



Making a difference for patients

Helping to improve the care provided to NHS patients will be Monitor's fundamental goal in our approach to pricing under our proposed new role as Health Sector Regulator.

Accurate pricing information helps GPs and commissioners make better decisions for their patients, making sure they get the best treatment in the best place at the best time. It also makes sure hospitals and other providers of care are paid fairly, can plan for the future and are incentivised to provide the best care possible.

To help us understand how the current pricing system might be improved we commissioned this report from PwC. It starts the process of building a shared understanding of the strengths and weaknesses of the current reimbursement system.

This is the most comprehensive analysis of pricing in the NHS that has ever been done. It includes quantitative evidence, where it is available and reliable, as well as theoretical analysis and qualitative evidence from sector participants and leading health academics. It covers the acute, mental health and community sectors, and payments paid through Payment by Results (PbR), local tariffs and block contracts.

The publication of this report is the first step in evolving the payment system to make sure it delivers the best possible care for patients and the best possible use of valuable resources. It also signals our intention to make our decision-making processes transparent and evidence-based, and to engage in extensive consultation as we progress.

Good quality information is key to improvements

The existing PbR system, where fixed prices are set for certain services, has brought about improvements in the quality and efficiency of care – as well as greater choice for patients. However, PwC find that the information underpinning the reimbursement system does need significant improvement.

Without a strong foundation of good cost data it is difficult to ensure that a pricing system provides the intended incentives to improve quality and efficiency, and poor quality data does appear to be undermining confidence in the prices set.

For example, over 40% of prices set under PbR change by 10% or more each year which leads to poor compliance with the PbR system. This is seen in the fact that non-tariff income as a proportion of providers' total income has been steadily rising over the last four years despite an increase

in the number of services covered by PbR. Poor quality information makes it hard to understand whether this is an efficient way to spend resources and to know what the real cost of these non-tariff services is.

Collecting good quality information will be a focus of our medium term strategy and we will build on the findings of this report to develop an approach to obtaining better data. In particular, we will look closely at how other countries manage their pricing, examining other approaches such as sampling and stricter validation in order to develop a system that draws on best practice.

Good quality cost data should be of direct benefit to providers and commissioners as well as regulators. We will strive to ensure that the pricing system delivers appropriate incentives and supports decision-making within the sector.

Removing barriers to integrated care

Moving between healthcare providers in the primary, community and acute sectors should be as seamless as possible for patients. This report suggests that the administrative fragmentation of the current system is a barrier to the expansion of integrated care pathways.

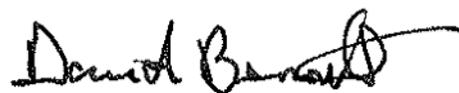
The reimbursement system should be neutral to the setting in which care is provided, allowing commissioners and providers to make the best decisions for patients.

Taking forward the findings of this report

We are already thinking about how the findings of this report can be developed into changes that could improve the quality and efficiency of care delivered to patients. However, it is important to recognise that this will be a lengthy and complex process. We want to make sure that changes are correctly designed and that we engage in a meaningful consultative process.

As we move to the next phase of work we are seeking the views of stakeholders in response to this report. It is my intention that Monitor's decisions will be based on the available evidence and will be made in as open and transparent way possible.

We have one ultimate goal – to help improve the care provided to NHS patients.

A handwritten signature in black ink, appearing to read 'David Bennett', with a long horizontal flourish extending to the right.

Dr David Bennett

Chairman and interim Chief Executive

How you can respond

Monitor would welcome comments on this report. In particular, readers could consider the following questions:

1. What are your views on the twelve key findings of this report?
2. Do you have any views on how the issues identified could be prioritised and taken forward in future work? We are particularly keen to understand what steps are most likely to lead to early impacts on the quality and efficiency of care.
3. Do you think there are any other issues, not covered by this report, which should also be considered with regard to the reimbursement of NHS services?

Please send your answers and/or general comments to pricing@monitor-nhsft.gov.uk or complete the online response form [here](#) on our website.

If you do not have internet or email access please write to: Pricing, Monitor, 3rd Floor, Wellington House, 133-155 Waterloo Road, London, SE1 8UG.

This document was published on Thursday 23 February 2012. Please submit your responses to the questions and any other comments that you have by **5pm on Friday 20 April 2012**.

Please note that we may use your details to contact you about your responses or to send you information about our future work. We do not intend to send responses to each individual respondent. However, we will analyse responses carefully and give clear feedback on our website and through other channels later in 2012 on how we have developed our approach to pricing as a result.

You can sign up to receive emails when we publish information on pricing, and on our proposed new role in general, [here](#) on our website.

*An evaluation of the
reimbursement system for
NHS-funded care*
Report for Monitor

February 2012

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Chapter 1

Executive Summary

Summary on a page: Our main finding is that the information underpinning the reimbursement system for NHS-funded care needs significant improvement

What we were asked to do

Reimbursement mechanisms are an important lever for delivering quality and efficiency improvements in the delivery of healthcare. Monitor asked us to undertake an evaluation of the reimbursement system for NHS-funded care. This involved an assessment of past performance and a consideration of whether they are fit-for-purpose given future reforms and demands. The evaluation identifies areas where reimbursement mechanisms can be improved. By the reimbursement system we refer to ‘Payment by Results’ (PbR), block contracts and local tariffs, collectively funding acute, mental health and community care. We assessed the system’s performance against three elements of a reimbursement system – information, incentives, and compliance. We have drawn on evidence from a range of sources. These include national and sample data sets from NHS providers, reimbursement approaches observed in other health systems and regulated sectors, surveys and case studies.

What we found

Our key finding is that the information underpinning the reimbursement system needs significant improvement. We found unexplained variations in the unit costs for the same services between providers. Existing evidence has also highlighted areas where data quality is poor. We therefore don’t know whether cost variation is genuine, due to data quality, or due to differences in how organisations undertake their costing. Some other health systems do things better. Germany, for example, has a rigorous level of assurance of the cost information used in price-setting. The experience of other regulated sectors suggests improvements are possible too. This finding applies across acute, community and mental health services.

PbR has delivered benefits – for instance enabling choice, improving information availability, and driving some quality and efficiency improvements. However, unless the information is accurate and reliable, reimbursement may not be set at a level that is sufficient to deliver high quality care. Poor information can also affect the stability of prices. We found that over 40% of prices set under PbR change by 10% or more each year. This undermines the confidence of providers and commissioners – they do not understand why prices fluctuate widely, and find it difficult to respond to price signals.

There is little evidence of increased delivery of care closer to the home. In the last year growth in expenditure on community services was 6%, only moderately outstripping the 5% rate of growth in expenditure on acute care.

It is not surprising that providers and commissioners are increasingly deciding to negotiate reimbursement locally, given incentive and information problems we highlight. We found that non-tariff income has been increasing, and our survey evidence shows that 50% or more providers engage in local negotiations with commissioners, outside the rules of PbR.

What it implies for NHS funded care

5% of GDP (£66 billion) was spent on reimbursing providers for NHS-funded secondary care in 2010/11 (including mental health). £28 billion of this amount was paid through PbR, where prices fluctuate each year. The rest is paid through local negotiations between providers and commissioners, where the quality of cost data underpinning these services is particularly poor. Better quality and more detailed information is needed to make reimbursement for NHS services more closely oriented to costs, and therefore a stronger lever for driving improvements to quality and efficiency. This applies across acute, mental health and community care.

Reimbursement mechanisms do not match the characteristics of the services they fund. For example, minimum capacity requirements and economies of scale are not captured in how providers are reimbursed. Some providers are under-funded while others are over-funded for particular services. Providers manage this by cross-subsidising across services. This may reduce funding available for other services and have a negative impact on quality.

Poor information hampers the reconfiguration and integration of services, which are intended to benefit patients. If the system cannot measure costs and revenues, it becomes difficult to quantify potential benefits of delivering integrated services.

We think that non-compliance with the reimbursement system is an indication that providers and commissioners do not think that current mechanisms are fit for purpose. Local negotiations and an increase in non-tariff income are a response to this. But quality of care may fall if commissioners and providers are agreeing lower local prices. Prices higher than tariff may represent inefficiencies. The concern is that local agreements are becoming more prevalent, but there is little evidence to show that these agreements are improving the quality or efficiency of patient care.

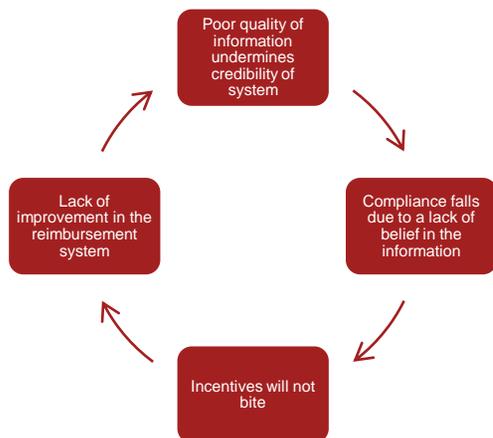
The reimbursement system plays an important role towards the achievement of policy objectives in health

The role of the reimbursement system in the NHS

The reimbursement system should support the overall policy objectives of the NHS. Its success relies on three elements –information, incentives and compliance.

An effective reimbursement system should incentivise improvements in both the quality of patient care and the efficiency of providers (and therefore the system as a whole). This requires a rigorous and comprehensive set of information.

Poor quality information undermines the credibility of the reimbursement system. Compliance falls as providers do not believe the information that is used to make reimbursement decisions. Incentives will not bite. Therefore a lack of compliance hinders improvements in the system. In short, there is a vicious circle, as set out below:



What reimbursement mechanisms are being evaluated

In the NHS the three main mechanisms that are used by commissioners to reimburse providers for patient care are: (1) PbR – the national tariff – and adjustments; (2) block contracts; and (3) local tariffs. They have the following features:

- PbR reimburses acute providers for approximately two-thirds of the services they provide to patients. Fixed prices for these services are set nationally each year – over 1,100 different prices are set as such, based on the reported costs of providers.
- The remaining one-third of services in the acute sector is reimbursed through block contracts and local tariffs, which are negotiated locally between providers and commissioners.
- Block contracts are also used to reimburse around 90% of community services care and around two-thirds of mental health care. Local tariffs reimburse the remainder of these services.

We have focused our evaluation on this categorisation of the reimbursement system. The mechanisms are applied to a range of care settings (acute, mental health and community services). We look at the incentives that are being created by each reimbursement mechanism, rather than their application in each care setting. For example, we examine the use of block contracts, but do not necessarily draw a distinction between their application in acute, mental health and community services.

The reimbursement of primary care is excluded from the scope of our analysis. However, we acknowledge that how this care is funded, and importantly how primary care and secondary care are integrated, will be an important consideration for the future reimbursement of NHS-funded care.

Throughout the report, we refer to the prices generated by reimbursement mechanisms. We use the word ‘price’ in two contexts:

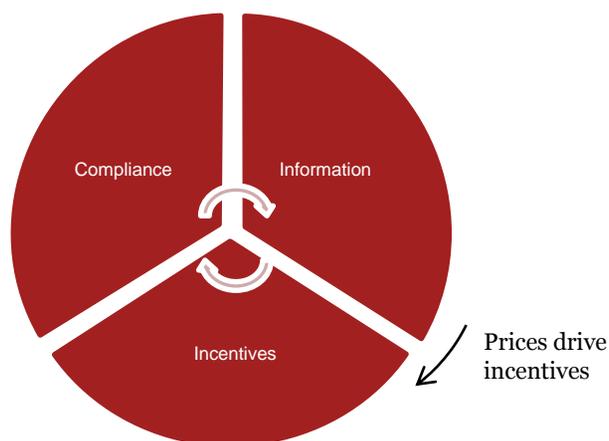
1. the price of a particular service or treatment
2. the overall payment under a contract for a bundle of services or activities.

We have evaluated the reimbursement system by looking at the information used, the incentives created and the level of compliance achieved

The framework we use

We have developed an analytical framework that splits the operation of reimbursement mechanisms into three elements:

1. The information that is collected and used to set levels of reimbursement.
2. The incentives that are created by the reimbursement system. This is a consequence of how information is used and how prices are set.
3. Compliance with the reimbursement system – in particular whether providers and commissioners operate within the rules of the reimbursement system. This is necessary for intended incentive effects of the reimbursement system to feed through into behaviours.



The evidence we draw upon

Our focus has been to test this framework using quantitative evidence, based on national and sample data sets. We have supplemented this analysis with qualitative evidence from stakeholders, insights from other regulated sectors and health systems and existing studies.

Quantitative data

We have used publicly available data sets covering the costs and activities reported by NHS providers, in addition to specific data sets provided to us by the Department of Health (DH). We have also gathered more granular data from samples of acute, mental health and community services providers. A table of data used is contained in Appendix 1.

Qualitative evidence

We have consulted widely with a range of individuals and organisations across the Government, the NHS and academia, including two workshops and 27 meetings. We have surveyed providers and undertaken case studies to fill data gaps and validate our findings.

Insights from other health systems and regulated sectors

We have considered the evidence from different approaches to reimbursement in international health systems including the Netherlands, Australia (Victoria), the United States and Germany. We have also considered approaches undertaken by regulators in other sectors, including water, telecommunications, energy and rail.

Existing evidence

We have reviewed the findings of over 50 reports and journal articles that have examined elements of provider reimbursement. These findings have been used in our evaluation as appropriate.

There is a need to improve the reliability of cost information used in the reimbursement system

Finding 1: Providers report very different average costs in providing the same treatment to patients

The main source of national information on the costs of providing NHS services is a dataset known as Reference Costs. This dataset shows each provider's estimated unit costs by Healthcare Resource Group (HRG). The data shows that providers report very different unit costs for delivering the same HRG.

Differences in cost could be driven by the complexity of the patient being treated, other costs incurred by the organisation, different levels of efficiency or differences in how the reporting of costs (or the coding of the patient) has been undertaken.

Why this matters

Variation in costs that cannot be explained undermines the usefulness of the data for constructing prices or making decisions within an organisation. It is not possible to tell how much of this variation is due to data reliability or legitimate variations in costs. As a consequence, prices may not reflect the true underlying cost of services, and therefore some services will be under- or over-reimbursed. The net impact on a provider will depend on the mix of services provided. However, prices that are not cost reflective can lead to cross-subsidisation which will blunt the efficiency and quality incentives of the reimbursement system.

To assess this, we looked at the 2010/11 Reference Costs return data by HRG. We used data on elective, non-elective, and accident and emergency HRGs paid through PbR. We found that 30% of the unit costs reported by providers, by HRG, were at least 50% higher or lower than the national average unit cost for that HRG (weighted by activity). In other words, 30% of providers are reporting unit costs that are a long way from the weighted national average unit cost, which underpins the amount they are paid. For 408 HRGs (21%), more than half of all providers reported unit costs that were 50% or more above or below the weighted national average unit cost.

Finding 2: Some of the variation in average costs is due to differences in the approaches to costing and variations in the quality of cost information between providers

NHS providers face a complex task in allocating their total costs to the provision of different services (i.e. HRGs) each year. In recent years guidance on how overheads should be allocated (to achieve consistency) has improved. However the disparity of costing systems amongst providers, and inherent flexibility in the guidelines as to how costs are allocated (provided it is logical), can affect the quality of Reference Costs. The Audit Commission (2011) recommended that 75% of providers should review how they allocate their costs.

In Germany, costing data is collected from a sample of hospitals that are required to meet explicit, and precisely defined, cost accounting standards. A large proportion of data is excluded following validation checks, and the error rate of data used is very low (An audit in 2007 found that only 0.2% of data used to set prices was recorded inaccurately (InEK, 2009)). The accuracy of NHS information is poor by comparison. In 2009/10, one in eight NHS providers had material errors in the total costs they were reporting for their organisations, according to the Audit Commission (2011). A material error is one which affects the total cost quantum by more than 1% – for the average provider 1% is approximately £2.2 million. More than a quarter of organisations had material errors (resulting in a movement of total costs by 0.3%) in one or more of the Reference Costs by HRG that they were reporting.

The Audit Commission concluded that the quality of cost information for services not covered by tariff (predominantly mental health and community services) was particularly poor (although no statistics were provided). This information is not used to set national prices for these services, but it may be used to set local tariffs.

Why this matters

Cost data forms the foundation of reimbursement. Reimbursement levels will not reflect underlying costs, if the consistency of cost reporting and the accuracy of the underlying information is poor. This impacts confidence in the pricing system – stakeholders will not believe the prices that are created and are less likely to comply with reimbursement rules.

There is a lack of confidence in the ability of the reimbursement system to reflect the underlying drivers of the costs of providing care

Finding 3: Some cost drivers – particularly patient casemix – are not captured adequately in the current information underpinning the reimbursement system

A survey undertaken by the DH showed that almost 75% of acute providers are using, or currently implementing, a system that records the costs of treating individual patients. Providers told us that they are using this patient level information – rather than Reference Costs, which represent an average view of costs – to understand the costs of their organisation. With this information, they find that the costs of treating patients vary widely (refer to page 29) - even when the patient service has the same classification (i.e. the same HRG code).

We found that casemix (the complexity of treatment required which is influenced by the characteristics of the patient and their symptoms) is a significant driver of variation in patient costs. Current reimbursement mechanisms attempt to reflect these differences (through currency design and top-ups for long stays or specialist services), but actual cost drivers may not be well targeted. In particular co-morbidities (two or more existing medical conditions) – and patient age as a proxy for co-morbidities – resulted in higher costs of services. We also found that the patient age profile varied in our provider sample – suggesting that some providers would face higher costs that they could not control and which may not be reimbursed accordingly.

Increased use of patient level data could be used to improve the information feeding into the pricing systems. Germany, Australia (Victoria) and the US (Medicare) use patient level data in setting prices.

Why this matters

Duplication in the collection of cost information results in an inefficiency in the system; providers are collecting cost information for the pricing system, whilst using alternative cost information for their own purposes. Harnessing this information would provide a more accurate picture of costing, and reduce the costs of compliance. However, for patient level cost information to be useful for price-setting it would need to be collected and reported consistently across providers. At present this is not the case as providers have different systems and use the information for different purposes.

Finding 4: Local reimbursement negotiations (through block contracts, and local tariffs) are not based on reliable cost information

Providers reimbursed through block contracts told us that block contracts are typically set with reference to historic funding levels. They believe that this is damaging to patient care because it bears little relation to the underlying needs of the patients they care for. There is no clear link between the services expected (or anticipated) to be provided, the costs of providing those services and the amount of funding.

Where local tariffs are used, these are often based on Reference Costs (at least as a starting point for negotiation). As described below, these are regarded as unreliable at the individual service level.

Why this matters

Setting prices without reference to the efficient costs incurred has a damaging effect on incentives – providers will not be incentivised to improve efficiency as they are not rewarded appropriately. This can threaten the sustainability of the services provided to patients.

The quality of data recorded for services provided outside of PbR is poor (see Audit Commission 2011, NHS Benchmarking Network 2011). This is because of different approaches to recording and allocating costs to different services. The consequence is that providers have widely different unit costs for the same services (which we see in sample data). Whether this data reflects actual activity and unit costs is not clear. There is no standard minimum data set for community services activity. As a result Reference Costs for these services can be based on sample activity or clinical estimates (DH Reference Costs guidance, 2010).

