



Reference Cost Mapping

A Final Report for Monitor

23 April 2014

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1 Introduction

Monitor has new duties as the sector regulator for health services in England under the Health and Social Care Act ('HSCA'). Monitor's remit is to:

- Set prices for NHS-funded care (in partnership with NHS England);
- License providers;
- Enable integrated care;
- Safeguard choice and prevent anti-competitive behaviour; and
- Support the continuity of services should a provider encounter financial difficulties.

Monitor is now responsible for the National Tariff Payment System, along with NHS England, taking over from the Department of Health ('DH'). This includes developing the Tariff Model which will be used to calculate prices for the 2015/16 national tariff and beyond.

For the Tariff Model to be fit for purpose, it is necessary to ensure that the input data, including reference costs, is as reliable, consistent and relevant as possible. As such, Monitor has engaged Deloitte to assess the year-on-year comparability of reference costs.

1.1 Background

Reference costs are one of the key inputs into the Tariff Model, with national tariff prices based on the average of reference costs submitted to Monitor. Prices are currently set on an annual basis using historic reference cost data as an input. There is a three year lag in this process. It is understood that Monitor is currently considering the possibility of basing the tariff on an average of a number of years of reference cost data, that is, for example, that prices are based on multiple years of reference cost data. This would require Monitor to be able to compare reference cost data across years. It is worth noting at the outset, however, that there are numerous reasons why reference costs may not be directly comparable between years, including:

- Changes in currency design;
- Re-mapping of services;
- Changes in costing guidance, leading to changes in cost allocation methodologies;
- Changes in the provider landscape;
- Changes in the underlying cost base, for example year-on-year pay and price changes; and
- Improvements in the quality of cost data submitted by providers over time.

1.2 Scope of the report

This report focuses on the approach that has been employed to compare reference costs across years. This includes an overview of the approach and results generated through this approach.

The methodology should be considered as a feasibility assessment. Specifically, whilst it is possible to generate estimates for unit costs across years, it is important to consider their comparability. The methodology marks a first step towards comparing reference costs across years and it is likely that Monitor will augment this approach in the future.

1.3 Structure of this report

The remainder of this report is set out as follows:

- Section 2 presents the methodological approach used to map reference costs across years;
- Section 3 summarises the key outputs; and
- Section 4 discusses potential next steps for Monitor.

Additional supporting information is presented in the Appendices to this report.

2 Approach

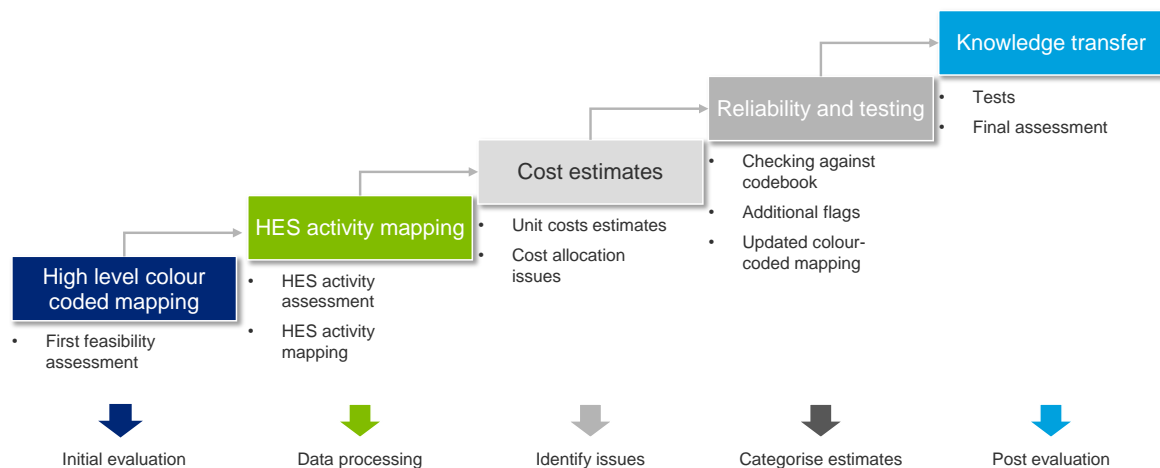
This section presents the approach used to map reference costs across years. Specifically, the selected approach maps data across 2010/11, 2011/12 and 2012/13 based on the 2011/12 currency design system; that is, 2011/12 is the base year for this analysis. This approach is developed based on discussions with Monitor and following consideration of work previously undertaken by Monitor's Impact Assessment team. The approach is applied to admitted patient care (APC) data and inlier costs; however the potential application of this approach to outpatient and A&E data is discussed in Appendix D, and the potential application to excess bed day costs is discussed in 4.1.

