National Casemix Office

NHS Digital

# Trimpoint Methodology

## HRG4+ 2016/17 Reference Costs Grouper

RC 16/17

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# Contents

# Introduction

Admitted Patient Care (APC) data often contains episodes with an exceptionally long length of stay, which have a disproportionate effect on the mean length of stay. In order to improve comparability, such episodes are removed prior to statistical analysis. This process is referred to as trimming and the thresholds for exclusion are known as trimpoints. Episodes or spells with a length of stay above the trimpoint are known as outliers.

In both National pricing and Reference Cost reporting, trimpoints are used to define a threshold: bed days occurring within the trimpoint (truncated bed days) and bed days occurring above the trimpoint (excess bed days) are reported, costed and priced separately.

Suppose for example an HRG has a trimpoint of 32 days

An episode whose length of stay is 50 days is reported as 32 truncated bed days and 18 excess bed days.

An episode whose length of stay is 31 days is reported as 31 truncated bed days and no excess bed days.

## Episode Trimpoints for Reporting

Truncated episode length of stay and excess bed days are reported separately in Reference Costs. The Grouper therefore includes a set of episode level trimpoints for this purpose at the HRG level. There is no policy requirement for these trimpoints to be split by admission method.

## Spell Trimpoints for informing national pricing

The Reference Cost process is used to inform NHS England / NHS Improvement for the purposes of setting the tariff. Tariffs are set at spell level and are split by admission method. The Mandatory tariff applies only to spell length of stay up to the trimpoint, and a per diem rate is used for excess bed days. The Reference Cost grouper therefore includes a set of spell trimpoints, split by admission method, for this purpose.

# Trimpoint Calculation Methodology

## Source Data

Trimpoints are calculated from episodes and spells in the Hospital Episodes Statistics (HES) Admitted Patient Care (APC) extract for a previous financial year (the trimpoints used for 2016/17 are those derived from length of stay in 2015/16 activity).

1. As the data were collected using an earlier edition of a primary classification, such as ICD-10, than that used in the HRG design, the data are amended (remastered) so that any retired ore deleted codes are replaced with the equivalent new codes so that ungrouped activity as a result of the update to the primary classification can be avoided. This was the case with HES 2015/16 which used ICD-10 4$^{th}$ Edition whereas

the HRG design for Reference Costs 2016/17 uses ICD-10 5th edition (see Changes from RC1516 section)

2. The data is preprocessed and 'PbR spells' are constructed according to the Spelling and Grouping Methodology workshop (11th January 2010).

3. The episodes are selected for inclusion in the analysis satisfy the following criteria

    a. The episode must have valid start and end dates with the episode ending within the financial year

    b. The record is an inpatient episode (CLASSPAT 1 or 5)

    c. The following treatment function codes (TRETSPEF) are excluded:

| | |
|---|---|
| 192 | Critical Care Medicine |
| 242 | Paediatric Intensive Care |
| 314 | Rehabilitation |
| 315 | Palliative Medicine |
| 422 | Neonatology |
| 424 | Well Babies |

4. Spells are regarded as elective if the admission method in the first episode available for grouping (when sorted by episode order and episode identifier) is 11, 12 or 13. Other spells are regarded as non-elective.

The selected episodes are grouped using the assured grouping engine[i]. Although spell grouping is for 'PbR spells', only these episodes will contribute to the spell HRG and length of stay.

# Aggregates

Trimpoints are calculated for the following aggregates:

1. Episodes, for each HRG
2. Elective spells, for each HRG
3. Non-elective spells, for each HRG

# Definition of trimpoints

Trimpoints are determined by the upper and lower quartiles as follows:

$$TP = Q_3 + 1.5(Q_3 - Q_1)$$

Since there is more than one accepted mathematical definition of quartiles, because they are determined by interpolation, a decision has been taken to define them as follows[ii] ($n$ is activity for the HRG):

$$Q_1 = \begin{cases} \frac{1}{2}\left(x_j + x_{j+1}\right) & \text{if } n \text{ is divisible by 4} \\ x_{j+1} & \text{otherwise} \end{cases} \qquad \text{where } j = \lfloor n/4 \rfloor$$

$$Q_3 = \begin{cases} \frac{1}{2}\left(x_k + x_{k+1}\right) & \text{if } 3n \text{ is divisible by 4} \\ x_{k+1} & \text{otherwise} \end{cases} \qquad \text{where } k = \lfloor 3n/4 \rfloor$$

Trimpoints are rounded to the nearest integer. Calculation of trimpoints by the above formula will mean that all trimpoints will be multiples of 0.5; therefore those which are half integers will be rounded above.