Survey results from the DH (2011) showed that 53% of Mental Health providers are either using or planning to implement a system which records costs of treating individual patients. In contrast, only 18% of other non-acute providers (including community services) are doing likewise.

Improvements to the information on the costs of treating individual patients are required in order to create effective incentives through these local pricing systems.

Existing research suggests that PbR has delivered some efficiency and quality improvements. However, the incentives of the reimbursement system are not as effective as they could be

Evaluation of the incentives of the pricing systems

Our ability to examine the impact of the reimbursement system on incentives has been limited by the availability of reliable information. As highlighted, the data that underpins the reimbursement system needs improvement. This makes it hard to attribute changes in the behaviour of providers and commissioners to the reimbursement system. Hence, we have drawn on elements of theory to supplement our evaluation of the impact of the reimbursement system on incentives.

Finding 5: PbR has enabled improvements to quality through increased patient choice, but there is little evidence to suggest that reimbursement mechanisms have driven improvements in the quality of care to patients

There is some research which suggests that patient choice (which has been enabled by PbR) has led to improvements in the quality of services being delivered to patients (Bloom et al, 2010). However, we have not found evidence that the reimbursement system is driving quality improvement in the absence of choice (e.g. for non-tariff services and non-elective services).

Evaluations of the impact of Best Practice Tariffs (BPTs) and Commissioning for Quality and Innovation (CQUIN) are currently being undertaken by the DH. It is too early to assess the impact of these initiatives on driving quality improvements. The interim evaluation reports are not yet publicly available.

Block contracts and local tariffs can be a lever to drive improvements in the quality of care (in the absence of choice), but this relies on commissioners aligning the prices they agree with the quality they want. Commissioners require access to reliable information on patient outcomes, and the link to service quality in order to do this. Whilst we have found pockets of evidence where commissioners link payments to outcomes, the ability to do this more widely is hampered by a lack of data on costs and patient outcomes.

Why this matters

The pricing system is a lever to drive improvements in quality. It does this through enabling patient choice (in the case of PbR) and rewarding providers for making improvements to quality. Without sufficient information on patient outcomes, the pricing system will not create appropriate incentives that consistently reward providers for quality improvements.

Finding 6: There is some evidence that PbR has led to improvements in efficiency across certain services. However, problems with the incentives created by the reimbursement system may limit further improvements to efficiency

There is evidence that moving reimbursement of elements of elective acute services from block contracts to PbR has improved efficiency. Aberdeen and Dundee Universities (2010) found that PbR reduced the average length of stay for elective treatments by 2.5% between 2002/03 and 2007/08. Our concern is that incentives for further efficiency improvements are blunted because the information used to set tariffs is not adequate. In particular, our analysis of patient level data identifies a number of situations where the current reimbursement system may be under- or over-reimbursing providers for certain services.

Reimbursement through block contracts creates incentives for a provider to manage its total costs and ensure that these match revenue. The reimbursement system will not deliver incentives to improve efficiency if the block payment is not linked to activity and quality outcomes (which we understand is often the case).

A recent study by The King's Fund looked at the level of efficiency in mental health services (which are primarily reimbursed through block contracts) across England. It found that the efficiency of these services was low, with a 20-fold variation in total bed days and a 6-fold variation in admission rates (Naylor and Bell, 2010). Our own analysis of sample data from community service providers and mental health providers showed wide variations in unit costs for the same services between providers. It is not possible to identify the role of other factors (aside from efficiency) in driving this cost variation.

Why this matters

The reimbursement system is an important lever in improving efficiency in the NHS. Our assessment is that the reimbursement system, through either PbR, local tariffs or block contracts, is not maximising the opportunity to improve efficiency. The “noise” in the data underpinning these systems, coupled with the way block contracts are managed, weakens the reimbursement system. In a cash-constrained environment, the sustainability of services to patients may be threatened.

The poor quality of information hinders an in-depth evaluation of reimbursement system incentives. Volatile prices are a direct result of this information

Finding 7: A large amount of cost variation is left unexplained by HRGs and adjustments. Whether this is due to weaknesses in the current mechanisms, the coding practices of providers or poor information is not clear

We examined patient-level cost information to evaluate the incentives that were being created by the reimbursement mechanisms. We found that, on average, the HRG code used by the provider explained about 33% of the variation in costs at the patient level (after we adjusted for top-up payments that would have been paid). We also found that top-up payments – for higher costs of specialist treatments, longer patient stays and local market factors – helped to cover these additional costs, but they are not always targeted appropriately. In particular, the relationship between the level of adjustment received through the market forces factor (MFF) and variation in costs at the patient level was very weak (the MFF explained just 0.6% of cost variation at the patient level).

There is some evidence that other systems do things better. InEK (the organisation responsible for price-setting for German DRGs) has reported that the 2011/12 G-DRG system explained 75% of the variation in costs across 3.5 million patient cases (from 2010) (InEK, 2011). In the US, Wynn (2008) found that the Medicare DRG system explained 47% of cost variation across almost 12 million patient records from 2007.

While this suggests improvements in the NHS are possible, we acknowledge the limitations of comparing the findings from different studies across systems. For example, our analysis was undertaken with a relatively small sample size that is not necessarily representative of the NHS. Costing and coding approaches can also influence our results.

Recent research by Andrew Street (University of York) investigated how well the NHS HRG system, and the DRG systems of 9 other European countries, explained variation in the costs of patients (using a small sample of 10 procedures). This analysis did not indicate that any one system dramatically outperformed the others (refer to page 36).

Why this matters

If there is available information on the drivers of variation in cost, this will improve the ability of the reimbursement system to reflect these variations. This matters as it ensures providers are reimbursed appropriately for delivering care, rather than relying on cross-subsidising across the services they deliver.

Finding 8: Fluctuations in average costs reported by providers have affected the stability of tariff prices. Individual tariff prices fluctuate widely each year which further blunts the incentives of the reimbursement system

Tariff prices move significantly from year to year. We found that more than 40% of individual prices have changed by 10% or more from one year to the next since 2005/06 (with the exception of 2006/07 to 2007/08 where a decision was made to carry the same prices through to the next year). Providers have told us that this instability affects their confidence in the pricing system. Providers do not see their own underlying costs fluctuate in the same way. This influences how they respond to price signals (e.g. focusing on overall revenue rather than individual prices). However, on some occasions, we understand that these price signals may hinder investment decisions.

In other sectors, regulators favour prices set for longer periods. This gives more certainty to providers of services and makes the prices more meaningful (providers have to live with them for longer periods). Prices become a stronger signal, which should enhance efficiency, and support better planning and investment decisions.

Why this matters

Unexplained fluctuations undermine the credibility of the tariff system. Providers do not understand why prices move significantly from year to year – the fluctuations do not correlate with how they believe costs are moving. This impacts compliance with PbR, reducing its effectiveness as a lever for delivering efficiency and quality improvements. Resetting prices each year can be beneficial. For example, the uptake of innovation can change the underlying costs of delivering care. The resulting changes to clinical practice may feed into prices more quickly, if prices are reset each year (although at present there is a three year lag between Reference Costs being incurred, and these costs feeding into prices). Prices set for a longer period would need sufficient flexibility to adapt to changes in innovation.

The current reimbursement system reflects administrative boundaries, not service characteristics. This can blunt incentives to improve efficiency and deliver integrated care

Finding 9: Different economic and clinical characteristics of different care settings and services are not reflected in the current reimbursement system

At present PbR – a payment for activity undertaken – is used widely to reimburse providers for acute services. However the term “acute services” is broad and PbR covers a wide range of activities. The economic and clinical characteristics of these activities vary widely. For example, many services reimbursed through PbR have minimum capacity requirements (i.e. minimum staffing levels). Some services have low volumes and so unit costs at the patient level are less predictable.

The mix of fixed and variable costs also varies between services. For example, some services (e.g. those using expensive diagnostic equipment) will have large economies of scale. The ability of providers to predict, control and exploit economies of scale varies by service. These characteristics are not reflected in how providers are reimbursed. In other systems, there are elements of flexibility – e.g. in Australia, a two-part tariff is used to reimburse emergency services, recognising the different costs associated with maintaining capacity compared with undertaking activity.

Block contracts are widely used to reimburse mental health and community services. Block contracts are essentially payments for a given level of capacity for a period of time. A capacity payment may create appropriate incentives for some of these services – for example – emergency admissions for mental health patients. However, for other services – such as district nursing visits where costs are largely aligned with the activity undertaken – block contracts may not create appropriate incentives.

Why this matters

Incentives will be distorted if the characteristics of the service provided or setting of care are not taken into account in the pricing system. For example, we might see high levels of activity in a higher-cost environment (i.e. an inpatient setting reimbursed for activity) and low levels of activity in a low-cost out-patient setting (i.e. community care reimbursed through block contracts) for the same service.

Finding 10: Lack of information and the incentives created by pricing systems in different administrative boundaries may hinder the flow of patients between different care settings

NHS-funded secondary care is currently reimbursed along the administrative boundaries of acute, mental health and community services. The same applies for primary care (reimbursed through a separate system and not considered as part of this evaluation). These boundaries may influence how and where patients are treated.

The reimbursement system does not create incentives for greater integration of care. For example, acute providers may lose revenue if they were to transfer activity to another setting of care – and they will still have to cover elements of fixed costs. Revenue will drop by the price of the activity but costs may not fall by the same amount. In community settings, block contracts may not provide incentives to increase activity. Differences in the quality and format of information between care settings also hinders integration. Commissioners may find it hard to compare the relative cost and quality of care in different settings.

There is a clear mandate for NHS-funded care to be better integrated at all levels of the system (DH, 2010). One indicator of how well this is happening is the trend in expenditure on care in different settings. Between 2009/10 and 2010/11, expenditure on community services grew by 6%, only slightly higher than the 5% growth in expenditure on general acute care (DH Resource Accounts, 2011). This suggests that any migration of services from acute to community settings has been limited.

The Nuffield Trust (2011) explored the challenges that PbR has on the development of integrated treatment pathways. Using case studies, it found that the reimbursement system hinders the incentives and the ability to provide integrated care pathways.

Why this matters

A lot of patient care is delivered across settings of care – and there is increasing focus amongst clinicians, commissioners and policymakers to deliver more integrated care. Poor information hinders this. Without knowing costs and quality in each setting, it is not possible to assess whether integration will be beneficial. However, the existence of these barriers may influence clinical decisions in a way that prevents the most appropriate form of care. Better and more consistent data is needed. In addition, the reimbursement system itself may not support integration and the structure of reimbursement mechanisms makes cost savings difficult to realise.

Providers and commissioners are increasingly operating outside the rules of the reimbursement system

Finding 11: Providers are not responding to signals being delivered through the pricing system at a service level

Income data from financial accounts of a sample of 69 NHS Trusts indicates that their total non-tariff revenue and, to a lesser extent, total tariff revenue is quite volatile (refer to page 48). In contrast, total patient revenue remains reasonably constant. It is unlikely that the mix of services a provider delivers changes significantly from year to year. This suggests there is a degree of smoothing (i.e. cross subsidisation) between tariff and non-tariff activities. Non-tariff income changes (either increasing or decreasing) in proportion to changes to tariff income.

Why this matters

The incentives to deliver efficiency gains at the individual activity level are removed if providers are able to cross-subsidise across their services. There is less need to improve efficiency in a service as costs can be cross-subsidised from other areas. This is important because it means that providers and commissioners are not responding to the incentives driven through the pricing system. Instead, they make their own local arrangements. These may increase costs and create inconsistencies across different providers and geographies. Cross-subsidisation can also affect new market entrants. Cross-subsidisation may enable incumbents to continue operating inefficient services, even when these could be better supplied by more efficient providers.

Finding 12: Providers and commissioners are increasingly negotiating prices locally and abandoning the pricing system.

From 2007/08 to 2010/11 the proportion of patient revenue from primary care trusts that was delivered through local negotiations between commissioners and providers increased from 23% to 28%, based on data from a sample of 69 NHS trusts. This is the opposite of what we expected to find, as an increasing number of services have moved under the remit of PbR.

Evidence from surveys also indicates that providers and commissioners are operating outside the rules of the pricing system. In surveys undertaken by the Healthcare Financial Management Association (HFMA) and the Foundation Trust Network (FTN), more than half the respondents acknowledged deviating from the rules of PbR in negotiations with commissioners.

Our own analysis shows that PbR prices can move significantly across years, against the expectations of providers. This reduces their usefulness as price signals and providers do not regard the price movements as cost-reflective. Providers reported anecdotal examples where well-performing service lines became loss-making within the space of a single year, despite them feeling there is no obvious underlying change in how services are delivered or their costs.

Why this matters

Non-compliance occurs because providers and commissioners believe the current system is not always fit for purpose. So, they find ways around adhering to national prices. This flexibility may be entirely appropriate in certain circumstances. In fact, it may lead to important services remaining open when these are under-funded through the reimbursement system. The key issue is that it is happening on a significant scale without evidence to demonstrate that it is improving the quality or efficiency of patient care. Quality may fall if lower prices are being negotiated locally to fit the commissioner's budget constraints or if providers are trying to increase volume. This may be particularly apparent if quality of services are difficult to measure.

Our evaluation findings lead us to eight areas where we suggest that the reimbursement system could be improved

1. Improving the information that is used to set reimbursement

Our key finding from the evaluation was that the information underpinning reimbursements needs to be significantly improved. We found that there are significant variations in the Reference Costs that providers are reporting for delivering the same services, directly impacting prices. This variation cannot be explained and at least some of this variation is likely to be due to differences in how providers allocate their costs. Without good information, commissioners and providers cannot judge efficiency and quality. This is an issue for all services. The reimbursement system needs to be based on more detailed and reliable (i.e. consistently allocated) cost data to effectively support decision-making. Improving the timeliness of translating cost data into prices (i.e. reducing the three year time-lag) would further improve the relevance of the information.

2. Ensuring the reimbursement models reflect the characteristics of the services they cover

Existing reimbursement mechanisms do not take account of the economic or clinical characteristics of the services that they are paying for. Economies of scale and capacity requirements can significantly affect the cost of delivering care. As the system does not recognise these in a systematic way, some providers may be under-reimbursed for particular activities. This may mean that they have to cross-subsidise from other services, impacting funding available elsewhere in their organisations. This can be addressed by ensuring that the structure of reimbursement is tailored to the characteristics of the service being delivered.

3. Adjusting for drivers of cost variation

We found that the reimbursement system does not fully address the drivers of cost variations in a consistent way. This may cause level playing field issues, create opportunities for cherry-picking, and require providers to cross-subsidise between services. We also found that the level of adjustment received through the MFF does not reflect the amount of cost variation observed at the patient level.

4. Encouraging quality improvements

We only found limited evidence that reimbursement mechanisms have directly impacted on the quality of services being delivered (in the absence of choice). This may, in part, be due to the difficulties with measuring quality outcomes and linking them to the reimbursement mechanism.

5. Improving transparency in price setting and stability of prices

We found that the prices set through PbR vary significantly from year to year – and in ways that commissioners and providers do not understand. This is a symptom of the poor information being used to set prices. It undermines confidence in the prices that are being set and weakens their impact as a price signal. It may also impact investment decisions. We found that providers do not understand the reasons behind fluctuations in prices each year. The uncertainty that these fluctuations create seems to be managed through adjustments to other income streams to maintain stability at the total income level.

6. Simplifying the reimbursement system

We think that there is value in looking, from a system perspective, at how provider reimbursement mechanisms could be simplified and better aligned with the higher level objectives of NHS-funded care. Provider income comes through a range of reimbursement mechanisms, each with different incentive properties. These mechanisms overlap with one another. When they interact, (e.g. non-tariff revenue offsetting a fall in tariff revenue) it can blunt the incentives of each. This limits the ability of the reimbursement system to drive behaviours, such as improvements to efficiency or quality, or the delivery of care in the most appropriate setting.

7. Working across settings of care

We found that reimbursement mechanisms currently operate within the administrative boundaries of settings of care (acute, community etc) rather than across them. This can sometimes hamper efforts to integrate or shift services. Organisations are reluctant to lose income, particularly if their cost base is largely fixed, making it hard to realise savings from delivering services in different ways. Inconsistent information on the cost of services between care settings is also a barrier.

8. Reviewing local arrangements

We found that providers and commissioners are increasingly engaging in local pricing discussions, suggesting national prices are not always fit for purpose. This may well be a manifestation of low confidence in the system. However, it is not clear that these local arrangements are delivering improvements to efficiency or quality.

Chapter 2

Background

This evaluation helps Monitor to develop priorities for reform of the provider reimbursement system in England

Context

Liberating the NHS sets out the Government’s reform programme for the NHS. Under the reforms, Monitor has an expanded role as a sector regulator, including a range of new duties. These include setting prices for NHS-funded care, licensing providers, addressing anticompetitive practices and protecting consumers from provider failure.

Reimbursement system responsibilities will be shared between the NHS Commissioning Board (NHSCB) and Monitor. The NHSCB will be responsible for designing currencies and Monitor for calculating and setting prices for these currencies, with the organisations required to agree on all proposals. A currency refers to the HRG that a provider uses to code a spell of patient treatment (from admission to discharge). The provider receives the tariff (price) associated with this HRG (and adjustments if applicable).

Monitor has commissioned this evaluation into the strengths and weaknesses of current NHS reimbursement system. The aim of this report is to build an evidence base to identify key areas for further work and to inform future priorities for reform.

What is covered by this evaluation

This report sets out our evaluation of the current systems that are used to reimburse NHS-funded care in England. We have looked at the three primary mechanisms used to reimburse providers for NHS-funded care, including:

1. PbR and adjustments
2. block contracts
3. local tariffs.

These mechanisms are used to fund acute, mental health and community services care. 5% of GDP (£66 billion) was spent on NHS-funded secondary care in 2010/11 (DH Resource Accounts, 2011). Around £28 billion of this was estimated to have been paid through PbR (DH, A Simple Guide to Payment by Results, 2011).

Throughout the report, we also refer to reimbursement mechanisms as pricing systems. We use the word ‘price’ in two contexts:

1. the price of a particular service or treatment
2. the overall payment under a contract for a bundle of services or activities.

There have been a number of previous evaluations of the NHS reimbursement system, focussed in particular on the performance of PbR. This evaluation builds upon these studies. This evaluation is distinctive for the following reasons:

- The evaluation brings together analysis of empirical data (including national and sample data sets), insights from case studies and discussions and surveys, insights from other health systems and regulated sectors and existing evidence (discussed further on page 21).
- In addition to PbR this evaluation covers other methods of reimbursement for NHS-funded care, such as block contracts and local tariffs.
- We have evaluated how the different reimbursement mechanisms interact with each other, and what impact the coexistence of different mechanisms have on the performance of each other.

Who have we worked with

We have worked closely with academic experts, including Professors Stephen Littlechild, Carol Propper, Martin Chalkley and Chris Chapman.

We have also engaged with a range of stakeholders. These include the Department of Health (DH, including the PbR team), the Audit Commission, the NHSCB, the Foundation Trust Network (FTN) and Healthcare Financial Management Association (HFMA), NHS West Midlands Strategic Health Authority, West Midlands Mental Health providers and NHS commissioners and providers. They have helped to shape and steer our evaluation and have provided much of the evidence we draw upon. We are grateful for their inputs and their time.

Over the last decade there have been substantial changes to how NHS-funded secondary care is reimbursed

How was acute secondary care funded pre-2003?