The output of the work is a set of unit costs for 2010/11, 2011/12 and 2012/13, by provider, by Healthcare Resource Group (HRG). Given that 2011/12 is the base year for the analysis, unit costs for 2011/12 will be the actual costs submitted by providers. Unit costs for 2010/11 and 2012/13 will be estimated based on the proposed approach. Specifically:

- 2010/11 data is mapped forward, so that it is expressed in terms of the 2011/12 reference cost design; and
- 2012/13 data is mapped backwards, so that it is expressed in terms of the 2011/12 reference cost design.

Figure 1 outlines the overall approach.

Figure 1: Approach to year-on-year mapping of reference costs



2.1 High level colour coded mapping

This first step involves deriving a high-level colour coded mapping which indicates the level of comparability of reference costs across years. This mapping classifies each HRG as one of the following:

- **Red.** HRGs that cannot be compared across years are classified as red.

- **Yellow.** HRGs that can be compared across years subject to certain assumptions are classified as yellow.
- **Green.** HRGs that appear comparable across years are classified as green.

This initial assessment is based on the Codebook which is a document developed by the Health and Social Care Information Centre (HSCIC). The Codebook outlines changes to HRG root design over a number of years.¹ In particular, the Codebook contains details of:

- New HRGs;
- Deleted HRGs; and
- Changes to existing HRG labels between designs.

This information is presented at the aggregate HRG level across a number of years. Table 1 presents an illustrative example of the type of information contained within the Codebook.

¹ Source: <http://www.hscic.gov.uk/casemix/costing>

Table 1: Codebook information example

HRG4 Root	HRG RC06/07	HRG Label RC06/07	HRG RC07/08	HRG Label RC07/08	HRG RC08/09	HRG Label RC08/09	HRG RC09/10	HRG Label RC09/10	HRG RC10/11	HRG Label RC10/11	HRG RC11/12	HRG Label RC11/12	HRG RC12/13	HRG Label RC12/13
AA01	AA01Z	Intracranial Procedures for Trauma with Major Diagnosis	AA01Z	Intracranial Procedures for Trauma with Major Diagnosis	AA01Z	Intracranial Procedures for Trauma with Major Diagnosis	AA01Z	Intracranial Procedures for Trauma with Major Diagnosis	Removed HRG					
AA02	AA02Z	Intracranial Procedures for Trauma with Intermediate Diagnosis	AA02Z	Intracranial Procedures for Trauma with Intermediate Diagnosis	AA02Z	Intracranial Procedures for Trauma with Intermediate Diagnosis	AA02Z	Intracranial Procedures for Trauma with Intermediate Diagnosis	Removed HRG					
AA02									AA02A	Intracranial Procedures for Trauma with Diagnosis of Intracranial Injury with CC	AA02A	Intracranial Procedures for Trauma with Diagnosis of Intracranial Injury with CC	Removed HRG	
AA02									AA02B	Intracranial Procedures for Trauma with Diagnosis of Intracranial Injury without CC	AA02B	Intracranial Procedures for Trauma with Diagnosis of Intracranial Injury without CC	Removed HRG	
AA02													AA02C	Intracranial Procedures for Trauma with Diagnosis of Intracranial Injury, with CC Score 10+
AA02													AA02D	Intracranial Procedures for Trauma with Diagnosis of Intracranial Injury, with CC Score 6-9
AA02													AA02E	Intracranial Procedures for Trauma with Diagnosis of Intracranial Injury, with CC Score 3-5
AA02													AA02F	Intracranial Procedures for Trauma with Diagnosis of Intracranial Injury, with CC Score 0-2

KEY

No Change
New HRG
Change to Description
Removed HRG

Results from the high-level mapping methodology are presented in Figure 2 below. It is found that:

- Approximately 25% of HRGs appear to be comparable across the three years;
- Approximately 70% of HRGs can be mapped across the three years subject to certain assumptions; and
- Approximately 5% of HRGs cannot be mapped across the three years.

This step marks the starting point; further steps build on this high-level assessment of comparability. Subsequent steps use Hospital Episode Statistics (HES) and reference cost data to estimate unit costs. A wider range of factors potentially impacting comparability are also considered.

Figure 2: high level colour coded mapping

Colour	Label	2010/11 – 2011/12	2012/13 – 2011/12	All three years
Comparable HRGs	The percentage of HRGs where, upon a high level comparison, unit costs could be mapped year-on-year.	~75%	~30%	~25%
Further investigation	The percentage of HRGs where unit costs for HRGs could be compared between years, but further investigation is needed to determine comparability	~20%	~65%	~70%
Not comparable HRGs	The percentage of HRGs that do not, on initial assessment appear comparable across years.	~5%	~5%	~5%

2.2 Activity mapping

Having derived a high-level, colour coded map, the next step was to undertake an activity mapping methodology, using HES and reference cost data. Figure 3 illustrates the detailed methodology employed to map reference costs between years. HES data contains patient level activity data across all NHS providers. In particular, it contains information on:

- Clinical procedures and diagnoses associated with patients;
- Demographic information on patients; and
- Geographic information on patients.