## Adjustment for small numbers

For HRGs with low activity, trimpoints do not apply. Instead the trimpoint is set to infinity so that no bed days are regarded as being excess. For the purposes of the Grouper, 32000 is used as the infinite trimpoint. This applies in the following circumstances:

- HRGs that can be generated as a core HRG in APC but for which there was no activity in that year
- HRGs where the number of cases is less than 5
- HRGs where the number of cases is between 5 and 30, and the calculated trimpoint would exclude less than 5% or more than 15% of the total bed days for those cases. Please note: for HRGs where the number of cases is between 5 and 30, and the calculated trimpoint would exclude between 5% and 15% of the total bed days the trimpoint *remains as the calculated trimpoint*

## Preset Trimpoints

In certain circumstances, there is a possibility that a trimpoint may be preset, regardless of what is calculated. At present the following trimpoints are preset:

1. HRGs that have length of stay logic that includes a maximum length of stay value / range (including where that maximum is zero days) have a trimpoint of infinity (32000)
2. HRGs which are ambulatory; i.e. all the codes going to them have an implied zero (or maximum) length of stay have a trimpoint of infinity (32000)
3. The ungrouped UZ01Z has trimpoint of infinity (32000) so that they have no excess bed days[iii]
4. The non-admitted consultations (chapter WF) should have a zero trimpoint because they should never be generated in APC[iv]
5. All unbundled HRGs have zero trimpoints because they will never be generated as core HRGs. These occur in chapters LE, RD (except RD97Z), RN (except RN97Z), SB (except SB97Z), SC (except SC97Z), SD, VC, XA, XB, XC and XD.

6. The HRGs in non-APC chapters LD (National Renal Dataset) and VB (Emergency Medicine)

*N.B. Preset trimpoints affect the episode, elective spell and non-elective spell trimpoints of the same HRG.*

# Assurance

## Testing Procedure

The following checks are made on the final trimpoints file before being offered for publication and incorporation in the HRG4+ Reference Cost Grouper.

1. Every HRG, whether or not it can be reached as the core APC HRG, must have a trimpoint (those which are not reachable will be set to zero).
2. All trimpoints should be set to their preset values whenever a preset trimpoint is applicable.
3. All preset trimpoints are correctly applied
4. Trimpoints are clinically realistic e.g. 50 days for a heart and lung transplant (usually long stay) or 2 days for a cataract operation (usually day case)

## Analysis

The purpose is to provide confidence in the new trimpoints with regard to what has been previously published.

If the two sets of trimpoints were calculated on the same HES data extract (for example RC1314 and RC1415 both used 2012/13 HES), HRGs which exist in both years and are not affected by design changes (whether direct or indirect) will have unchanged trimpoints.

If the two sets of trimpoints were calculated on different HES data extracts, a third set of trimpoints should be calculated using last year's grouper on the new HES data extract; for example RC1617 uses 2015/16 HES but RC1516 used 2014/15 HES so the third set needs to be RC1516 on 2015/16 HES. Two comparisons are then carried out:

1. The two sets using a common HES extract but different HRG designs: trimpoints will be unchanged for HRGs which exist in both years and are unaffected by design changes
2. The two sets using a common HRG design but different extracts. Changes in trimpoints are inevitable here and are best explained by HRG designers who have a good working clinical knowledge. Possible explanations for changes are:
    a. Change in clinical practice e.g. more operations being carried out laparoscopically
    b. Changes in underlying primary classification, may impact HRGs derived e.g. if ICD-10 update includes code deletions some activity my U-group using a design based on a different underlying primary classification

c. Change in data quality i.e. significant change in the number of U-groups being assigned

d. On occasions, a quartile may be borderline and therefore the trimpoint becomes sensitive to a small change in this quartile

# Specification of the Trimpoints File

The trimpoints file is made available for publication as an Excel spreadsheet.

