English NHS, but that it continues to retain its status as best in class from an international perspective.

How Grouper Processing Works for Episodes and Spells, using Standard CDS Data Input
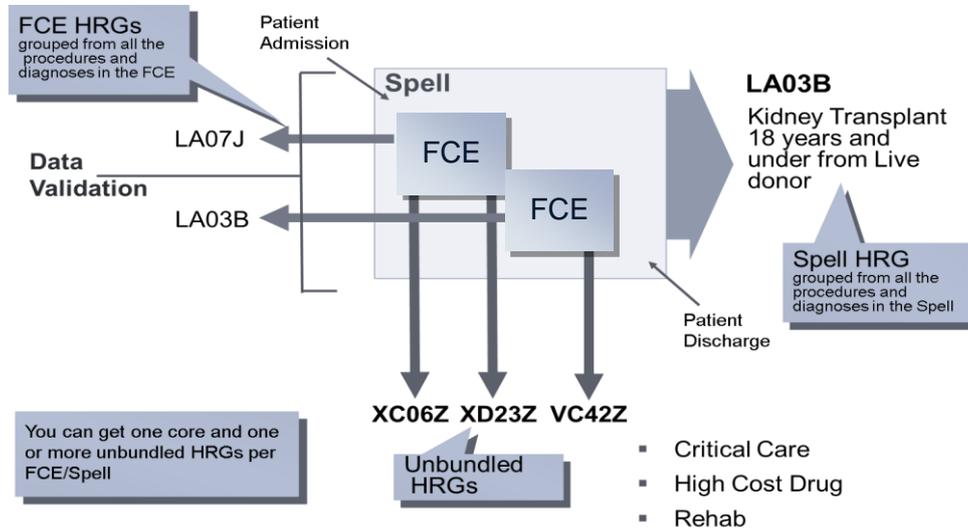
Debunking the Myths

Myth: OPCS procedures codes cannot be updated to reflect innovations in clinical care

There is an OPCS portal[xi] which can be used to request additional OPCS codes. These are currently scheduled to be updated every three years. The next scheduled update (OPCS-4.8) is planned for national implementation in April 2017.

Myth: ICD-10 codes for diagnoses are not updated regularly in the UK

ICD (diagnosis) codes are updated on a three year cycle. The next scheduled update is planned for national implementation in April 2016[xii].

Myth: HRG content is not transparent

Every Grouper release by the NCO includes a comprehensive documentation suite[xiii] which provides full details of HRG design changes from a previous design iteration (the Summary of Changes word document), as well as a mapping of code content from OPCS/ICD-10 etc. to HRG (Code to Group excel file), including the logics required to generate specific and particular HRGs.

Myth: HRG output cannot be compared across different Grouper releases

Comparing HRG output across Grouper years requires processing the data using two or more Groupers. To facilitate grouping of patient records to HRGs, a Grouper User Manual is published, that provides full details of data input requirements.

All publicly released Groupers are available to download from the NCO website, to enable year-on-year comparison for benchmarking and performance measurement.

Myth: HRGs are not relevant to clinicians

HRGs are designed by practising clinicians who are themselves nominated representatives of Royal Colleges and Professional bodies within the UK. Clinicians who require further clarification on HRG designs should approach their EWG representative in the first instance.

HRGs provide an aggregate level to start to understand the cost and funding implications of clinical decisions. HRG analysis will not provide answers; it will highlight differences which will need to be understood at a sub-HRG, often patient level, within a healthcare provider.

Myth: The HRG4+ Classification unduly rewards providers who "code more"

All HRG output relies on reliable and accurate coding of patient care, that complies with nationally mandated coding standards for the year in question, and which is subject to both internal and external coding audits.

The HRG4+ design uses additive logic to determine the level of complications and comorbidities (CCs) that a patient has, simply coding more secondary diagnoses does not necessarily mean that this will impact upon the HRG generated. The CC lists for each HRG Subchapter are designed by the Expert Working Groups to ensure that only clinically relevant CCs, by patient body-system, are recognised in HRG generation. Duplicate or less specific secondary diagnoses do not contribute to the "CC score" for a patient record.