Introduced into the English NHS in 2003/04, PbR represented a shift in the reimbursement of NHS-funded secondary care. Prior to 2003, NHS-funded secondary care was funded through block grant payments. These were agreed locally between commissioners and providers. Such contracts were usually negotiated based on historic “baseline” arrangements and then adjusted to reflect inflation and consideration of potential efficiencies. Block contracts specified, in one form or another, a payment for a broad range of health services and treatments. Depending on the type of contract, certain activity levels might have been stipulated in the agreement. Activity levels which fell outside these targets may have triggered pre-defined actions; these would be renegotiations or data validation procedures (Raftery et al, 1996).

The evolution of funding since 2003

After PbR was introduced in 2003 (an activity based funding mechanism), providers of acute care were reimbursed by the volume and type of care (case-mix) provided. Funding was determined based on a nationally mandated schedule of prices for specific interventions payable to all providers of NHS-funded services.

PbR was introduced in a phased manner, both in the scope of activity and its application to different types of providers. It was first applied to marginal changes in output for 15 HRGs in 2003/04 covering £100m of elective activity at Foundation Trusts. It was extended to a further 33 HRGs in 2004/05 (Department of Health, 2010). By 2006/07, it covered non-electivity and outpatient activity at all trusts. A transition period between 2005-06 and 2007-08 was intended to smooth the impact of PbR on providers and PCTs. By 2007/08, 94% of acute spells were covered by PbR (Farrar et al, 2011).

Prices under PbR (tariffs) are set based on Reference Costs. Reference Costs are the average reported unit cost to the NHS of providing defined services in a given financial year. Services are classified according to an HRG. A given HRG can be either elective or non-elective, depending on how the patient was admitted. For example, the admission might have been planned (elective) or an emergency (non-elective). HRGs are a case-mix classification system which take into account the diagnosis of the patient and the service provided.

That is, patients with the same HRG classification should require the same underlying resources of the provider for treatment. HRGs have evolved from Diagnostic Resource Groups (DRGs) – the case-mix classification pioneered in the USA in the 1980s. The DH developed HRGs because it believed that they were the most developed, comprehensive tools in England for classifying health services (Audit Commission, 2004).

What was the rationale for introducing PbR?

The aim of PbR was to improve the fairness and transparency of hospital payments and to encourage provider activity and efficiency. PbR made clear links between activity and payment, encouraging the entry of efficient providers into the market which increased its capacity.

PbR was intended to improve efficiency and increase value for money as both commissioners and providers could retain and invest savings to improve service. It also aimed to facilitate choice, increase contestability, enable innovation, improve quality of care and reduce waiting times (DH Code of Conduct for Payment by Results, 2007).

Why are some services still funded through block contracts?

The introduction of PbR to mental health trusts and community service providers was initially planned for 2008/09. It was anticipated that by this time the quality of data covering these services (in 2004 it was particularly poor) would have sufficiently improved (The Audit Commission, 2004). However, good quality data still continues to be a major barrier to introducing PbR to the rest of secondary care (Audit Commission, 2011 & DH Reference Costs Guidance, 2010). In addition, PbR was not established in other settings of care (e.g. primary care) as it may not have suited the economic characteristics and objectives of providing these services.

Information, incentives and compliance play an important role in ensuring that the reimbursement system enables efficiency and quality improvements

The role of the reimbursement system in the NHS

The reimbursement system is a key lever for supporting the overall policy objectives of the NHS. For example, the introduction of PbR supported the objective of enabling patient choice. The reimbursement system also has a role to play in supporting a current objective – greater development of integrated care pathways. The reimbursement system can drive improvements to efficiency and quality, through rewarding providers for certain outcomes. In this way, the reimbursement system plays an important role in the overall long-term sustainability of the NHS, and in promoting the delivery of quality care to patients in an efficient manner, ensuring value-for-money for taxpayers.

Its success relies on three elements – information, incentives, and compliance.

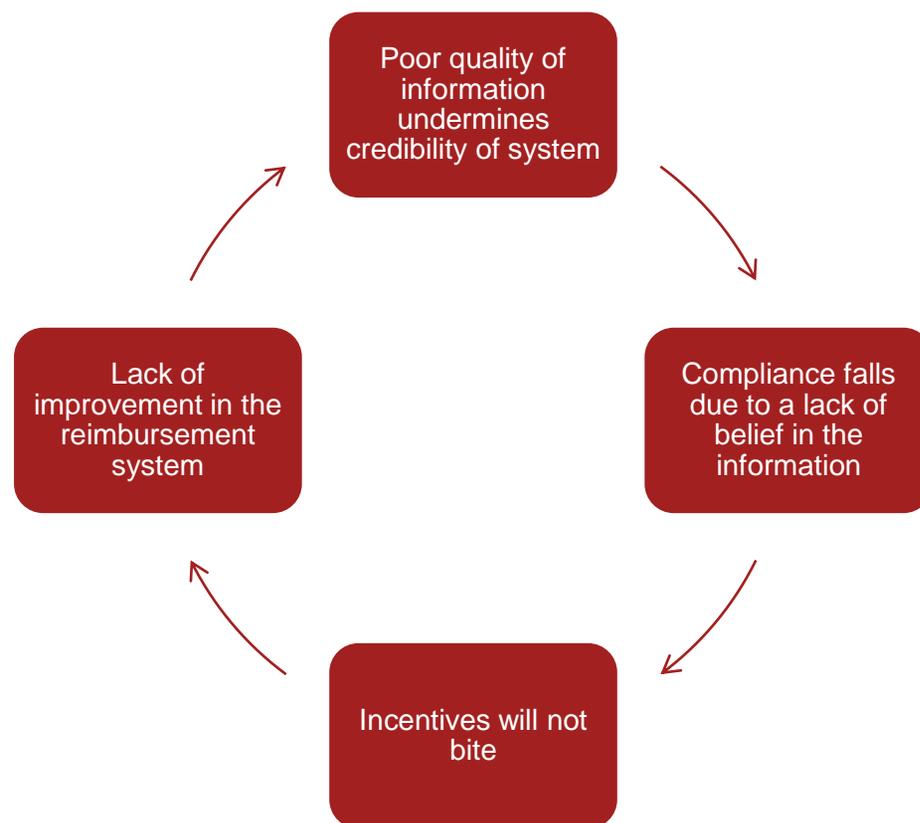
An effective reimbursement system should deliver incentives to providers and commissioners to make improvements in both the quality of patient care and the efficiency of delivery. This requires a rigorous and comprehensive set of information.

Reliable and accurate information is required to set appropriate national prices. The same applies for locally negotiated contracts. Commissioners need to understand the underlying costs of services that they are purchasing from providers.

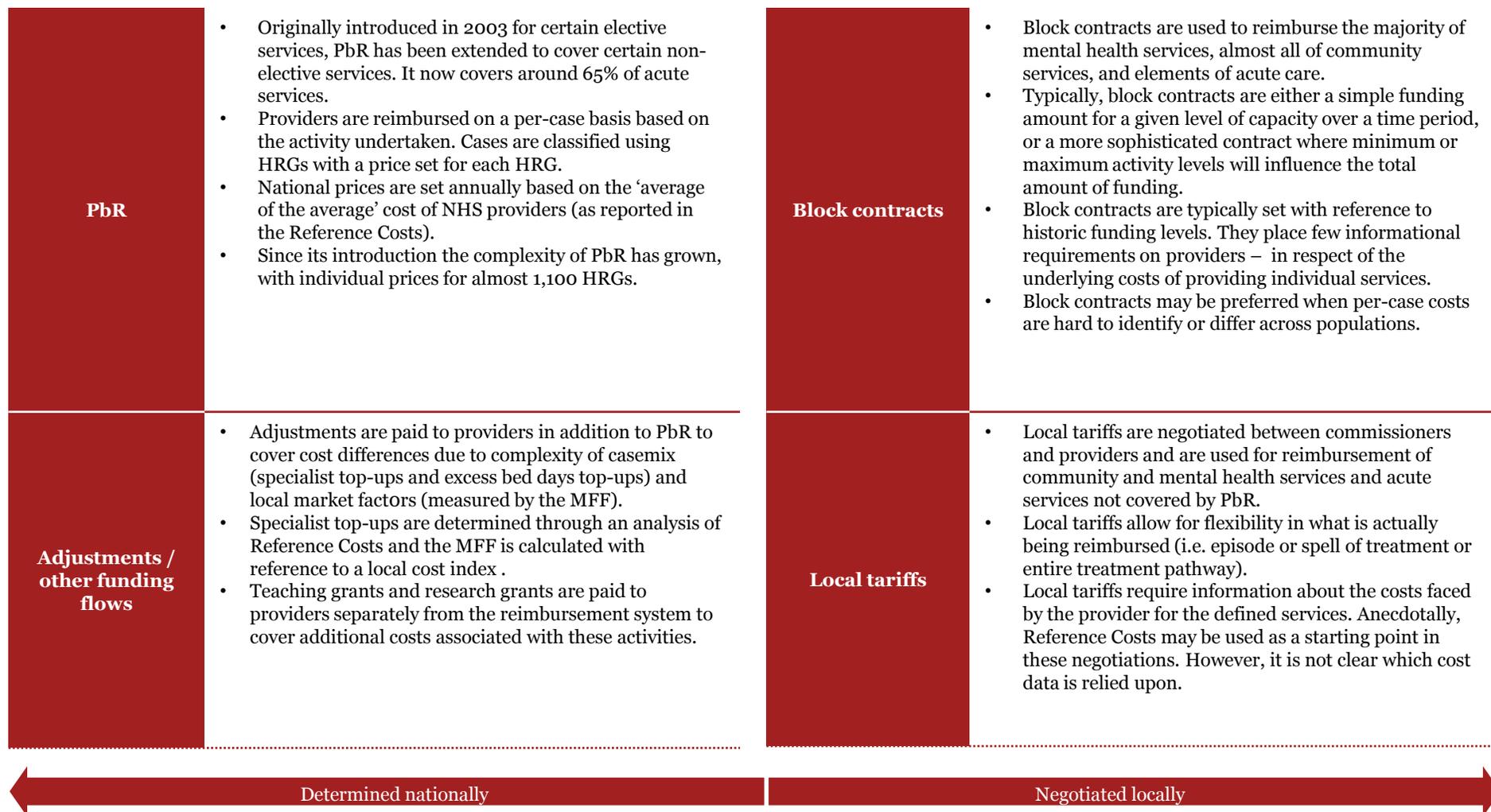
Without this information, there is a risk that the reimbursement system will not create appropriate incentives. At worst, it could create perverse incentives and have a negative impact on clinical decisions. The system could, for example, under-reimburse certain types of care, with a knock-on impact on the continuity of services for patients. Conversely, over-reimbursement will result in inefficiency, increasing costs to taxpayers.

Poor quality information undermines the credibility of the reimbursement system. Compliance falls as providers do not believe the information being used to make reimbursement decisions. Incentives will not bite. Therefore, a lack of compliance hinders improvements in the system. In short, there is a vicious circle, as set out in Figure 2.1.

Figure 2.1: Importance of information, incentives and compliance



The NHS uses a range of reimbursement approaches. Each has its own economic characteristics and informational requirements



The remainder of the report sets out our evaluation against three elements – information, incentives and compliance – and our recommendations for future work

Chapter 3

We describe the approach we used in this evaluation, in particular, the analytical framework. The framework consists of three elements that are important to the design and functioning of a reimbursement system:

- 1. Information** – The information that is collected and used to set levels of reimbursement.
- 2. Incentives** – The incentives that are created by the reimbursement system. This is a consequence of how information is used and how prices are set.
- 3. Compliance** – Compliance with the reimbursement system – in particular, whether providers and commissioners operate within the rules of the reimbursement system. This matters because it allows the intended incentive effects of the reimbursement system to feed through into behaviours.

Chapters 4 – 6

These three chapters contain the results of our evaluation against the elements of our analytical framework. Each chapter begins with a summary of the questions we investigated, and our key findings. We then describe our evidence base in more detail – including the results of quantitative analysis, findings from existing studies, qualitative evidence from stakeholders and insights from other health systems and regulated sectors.

Chapter 7

In this chapter, we set out eight areas where we recommend further work, based on our evaluation of the reimbursement system described in Chapters 4 – 6.

These areas relate to ways in which the information used, incentives created and the level of compliance with the reimbursement system could be improved.

Glossary of terms and Bibliography

This section contains a glossary of terms used throughout the report and a list of the literary sources examined.

Appendices

Information contained in the appendices supports the evaluation described in Chapters 4 – 6. We describe the analysis that has been undertaken and the evidence that has been used to evaluate the reimbursement system against our analytical framework in more detail. The appendices are referred to throughout the body of the report.

Chapter 3

What we have covered

What an effective reimbursement system looks like

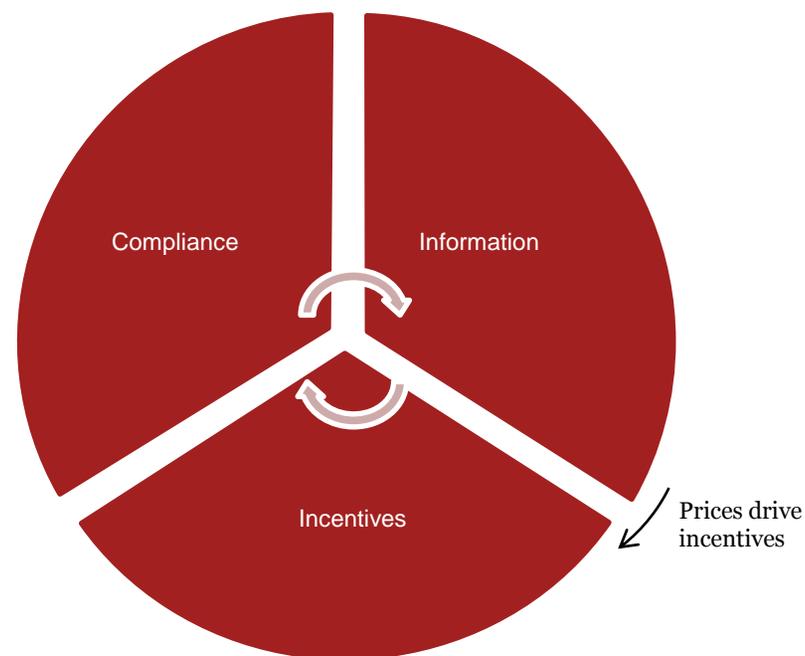
We have focused on three building blocks that are important to the effective design and functioning of a reimbursement system:

- 1. Information** – The information that is collected and used to set levels of reimbursement.
- 2. Incentives** – The incentives that are created by the reimbursement system. This is a consequence of how information is used and how prices are set.
- 3. Compliance** – Compliance with the reimbursement system – in particular, whether providers and commissioners operate within the rules of the reimbursement system. This matters because it is the link to ensuring that the intended incentive effects of the reimbursement system feed through into behaviours.

As highlighted on page 15, poor quality information undermines the credibility of the reimbursement system. Without reliable information, it is not possible to design effective incentives through pricing. Compliance falls as providers do not believe the information being used to make reimbursement decisions. Incentives will not bite, and therefore a lack of compliance hinders improvements in the system.

There also needs to be confidence in how reimbursement mechanisms interact with one another. Where there are multiple reimbursement mechanisms that create different incentives, there is a risk that they can blunt the incentives of each other.

Figure 3.1: Relationship between the three elements of an effective reimbursement system



Elements need to be applicable for each reimbursement mechanism and appropriate across all sectors of care (mental health, acute, community services)

Within the analytical framework, we investigated a set of specific questions

Information

Is it accurate and reliable?

This will promote confidence and legitimacy in the reimbursement system. Consistency in cost allocation methods and appropriate validation processes will facilitate data accuracy and reliability.

Is it appropriate?

The information collected must be sufficiently granular and detailed. Without this, the reimbursement level will not reflect the underlying costs of provision. Ideally, it should also be useful to providers when considering how to manage their organisations.

Incentives

Do they drive improvements to efficiency?

The reimbursement system is a lever to drive efficiency improvements. Pricing should deliver information to providers and commissioners to encourage improvements to efficiency and reward them for doing so.

Do they drive improvements to quality?

The pricing system is a lever to drive improvements to quality. Reliable information on quality outcomes is a pre-requisite to drive quality improvements through pricing.

Compliance

Are stakeholders responding to incentives?

Providers and commissioners need to respond to the incentives created in order for the pricing system to deliver improvements to efficiency and quality.

What are the drivers of observed behaviours?

Where providers and commissioners are not responding to incentives, the drivers and enablers of this behaviour need to be understood.

Our evidence base has been drawn from a range of sources

We have drawn upon a wide-ranging base of evidence, much of which is new.

Our focus has been on quantitative data which we have sourced from a wide range of large national data sets and smaller data samples. These sources are complemented by qualitative evidence, which includes: case studies and discussions and surveys of stakeholders; insights from other health systems and industry sectors; and a literature review of the existing evidence. A more detailed description of the quantitative sources can be found in Appendix 1 and references of individual reports and journal articles can be found in the bibliography section at the end of the report.

Literature review

We have reviewed the findings of over 50 reports and journal articles related to provider reimbursement. The literature review has given direction to our quantitative and qualitative research.

Quantitative data sources

National data sets

- Reference Costs
- PbR tariff rates
- Hospital episode statistics
- Mental Health Minimum Dataset (MHMDS)
- Programme budgets

Sample data sets

- Patient level cost data from 14 NHS acute providers
- Foundation Trust financial accounts
- NHS Trust financial accounts
- Cost and activity data from 9 NHS mental health providers in the West Midlands
- Cost and activity data on community services from 17 NHS Primary Care Trusts in the West Midlands

Qualitative data sources

Surveys

- Foundation Trust Network
- Healthcare Financial Management Association

Case studies & discussions

- 27 meetings and 2 workshops with stakeholders

Insights from other health systems

- The Netherlands
- Australia (Victoria)
- USA
- Germany

Insights from UK regulated industries

- Water
- Energy
- Telecoms & post
- Rail

Chapter 4

Information



Chapter summary: The key findings of our evaluation of the information underpinning the reimbursement system

The role of information in the reimbursement system

Accurate and reliable information is needed to calculate prices that drive incentives to improve the quality and efficiency of patient care.

What we focused on

We have evaluated the different information sets that are used to set NHS reimbursement mechanisms. Our evaluation has focused on two primary questions:

1. Whether the information used to underpin the reimbursement system is sufficiently reliable
2. Whether the most appropriate information is being used in setting each reimbursement mechanism.