HES data can be “grouped” using a piece of software called a “Grouper” in order to assign HRGs to hospital visits by patient based on their clinical diagnoses and the procedures undertaken on them. A Grouper uses algorithms to assign HRGs to episodes reported in the HES dataset, based on the information contained within patient records. Groupers change year-on-year to reflect changes in currency design; HES activity data for each year is usually grouped with the relevant year’s grouper in order to assign HRGs to individual patient episodes. However, in principle, HES activity data for a particular year can also be grouped with another year’s grouper. So for example:

- HES activity data for 2010/11 could be grouped according to the 2011/12 and 2012/13 groupers; and
- HES activity data for 2012/13 could be grouped according to the 2011/12 and 2010/11 groupers.

The recommended approach involves using episode level HES data to predict which services activity would have been assigned to under a different years’ currency design; and allocating cost on this basis. Activity is therefore used to allocate costs, that is, activity is assumed to be a cost driver. This is a key assumption underpinning the approach.

Specifically, HES activity data is grouped according to different groupers and this data is analysed. Under the proposed approach:

- 2010/11 data is grouped according to the 2011/12 grouper; and
- 2012/13 data is grouped according to the 2011/12 grouper.

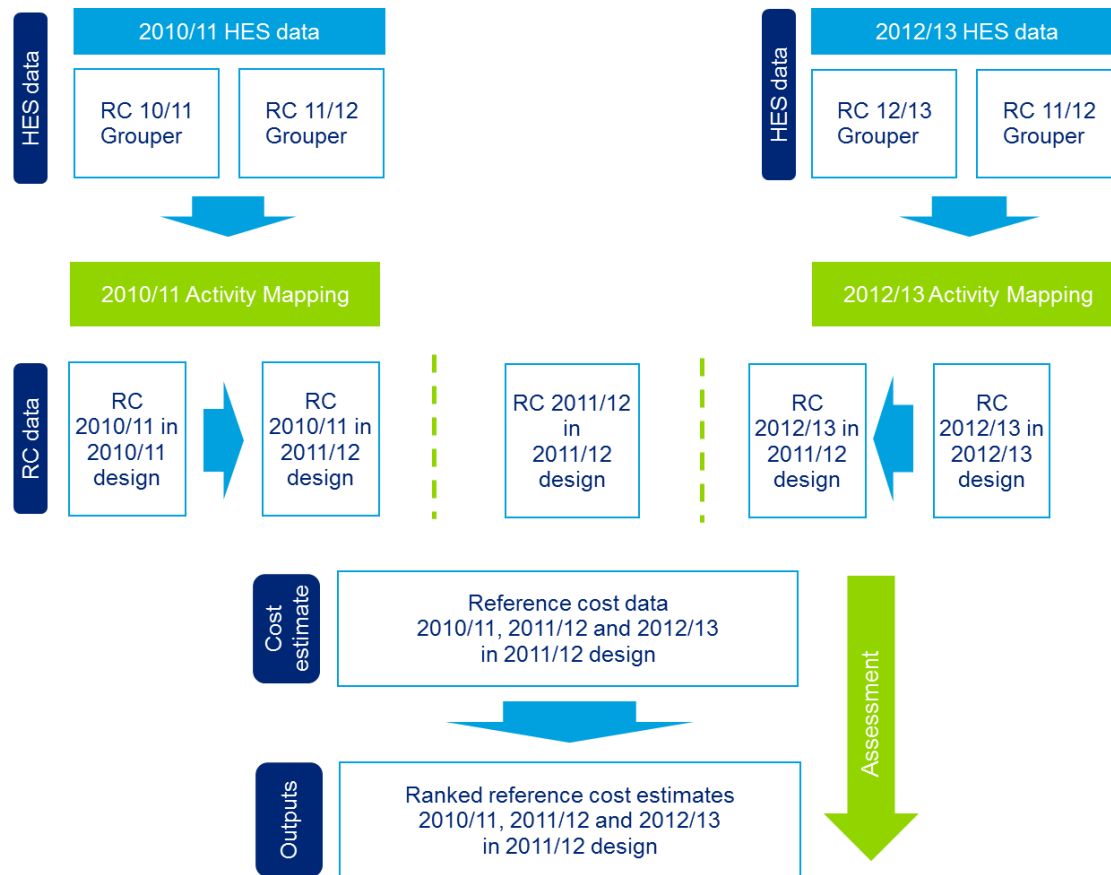
This follows as 2011/12 is the base year for this methodology. This process assigns 2010/11 activity to HRGs using the 2011/12 reference cost design; and 2012/13 activity to HRGs using the 2011/12 reference cost design.² Box 1 presents a worked example of the approach and how it applies to the data for a single provider. In particular, Step 1 in Box 1 presents an illustrative example of the activity mapping and its outputs.