It consists of the following columns

| *Column* | *Heading* | *Description* |
|---|---|---|
| A | HRG+ Code | Split level HRG4+ code |
| B | HRG+ Code Description | HRG4+ code description |
| C | Preset Trimpoint | Preset trimpoint. If no preset is applicable then this field is blank |
| D | Episode Trimpoint | Episode level trimpoint |
| E | Elective Spell Trimpoint | Elective spell trimpoint |
| F | Non-elective Spell Trimpoint | Non-elective spell trimpoint |

A row is present for every HRG in the reference database, even if it cannot be generated as a core APC HRG.

# Changes in methodology from RC1516

From April 2016, the update to ICD-10 5th edition, involved significant changes to the primary classification, including the retirement of relatively common diagnosis codes e.g. I48.X Atrial fibrillation and flutter, to be replaced with new more specific code(s). Therefore in running the RC1617 HRG design, which includes the change in primary classification, on 1516 HES data, which contains an earlier version of the ICD-10 code a large percentage of records U-grouped as a result of this. Approximately 1.45m episodes (12.5%) U-grouped solely as a result of this change in underlying classification.

Therefore in order to ensure the trimpoints were not unduly affected by this change, it was necessary to remaster the most recently available 201516 HES data to replace the retired ICD-10 codes with their equivalent new ICD-10 5th edition codes, so that the RC1617 trimpoints could be appropriately calculated.

# The Documentation Suite

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

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

- The **Casemix Companion** is a starting point and general reference guide for anyone interested in learning about the casemix classification system used by the NHS in England. The document provides an introduction to HRGs, groupers, HRG4+ design concepts and grouping logic, and it contains links to additional resources
- The **Grouper User Manual** provides instructions on how to prepare and group data using the Grouper software application. Sample data with expected results is provided. This document is updated with every grouper release.
- The **Summary of Changes** document provides an overview of the main differences between the current grouper design and its relevant predecessor.
- The **Chapter Summaries** document provides an overview of the scope, composition and relevant grouping logic of individual HRG subchapters, and highlights significant changes to the latest HRG design.
- The **Code to Group Workbook** is a spreadsheet that embodies the casemix design. It provides details of the constituent elements that contribute to HRG grouping, and it contains reference data such as the ICD-10 and OPCS-4 codes utilised in the design. It contains the procedure and diagnosis hierarchies pertinent to a specific design, and the Complication and Comorbidities lists for HRG subchapters. The spreadsheet also includes information on Programme Budgeting Category (PBC) mapping, as well as a comprehensive list of HRG codes and labels.
- The **Code to Group User Manual** explains how to make best use of the information found in the Code to Group Workbook. Specifically, the manual clarifies the grouping logic found in the workbook's Code to Group tab.
- The **ICD-10 5th Edition Update** outlines the changes to the HRG4+ 2016/17 Reference Costs Grouper made as a result of the 5th Edition update to the International Statistical Classification of Diseases and Related Health Problems – Tenth Revision (ICD-10), which is effective from 1 April 2016.

[i] Casemix operates a testing grouping engine which is used to test and assure the HRG Grouper. This grouping engine, with the prospective HRG Reference Database, is used to group the HES extract for production of trimpoints.

[ii] This is the default method used by statistical packages including SAS (but not Excel). The trimpoints are actually calculated by SQL Server queries.

[iii] This is a new DH requirement as of 2012/13 (previously it was set to zero) which affects the way that excess bed days are reported in Reference Costs. For payment purposes it does not actually matter what the trimpoint of UZ01Z is because that HRG code has a zero tariff assigned to it.

[iv] The only way of generating these HRGs is from X62 OPCS codes which are not supposed to be used in APC, according to National Coding Guidance.