National Casemix Office

NHS Digital

Trimpoint Methodology

HRG4+ 2018/19 Reference Costs Grouper

RC 18/19

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Contents

Introduction

Admitted Patient Care (APC) data often contains finished consultant episodes (FCEs) with an exceptionally long length of stay. When used in calculations, these episodes have a disproportionate effect on the mean length of stay of the HRG against which they have been reported. 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. FCEs or spells with a length of stay above the trimpoint are known as outliers.

In both National Pricing and Reference Costs reporting, trimpoints are used to define a threshold: bed days occurring within the trimpoint (truncated or inlier bed days) and bed days occurring beyond the trimpoint (excess bed days) are reported, costed and priced separately.

Suppose for example that an HRG has a trimpoint of 32 days.

An episode generating this HRG whose length of stay is 50 days is reported as 32 inlier bed days and 18 excess bed days.

An episode generating this HRG whose length of stay is 31 days is reported as 31 inlier bed days and no excess bed days.

Episode Trimpoints for Reporting

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

Spell Trimpoints for Informing National Pricing

National Reference Costs are used as the basis of NHS England / NHS Improvement's National Pricing process. National prices are set at spell level and are split by admission method. Mandatory national prices only apply to spell length of stay up to the trimpoint, while a per diem rate is used for excess bed days. The Reference Costs Grouper includes a set of spell-level trimpoints, split by admission method, for this reason.

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 the 2018/19 Reference Costs Grouper are calculated using the length of stay from HES 2017/18 data. However, before the trimpoints can be calculated, the following steps must be taken:

1. The data must be preprocessed, and “PbR spells” must be constructed according to the Spelling and Grouping Methodology workshop (11 January, 2010).

2. Episodes are then selected for inclusion in the analysis based on the following criteria:

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

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

    c. The record must not have one of the following treatment function codes (TRETSPEF), which are excluded:

        192 Critical Care Medicine

        242 Paediatric Intensive Care

        314 Rehabilitation

        315 Palliative Medicine

        422 Neonatology

        424 Well Babies

3. Elective admissions must then be separated from non-elective admissions. 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. All 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 the selected 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):

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

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

Trimpoints are rounded up to the nearest integer. Calculation of trimpoints using the above formula means that all trimpoints will be multiples of 0.5, but those that are half-integers will be rounded up.

Adjustment for Small Numbers

A standard trimpoint is not applied to an HRG with low activity. Instead an “infinite” trimpoint is applied to the HRG so that no excess bed days can be reported for activity grouping to that HRG. For the purposes of the Grouper, 32,000 is used as the infinite trimpoint. An infinite trimpoint is applied to an HRG in the following circumstances:

- The HRG can be generated as a core HRG in APC, but there was no activity reported against the HRG in the source data
- Fewer than 5 cases were reported against the HRG in the source data
- HRGs where the number of cases is between 5 and 30 in the source data and the calculated trimpoint would exclude less than 5% or more than 15% of the total bed days for those cases. 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, excess bed days are not applicable, therefore the trimpoint is preset to 32,000 regardless of what trimpoint is calculated. These are:

1. HRGs with a maximum length of stay, as defined by the HRG logic
2. Ambulatory HRGs – the HRG has an implied maximum length of stay (very often same day) due to the nature of the procedures which are grouped to these HRGs.
3. Ungrouped activity UZ01Z

For HRGs which cannot be generated as a core APC HRG, the trimpoint is set to zero. This includes:

1. Unbundled and critical care activity: these HRGs are found in Chapters LE, RD (except RD97Z and RD98Z), RN (except RN97Z), SB (except SB97Z), SC (except SC97Z), SD, VC, XA, XB, XC and XD

2. Emergency Medicine (Chapter VB)
3. National Renal Dataset (Chapter LD)
4. The Outpatient Attendance HRGs: Chapter WF[iii]

Preset trimpoints affect the episode, elective spell and non-elective spell trimpoints of the same HRG. Thus any HRG with a preset trimpoint will have the same trimpoint for its episode, elective spell and non-elective spell trimpoint.

Assurance

Testing Procedure

The following checks are made on the final trimpoints file before publication and incorporation into the HRG4+ Reference Costs Grouper.

1. Every HRG, whether or not it can be reached as a core APC HRG, must have a trimpoint (those that cannot be generated as a core APC HRG will be set to zero)
2. All HRGs with a preset trimpoint must have that trimpoint correctly applied
3. 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)

Trimpoint Analysis

Before publishing trimpoints, a newly calculated set should always be compared with what has been previously published. Changes in trimpoints will be due to:

1. Change in HRG design e.g. RC1718 to RC1819
2. Change in base data e.g. 2016/17 HES to 2017/18 HES
3. Change in methodology – this usually does not change, but from 2017/18 HES onwards, Neonatal Critical Care (NCC) and Paediatric Critical Care (PCC)activities are now available and are therefore included in the calculation of CC Days. It should be noted that adjustments for Adult Critical Care (ACC) activities have always been taken into account in the trimpoint calculation for core HRGs. In this case, it could also be viewed as a base data change

Changes due to HRG Design

To investigate the effects of HRG design change, the newly calculated Reference Cost 2018/19 trimpoints should be compared against a Reference Cost 2017/18 set which were derived from the same base data and using the same methodology as the 2018/19 trimpoints (the published 2017/18 trimpoints should not be used as they were derived from different data).

- Trimpoints should be compared as calculated (before low numbers and preset adjustments are applied)
- Only trimpoints for HRGs with activities over 30 should be compared
- Trimpoint changes should be regarded as significant it the difference (in either direction) is at least 3 days and the percentage increase or decrease is at least 20%

- HRGs with no changes to them (no changes to activity) should be expected to have no change to their trimpoint

Changes due to change in base data

The second set of RC1718 trimpoints should then be compared with last year's published trimpoints, using the same criteria as above.

Differences will be due to differences in the base data and explanations for these are not always straightforward; these could include

- Change in clinical practice e.g. more operations being carried out laparoscopically
- Increase in take up of new OPCS codes increasing the likelihood of HRGs dependent on these codes being assigned
- Change in data quality i.e. significant change in the number of U-groups being assigned
- 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, 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

The trimpoints spreadsheet includes a row for every HRG in the reference database, even those that cannot be generated as a core APC HRG.

Changes from Reference Costs 2017/18

NCC and PCC data are now available in 2017/18 HES; therefore the critical care days in each episode includes these in addition to ACC.

The anomaly in the calculation of CC Days in CASEMIX/HES, which resulted in the undercounting of days in spells where the discharge date was not populated in all episodes has also been rectified.

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.

[i] Casemix operates a testing grouping engine that 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] The codes which drive these HRGs: X621, X622, X623, X628 and X629 are not supposed to be recorded in APC