2.3 Cost estimates

Having derived the activity mapping, the mapped HES data is then combined with reference cost data. The activity mapping is used to allocate total cost to HRGs. In particular, using the activity mapping, total costs are assigned to HRGs for 2010/11 RC using the 2011/12 RC design and to HRGs for 2012/13 RC using the 2011/12 design. Unit costs are then generated for HRGs based on total cost estimates and activity. Steps 2 to 4 in Box 1 illustrate how cost estimates are obtained from the activity mapping.

² Note that grouping activity data with the grouper from a different design is a challenging process and can generate a significant amount of ungrouped activity, i.e. an HRG denoted as "UZ01Z". In practice this means that the unit cost estimates for HRGs are generated based on a sample of HES activity, rather than the whole data set. The cost distribution of ungrouped HRGs has been assessed to understand potential issues that could drive bias in particular cost estimates. These issues have been identified in the detailed outputs.

Figure 3: Detailed mapping approach



Box 1: Mapping approach example

This box presents an illustrative example of the activity mapping approach using HES (step 1) and how RC cost estimates are generated using this mapping (steps 2-4). The example illustrates how 2012/13 cost estimates are allocated to the 2011/12 RC design, i.e. mapping backwards from 2012/13 RC design to the 2011/12 RC design. The approach for generating cost estimates for 2010/11 data in 2011/12 design follows the same principles.

1 Step 1 Activity mapping within HES

HES data is used to apportion activity between HRGs

- From grouped 2012/13 HES data an "activity mapping" is produced, which is the percentage of activity in 11/12 HRG codes that corresponds to each 12/13 HRG code
- In the illustrative example below the 80 FCEs assigned to the 12/13 code AA01C correspond to 28 (35%) and 51 (65%) FCEs in the two HRGs AA01A and AA01B in the 11/12 design.

Illustrative mapping

2012/13	12/13 Activity	2011/12	11/12 activity	Activity %
AA01C	80	AA01A	28	35%
AA01C	80	AA01B	52	65%
AA01D	60	AA01A	51	85%
AA01D	60	AA01B	9	15%
AA01E	30	AA01X	30	100%

2 Step 2 Total cost mapping in reference costs

Reference cost data is used to produce total cost estimates

The activity split of each 11/12 and 12/13 code is used to apportion costs in the 2012/13 RC data according to the 11/12 RC design:

- A** $11/12 \text{ cost component} = (12/13 \text{ cost}) * (\% \text{ split})$
 - £5,315 = 35% * £2,800 is the calculation displayed below for one of the cost components of the 11/12 code AA01A which is summed with 85% * £5,100 to get £5,315 the total cost for AA01A.
- B** This calculation is undertaken for all 12/13 codes. The results are then summed across the same 11/12 category (AA01A in the example below).

2011/12	2012/13	Activity %	12/13 Total cost	11/12 cost component ^A	11/12 total cost ^B
AA01A	AA01C	35%	£2,800	35%*£2,800	£5,315
AA01X	AA01E	100%	£6,000	100%*£6,000	£6,000
AA01A	AA01D	85%	£5,100	85%*5,100	£5,315

3 Step 3 Activity mapping within reference costs

Reference cost data is used to estimate activity

The activity ratio of each 2011/12 and 2012/13 code from step 1 is used to apportion activity in the 2012/13 reference cost data according to the 2011/12 design:

- A** $2011/12 \text{ activity component} = (2012/13 \text{ activity}) * (\% \text{ split})$
 - In the example below a component is calculated as
- B** $35\% * 80 = 28$ which summed with $85\% * 60 = 51$ to get the 79.
 - This calculation is undertaken for all 2012/13 codes. The results are then summed across the same 2011/12 category.
 - The purpose of this step is to allow the calculation of unit costs per HRG (step 4).

2011/12	2012/13	Activity %	12/13 Activity	11/12 Activity component ^A	11/12 activity ^B
AA01A	AA01C	35%	80	35%*80=28	79
AA01X	AA01E	100%	30	100%*30	30
AA01A	AA01D	85%	60	85%*60=51	79

4 Step 4 Unit cost calculation

Estimated total cost and activity are used to estimate unit costs

Estimated total cost based on 2011/12 design (from step 2) is divided by estimated total activity based on 2011/12 design (step 3). The result is the estimated unit cost for 2012/13 RC data based on 2011/12 design:

- $2011/12 \text{ unit cost} = (2011/12 \text{ total cost}) / (2011/12 \text{ Activity})$
 - In the illustrative example the unit cost for 201/12 AA01A would be $£5,315 / 79 = £67.30$

Source: Costs for the HRGs displayed are illustrative only. HES activity and reference cost activity reconcile here, but this may not always be the case. In practice, the methodology is applied to provider level submissions for HRGs, however providers are abstracted from the above example for simplicity.