What we found

- **Providers reported very different unit costs in providing the same services to patients.** Each year, providers report their estimated unit costs by HRG. Across a number of HRGs, these data show that there is wide variation in the unit costs reported by providers. Under PbR, the tariff for an HRG is based on its weighted national average unit cost. Wide variations in costs can undermine their usefulness for constructing prices or as an information signal to providers. We analysed 2010/11 data for HRGs paid through PbR. We found that 30% of unit costs reported by providers were at least 50% away from the national average unit cost for that HRG (weighted by activity). Large variations in costs that cannot be explained create a problem for the reimbursement system. It is unknown whether the observed cost variation is legitimate (driven by differences in efficiency or other factors) or the result of differences to costing and coding (see pages 24 – 26).
- **At least some of this variation is due to differences in the approach to costing and variations in data quality between providers.** Providers face a complex task in allocating their costs to HRGs. Anecdotal evidence suggests that differences in approaches to the allocation of overheads may contribute to cost variation. Despite guidance on overhead allocation, there are no explicit and prescribed standards that are uniformly adopted by all providers. Overheads typically represent around 20% of costs in treating patients. Differences in how these costs are allocated can therefore make a substantial impact on the unit costs of HRGs. The Audit Commission has found that data quality is improving. However, accuracy is still low compared with Germany (page 27), for instance.
- **Some cost drivers – particularly patient casemix within HRGs– are not captured in current information sets used to set prices.** Patient level costing systems are being used increasingly by providers, with less emphasis being placed on Reference Costs as an internal organisational management tool. We analysed patient level data from a sample of 14 acute providers. This data shows that costs of patients within an HRG can vary widely. These cost variations are driven, in part, by differences in casemix (co-morbidities and age). This variation (and therefore the impact of these factors on cost) is masked through the reporting of average Reference Costs from each provider (pages 28 – 31).
- **Local reimbursement negotiations (through block contracts and local tariffs) are not based on reliable cost information.** Block contracts are typically based on historic funding levels, with no link between the needs of the patient (and the underlying resource costs) and the funding amount. When local tariffs are negotiated, they may be based on Reference Costs (at least as a starting point). The Audit Commission has found that data on these services was particularly poor, however localised efforts to improve data quality may be delivering benefits. We collected cost and activity data from a sample of Mental Health providers participating in a Reference Costs cluster pilot programme. Anecdotal evidence suggests that participation in the programme and benchmarking costs with other providers is improving the consistency of data recording approaches (page 32).



In Reference Costs, there are examples of both extremely high and low variance in the reported unit costs between providers for the same HRGs

What the issue is

Each year NHS providers give the DH an estimate of their average costs of delivering services for every HRG. These costs are known as Reference Costs. The average (weighted by activity) Reference Costs of all providers are used to set the tariff for HRGs reimbursed through PbR. The DH makes some adjustments to this information, such as converting patient episodes (a specific treatment) into spells (treatments from admission to discharge). They also identify trim points (number of days in an HRG after which a provider is eligible for an excess-bed day top-up) for long-stay patients. A high level of variation in the average costs reported by providers suggests that either providers face very different costs in providing the same services, or there are issues with the data being provided.

We analysed the distribution of reported Reference Costs for elective, non-elective, and accident and emergency (A&E) HRGs in 2010/11. We calculated the coefficient of variation (CV) for these Reference Costs. The CV is a normalised measure of standard deviation. This allows for a relative comparison of the level of variance in HRGs with different average values. A lower CV value, i.e. less than 1.0, indicates a lower level of variance in the reported costs. If the CV is greater than 1.0, there is a high degree of variance in reported unit costs.

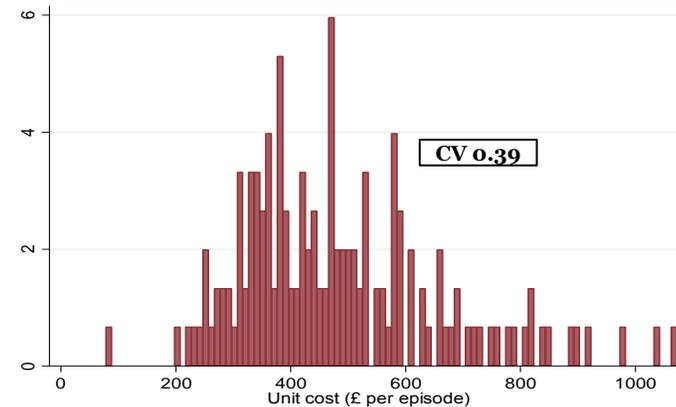
What we found

Some HRGs have low levels of variance in reported average costs of providers. In 2010/11, reported unit costs for Pleurisy (non-elective) had a CV of 0.39 (Figure 4.1). The distribution of costs are inside a normal distribution. In contrast, the CV of reported unit costs for Intermediate pain procedures (elective) was 1.96 (Figure 4.2). This indicates a significant amount of variance. There are many HRGs that show variations of this type: in 2010/11, 344 HRGs (18%) exhibited a CV greater than 1.0 and 70 HRGs (4%) exhibited a CV greater than 2.0.

What the implications are

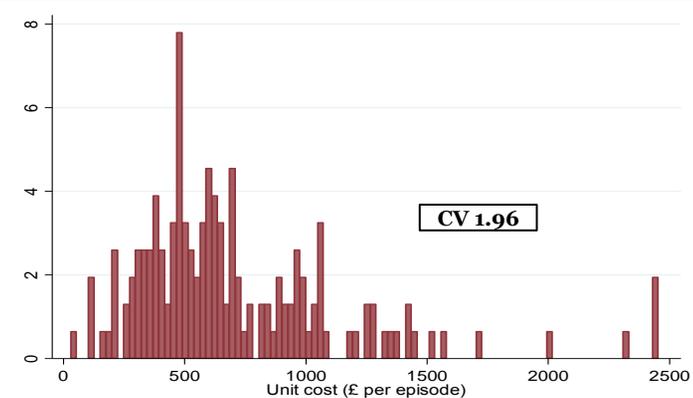
It is important to understand what is driving the high variation in reported unit costs across providers (e.g. trusts may allocate costs differently, or there may be legitimate variations in costs, or it may reflect differences in efficiency). Without knowing the drivers of variation, a tariff based on the national average cost may systematically over- and under-reimburse providers.

Figure 4.1: Distribution of 2010/11 Reference Costs across providers for DZ28Z (Non-elective Pleurisy)



Source: PwC analysis of Reference Costs

Figure 4.2: Distribution of 2010/11 Reference Costs across providers for AB05Z (Elective intermediate pain procedures)



Source: PwC analysis of Reference Costs



Across a number of NHS services, there is large variation in the average costs reported by providers

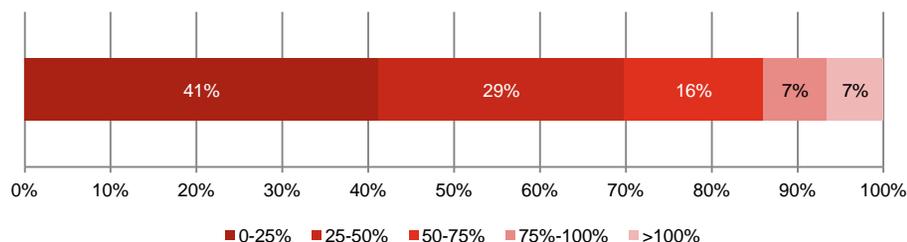
What the issue is

Variations in reported unit costs may not be a material issue for NHS-funded care if it is confined to a small number of HRGs. However, Reference Costs in 2010/11 accounted for over £52 billion in expenditure on NHS-funded care. For HRGs reimbursed through PbR, we investigated:

1. how the unit costs reported by providers varied from the national average unit cost (weighted by activity across all providers) at the HRG level
2. the number (and proportion) of HRGs where more than half of all providers reported unit costs that were more than 50% away from the national average unit cost (weighted by activity).

We calculated the national average unit cost (weighted by activity) for all HRGs that are currently reimbursed through PbR (including elective, non-elective and A&E HRGs). For each HRG, we looked at how the unit cost reported by each provider compares with the weighted national average unit cost across all providers. This is shown in Figure 4.3 below. The chart shows how close the reference costs reported by trusts are to the weighted national average for each HRG. It shows that 41% of reported unit costs are within 25% of the weighted national average unit cost. Seven per cent of reported unit costs are more than 100% away from the weighted national average unit cost.

Figure 4.3: Proportion of provider unit costs from 2010/11 Reference Costs by much they vary from the national weighted average unit cost



The shading shows the distance of unit costs from the weighted average cost for the relevant HRG.

Source: PwC analysis of Reference Costs

What we found

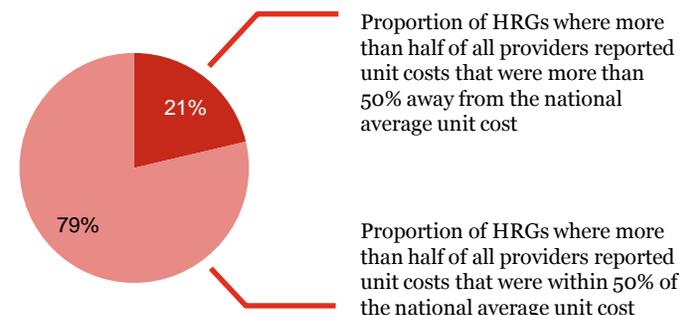
For all elective, non-elective, and A&E HRGs paid through PbR, we found that 30% of the unit costs reported by all providers, by HRG, were at least 50% higher or lower than the weighted national average unit cost. In other words, 30% of providers are reporting unit costs that are a long way from the weighted national average (see Appendix 2 for details of the methodology).

We also found that for 408 HRGs (21%), more than half of all providers reported unit costs that were more than 50% away from the weighted national average unit cost (see Figure 4.4).

What the implications are

If reported unit costs are significantly different from the weighted national average cost, providers will be unable to recover their estimated costs through PbR. Prices set for these services, based on this data, may systematically over- and under-reimburse providers (if additional costs are not adequately reimbursed through top-ups). Variation may be due to differences in efficiency, complexity of patient treatments (casemix), other external cost factors, and differences in approach to coding and costing. Reasons for this variation need to be better understood to improve the confidence in, and reliability of the information collected from providers.

Figure 4.4: Proportion of 2010/11 Reference Costs costs split by degree of variation at the HRG level



Source: PwC analysis of Reference Costs



A large proportion of the variation in reported costs between providers is not explained by differences in average length of stay

What the issue is

There are a number of reasons why there are likely to be differences in reported average cost between providers. These include differences in casemix, exogenous cost drivers (i.e. local market differences), differences in efficiency and differences in approaches to costing and coding. Under the current reimbursement system, differences in average length of stay between providers are adjusted through additional top-up payments for patient spells that exceed a certain number of days in hospital. Differences in average length of stay may therefore be an explanation for the high variance in reported average costs.

We conducted a statistical test using Hospital Episode Statistics (HES) and Reference Costs. We investigated the relationship between unit cost and average length of stay.

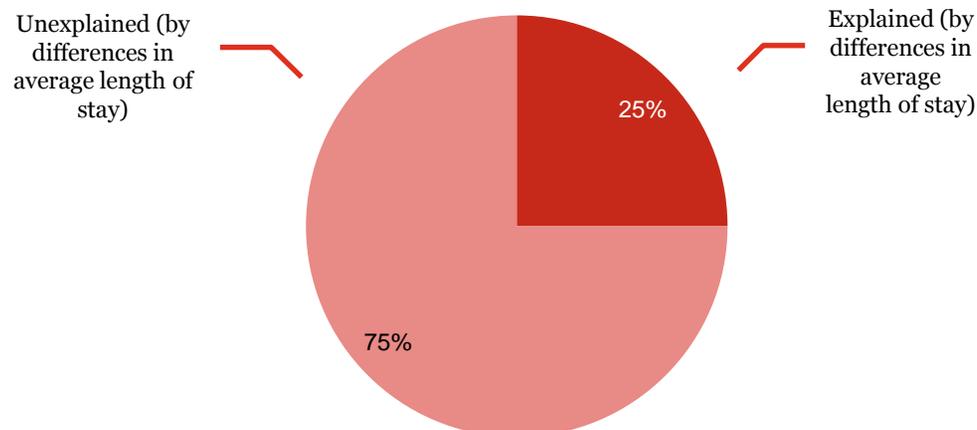
What we found

A simple regression of unit cost against average length of stay using data from 2010/11 showed a positive relationship (Figure 4.5). Average length of stay explained around 25% of differences in unit cost. It is expected that there would be a positive relationship, as longer patient stays in hospitals are a driver of increased costs.

What the implications are

Length of stay explains some of the variation in reported unit costs, but the majority is left unexplained. This matters because if there is large unexplained variation in reported costs between providers, it is difficult to use this information to set cost-orientated prices. This will affect the incentives of providers and commissioners. Some providers will be disadvantaged, potentially threatening the sustainability of services. Other providers will be advantaged by receiving reimbursement above efficient levels. This will impact the funding available for commissioners to spend on other services.

Figure 4.5: How much of the difference in unit cost is explained by average length of stay



Source: PwC analysis of Reference Costs



Some of the differences in reported average costs between providers are influenced by the quality of the information recorded and how they allocate costs

What the issue is

Validation of the accuracy of Reference Costs is largely the responsibility of providers. The DH (who collect Reference Costs) question providers on obvious data errors (such as HRGs having a reported cost but no activity) which are mandatory to fix. We understand the DH also raise other issues relating to data accuracy that are non-mandatory for providers to fix. The onus is on providers to get it right. In 2010, the Audit Commission conducted the first external audit of Reference Costs in 7 years (including reported costs of services not covered by PbR). The audits took place at all NHS trusts and Foundation Trusts and some independent sector providers.

What we found

Accuracy in data collection has improved since the introduction of PbR, but there are still a number of issues (as set out in the table below).

Key findings from Reference Costs audit (Audit Commission, 2011)

- 1 in 8 NHS providers made a material error with the total amount of costs reported
- 1 in 4 NHS providers made a material error, with the cost reported for at least one HRG materially incorrect
- Data quality on services not covered by PbR is particularly poor
- Accuracy of clinical coding has improved, but 9% of services are still coded incorrectly.

Current NHS costing guidance represents significant improvement in respect of a standardised approach to overhead allocation. However, the costing manual is prepared in recognition of the different capabilities of providers to in their ability to disaggregate and record costs. The guidelines therefore still contain some inherent flexibility with the way allocation is done, provided that it is done on a 'consistent and logical basis'. Costing pools developed, should have a 'full audit trail' (DH, NHS Costing Manual 2011, pp. 10, 19).

While differences in overhead allocation will not affect the total quantum of costs reported, it will affect the reported costs for different HRGs. Overheads represented almost 20% of patient costs in data we collected from a sample of acute providers.

Therefore, differences in overhead allocation can have a large impact on reported average costs for individual services. A study by the Chartered Institute of Management Accountants found that inconsistent allocation of overheads by NHS providers was contributing to cost variation (CIMA, 2004). This is an ongoing issue. The Audit Commission (2011) recommended 75% of providers should review their allocation of costs.

How teaching income is allocated may also affect Reference Costs

Grants for teaching and research paid to NHS providers amounted to £5 billion in 2010. Historically, NHS providers have not had to account for how this money is spent, and there were concerns it was used to cross-subsidise services to patients. Of 23 providers questioned by the British Medical Association in 2007, fewer than half could account for the additional expenditure (BMA, 2007). The HFMA's Clinical Costing Standards provide guidance on how to separate teaching and research costs from Reference Costs. It is not clear whether this process has been uniformly adopted by providers, but it will have a material impact on Reference Costs.

What the implications are

Inconsistency with costing approaches between providers undermines the reliability of the information to set prices. Further information on how providers are allocating overheads, and the impact that this is having on the costs of individual HRGs, is required. This will be a necessary first step in establishing explicit and precise guidelines that can be followed by all providers.

In other countries, far higher levels of cost accuracy are achieved

The German health system collects cost data from a sample of providers that meet pre-defined cost accounting standards. Only 14% (InEK, 2009) of hospitals reach the required level of data quality and they are financially rewarded for participating in the sample. Each hospital must follow explicit and precise cost allocation guidelines. The costs of individual patients are collected.

Four different axes of verification checks are employed: technical; economic; medical; and medical-economic. Providers are allowed to correct and send data which is invalid, which they are encouraged to do. Provider's are penalised if more than 35% of their data is excluded. In 2010, 28% of submitted data was excluded after data checks (EuroDRG, Quentin, 2010). The result is a very low error rate: an audit conducted in 2007 found a 0.2% error rate in the data that was used to set prices (InEK, 2009).



There is a disconnect between the data collected from providers to set reimbursements, and the patient-level data that providers are increasingly using to manage and run their organisations

What is the issue

Providers report their average cost for each service (HRG) through Reference Costs. In reporting only an average cost, the distribution of costs of different patients within a provider is not reported. Increased use of this information may help to inform pricing systems so that reimbursement could better reflect underlying patient need.

What we found

Increasingly, providers are adopting patient level costing systems (PLICS) to understand the costs in their organisations. At present PLICS are more prevalent amongst acute providers. A small number of mental health providers are also using or adopting the systems. PLICS capture costs at the individual patient level, providing organisations with granular information about their drivers of cost - for example, how much average cost is influenced by their most expensive (or least expensive) patients. This matters, particularly where trusts have average costs that vary relative to national norms. Patient-level information helps to identify why average costs may differ.

A survey undertaken by the DH (2011, see table on right) found that the majority of providers that use PLICS use them, at least in part, to underpin their Reference Costs collection. This is in contrast with key messages from our consultation with providers. For example, one provider we spoke with indicated that they did not use their PLICS data to develop their 2010/11 Reference Costs return. This was due to time constraints and conflicting priorities when Reference Costs were being collected.

What the implications are

Patient-level information could be used to better inform pricing systems if providers are collecting and using this information to understand their drivers of cost. We understand that the DH currently only collect and use patient-level information in a limited way. Greater alignment of information used for internal and regulatory purposes may also reduce the regulatory burden on businesses (although at present not all provider use PLICS). Additionally, PLICS can provide more granular information on the drivers of cost within a provider (compared to Reference Costs) and could be used to improve the cost-orientation of prices (discussed further on pages 29-31). Currently, providers have different PLICS systems and record costs in different ways. Recording of costs using PLICS will need to be consistent in order for the information to be useful for price-setting purposes.

Providers are increasingly using PLICS (DH, 2011)

- Almost 75% of acute organisations have either implemented a PLICS system or are in the process of implementing a PLICS system, with a further 13% planning to implement one
- Nearly 90% of those organisations who have implemented a PLICS system, or are in the process of implementing a PLICS system report that they use the Acute Clinical Costing Standards
- 88% of providers used their PLICS to underpin part or all of their Reference Costs return
- 53% of mental health providers have either implemented or are planning to implement a PLICS system
- 18% of other providers (including community services, ambulance, care trusts and PMS) are planning to implement a PLICS system

Other systems use more detailed data in setting reimbursements

US – In the Medicare DRG system, patient-level charge data is used for reimbursement purposes, rather than patient-level cost data. Charge data is easily accessible for hospitals in the US, as they use their charges for each DRG treatment as the basis for negotiation with private insurers. The charge data is converted into cost data using the ratio of cost to charges which all hospitals submit in their cost reports to Medicare (see Appendix 3 for further details).

Australia (Victoria) – Victoria first introduced patient-level clinical costing to record case-related data in 1993. This required a large initial investment in technology in a small number of hospitals (5 hospitals in the first year), so that data related to the resource use of each patient could be recorded. After recording the relevant DRG for each patient, the products and services used in the treatment are recorded and assigned relative values based on individual studies undertaken in each hospital. These relative values are aggregated within each DRG and overhead costs are apportioned using departmental shares, and a relative weight for each DRG is determined. (Jackson et al, 2000)



Costs vary even more widely at the patient level. This is masked in Reference Costs, which focus on average costs, but is significant to trusts that have a more complex casemix

What the issue is

Providers report their unit costs by HRG through Reference Costs. If the costs of different patients within the same HRG vary widely, this variation is masked through the reporting of unit costs only.