Full details of the CC lists used in the HRG casemix classification can be found in the relevant Code to Group excel workbook documentation for each Grouper.

Myth: The HRG Classification does not take account of multiple procedures

For surgical activity, the HRG output for a patient will depend upon the dominant procedure recorded in a patient record. This is determined by the use of a procedure hierarchy, full details of which are published in the code to group excel workbook for each Grouper.

Where it is common for patients to undergo multiple procedures within the same healthcare admission or attendance, the HRG design reflects this. HRG4 therefore includes HRGs that have been clinically designed to reflect the fact that the resource use of undertaking two or more procedures at the same time can outweigh the resources required to undertake any one of them in isolation. HRG4+ expands this recognition of multiple procedures across more HRG Subchapters where it is clinically relevant to do so.

Myth: The HRG classification causes volatility in income

It is unfeasible that changes to an aggregate casemix classification alone could cause volatility in income. Changes to activity bases can be as a result of changes to actual activity levels at a local or regional level between years, or coding depth or quality. As future income is currently dependent on both counting and costing quality in a previous year, improvements in costing can result in cost shifts between casemix classifications that are out with the enhancements of the casemix classification itself.

Changes to the HRG design to better represent the differences between complex and routine care, or the resource differential between treating children and infants, can more effectively represent the resource required to deliver quality patient care. This is not volatility; it is a purposeful improvement in assuring that resources reflect emerging and apparent patient need.

Myth: It is not clear who to speak to regarding the HRG classification

Any and all enquiries should be directed to the HSCIC enquiries email address **enquiries@hscic.gov.uk** marked for the attention of the National Casemix Office.

Myth: The National Casemix Office do not publish analyses to help users

The NCO undertakes bespoke analysis, including impact assessment of HRG performance in both costing and reimbursement terms, at a local, regional, national and international level.

The NCO is planning to publish its analytical findings in future to support performance and benchmarking metrics and provide detailed impact analysis of the currency designs.

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[i] http://systems.hscic.gov.uk/data/clinicalcoding/codingstandards/icd10

[ii] http://systems.hscic.gov.uk/data/clinicalcoding/codingstandards/opcs4

[iii] http://systems.hscic.gov.uk/data/nhsdmds

[iv] http://www.hscic.gov.uk/commissioningdataset

[v] Publications available at: https://www.gov.uk/government/publications/nhs-reference-costs-2013-to-2014
Costing Guidance available at:
https://www.gov.uk/government/publications/nhs-reference-costs-collection-guidance-for-2013-to-2014

[vi] https://www.gov.uk/government/publications/national-tariff-payment-system-2014-to-2015

[vii] http://www.england.nhs.uk/

[viii] https://www.gov.uk/government/organisations/monitor

[ix] See: http://www.hscic.gov.uk/maternityandchildren/CYPHS for further details regarding the dataset that will form the basis of initial CHGs in terms of scope and care coverage

[x] See https://www.england.nhs.uk/commissioning/spec-services/policies/ for Clinical Policies and Statements for Specialised Services Commissioning and http://www.england.nhs.uk/ourwork/d-com/spec-serv/crg/ for the CRG membership page

[xi] https://isd.hscic.gov.uk/rsp/

[xii] http://systems.hscic.gov.uk/data/clinicalcoding/codingstandards/icd10/icd10updates

[xiii] The Landing Page for all Casemix Reference Material, including Grouper Software can be found at: http://www.hscic.gov.uk/casemix/downloads. This site also provides a link to archived Casemix Products from the 2007/08 financial year onwards; Generic documentation such as the Casemix Design Framework and the Grouper User Manual can be found at: http://www.hscic.gov.uk/casemix/general;

Documentation relating to the most current Costing Product can be found at: http://www.hscic.gov.uk/casemix/costing, with documentation relating to the most current Payment product being available from http://www.hscic.gov.uk/casemix/payment.

This publication may be requested in large print or other formats.