2.4 Effectiveness and testing

The mapping approach generates estimates of unit costs for each HRG for each year, by provider. However, there are a number of factors which impact the effectiveness of these estimates, as outlined below:

- **Re-design of HRGs.** There are changes in currency design across years. Currency re-design could entail, for example, one HRG from 2011/12 being replaced by two new HRGs in 2012/13, with increased granularity reflecting different complexity levels.
- **Re-mapping of HRGs.** In some cases, groups of HRGs have been consolidated or changed due to differences in the underlying grouper that is used to assign HRGs to the HES data. In particular, activity in one year is assigned to a different HRG in another year, independent from anticipated design changes. So, for example, whilst 2010/11 and 2011/12 reference cost data are collected against the same currency design, there may be re-mapping of HRGs from one year to the next which impacts the comparability of reference costs.
- **Costing Guidance changes.** A number of sub-chapters have been impacted by specific costing guidance changes across years. For example pharmaceutical costs were excluded from high cost drug HRGs in 2011/12 but not in 2010/11. These changes also impact the comparability of reference costs across years.
- **Changes to the provider landscape.** Mergers between providers have altered the provider landscape across years. The proposed approach identifies Trusts that have merged across years. This accounts for structural changes and potential differences in unit costs following mergers between providers.

These issues feed into the assessment of the cost estimates in Section 3.

2.5 Knowledge transfer

It is anticipated that the proposed approach and outputs will be transferred to Monitor's Tariff Calculation function. In order to facilitate this handover and transfer of knowledge, a number of technical workshops will be provided that will deliver a step-by-step run through of the technical approach.

Knowledge transfer is a key part of this process, given the technically complex nature of the approach. In particular, it is important that Monitor understands the flexibility offered within the approach, the key parameters that can be varied and the interpretation of outputs.

3 Outputs

This section presents the outputs of the mapping methodology. Specifically, it details the percentage of HRGs that can be mapped effectively across two years or all three years, accounting for issues such as currency re-design, re-mapping and costing guidance changes. Table 2 summarises the results of the methodology. This summary is based on a more granular classification approach, whereby each HRG is given a score from 1 to 9. Full details of this classification are presented in Appendix A.

Table 2: Summary outputs

Colour	Label	2010/11 – 2011/12	2012/13 – 2011/12	All three years
Comparable HRGs	The percentage of HRGs where unit costs could be mapped year-on-year.	~60%	~30%	~20%
Some comparability	The percentage of HRGs where unit costs could potentially be mapped year-on-year, but there are questions around the reliability of the estimates, due to, for example changes in HRG design, re-mapping or costing guidance.	~33%	~65%	~70%
Not comparable HRGs	The percentage of HRGs that are not comparable year-on-year due to data issues or strong concerns over the reliability of estimates.	~7%	~5%	~10%

Decreasing effectiveness of estimates

Note: units are department and HRG averaged across providers. Please refer to Appendix 1 for a more detailed version of this table.

It is found that:

- Approximately 20% of HRGs can be compared across the three years with confidence;
- Approximately 70% of HRGs can be compared across the three years, subject to certain assumptions; and
- Approximately 10% of HRGs cannot be compared across the three years.

These results can be compared to the initial results from the high-level colour coded mapping (presented in Figure 2). Specifically, accounting for wider factors such as changes in currency design, re-mapping of HRGs and costing guidance changes reduces the number of HRGs that can be reliably compared across the three years, in light of the improved information.

Table 2 also presents the comparability of HRGs across two years of data, that is:

- Comparability of HRGs between 2010/11 and 2011/12; and
- Comparability of HRGs between 2011/12 and 2012/13.

HRGs are more comparable between 2010/11 and 2011/12 compared with 2011/12 and 2012/13. Specifically, 60% of HRGs can be compared with confidence between 2010/11 and 2011/12, whereas 30% of HRGs can be compared with confidence between 2011/12 and 2012/13. This difference in comparability reflects the fact that 2010/11 and 2011/12 reference cost data were collected against more similar currency designs, whereas in 2012/13 there were more significant design changes. Only 60% of HRGs can be compared with confidence between 2010/11 and 2011/12 (that is, under the same currency design), reflecting wider issues such as re-mapping and costing guidance changes impacting the level of comparability.

3.1 Macroeconomic factors

There are annual changes in providers' underlying cost base along with efficiency requirements across the sector. These factors impact all NHS providers and as such should be adjusted for when estimating costs across years. It is however noted that these macroeconomic factors do not affect the classification of HRGs that is presented in Table 2. The main factors to adjust for are cost uplifts and efficiency gains.

3.1.1 Cost uplifts

Input costs faced by providers are subject to year-on-year inflationary increases, in line with macroeconomic trends. These inflationary increases, along with certain uncontrollable cost pressures could be taken into account when estimating reference costs across years. In this context, cost uplifts could be applied using various approaches. One approach is to assume that cost uplifts are comprised of four major categories, that is, the approach followed in the National Tariff.³ These four components are outlined below:

- **Inflation.** This captures salaries, drug costs and other operating costs.
- **CNST.** This captures changes in the cost of the Clinical Negligence Scheme for Trusts (CNST).
- **Capital costs.** This captures changes in capital costs (that is, changes in costs associated with depreciation and PFI payments).
- **Service development.** This captures additional costs as a result of changes to NHS England's Mandate.