What we found

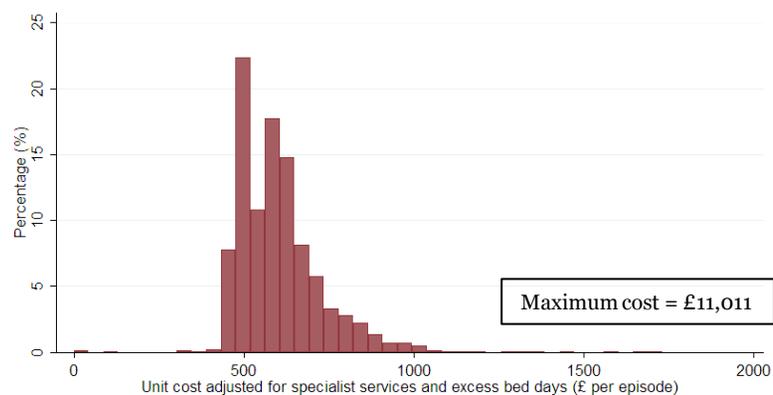
We plotted histograms for individual HRG codes within a single provider, using patient-level cost information for 2010/11 from a sample of 14 acute providers. This enabled us to identify the existence of HRG codes with long tails or multiple peaks in their cost distributions. For some HRGs, we found that the most expensive episodes cost more than 20 times the median cost (see Figure 4.6). Also, we found HRG codes with multiple peaks (see Figure 4.7).

Multiple peaks can occur when there are two distinct types of patients being treated within an HRG, but this variation is masked because the Reference Costs focus on average costs (rather than the distribution).

What the implications are

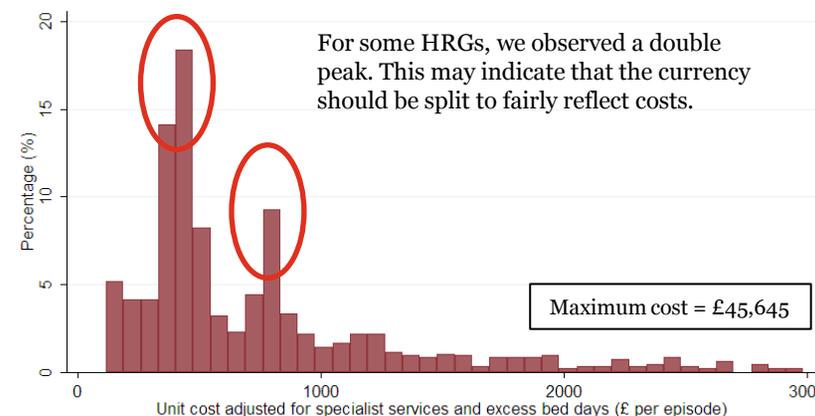
Analysis of patient level data shows how the unit cost of providers for a given HRG is affected by the distribution of the costs of different patients. The design of incentives through pricing could be improved by collecting this information. For example, observed double peaks in the distribution of patients with the same service may suggest that splitting the HRGs into two classifications would be more appropriate. If there are two distinct groups of patients, it may be easier for providers to ‘cherry-pick’ the lower-cost patients and still get reimbursed at the average cost. However the provider would need to be able to identify the lower-cost group of patients, ex-ante, and have a method for ‘pre-selecting’ them. This could result in the tariff (designed to cover both groups of patients) systematically over and under-reimbursing providers.

Figure 4.6: Distribution of unit costs for patients within a provider for upper GI tract procedures (elective)



Source: PwC analysis of PLICS data set

Figure 4.7: Distribution of unit costs for patients within a provider for nerve disorders (non-elective)



Source: PwC analysis of PLICS data set



As expected, patient age and the number of co-morbidities are significant drivers of cost variation

What the issue is

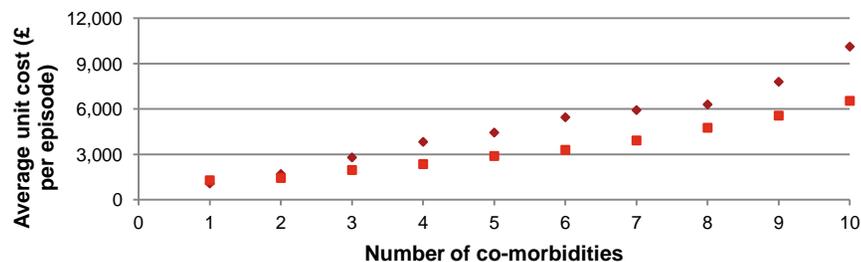
Providers may face additional costs due to differences in the complexity of their patients, and the length of time these patients remain in hospital (length of stay). The current pricing systems attempt to adjust for these additional costs through top-up payments – for qualifying specialist activities and excess bed days. However in the absence of using patient-level data in the pricing systems, actual additional costs may not be adequately adjusted for.

What we found

Analysis of patient-level data indicated that the number of co-morbidities recorded for a patient was a significant driver of variation in costs (see Figure 4.8). Only two providers in our sample recorded co-morbidities, so a wider analysis incorporating a bigger sample could not be undertaken. For those providers, there was a relationship between the age of patients and the number of co-morbidities. This is consistent with existing evidence. For example, data collected by the NHS Benchmarking Network (2011) has shown that the probability of having a long term condition increases with age. 17% of those aged under 40 say they have a long term condition whilst 60% of those aged 65 and over say they have a long-term condition.

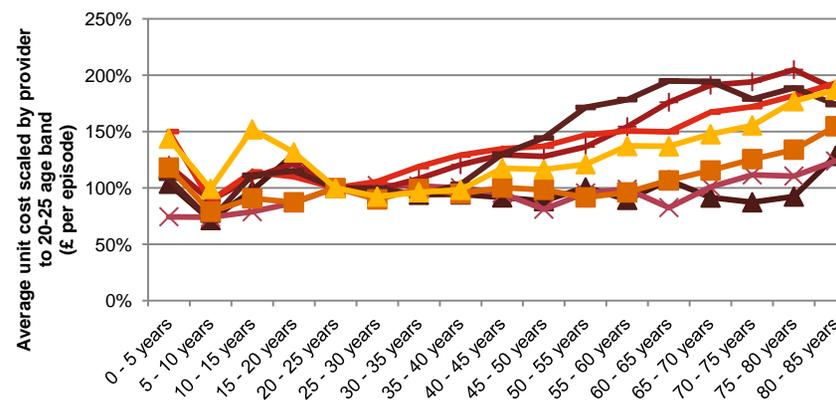
Using data from 7 providers in our sample (which had the highest quality of data with respect to recording patient age), we see a relationship between unit cost and the age of the patient – both for very young and very old patients (see Figure 4.9). These relationships are more pronounced across different providers.

Figure 4.8: Relationship between co-morbidities and unit cost across two providers



Source: PwC analysis of PLICS data set

Figure 4.9: Relationship between patient age and unit cost across seven providers



Source: PwC analysis of PLICS data set

In a number of cases, the age of the patient will impact the HRG classification. Our analysis of 2010 inpatient and outpatient tariffs identified 176 (out of almost 1,110) tariffs that were age-specific. However, this leaves around 900 HRGs which are not age related.

Whether this matters to providers depends on whether age profiles vary. Across our sample, we found that they did. In Appendix 4, we show the age profile of four providers from our sample.

What the implications are

If case-mix factors such as co-morbidities and the age of the patient are significant drivers of cost, this should be reflected in the reimbursement system. Where it is not, and casemix varies between providers, systematic over and under-reimbursement may occur. We recommend that a more detailed examination of the drivers of cost at the patient level be undertaken. This could help to inform new currencies (i.e. more age-specific currencies) or alternative ways to adjust for drivers of cost variation. The DH are currently aware of the impact of multiple co-morbidities on driving costs. They are investigating this as part of the development of HRG4+.



The top 1% highest cost patients represent a significant proportion of the total cost per HRG. Reimbursing these cases separately would substantially reduce unit costs at an HRG level

What the issue is

Currently, providers report their unit costs by HRG through Reference Costs. The reported unit cost may be distorted if the highest cost patients have a significant impact on a provider’s average cost for that HRG. This may undermine the alignment of the tariff price with the true ‘average’ cost faced by providers for that HRG.

What we found

Using patient-level cost from our sample of acute providers, we examined the impact on unit cost by removing the top 5% most expensive patients from the data set. This was carried out for four different HRGs selected at random, across all providers.

When we removed the most expensive patients, this had a significant impact on unit costs. Removing the top 1% of episodes across a sample of HRGs reduced unit cost by between 16% and 26% (see Table 4.1).

What the implications are

Given the impact that the most expensive patients have on unit costs, it may be worth considering whether an alternative mechanism for reimbursing providers for these patients may be appropriate. This may be a recognition that it is not possible (or practical) for a national pricing system to set prices for the treatment of all types of patients, and that local negotiation between a provider and commissioner for the care for these patients may be a more transparent and effective mechanism. Further investigation into the distribution of patient costs within HRGs, across a wider sample of providers, will inform situations where separate reimbursement (negotiated locally) may be appropriate.

Table 4.1: Adjustment of unit costs after removal of top 1% of patients

HRG	Total episodes	Mean unit cost	Episodes removed	Revised unit cost	% decrease in unit cost
Minor pain procedures	23,739	£359	245	£265	26%
Single plasma leucophoresis, etc	16,063	£726	166	£587	19%
Major pain procedures	6,122	£947	67	£791	16%
Minor neonatal diagnoses	14,388	£2,078	149	£1,740	16%

Source: PwC analysis of PLICS data set



Outside of PbR, the quality of data across providers nationally is varied. However localised efforts to improve cost and activity recording may be delivering benefits

What the issue is

Under block contract arrangements, the historic level of funding is used as a basis for negotiation of the contract price, rather than the underlying needs of patients. This has created few incentives for providers to record their costs in undertaking individual services accurately. Accurate and reliable data on these services is required in order to identify areas where efficiency can be improved and design incentives through reimbursement. Nationally, Reference Costs are collected for a range of services that are not currently reimbursed through PbR.

What we found

The quality of data that is collected nationally for services outside of PbR is varied. Several sources highlight issues with data quality:

1. The NHS Benchmarking Network has found that completeness of data collection and activity recording remains an issue for some community services and mental health providers. It also stresses that Reference Costs in Mental Health are too varied, which might have large financial implications if PbR is implemented (NHS Benchmarking, 2011).
2. Additionally, the Audit Commission found that the use of disparate data collection systems has been one of the causes of more errors in Reference Costs outside of PbR (Audit Commission, 2011).

As part of our evaluation we consulted with a sample of mental health providers. These providers are piloting a mental health cluster programme, where patients are allocated to one of 21 clusters based on their needs, and costs and activity recorded accordingly. Clusters represent a way of controlling for casemix. Within the same cluster, it is anticipated that a patient will have similar needs.

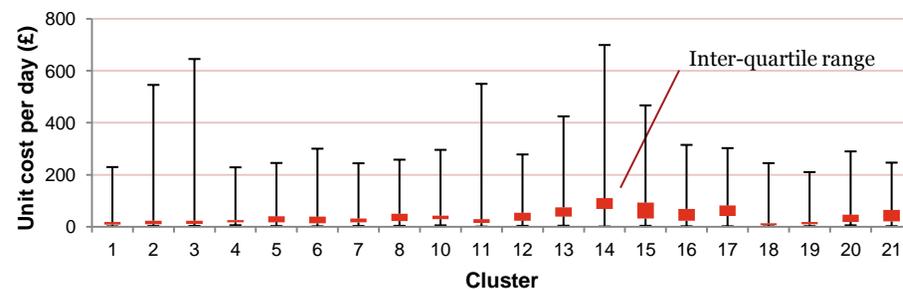
At the time of conducting the evaluation, cost data from the West Midlands Mental Health providers was not available to be analysed. However, the NHS West Midlands Strategic Health Authority provided us with the 2010/11 Reference Costs that had been collected nationally as part of the Mental Health cluster pilot. This data was collected from 85 providers, and activity and costs were separated by cluster (although only 57 providers were able to allocate all or some of their activity to clusters). Analysis of the unit costs per day across all providers for the 21 clusters is shown in Figure 4.10.

Although the range in reported costs is significant, it is worth noting that for most clusters the average cost was distorted by the existence of one or two outliers. This is the first year that cost and activity has been recorded and collected by cluster, and DH highlighted a number of issues with the data collected. Therefore the average costs reported should not be taken as an indication of future currency values (refer to Appendix 5 for more details).

What the implications are

There are ongoing efforts to improve the granularity and reliability of cost data on non-acute services, and the mental health cluster pilot programme is one example of this. With increased standardisation in activity and cost reporting, this data will help to develop reimbursement approaches that better align funding with the needs of the patient.

Figure 4.10: Box plots of variation in unit costs per day by cluster across mental health providers



Max	222	535	634	211	228	287	228	236	267	535	255	385	630	435	292	261	239	201	271	226
Min	2	3	4	6	3	2	3	4	6	1	4	4	1	4	2	2	1	2	6	2
Ave	21	34	36	28	35	37	34	45	44	38	48	71	113	84	55	72	16	24	47	48

Source: Mental Health Pilot Reference Costs Collection 2010/11, provided by NHS West Midlands Strategic Health Authority

Chapter 5

Incentives



Chapter summary: The key findings of our evaluation of the incentives of the reimbursement system

The role of incentives in the reimbursement system

The reimbursement system creates incentives for providers and commissioners through the prices that are set for either individual or bundled services. These include incentives to improve the efficiency and quality of care delivered. An in-depth evaluation of incentives is constrained by problems that we identified with the cost information. This makes it difficult to attribute patterns observed in the data to the influence of reimbursements. We have therefore supplemented our quantitative analysis with theory on the role of reimbursement on incentives.

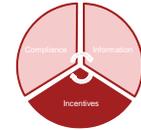
What we focused on

In evaluating the incentives created by reimbursement system, we have focused on two main questions:

- whether the reimbursement system create effective incentives to improve efficiency
- whether the reimbursement system create effective incentives to improve the quality of care.

What we found

- **There is existing evidence that PbR has led to efficiency improvements.** A study by Aberdeen and Dundee Universities (2010) found that modest improvements to efficiency in certain elective services could be attributed to the migration of reimbursement from block contracts to PbR (page 35).
- **Elements of the pricing system are not performing as well as they could be.** Analysis of patient-level cost information indicated that providers face large variation in the costs of different patients, even within the same HRG classification. In our sample, the HRG code that a provider used explained 33% of the variation in costs. Some evidence from the German and US systems suggest this could be improved, however, we are mindful of the limitations of our analysis in drawing meaningful cross-system comparisons. In the NHS, top-ups help to explain cost variation; however, some adjustments appear more effective than others (pages 36 – 38).
- **Individual tariff prices fluctuate each year which affects their ability to shape incentives.** We looked at tariff prices each year since 2005/06. With the exception of 2006/07 and 2007/08 (where prices didn't change) more than 40% of prices fluctuated by 10% (either up or down) or more each year. Anecdotally, we understand that these price changes affect the confidence that providers and commissioners have in the pricing system and can also affect incentives for capital investments (pages 39 – 40).
- **Poor quality information underpinning block contracts blunts their incentive properties.** A number of sources of evidence suggest that providers reimbursed through block contracts are not receiving (or responding to) incentives to improve efficiency. An in-depth analysis of this issue is constrained by data limitations. In most cases, there is a weak link between the contract price and the needs of patients, and providers bear risk associated with casemix (pages 41– 42).
- **Choice has enabled quality improvements, but the impact of reimbursement system on driving improvements to quality is unknown.** There is existing evidence that PbR has enabled some improvements to quality by facilitating choice. However we found little evidence of the impact of the reimbursement system in driving quality improvements. It is too early to gauge the impact of initiatives such as Best Practice Tariffs or Commissioning for Quality and Innovation on improvements to quality (page 43).
- **The current pricing systems reflect administrative boundaries of services as opposed to economic or clinical characteristics of different care settings and services.** An activity-based payment mechanism, such as PbR, may not be the most efficient way to reimburse certain services, such as those that have to maintain minimum capacity requirements, or where economies of scale exist (page 44).
- **Incentives created by pricing systems within different administrative boundaries may hinder the flow of patients across care settings.** The incentives that PbR creates to increase activity may slow down the migration of acute services into community settings and hinder the development of care pathways across different administrative settings (page 45).



There is evidence that PbR has led to improvements in efficiency for some acute services

What the issue is

Contract theory suggests that PbR, an activity-based payment system, should be more efficient than using budgets based on historical cost or activity – so-called ‘block contracts’. One mechanism by which PbR promotes efficiency incentives is to reward providers for lowering their costs. Since the tariff is based on average cost, providers with below-average costs can gain a surplus from the provision of those services. Where providers have higher than average costs, they will be incentivised to improve their efficiency, or reduce their provision of these services. Where choice exists, this a more efficient provider may increase its supply of these services to satisfy demand.

The introduction of PbR appears to have caused improvements in efficiency. Below we discuss the finding by the Health Economics Research Unit (HERU) on the relationship between introducing PbR and changes to efficiency.

What is the evidence

The study, by Aberdeen and Dundee Universities (2010), looked at changes in efficiencies in the English NHS (which introduced PbR) compared to Scotland. This enables the findings to be interpreted as the causal impact of PbR on the measures of cost used in the study. Length of stay and proportion of day cases were used as proxies for cost.

There is some concern in the contract literature that the purchase of health services on activity-based contracts may achieve cost reductions at the expense of quality. In other regulated industries, the regulator measures quality and rewards/punishes providers if they deviate from prescribed standards. However, in health the quality of services provided is arguably more difficult to measure. For example, it is sometimes difficult to attribute the outcomes of a patient to the quality of service provided.

The HERU study attempts to control for quality by using three variables: hospital mortality, 30-day mortality following coronary artery bypass grafting, and 28-day emergency readmission following treatment for hip fracture.

Their regression results appear to show that PbR reduced the average length of stay for electives by 2.5% between 2002/03 and 2007/08. This change is statistically significant, but relatively small – only around 0.5% per annum. They found no evidence that quality had been compromised, based on the variables they measured.

What the implications are

Monitor has targeted efficiency savings (for Foundation Trusts) of between 6% to 7% per annum. To put this efficiency figure in context, other regulators have mandated higher efficiency targets in the past. For example, between 2005-2009, BT had a target of RPI-5.25% for Interconnection Circuits (Ofcom, 2009) and, in the past, has had efficiency targets as high as RPI-12% (The King's Fund, 2011). Whilst it may not be possible for all aspects of hospitals to achieve high efficiency targets, these figures suggest that there can be large rooms for efficiency gains in certain parts of a monopoly.

Improvements to PbR will need to address the incentive problems that we identify in this chapter, including:

- excessive volatility in prices
- cross-subsidisation between services
- incentives for appropriate investment in capital.



We found that one-third of the variation in costs between patients was explained by the HRG used to code the spell of care

What the issue is

Under PbR, spells of patient treatment (from admission to discharge) are classified by providers to one of around 1,100 HRGs (in 2010/11). HRG codes are designed to capture spells of treatment of similar casemix, and so the underlying resources required to treat patients within the same HRG should be similar. Differences in casemix within an HRG are captured through top-ups (page 37) and cost differences between providers driven by local market factors through the MFF (page 38). The different HRG codes and adjustments are designed to reflect differences in the cost of treating patients driven by casemix and local market factors.

Using patient-level data from a sample of 14 acute providers, we undertook statistical analysis to investigate how much of the variation in costs of patients could be explained by the classification (HRG) of the service. This investigated the appropriateness of current classification systems given cost variation between patients. We adjusted unit costs to reflect top-ups that would have been paid in addition to tariff.

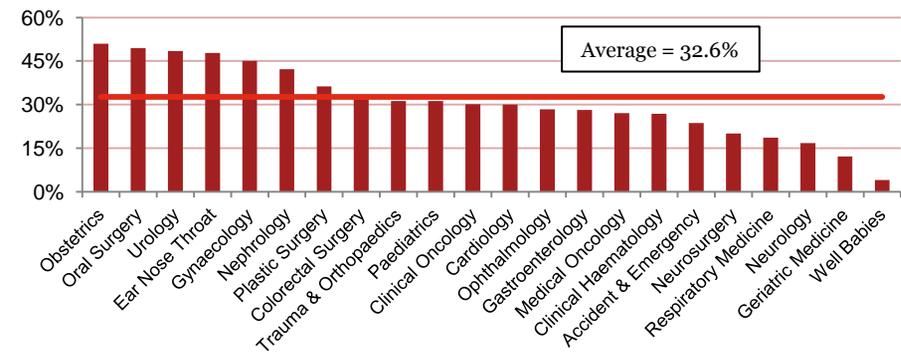
What we found

Our analysis indicated that the HRG codes explained around one-third of variation in costs (see Figure 5.1). According to our model, two-thirds of the variation in costs were left unexplained by HRGs. Part of this unexplained variation may be driven by other costs (such as high-cost drugs) that are included in PLICS, but reimbursed separately from HRGs. We were not able to separate these costs to identify whether this impact would be material.

There is some evidence from international systems that indicates that improved results are achievable. For example, the German DRG classification system explained 75% of the variation across 3.5 million patient cases from 2010 (InEK, Heimig, 2011). Similarly in the US, a study undertaken by RAND (Wynn, 2008) found that the MS-DRG systems explained 47% of the variation in costs from almost 12 million patient cases in 2006.

Recent research by Andrew Street (University of York) presented at the 2011 Europe DRG conference compared different DRG systems across Europe. For eight out of the 10 procedures examined, the English HRG system either combined with or excluding patient characteristics, explained more of the variation in cost at the patient level, than patient characteristics alone. While this might sound intuitive, only one other European system (Sweden's), achieved a similar result for the procedures analysed.

Figure 5.1: Proportion of cost variation explained by the HRG code used to classify patient spell (by specialty)



Source: PwC analysis of PLICS data set

The research presented did not make any direct comparisons between the performance of the English HRG system and its explanation of cost variation and the other DRG systems of European counterparts. Further details of this presentation and its key findings can be found in Appendix 6.

What the implications are

Our analysis of sample data has indicated that two-thirds of cost variation is left unexplained by the current HRG system. We are not able to say whether this is caused by weaknesses in the classification system, problems with how providers have coded treatments (the Audit Commission found that 9% of treatments are coded incorrectly), how costs are recorded into PLICS, casemix and local market factors (although we adjusted for these top-ups), the impact of high-cost drugs on unit costs, or issues with our sample. For example, it may be that the current HRG systems does not explain cost variation as well in specialist and teaching providers, as it does across the whole population.

Despite the limitations on drawing meaningful conclusions from this analysis, further analysis of patient level data would help to identify opportunities to make improvements to the pricing system, including adjustments to HRG classifications as necessary.



Current adjustments for casemix paid to providers help to cover additional costs. However, further analysis would be required to identify whether the full costs are reimbursed

What the issue is

In addition to 1,100 HRG codes, casemix differences are reflected through top-up payments. These payments target additional costs incurred by providers for more complex casemix within an HRG. In 2010/11, providers received a top-up payment in addition to the tariff for qualifying specialist (orthopaedic) services (30%) and children's (78%) services (refer to Appendix 7). There was also a top-up of £828 for Thrombolysis for Stroke (Alteplase) episodes. Additional payments, varying by HRG, were also made for long stay patients in the form of a per day payment for excess bed days above the established 'trim point' for that HRG.

What we found

Using patient-level cost information, we explored whether these additional payments improved the explanation of cost variation in patients across different HRGs (see Table 5.1). We found that activities which attract top-ups payments (specialist activities and excess bed day payments) are significant drivers of additional cost. The unit cost of orthopaedics services was almost four times the unit cost of non-specialist services. Much of this additional cost would be reimbursed through higher tariffs (for orthopaedic HRGs) in addition to the 30% top-up payment.

The unit cost for children's services are almost one and a half times higher than the unit costs of other non-specialist services. Thrombolysis for stroke had a unit cost more than twice that observed for non-specialist services.

Excess bed days are also a significant driver of cost. When an excess bed day was observed, costs were £731 higher than the unit cost. The rate of payments for excess bed days varies across HRGs, with a maximum payment of £521. One reason why excess bed day payments would be less than additional costs observed in our analysis, is due to costs being front-loaded. That is, the per day cost decreases the longer the patient stays in hospital.

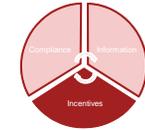
Table 5.1: Effect of specialities and excess bed days on unit cost

Variable	Coefficient (£)
Unit cost across all services	1,360
Additional cost of children's service	2,004
Additional cost of orthopaedics service	5,193
Additional cost of thrombolysis for stroke	1,577
Excess bed day cost	731

Source: PwC analysis of PLICS data set

What the implications are

Our analysis has indicated that current top-ups are directed towards higher cost activities, which is anticipated. Recent analysis commissioned by Project Diamond (a group of 12 London-based teaching and specialist hospitals) has found that specialist providers will be under-funded through the 2011/12 tariff, even with the assistance of specialist top-ups (refer to Appendix 6). It has not been possible to conclude, based on the information that we had and the analysis undertaken, whether specialist top-ups are either under- or over-reimbursing providers for these activities.



From analysis of a small sample of providers, we did not find evidence that the level of adjustment that a provider receives through the MFF reflects differences in the costs of treating patients

What the issue is

Under PbR, providers receive a market forces factor (MFF) uplift through tariff, for unavoidable regional cost differences, such as land, buildings and staff costs (see Appendix 7). In 2010/11, the level of MFF adjustment that a provider receives ranges from 1.00 to 1.32 on the tariff. This adjustment is paid directly by commissioners out of their budgets.

What we found

We used patient-level data from 13 providers to investigate the relationship between the level of MFF adjustment that a provider receives and its variation in the cost of services to patients. We controlled for differences in case-mix that would drive cost variation and adjusted costs for excess bed day payments and specialist top-ups.

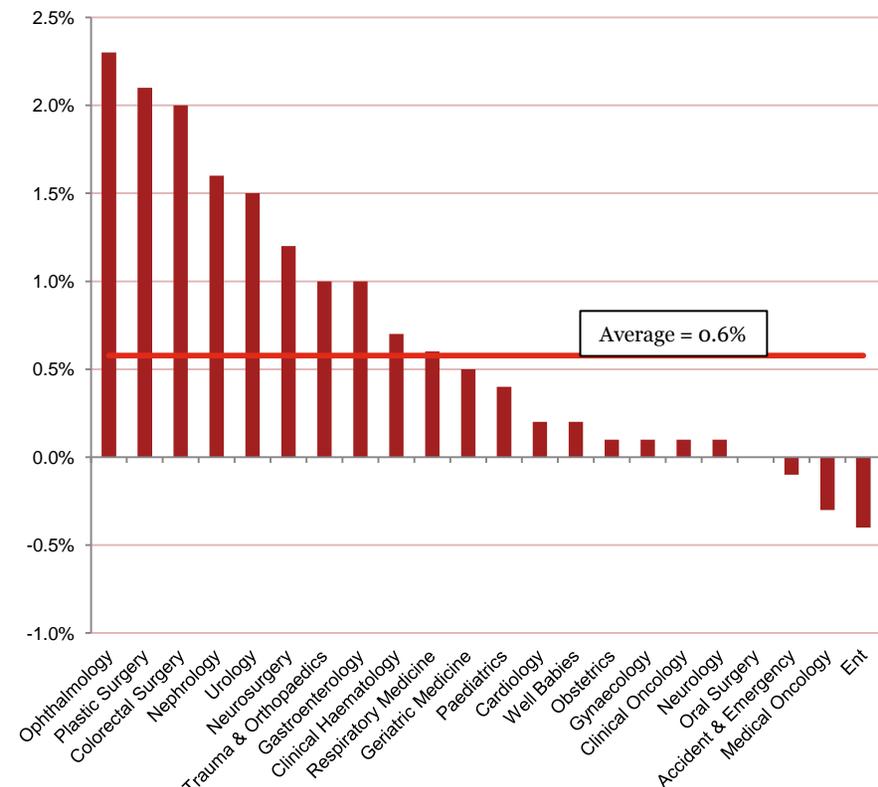
Our analysis indicated that the level of MFF adjustment does help to explain cost variation, but only by 0.6% on average (see Figure 5.2).

Commissioners we spoke with highlighted the challenges the MFF presents from a budgeting perspective. Commissioners outside London face challenges when patients request referrals to London-based providers (as they may work in London). In this instance, commissioners will incur additional costs which will impact on remaining budget for other services. We investigated whether there was any evidence that the MFF was affecting patient referrals into London-based providers. Based on the analysis undertaken we did not find any evidence that the MFF was distorting the flow of patients into London (refer to Appendix 8).

What the implications are

There are two main issues with the MFF. Firstly, it is paid for directly by commissioners, and can therefore influence their referral decisions and impact on patient choice. Secondly, where the level of adjustment does not reflect the variation in costs of treating patients, it will blunt the incentives that are being driven by the pricing system (through either over or under-reimbursing providers). Further work could be undertaken to understand widespread impact of both these issues on the incentives of commissioners and providers. It should be noted that the results of our analysis may be influenced by the small sample size and the over-representation of London-based providers in our sample. This suggests more work is needed to understand how local market factors drive cost variation in patient treatments.

Figure 5.2: Proportion of cost variation across different patients explained by the MFF (by specialty)



Source: PwC analysis of PLICS data set



Instability in tariff prices reduces their usefulness as a signal to improve efficiency and / or quality

What the issue is

Tariff prices are set each year under PbR. The tariff price is based on the weighted average reported cost from three years earlier (adjusted for inflation). Fluctuations in the level of prices may make it difficult for providers to make planning and investment decisions based on PbR. Unexpected changes may also threaten the sustainability of services and lead to cross-subsidisation (e.g. if a service becomes loss-making).

To investigate the relative stability of individual tariff prices each year, we compared real changes in tariff prices from 2005/06 to 2008/09, and nominal changes from 2010/11 to prices set for 2011/12. The movement from HRG3.5 to HRG4.0 meant that changes in tariff prices between 2008/09 and 2009/10 could not be analysed effectively (see Appendix 9 for further details of the analysis undertaken).

What we found

We found that between 2005-06 and 2006-07 and 2007-08 and 2008-09, more than 40% of the individual tariff prices fluctuated by 10% or more each year. The consistency in prices between 2006/07 to 2007/08 was caused by the same cost data being used to calculate prices in both years. Between 2010/11 and 2011/12 almost 50% of prices will fluctuate by 10% or more.

At an overall level, average tariff per episode has remained relatively stable, not changing by more than 4% except between 2008-09 and 2009-10 (which coincided with a policy change on trim points which affect top-ups, refer to Appendix 9 for further details).

Anecdotally, we understand that these fluctuations have a big impact on the notional performance of service lines, transforming profitable services into loss-making services overnight. One provider we spoke to indicated that they no longer assessed the performance of their services using the tariff. That is, they instead used a notional tariff that moved in a consistent fashion each year.

Capital investment decisions may also be distorted by volatility in tariff prices. A teaching-specialist provider based in London was looking to invest £140m into a planned capital upgrade of its cancer screening equipment. The investment has been put on hold following uncertainty about changes to future tariffs (incentives for capital investment are discussed further on page 40).

Table 5.2: Number (and proportion) of tariffs changing by +/-10% and +/-50% annually

	2005-06 to 2006-07 (real)	2006-07 to 2007-08 (real)	2007-08 to 2008-09 (real)	2010-11 to 2011-12 (nominal)
Increase of more than 50%	29 (3%)	0 (0%)	24 (2%)	95 (5%)
Increase of more than 10%	258 (24%)	0 (0%)	169 (15%)	504 (27%)
Decrease of more than 10%	240 (22%)	1 (0%)	291 (27%)	394 (21%)
Decrease of more than 50%	6 (1%)	1 (0%)	6 (1%)	37 (2%)

Source: PwC analysis of tariff rates

What the implications are

Fluctuations in individual prices will blunt the incentives being driven by the pricing system, making it harder for commissioners and providers to respond to price signals. Improvements to costing data underpinning these prices, in addition to a more detailed understanding of the drivers of cost variation (Chapter 4) will help to improve the stability of prices. Additionally, it may be worth considering whether individual prices should be set for longer periods to promote stability, if actual costs are stable.

Other regulators favour longer price-setting periods

Ofgem sets revenue caps for 5-year periods for the distribution of electricity and gas (and is moving towards an 8-year price setting period). Effectively this determines the prices that companies in these sectors can charge. For example, DPCR5, the most recent 5 year price control period for electricity Distributor Network Operators (DNOs), capped revenue at £22bn for 5 years (Ofgem, 2009). This provides a sufficient level of comfort over the level of revenue received, to facilitate forward planning and investment. Ofwat uses a similar model for the water and sewerage regional monopolies.



The way in which capital is reimbursed through the reimbursement system may have an impact on investment decisions

What the issue is

Through tariffs, PbR reimburses providers for the average level of capital expenditure across the NHS population. Where capital expenditure (in respect of proportion of total expenditure) varies across the population, providers may be over- and under-reimbursed systematically for their capital expenditure (CAPEX).

We investigated the patterns of capital and financing expenditure, including the impact of having a PFI obligation, using historical financial accounts from a sample of 75 Foundation Trusts (between three and five years of data depending on availability).

What we found

Capital expenditure ranged from 2.2% to 13.8% of total expenditure amongst our sample (see Table 5.3 and Appendix 10 for further details). Financing costs were higher for providers with PFI obligations (1.98% of costs compared with 1.34%). One provider spent 6.3% of total expenditure on financing (see Figure 5.3). It is not possible to determine what an efficient level of capital and financing expenditure is, and the impact that this expenditure has on overall operational efficiency. As only average capital and financing costs are reimbursed through HRGs, providers that have more expensive capital structures will be disadvantaged, unless they can reduce costs in other areas (or increase revenue).

An international comparison of the proportion of capital expenditure in the NHS against health systems in The Netherlands, Germany and Australia (Victoria) is shown in Table 5.4. In contrast to the way in which capital expenditure is reimbursed in the NHS, these jurisdictions have historically reimbursed the capital expenditure of providers separately from operating expenditure (although Victoria partly funds capital expenses through its DRG system). The Netherlands and Germany are now moving towards funding capital through the DRG system (refer Appendix 3).

What the implications are

The reimbursement of capital is a complex area with wide-reaching incentive issues and impacts. Our analysis has demonstrated that capital expenditure and financing costs vary between providers. Providers may be systematically over and under-reimbursed for these expenses, as they are reimbursed at the average level across providers through HRGs. The impact of this, and whether it matters from a reimbursement perspective, requires further analysis.

Table 5.3: CAPEX as a proportion of expenditure (provider sample)

Measure	Average proportion of expenditure on CAPEX
Minimum	2.2%
1st quartile	3.8%
Average	5.0%
3rd quartile	5.6%
Maximum	13.8%

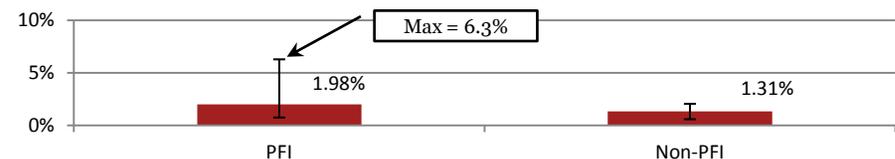
Source: PwC analysis of NHS Foundation Trust financial accounts

Table 5.4: CAPEX as a proportion of expenditure (int. comparison)

Country	Average proportion of expenditure on CAPEX
England	4.7%
The Netherlands	7.9%
Germany	3.6%
Australia (VIC)	5.5%

Source: OECD

Figure 5.3: Share of total costs which are financing costs (by PFI & non-PFI FT provider*)



Source: PwC analysis of NHS Foundation Trust financial accounts

Long price setting periods in other regulated industries have helped to lower the cost of capital

In the energy sector, the regulated parts of the industry (transmission and distribution) typically have a lower cost of capital than the unregulated parts of the industry (generation and retail). In part, this is a function of the stability of the regulatory regime and a guaranteed revenue stream. Standard and Poor's (2008) provides favourable ratings to regulated energy companies with a stable of regulatory framework and where the tariff design is conducive to cost recovery. The insight for health is that a well-designed regulatory environment may help to lower the cost of capital.

*A PFI provider is one that had PFI obligations listed in its financial accounts that we reviewed.

The information underpinning block contracts may hinder the ability to drive improvements to efficiency

What the issue is

A fixed funding cap (such as a block contract) can deliver incentives to control costs. However, if there is a weak link between the level of reimbursed received and the quality of the services performed, this financial pressure may simply reduce quality, as opposed to improvements in efficiency. Furthermore, if a block contract does not reward providers for improvements to efficiency – this may facilitate inefficiency. For example, if providers fear that their future budget will be cut if they do not spend the entire block contract. This is not a problem with block contracts, per se, but with how block contracts are administered and linked to the achievement of desired outcomes. This all comes back to the quality of information supporting the pricing mechanism.

What we found

Cost and activity data that we collected from a sample of PCT community service providers showed large variations in the unit costs of different service lines of community care (see Figure 5.4).

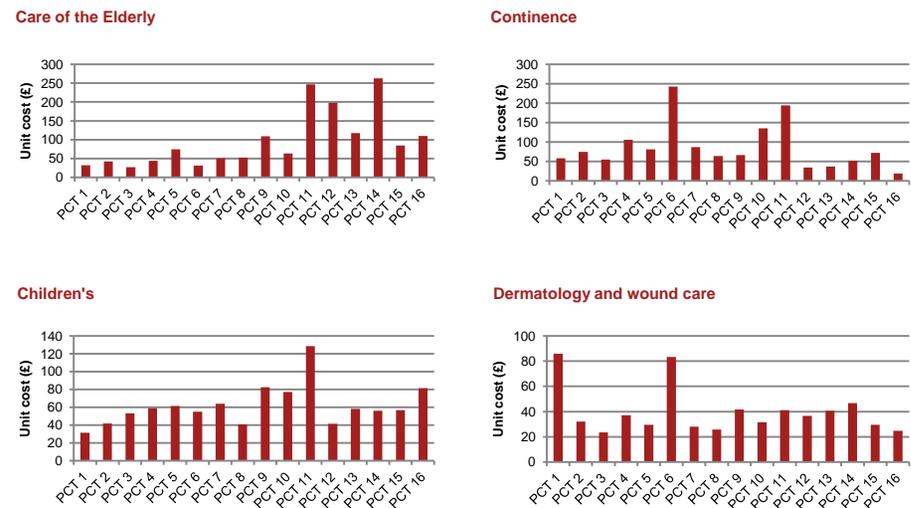
We also found no relationship between expenditure and activity when we compared SHA expenditure of mental health with recorded activity cases (see Figure 5.5). Data limitations aside, this suggests that these payments may have had a weak link between payment and activity (one possible, albeit crude, measure of an outcome) (see Appendix 11 for further details on mental health activity data recorded in the mental health minimum dataset).