A combination of these factors can be used to generate an index which reflects the expected annual cost uplifts for an average provider. This type of index could be applied to cost estimates; for example, this could involve constructing an index where a value of 1 is assigned for the base year, that is, 2011/12, and 2010/11 and 2012/13 values are estimated relative to this according to the cost uplift factor in the relevant year. It is recommended that this approach is applied to reference cost estimates that are generated.

³ <http://www.monitor.gov.uk/NT>

3.1.2 Efficiency

Whilst cost uplift factors reflect increased input costs over time, these are offset to some extent by improved provider efficiency. Providers are expected to become more efficient over time, for example through technological developments. Estimated reference costs should also take account of improved provider efficiency, year-on-year.

Each year, there is an efficiency requirement set out in the National Tariff; this represents the target level of efficiency that providers should achieve in a particular year. One option is to use the historic National Tariff efficiency requirement for each year to adjust the corresponding reference costs. However, it is noted that the efficiency requirement is an aspirational target and it does not reflect the actual efficiency gains achieved by providers in a particular year.

Monitor is currently undertaking work to develop an appropriate method to estimate the efficiency factor for 2015/16, whilst evaluating further options for the longer term. This work will eventually produce an estimate of the year-on-year efficiency gains that have been realised by providers. In order to adjust reference costs for efficiency, this estimate could be applied.

3.1.3 Recommendation

It is recommended that the net impact of cost uplifts and efficiency is applied to the estimated reference costs for 2010/11, 2011/12 and 2012/13. Specifically, it is recommended that:

- Cost uplift factors are applied in line with the factors identified in the National Tariff; and
- Historic data on sector-wide efficiency gains is applied to reference costs when such data becomes available. In the meantime it is recommended that the efficiency assumption used in the Tariff Model is applied as an approximation.

3.2 Limitations

The proposed approach enables an estimation of unit costs across HRGs for 2010/11, 2011/12 and 2012/13. However, there are a number of limitations associated with this approach, as outlined below. As part of the future refinement of this approach, Monitor may wish to address some of these potential limitations.

- **Cost allocation assumptions.** The mapping methodology allocates total costs for HRGs based on activity shares across HRGs. Given that activity may not always be the primary driver of total cost differences between HRGs, this is a potential limitation of the approach.
- **HES activity and reference cost activity split.** There is evidence to suggest that total activity recorded in HES does not reconcile with total activity recorded in reference costs, for a particular provider or service. The mapping approach employed in this analysis assumes that the percentage split of activity between different HRGs is the same in both HES activity and reference cost activity data.
- **Department split.** In reference costs, the unit cost for each provider and HRG is reported for each department. However, in HES, Finished Consultant Episodes (FCEs) are not

assigned to departments in the same way. Therefore, the HES activity mapping methodology does not differentiate by department, meaning the activity mapping is calculated at a provider and HRG level. When this activity mapping data is combined with reference costs, the estimated cost for HRGs is allocated on the basis of activity through the activity mapping. For each HRG and provider, this mapping is therefore applied uniformly across different departments in reference costs when generating cost estimates. Given that the activity mapping in HES could differ by department, this is a limiting assumption of the methodology. Monitor may wish to extent this methodology over time to enable a more granular mapping of reference costs at the level of provider, HRGs and departments.

- **Costing guidance changes.** The proposed approach considers changes to costing guidance that impact particular sub-chapters; that is, the most material changes highlighted in the guidance. However, there may be costing guidance changes which impact the entire reference cost data set for a particular year. These changes potentially limit the comparability of reference costs from one year to the next. Further details on costing guidance changes are presented in Appendix B. However, engagement with Monitor's Costing team indicates that there have not been any material costing guidance changes which impact the comparability of reference cost data as a whole across the three years under consideration.

4 Next steps

This section presents a brief overview of potential next steps for Monitor in terms of implementing the proposed mapping approach.

It is found that there are a number of challenges which limit the comparability of reference costs across years. Furthermore, whilst unit cost estimates can be generated for the majority of HRGs, a degree of judgement is required in order to assess how effective the estimates are. In terms of next steps, it is recommended that Monitor seeks to augment the proposed approach, for example by:

- Conducting a more detailed analysis of the scoring index employed;
- Considering in further detail the treatment of low activity HRGs in the analysis;
- Running a data set based on multiple years of reference cost data through the Tariff Model;
- Accounting for the cost of excess bed days in the methodology; and
- Taking steps to account for different activity mapping between departments.

A number of these next steps are discussed in more detail in the following sections.

4.1 Excess bed days

One aspect of the National Tariff is the cost per day for excess bed days. Each HRG has a maximum expected length of stay, which is referred to as the upper trim point. The additional cost associated with patients whose recorded length of stay exceeds this upper trim point is reimbursed on a per day basis which varies across HRGs. In reference costs, the total number of excess bed days for each provider and department is reported, along with the associated total cost.