These observations are supported by existing evidence. A recent study by The King’s Fund found that efficiency of mental health services is low, with a 20-fold variation in total bed days and a 6-fold variation in admission rates, after controlling for population characteristics (Naylor and Bell, 2010).

What the implications are

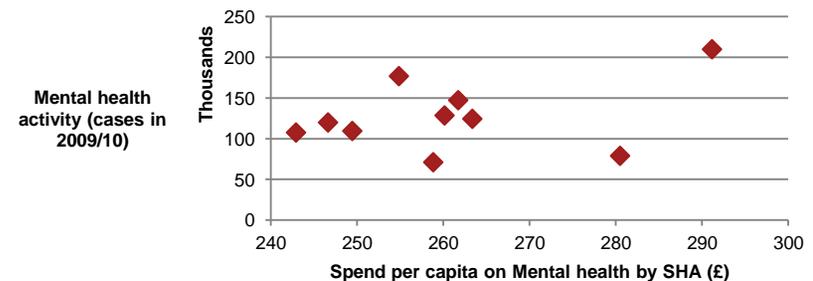
Linking historically-incurred costs to the level of revenue received is not the best way to deliver incentives to improve efficiency. Better information (on the cost of patient treatments in non-acute settings and on patient outcomes that can be linked to reimbursement) is needed to sharpen these incentives.

Figure 5.4: Unit cost variation amongst community services sample



Source: NHS West Midlands Strategic Health Authority

Figure 5.5: Relationship between level of expenditure and recorded activity for mental health services



Source: MHMDS and Programme Budgets



Similarly, improved information is required to align funding provided through block contracts to the underlying needs of patients

What the issue is

The amount of funding that a provider receives through a block contract is typically based on historical legacy arrangements. If the amount of funding is not determined with reference to the expected volume and casemix of patients, and associated costs of services, it is unlikely that there will be a link between the amount of funding and the underlying resource needs of patients. This may affect patient access to services and the quality of care provided. Patients with similar needs could receive different packages of care (because of resource constraints) depending on which provider they are referred to. This will occur if providers vary in respect of their casemix, and these differences are not reflected in the funding each receives. To explore this issue in more detail, we collected sample data on patient casemix profiles from a group of nine mental health providers in the West Midlands.

What we found

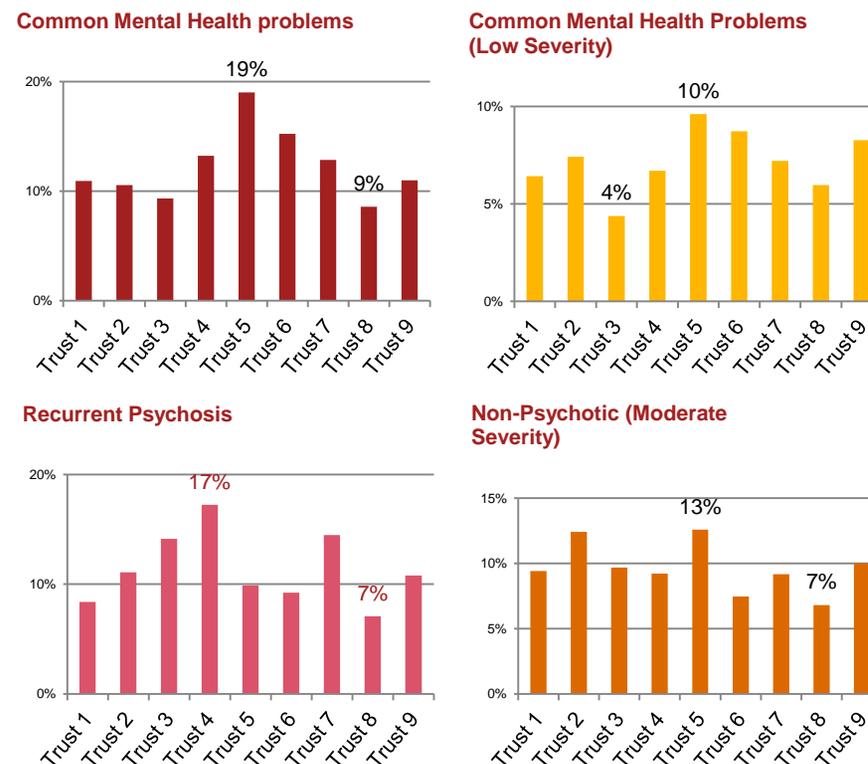
The sample data suggests that our providers do face a different casemix (refer Figure 5.6). The four charts compare the proportion of caseloads of the nine providers across four (out of 21) clusters.

Under the PbR pilot programme, providers allocate patients to a cluster. They are classified based on clinical need, which drives the treatment given (and therefore the underlying resource costs). We consulted with one of the providers represented in our sample. They indicated that patient casemix, and the underlying resource costs of treatments, was not factored into their block contract negotiation. As a result, they had to work within a fixed funding cap, regardless of the needs of the patients that were referred to them.

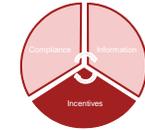
What the implications are

At present we do not understand whether funding being paid through block contracts is following the patient. From sample data we see that providers reimbursed through block contracts have different casemix. If this information doesn't feed through into block contracts, it is difficult to determine whether the appropriate amount of funding will follow the patient. Ongoing work to develop clinically meaningful definitions for clusters of mental health patients, and the costs for associated treatment pathways will help to improve the information underpinning these reimbursements.

Figure 5.6: Proportion of total patients allocated to different care clusters amongst a sample of providers



Source: NHS West Midlands Strategic Health Authority



Despite some evidence that patient choice has led to quality improvements, the impact of reimbursement mechanisms in driving quality improvements is unclear

What the issue is

The reimbursement system should either be an enabler or a driver of improvements to quality. Where patients and commissioners can choose their provider, under a fixed-price system, the informed choice that commissioners and patients can act on should drive improvements to quality – providers compete on quality for patient volume (and therefore revenue). This is one of the purposes of PbR – to enable patient choice on the grounds of quality to take place through providing fixed prices.

The incentives for providers to make quality improvements may not be as strong in the absence of choice (as is the case across much of the NHS, and in particular non-elective services such as Accident and Emergency). Improvements to quality may drive up their costs with no corresponding benefits through increased revenue. In these situations, the pricing system may need to act as a lever to drive improvements to quality.

What we have found

We did not identify any new evidence during the course of this evaluation of the impact of the reimbursement system on quality improvements. There is existing evidence that PbR, as an enabler of patient choice, had enabled improvements to quality.

For example, one econometric study found that the addition of a rival hospital increases heart attack survival rates by 9.5% (Bloom, et. al. 2010). In previous work, PwC has found that a provider's quality metrics improved when it was located close to an independent sector provider that performed well on quality metrics.

There are also efforts to link reimbursements directly to improvements to quality outcomes. Examples include best practice tariffs (BPTs) and Commissioning for Quality and Innovation (CQUIN).

BPTs provide additional financial rewards to providers for following best practice treatment pathways. In 2009/10, BPTs were introduced for Stroke, Fragility Hip Fracture, Cataracts and Cholecystectomy. These are designed to improve both the efficiency and quality of these treatments.

CQUIN is an overlay to PbR that allows commissioners to reward providers for making improvements to quality. Providers can increase their total revenue by as much as 1.5% for making achieving quality improvement targets set under CQUIN.

BPTs and CQUIN have been recently introduced and their impact on driving improvements to quality is not yet known. DH is currently undertaking evaluations of BPT and CQUIN which are not complete, and results are not yet publicly available.

There is anecdotal evidence of commissioners using block payments to drive quality improvements. We spoke with a specialist cardiac provider who tendered for a three-year contract for the provision of a bundle of services in the community. Over the three-year period, the proportion of the payment that related to the achievement of quality outcomes increased, with the metrics renegotiated at the end of each year.

However, it has not been possible to ascertain how widespread such arrangements are, and how effective they have been. A mental health provider we spoke within the West Midlands indicated that quality metrics were not included in their block contracts.

What the implications are

Reliable information on quality outcomes for patients, and the costs to providers of improving quality, is needed so that reimbursements can be designed to incentivise quality improvements. Consideration of the impacts of BPT and CQUIN (when the evaluations are publicly available) will be important. This may help to identify where there are gaps in the information that is needed. Greater collection of data on quality outcomes of treatments may be needed to sharpen the incentives of pricing to drive quality improvements.



Activity-based payment may not be an efficient way to reimburse services that exhibit economies of scale and have minimum capacity requirements

What the issue is

PbR (a payment for activity undertaken) is used to reimburse a wide range of acute services, some of which have very different economic characteristics. Per-case reimbursements make sense for services for which the required resource level can be planned, and treatments are relatively standardised. However, for other services, such as non-elective treatments, providers may be required to incur costs in maintaining capacity to provide those services. These services are likely to exhibit economies of scale, which may not be reimbursed through an average-based tariff system.

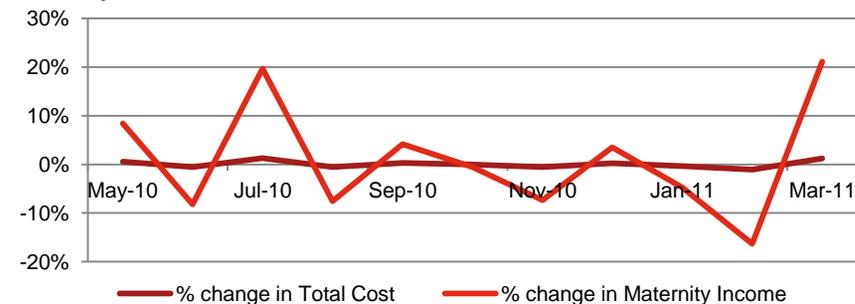
What we found

We conducted a case study with the Liverpool Women's Foundation Trust (LWFT) on per-case reimbursement of maternity services. LWFT maintains minimum staffing levels for its obstetrics ward, in accordance with guidance from the Royal College of Obstetricians. LWFT provided us with monthly cost and activity data between April 2010 and March 2011 (see Figure 5.7). The data shows that costs that vary with activity represent less than 10% of total costs. When activity levels fall, unit costs increase, and the tariff was not sufficient to cover these higher costs. Maternity services were underfunded across a number of months and in total.

FTN Benchmarking has also collected evidence from providers that the maternity tariff was not sufficient to cover the overhead costs of these services, including the Clinical Negligence Scheme (FTN Benchmarking: Maternity Briefing May 2010).

Previous analysis undertaken by PwC has shown that economies of scale were greater for inpatient non-elective services compared with those for outpatient services (PwC Provider Economics Report for DH, 2010). Refer to Appendix 6 for further details on this study.

Figure 5.7: Month-on-month variation in income and total costs for maternity services



Source: Liverpool Women's Foundation Trust

In Australia, a two-part tariff is used for emergency care

Emergency services which are followed by an inpatient admission are reimbursed through DRGs, while there is a fixed grant outside of the DRG system for non-admitted emergency services patients. This is to cover the fixed cost of running an emergency department when it is not at full capacity. The grant is distributed to hospitals that operate a 24-hour emergency services department, which has two components – an availability component and an activity component. The two components are based on each hospitals' estimated share of admitted and non-admitted emergency department patients, respectively. Estimates, rather than real admission data, are used to avoid affecting the incentives to either admit or not admit emergency department patients (Victorian Government Department of Health, 2011).

What the implications are

Failure to account for different economic characteristics (such as economies of scale or minimum capacity requirements) in reimbursement, can potentially disadvantage certain providers, and impact on resources available for other services. As a result, providers may cross-subsidise from other tariff revenue, or organise side deals with commissioners. For other services, commissioners may be forced to reimburse at a level greater than efficient costs. Further work to understand and classify the different NHS-funded services in respect of their economic characteristics to understand the most effective method of reimbursement is required.



Different methods of reimbursement across care settings creates administrative boundaries that hinder patient flows

What the issue is

Activity-based payments, such as PbR, create incentives to increase capacity and activity. Block contracts, widely used to reimburse community services, may not reward the provider for increasing its activity unless there is a clear link between payment and performance outcomes. These contrasting incentives may affect the transitioning of care from acute settings to community settings, particularly relevant for patients with long term condition. As acute providers are unable to adjust costs in the short run (refer to page 44), they will want to increase their activity to cover fixed costs.

What we found

Across a sample of health economies, the NHS benchmarking network (2011) found that around two thirds had integrated commissioning programmes. Of these, only 40% had pooled budget arrangements for integrated care programmes (NHS Benchmarking Network, 2011).

The Nuffield Trust has previously investigated the challenges faced by commissioners and providers in developing integrated care pathways. They conducted case study interviews with a series of sites across England (Nuffield Trust 2011). They cite a number of barriers to integrated care, including a current emphasis on competition rather than collaboration and the incentives created by PbR for acute hospitals to expand activity.

Between 2009/10 and 2010/11, expenditure on community services grew by 6%, slightly higher than expenditure of general acute care, which was 5% (DH Resource Accounts, 2011). These figures suggest that a migration of lower-cost activity from acute setting to community settings has not yet occurred.

We also spoke with a trust that is looking to develop an integrated pathway of care for patients that receive hip replacements. Following a recent merger with a community services provider, the trust is developing a standardised integrated care pathway for hip replacement patients that could be purchased by their commissioner.

The provider indicated that the care pathway would be more efficient for the commissioner and believed it could also improve the quality of care. However, to date, the commissioner has been reluctant to pursue purchasing these services bundled into a pathway. This provides anecdotal evidence that it is not just the incentives driven under PbR (i.e. to increase activity in acute setting) that may be blocking the development of integrated care.

Dutch trials show that integrated care pathways can improve cooperation between providers. However, they may have an effect on patient choice

In The Netherlands, integrated care pathways have been trialled for a number of homogeneous tariff categories, for example, diabetes in the Maastricht region. This involves the creation of care groups, consisting of GPs and other health care professionals who negotiate with insurance companies over a price for delivering the entire care pathway. The package of care is defined by a professional clinical organisation, and it can be wholly delivered by the care group, or it can be separated into parts and subcontracted out.

The trial in Maastricht revealed qualitative evidence that the cooperation between providers improved, there was better use of electronic health records, and patients were more satisfied with the transparency of the care pathway. However, there were no significant impacts on quality of care indicators, and due to trade secrecy, providers were unwilling to disclose the impact on their costs. Reduced patient choice was reported as care groups worked only with their preferred providers, and there were concerns over the market power that care groups held over subcontracted providers (RIVM, 2010).

What the implications are

Current expenditure trends suggest that a migration of services towards community settings has not yet occurred. These trends may continue, in the absence of appropriate incentives and support for local efforts to develop integrated pathways. This may hinder improvements to efficiency in the NHS as migration of services into lower-cost community settings will not occur.

Chapter 6

Compliance



Chapter summary: The key findings from our evaluation of compliance with the reimbursement system

How does compliance link in with other aspects of our evaluation?

Stakeholders should comply with a reimbursement system that is functioning well. They should not need to find ways around it. A degree of non-compliance with the current system is anticipated, given the weaknesses highlighted with the information that is used, the prices that are set and the incentives that are created. In fact, non-compliance may not actually be a bad thing. Important services may remain open as a result. It is difficult for the pricing system to get it right every time, given the level of complexity. There are around 1,100 prices that change each year and a mix of reimbursement mechanisms for different services.

What we focused on

We have investigated how providers and commissioners have responded to the incentives created through the pricing system. Specifically, we focus on compliance with the national prices set for HRGs covered under PbR.

What we found

Providers appear to be managing their organisations at a total income level, and not responding to signals being delivered through the pricing system. They do this by operating outside the tariff system. We found that non-tariff revenue, and to a lesser extent tariff revenue, fluctuate each year, while total patient income remains relatively stable. This was observed from income data from a sample of 69 acute providers (non-Foundation Trusts). This suggests that either the services being provided each year are drastically changing (which we know is not the case) or they are cross-subsidising between different income streams. Cross-subsidisation will blunt the ability to drive incentives through different pricing mechanisms – as one income stream offsets the other (page 48).

There is evidence to suggest that providers and commissioners are increasingly negotiating prices locally and abandoning the pricing system. We examined historical financial accounts of a sample of 69 acute providers (non-Foundation Trusts) and found that over the last four years, the proportion of non-tariff income has been steadily rising. This is despite more acute services moving under the remit of PbR. A survey of Foundation Trusts undertaken during this evaluation illustrated that more than 50% of respondents acknowledged operating outside of the rules of PbR in negotiations with their commissioners. This was consistent with responses to a HFMA survey in which 60% of respondents indicated that they had deviated from PbR rules in negotiations with commissioners. Anecdotally, the main driver of non-compliance seems to be a lack of confidence in the pricing systems.

It is inevitable that there will be some local negotiation of prices. But this should only happen where it can be demonstrated that it is in the best interests of patients, improving efficiency and quality. Our concern is that the need for local negotiations is driven more by a lack of confidence in prices set nationally, rather than by clear evidence that an alternative arrangement improves quality and efficiency. The balance between having a rigid and mandated national prices, and local flexibility, involves deciding how far national reimbursement mechanisms can reflect local circumstances, and then having a clear framework for when local negotiation is appropriate (i.e. cases where benefits to patients can be demonstrated) (pages 49 – 50).



The components of trust income move from year to year, but overall income stays reasonably stable. Shortfalls are made up in other ways if one element of provider income is squeezed

What the issue is

The incentives being driven by one element of provider reimbursement may be undermined if any income changes are offset or made-up through other reimbursement routes. It also encourages trusts to focus on managing total revenue, rather than necessarily focusing on the income and costs of individual elements of their organisations.

What we found

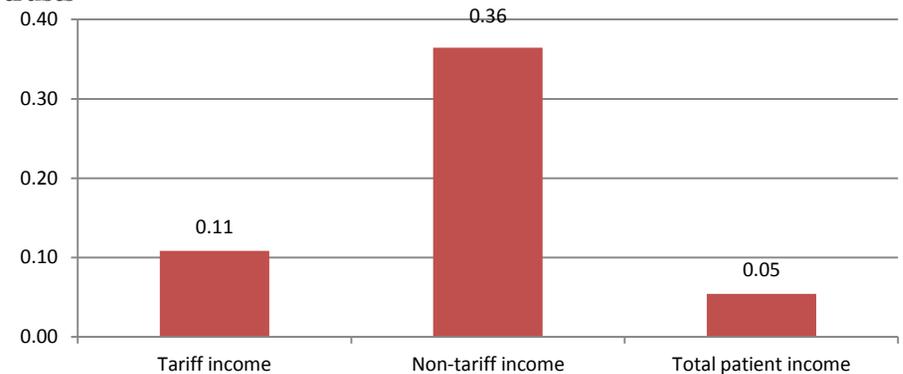
We compared the fluctuations in different income streams for a sample of 69 NHS providers (non-FTs) between 2007/08 to 2010/11. The coefficient of variation has been used to measure the volatility (in real terms) of each income stream. As Figure 6.1 shows, the most volatile patient income stream was non-tariff revenue, followed by tariff revenue. Total patient income remained relatively stable (see Appendix 12 for further details).