The methodology and outputs presented in this report are based on inlier costs, that is, costs excluding the cost of excess bed days for HRGs. In order to augment the methodology, Monitor may wish to account for excess bed days.

As a first step, the materiality of excess bed day costs (as a proportion of total costs) has been calculated for each provider, HRG and department. If the cost of excess bed days represents a significant share of the total cost for an HRG, Monitor may wish to estimate the cost of excess bed days for particular HRGs as part of the methodology.

The analysis indicates that excess bed days represent on average 5-6% of total APC costs. Whilst the average excess bed day cost is relatively low, this may vary across HRGs. As such, an additional indicator variable has been created as part of the methodology to identify those HRGs and departments for which the cost of excess bed days is a material component of costs. This variable is based on 2011/12 reference cost data.

4.2 Activity mapping between departments

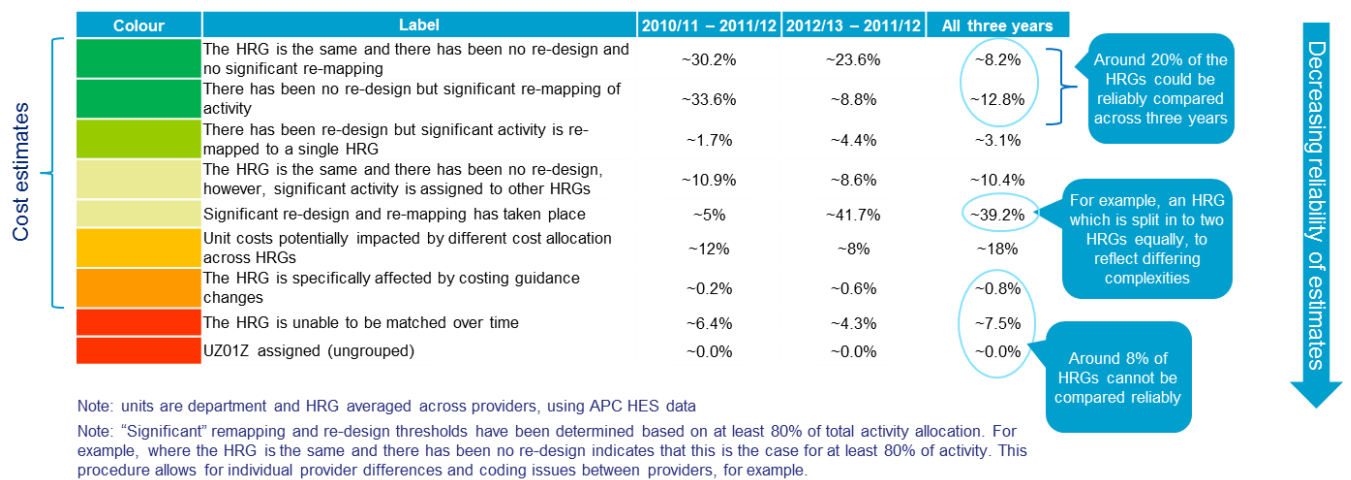
As discussed in Section 3.2, due to the difficulty in assigning departments to activity, the HES activity mapping is applied uniformly across different departments in reference costs when generating cost estimates. As a next step, Monitor may wish to assign appropriate departments for some APC activity in HES, which would allow for more granular mapping at the level of provider, HRG and department. A combination of variables in HES data could be used to create an additional variable which assigns departments to the FCEs. In particular, the admission method field in HES, length of stay and patient classification could be used to assign departments to FCEs across elective, non-elective and day-case settings. For example, day cases would be identified where length of stay is recorded as zero and patient classification indicates day case; patient classification indicating day case but with length of stay greater than zero would instead indicate elective care.

Appendices

Appendix A Detailed outputs

This section presents more detailed outputs of the year on year mapping approach. Specifically, it shows the percentage of HRGs that can be mapped across the three years, accounting for issues such as currency re-design, re-mapping and costing guidance changes in a more granular way than the summary table included in Table 2. Based on this more granular classification approach, each HRG is given a score from 1 to 9, reflecting how effective the estimated unit cost is for that HRG, according to the level of re-design, re-mapping and costing guidance change over time.

Figure 4: Detailed outputs



The approach has been developed to allow Monitor to have the flexibility to select different options depending on requirements. In particular, the categories may be amended by choosing different thresholds to suit different preferences over re-design, re-mapping and costing guidance changes.

Appendix B Limitations

There are a number limitations associated with the approach, which raise concerns over the appropriateness of the approach used to map reference costs between years. This appendix discusses the general limitations associated with the methodology.

Limitations arising from costing guidance changes

In the summary outputs of this report, costing guidance changes refer to changes in costing guidance that impact particular sub-chapters only, which are the most material changes, highlighted in the guidance. However, a series of costing guidance changes affect a higher number of reference costs data across the years, meaning that there are some costing guidance changes that impact the whole of the reference cost data for a particular year. This presents a limitation in terms of the comparability of the cost estimates in general across the years.

This section presents a list of year-specific changes including costing guidance changes that impact a high number of reference costs for a particular year. The presence of these issues may impact the effectiveness of cost estimates in a way that is unknown.

2011/12 specific changes compared with 2010/11

This section presents a list of changes in 2011/12 compared with 2010/11, including costing guidance changes that impact a high number of reference costs for a particular year. The presence of these issues may impact the effectiveness of cost estimates in a way that is unknown.

- No data is collected from PCTs
- Mental health clusters are established and activity is now recorded against this
- Hospital travel costs are not included
- No DOA codes for patients arrived dead to A&E
- Standard cost for at most 20% of costs and activity is abolished, 100% costs and activity should be submitted not to standard cost.
- Clarified the correct use of settings for unbundled HRG
- Clinical audit and research unit costs (ambulance Trusts only) are excluded
- Emergency bed service costs (ambulance Trusts only) are excluded
- Hazardous area response teams (ambulance Trusts only) costs are excluded
- Mental health clusters are established and activity is now recorded against these
- Hospital travel costs are not included

- Intensive care bed information services costs are excluded
- Logistics or courier transport services (ambulance Trusts only) costs are excluded
- Neonatal transfers (ambulance Trusts only) costs are excluded
- Orthoses (as a type of discrete external aid or appliance) costs are excluded
- Patient education costs are excluded
- Patient transport services are excluded (these are flagged in the guidance but they were excluded also from the previous RC)
- Single point of telephony services (ambulance trusts only) costs are excluded
- Voluntary or community first responders are included (ambulance trusts only)
- Home delivery of drugs excluded
- No income or expenditure related to donated assets
- Finance Directors have to approve the reference costs and general quality improvements

2012/13 year specific changes compared with 2011/12

This section presents a list of changes in 2012/13 compared with 2011/12, including costing guidance changes that impact a high number of reference costs for a particular year. The presence of these issues may impact the effectiveness of cost estimates in a way that is unknown.

- Costs rather than income from private patients is net off from the total RC quantum
- No separate line for sub-contracted services
- Medical equipment loans costs are excluded
- Genetic laboratory costs are excluded
- Infectious diseases units are excluded
- Anti-coagulation services costs are included

Data challenges

There are also a number of data challenges associated with the approach. In particular, the grouped HES data that was received from Monitor and the Casemix team had in some cases a significant number of ungrouped HRGs assigned to activity. However, this was only material when grouping 2012/13 activity data with the 2011/12 grouper.

A number of potential drivers of this result have been investigated with Monitor's Knowledge and Information Management (KIM) team and the Casemix team, for example extensive changes in the grouping software or an error in the grouping process. In practice this means that the methodology in its current state is applied only to a fraction of the HES data (around 80%). Should the remaining 20% of activity be successfully grouped to meaningful currencies, the impact on the results is unknown. However, the approach is not dependent on a fully grouped dataset and can be applied in a straightforward manner to a subset of HES data.

Appendix C Testing procedures

This section list the various testing procedures employed to corroborate the cost estimates obtained. In particular, different testing procedures have been put in place to understand if there could be non-logical changes in the total activity or total costs due to re-mapping.

Successful tests conducted include:

- Matching average unit cost estimates with actual average costs for certain HRGs
- Total quantum of activity and cost by:
 - Provider
 - Chapter
 - Sub-chapter
 - HRG
- Verification of missing data points to identify whether some estimates could systematically biased, for example by investigating:
 - The distribution of missing observations by both chapter and sub-chapter
 - The number of providers by chapter and sub-chapter.

Appendix D A&E and outpatient issues

The methodology to compare reference costs year-on-year has been applied to APC data only. There are a number of separate issues to consider when applying the mapping methodology to accident and emergency (A&E) and outpatient (OP) data. While APC data is grouped annually by the casemix team, this is the first time that A&E and OP data has been grouped with a number of different groupers, by Monitor. An initial feasibility assessment has been undertaken as to whether the methodology adopted for APC data could also apply to accident and emergency (A&E) and outpatient (OP) data. This appendix contains the investigation in to applying the methodology to A&E and OP data.

4.2.1 Accident and Emergency data

For A&E data there are a small number HRGs only. In addition, between 2010/11 and 2012/13 there has been only a small amount of re-mapping, for example around dental procedures, indicating that activity mapping using HES to allocate HRGs may not be necessary and instead a straightforward comparison of individual currencies may be a reasonable option, given the smaller computational difficulties.

4.2.2 Outpatient data

For outpatient data there are significant issues related to data processing that hinder the applicability of the methodology in this setting.

We obtained a successfully grouped set of outpatient data grouped with the necessary groupers through a number of sessions with Monitor's KIM team. However, due to size and memory restrictions and problems with unbundled HRGs, the data set was difficult to manage. Further processing of the data is required in order to understand further the issues around this data set.