These trends suggest that providers use non-tariff income to smooth variability caused by tariff instability.

Liverpool's Women FT were forced to find alternative funding sources after fluctuations in the maternity tariff

In 2010/11, an unexpected change to the maternity tariff resulted in drop in turnover by £3m. As a result of the change in tariff and the national efficiency target, the maternity service faced a cost reduction target of 7% and moved into a deficit as a service line. It was not possible for the provider to target that level of savings from maternity within the timescale, or to cross-subsidise from existing income, as this service represents over 30% of income for the Trust. The local PCT supported the provider through an additional block contract payment and significant cuts were avoided.

Figure 6.1: Coefficient of Variation of different income sources for 69 NHS trusts



Source: PwC analysis of NHS Trusts' financial accounts

What the implications are

These income trends suggest that providers may be adjusting the amount of income they receive from non-tariff sources to maintain constant total revenue. This matches the evidence from our case study (see box on left of page), which suggests that instability of tariff threatens the sustainability of services. When cross-subsidisation occurs, the ability of the pricing system to drive incentives is blunted. Providers do not need to respond to the price signals, for instance by reducing costs, as they make up any shortfalls in income from other revenue sources. They may continue to run loss-making services which threaten the sustainability of services, and lowers the overall efficiency improvements of the provider. When price signals are unexpected, and not consistent with the efficient (or desired) costs of providing that service (due to poor information feeding into the prices), cross-subsidisation will be a good thing. It allows the provider to cope with the failings of the pricing system. However, the risk of ongoing cross-subsidisation is that a provider will focus on total revenue and ignore price signals being delivered through PbR. This can undermine the purpose of setting individual prices for services.



Providers and commissioners appear to be increasingly using local negotiations and departing from PbR guidance

What the issue is

Under the current reimbursement system, PbR is used to reimburse around two-thirds of elective care. There are around 1,100 nationally prescribed prices for spells of treatment. Providers and commissioners are required to use these prices in their contracting arrangement. There are some exceptions to these rules, with PbR guidance allowing for local flexibilities in price-setting across a number of areas.

What have we found

Through consultation with providers and commissioners, we found examples of deviations from prices set under PbR. There is also evidence from surveys of providers.

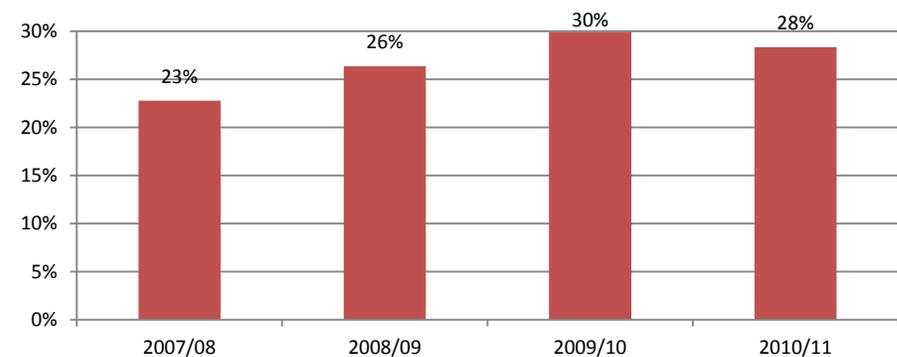
The HFMA conducted a survey on the use of local flexibilities in price setting. Out of 25 respondents, 60% indicated that they deviated from PbR rules (although the materiality of these deviations varied). We surveyed Foundation Trusts and found a similar result. Out of 35 acute providers, more than 50% (19 out of 36) indicated that they deviated from PbR rules in negotiations with commissioners (see Appendix 13 for further details). The materiality of these local agreements is not known. Examples given centred on local risk-sharing between commissioners and providers. For example, capping penalties for emergency readmissions, marginal pricing above a specified contract level, or negotiating prices for services lower than the tariff rate.

Recent trends in the proportion of patient income through non-tariff sources suggests that increasing local negotiations is a widespread occurrence. Despite more acute services coming under the remit of PbR in recent years, data from historical financial accounts of a sample of 69 NHS providers (non-FTs) illustrates that an increasing proportion of patient income is being received through non-tariff sources.

What the implications are

The increased use of local negotiations in place of national prices under PbR is a reflection of the difficulties in setting around 1,100 different prices. Providers and commissioners appear to have lost confidence in nationally set prices and are trending towards local negotiations. However, despite this, it is important to understand the drivers of these local arrangements, and the impact that they are having on efficiency and quality. Where quality outcomes are hard to observe, there is a risk that local variations in price (for example setting prices lower than the tariff) can have a detrimental effect on the quality of care provided.

Figure 6.2: Proportion of patient revenue that is non-tariff revenue amongst acute providers



Source: PwC analysis of NHS Trusts' financial accounts

The Dutch health system combines national tariffs with local flexibilities

In The Netherlands, hospitals are reimbursed based on diagnosis treatment combinations (DBC), which are split into an A segment and a B segment. The A segment treatments have centrally fixed prices, which are calculated using conventional costing methods, and capping by an overall budget. However, the price of B segments are determined by local negotiations between hospitals and private insurers, while there is a fixed amount of reimbursement for medical specialists. Segment B currently forms 34% of hospital revenue, but the long-term plan is to reach 70-80%, as the government seeks further liberalisation of Dutch healthcare.

The result of leaving the B segment treatments flexible to local negotiation has been mixed. Some hospitals attempt to negotiate the total budget for all B-segment treatments in block contract style. In addition, although negotiations between insurers and providers were intended to be based on quality, they often revolved around price and volume requirements. Prices also tend to vary fairly widely between insurers, for example hip replacement costs between €7,603 and €11,370 across different areas (Tan et al, 2010).



Compliance with PbR is not being actively enforced, despite evidence that local arrangements are being used in place of national prices

What the issue is

Compliance should be a consequence of a well-functioning reimbursement system. In some cases, active enforcement regimes will also be necessary. Under the Code of Conduct for Payment by Results, the casemix classifications, prices and payment rules are set at a national level and are not subject to local negotiation – except in cases where this is explicitly allowed under PbR guidance (Department of Health, 2011).

Persistent non-compliance by individual NHS Trusts or PCTs can be penalised through intervention and/or direction on behalf of the Secretary of State. However, it is not clear how these events would be identified. Despite the Audit Commission having responsibility for the assurance of data used to underpin PbR, it is not clear how contractual arrangements between commissioners and providers are monitored to ensure compliance.

What we found

We did not find any evidence of examples where non-compliance with PbR rules was investigated and dealt with under sanctions available. This is despite indications from providers that they are deviating from PbR rules in negotiations with commissioners.

What the implications are

It is inevitable that there will be some local flexibility within the reimbursement system. The key issue is being clear about when and how this flexibility should apply. Flexibilities should apply in a consistent and transparent manner to minimise distortive incentive impacts. Good information is key to ensuring national reimbursement mechanisms are effective. Where reimbursement mechanisms cannot adequately reflect local circumstances, local negotiations should be supported by good information on both cost and quality to ensure any changes to prices are beneficial to patient care.

Compliance should improve if stakeholders have more confidence in the reimbursement levels being set. The quality of information is key. In other sectors, compliance with rules is incentivised through the use of financial sanctions. The experience of regulators in other sectors provides some examples that could be followed, although it is important to take these in context – in other sectors, information is generally more reliable than in healthcare and the pricing systems are more stable.

Other regulators use financial sanctions, such as changes to prices and direct fines, to penalise underperformance

Changes to regulated prices

Regulators measure quality and penalise low performers by reducing the prices they are allowed to charge – effectively lowering the allowed revenue cap. For example, Ofwat uses the Overall Performance Assessment to make annual adjustments to prices between price determinations. Companies with high-quality scores on the OPA are rewarded by up to 0.5% revenue and low-performing firms are punished by a loss of up to 1.0% of revenue (Ofwat, 2009)

Fines

Regulators issue fines for underperformance with regards to quality but also for providing inaccurate information. For example, Ofcom fined TalkTalk, an internet service provider, £3m in 2011 for charging customers for services they did not receive (Ofcom, 2011). Fines can be very substantial: in 2008, Ofwat fined Severn Trent Water £36m (equivalent to 3% of turnover) for providing false information (Ofwat, 2008). For publicly owned companies, fines can be controversial. For example, ORR fines to Network Rail, like the £3m fine for the Potter's Bar derailment (ORR, 2011), have been unpopular with some parties since the fine is essentially footed by the tax payer.

Chapter 7

Key areas for further investigation

Our evaluation findings lead us to eight areas where we suggest that the reimbursement system could be improved

1. Improving the information that is used to set reimbursement

Our key finding from the evaluation was that the information underpinning reimbursements needs to be significantly improved. We found that there are significant variations in the Reference Costs that providers are reporting for delivering the same services, directly impacting prices. This variation cannot be explained and a large portion is likely to be due to differences in how providers allocate their costs. Without good information, commissioners and providers cannot judge efficiency and quality. This is an issue for all services. The reimbursement system needs to be based on more detailed and reliable (i.e. consistently allocated) cost data to effectively support decision-making. Improving the timeliness of translating cost data into prices (i.e. reducing the three year time-lag) would further improve the relevance of the information.

2. Ensuring the reimbursement models reflect the characteristics of the services they cover

Existing reimbursement mechanisms do not take account of the economic or clinical characteristics of the services they are paying for. Economies of scale and capacity requirements can significantly affect the cost of delivering care. As the system does not recognise these in a systematic way, some providers may be under-reimbursed for particular activities. This may mean they have to cross-subsidise from other services, impacting funding available elsewhere in their organisations. This can be addressed by ensuring that the structure of reimbursement is tailored to the characteristics of the service being delivered.

3. Adjusting for drivers of cost variation

We found that the reimbursement system does not fully address the drivers of cost variations in organisations in a consistent way. There are weaknesses with the way in which cost variation driven by casemix is reimbursed. This may cause level playing field issues, create opportunities for cherry picking, and require providers to cross-subsidise between services. We also found that the level of adjustment received through the MFF does not explain much of the cost variation observed at the patient level.

4. Encouraging quality improvements

We found only limited evidence that reimbursement mechanisms have directly impacted on the quality of services being delivered. This may in part be due to the difficulties with measuring quality outcomes and linking them to the reimbursement system.

5. Improving transparency in price setting and stability of prices

We found that the prices set through PbR vary significantly from year to year – and in ways that commissioners and providers do not understand. This is a symptom of the poor information being used to set prices. It undermines confidence in the prices that are being set and weakens their impact as a price signal. It may also impact investment decisions. We found that providers do not understand the reasons behind fluctuations in prices each year. The uncertainty these fluctuations create seems to be managed through adjustments to other income streams to maintain stability at the total income level.

6. Simplifying the reimbursement system

We think there is value in looking, from a system perspective, at how provider reimbursement system could be simplified and better aligned with the higher level objectives of NHS-funded care. Provider income comes through a range of reimbursement mechanisms, each with different incentive properties. These mechanisms overlap with one another. When they interact (e.g. non-tariff revenue offsetting a fall in tariff revenue), it can blunt the incentives of each. This limits the ability of the reimbursement system to drive behaviours, such as improvements to efficiency or quality, or the delivery of care in the most appropriate setting.

7. Working across settings of care boundaries

We found that reimbursement mechanisms currently operate within the administrative boundaries of settings of care (acute, community etc) rather than across them. This can sometimes hamper efforts to integrate or shift services. Organisations are reluctant to lose income, particularly if their cost base is largely fixed, making it hard to realise savings from delivering services in different ways. Inconsistent information on the cost of services between care settings is also a barrier.

8. Reviewing local arrangements

We found that providers and commissioners are increasingly engaging in local pricing discussions, suggesting national prices are not always fit for purpose. This may well be a manifestation of low confidence in the system. However, it is not clear that these local arrangements are delivering improvements to efficiency or quality.

Glossary of terms

Glossary of terms

Term	Definition
Acute care	Short-term medical treatment, usually in a hospital, for patients having an acute illness or injury or recovering from surgery.
Acute trust	A legal entity/organisation formed to provide health services in a secondary care setting, usually a hospital.
Ambulance trust	A legal entity responsible for providing ambulance services within a defined geographic area.
Average length of stay (AvLoS)	Length of stay refers to the number of days that a patient was in hospital, from admission to discharge. Average length of stay is used when describing patients at a particular provider (i.e. the average length of stay of a provider), or patient classified to the same HRG code (i.e. the average length of stay for a given HRG).
Best Practice Tariffs (BPT)	Special tariffs under PbR, which are paid to providers in place of normal tariffs, if best practice guidelines for treatment are followed. Best practice is defined as care that is both clinical and cost effective, and is different for each procedure. Under PbR, BPTs are eligible for four services during 2010/11. These are Cataracts, Cholecystectomy, Fragility Hip Fracture and Stroke. BPTs are being expanded in 2011/12 to cover five new speciality treatments and four new day-case elective treatments.
Block contract	Block contracts usually involve a fixed sum to purchase a defined set of care services during a given period. More sophisticated block contracts have payments determined based on the achievement of quality outcomes and / or the level of activity undertaken. It is the current method of funding around one-third of acute care, two-thirds of mental health care and ninety per cent of community services.
Capital expenditure (CAPEX)	Funds used by a provider to acquire or upgrade assets that appear on its balance sheet. Examples of physical capital assets include property, plant and equipment.

Term	Definition
Casemix	The type of patients treated by a hospital or care unit. Patients are grouped according to their requirements of similar tests, procedures, and resources.
Clinical Negligence Scheme for Trusts (CNST)	A membership organisation that handles clinical negligence claims against NHS member bodies. The costs are met by membership contributions. In the tariff calculation, price increases are targeted at some HRGs (e.g. maternity) to take account of cost pressures arising from these contributions.
Coefficient of Variation (CV)	The coefficient of variation (CV) is a standardised measure of the standard deviation (allowing for comparison across HRGs that have different unit costs). In a given dataset, the CV is equal to the standard deviation divided by the mean.
Commissioners	Commissioners include all organisations that participate in the procurement of services for NHS patients including Primary Care Trusts, Primary Care Practices participating in Practice Based Commissioning, Local Authorities and their authorised agents, including Commissioning Consortia and any Procurement Agency.
Community services	Locally-based health or social care services provided to patients in and around their home.
Co-morbidities	The presence of one or more disorders (or diseases) in addition to a primary disease or disorder (e.g. Patient diagnosed with cancer and diabetes).

Glossary of terms

Term	Definition
CQUIN	Commissioning for Quality and Innovation (CQUIN) was introduced in April 2009 as a national framework for locally agreed quality improvement schemes. It enables commissioners to reward excellence by linking a proportion of English healthcare providers' income to the achievement of local quality improvement goals.
Currency	A unit of healthcare activity such as spell, episode or attendance. Under PbR, currency is the unit of measurement by which the national tariff is paid. Admitted patient care healthcare resource groups (HRGs) are an example of PbR currency.
Diagnosis Related Groups (DRGs)	A casemix classification system first developed by Yale University and adopted for the Medicare programme in the USA in 1983. It has been adopted by many countries since, including many European countries and Australia, among others.
Elective care	Elective care means planned specialist medical care or surgery, usually following referral from a primary or community health professional such as a GP. (NHS)
Excess bed day top-up	A top-up that is applied to tariff when length of stay exceeds HRG specific trim point.
Finished Consultant Episode (FCE)	An FCE or episode of care is a completed period of care of a patient using an NHS hospital bed, under the care of one consultant within one healthcare provider. If a patient is transferred from one consultant to another, even if this is within the same provider unit, the episode ends and another one begins. (Audit Commission)

Term	Definition
Foundation Trust	NHS Foundation Trusts are NHS Trusts that have achieved independent legal status or public benefit corporations. They have unique governance arrangements and are accountable to local people, who can become members and governors. They are free from Government control and are not performance managed by health authorities. They are overseen by Monitor.
Healthcare Resource Group (HRGs)	The currency for the admitted patient care tariff based on standard groupings of clinically similar treatments which use similar levels of healthcare resource.
Hospital Episode Statistics (HES)	Hospital Episode Statistics (HES) is the national statistical data warehouse for England of the care provided by NHS hospitals and for NHS hospital patients treated elsewhere.
Inpatient	The informal term for a hospital's activity (patient treatment) after a patient has been admitted to a hospital. The technical term is 'admitted patient care' (APC).
Market Forces Factor (MFF)	An index used in PbR and PCT allocations to estimate the unavoidable cost differences of providing healthcare (see Appendix 7).
Non-elective care	Specialist medical care or surgery that is unplanned (e.g. emergency hospital admission).
Operating expenditure (OPEX)	A category of expenditure that a provider incurs as result of performing its normal business operations (e.g. patient activity).

Glossary of terms

Term	Definition
Patient-level costing	Patient-level costing is defined by the ability of a costing system to measure the hospital resources consumed by individual patients.
Patient-level costs	Patient-level costs are calculated by tracing resources actually used by a patient and the associated costs by using actual costs incurred by the organisation in providing a service or event.
Payment by Results (PbR)	Payment by Results is an approach to reimbursing providers on the basis of activity undertaken, in accordance with national rules and a national tariff. This was first introduced to pay for certain acute care services in the NHS in 2003/04.
Primary care	Services provided by family doctors, dentists, pharmacists, optometrists and ophthalmic medical practitioners, together with district nurses and health visitors.
Primary Care Trust (PCT)	A PCT is a type of NHS trust. PCTs commission primary, community and secondary care from providers on behalf of patients.
Providers	The term providers covers all organisations who either currently, or in future, may provide services within the scope of PbR, including: NHS Acute Trusts, NHS Foundation Trusts, Mental Health Trusts, Consultants, Independent Sector Providers, Primary Care Practices, GPs, Pharmacies, community services, social services and the voluntary sector.
Reference Costs	Reference Costs are the average cost to the NHS of providing a defined service in a given financial year. NHS Health Care Providers are mandated to provide annual Reference Costs data (for a wider range of services) to the Department of Health. Reference Costs have been collected annually since 1998.

Term	Definition
Reimbursement mechanism	Isolated method by which providers of health care are reimbursed (e.g. PbR, block contract, local tariff).
Reimbursement system	The term used to describe the collection of different reimbursement mechanisms (PbR, local tariff and block contracts) that are used to reimburse NHS-funded secondary care.
R-squared (R²)	A statistical measure which shows how much of the variation in a dependent variable (e.g. the cost of a patient treatment) is explained by the independent variable. For example how much of the variation in cost of a patient treatment (from the average cost) is explained by the age of the patient.
Secondary care	Hospital or specialist care to which a patient is referred by their GP. The DH categorised Mental Health, Community Services, Maternity Care, General & Acute Care, A&E as part of secondary care (DH Resource Accounts, 2011).
Specialist top-up	Top-up that is applied to specialist activity (defined by the Specialised Services National Definition Sets). For further details, see Appendix 7.
Spell	The period from the date of admission of a patient into hospital until the date of discharge, which may contain one or more episodes of treatment.
Tariff	The nationally mandated price(s), under PbR, for a unit of healthcare activity. Tariffs are published by the DH each year.
Trim point	The trim point for a given HRG is a set number of days of a patient length of stay. After the spell of treatment exceeds this number of days, a provider will receive a top-up adjustment for each additional day of treatment. For each HRG, the trim point is calculated as the upper quartile length of stay for that HRG plus 1.5 times the inter-quartile range of length of stay.

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