HEALTHCARE COSTING FOR VALUE INSTITUTE

hfma

Improving the quality of source information for costing in acute and community services

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Contents

Foreword

Even with the best costing processes in place, the accuracy of NHS providers' cost data is dependent on the quality of their non-financial data.

Allocating clinical staff costs at patient level requires detailed information about how long staff spend with each patient in different settings, such as on wards, in theatres or in a patient's home. At the same time, how other resources are used to support individual patient care needs to be clearly recorded – for example, diagnostic facilities and drugs.

The allocation of indirect and overhead costs is also dependent on other types of non-financial information, such as floor area and workforce numbers. Get any of these figures wrong – or fail to record the necessary information – and the cost data derived from it will be wrong too.

Costing practitioners are not responsible for the quality of source data. However, they have a clear interest in ensuring that source data is as accurate as possible. This guidance suggests how costing practitioners can work with others towards this aim, covering important issues such as clinical engagement, accountability and joint working with informatics teams.

The HFMA has championed improvements in costing for several years. It continues to do this through the work of its costing practitioner groups and the Healthcare Costing for Value Institute, promoting both the production of accurate cost information and its use in value-based decision-making.

The publication of this guidance forms part of this 'championing' role – a role that has seen the association develop clinical costing standards since 2010, in conjunction with, and with support from, both the Department of Health and Monitor. These standards continue to have an important role in supporting costing practitioners to improve their costing processes during the transition to the revised patient-level costing process described in Monitor's *Costing Transformation Programme*.

The *Acute clinical costing standards* and the *Mental health clinical costing standards*, together with the two guidance papers *Understanding the general ledger for costing* and *Improving the quality of source data for costing* form part of Monitor's *Approved costing guidance* for 2016/17.

Both the standards and this guidance have been developed with the full involvement of costing practitioners. Their contribution massively enhances the guidance, ensuring it is based on how processes and systems work in the reality of busy healthcare organisations. The commitment and support of these practitioners– and that of their organisations – is greatly appreciated by the HFMA.

This practitioner network also offers access to good practice examples from around the service, many of which are included here. Monitor has recognised that an engaged costing community is vital to the success of its *Costing Transformation Programme* and the HFMA will continue to work with these practitioners as the service continues to improve costing and deliver the programme.

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Executive summary

Trusts increasingly need robust data to meet the NHS's challenges over the next few years and over the longer term. Information on costs and outcomes should underpin decision-making, ensuring local decisions are informed by a clear understanding of current costs and the likely costs of any new ways of working. It will also provide the bedrock for new payment systems.

To provide reliable and robust cost information, costing practitioners need access to high-quality non-financial data. No matter how sophisticated costing methodologies are, if the activity or other source data used is inaccurate or incomplete, this will lead to inaccurate patient-level costs.

Source data used in costing is of variable quality. Generally, the data used in acute services to support billing for income is of a higher quality than other source data, which has a higher risk of being of poor or unknown quality. This can have a significant impact on the quality of costing information, which can lead to poor decision-making, inaccurate price-setting, weaknesses in assessing value and inadequate information for managing savings plans.

> "'Data has helped us to see where there is room for further improvement. It has allowed us to focus on reducing delays in decision-making prior to surgery and to tackle variation in different surgeons' approaches where they haven't followed the pathway."
>
> **Simon Kenny, clinical director for surgery, Alder Hey Children's Hospital NHS Foundation Trust**

The quality of source data is not the responsibility of costing practitioners. The data used for costing comes from across the organisation, and responsibility for getting it right is similarly broad. Effective trust board engagement to support costing is crucial to driving improvements in the quality of underlying source data. Trusts should have clear senior accountability structures for data quality so that the quality of all source data improves for all end users.

While costing practitioners are not responsible for the quality of source data, they do have an important role to play in helping their organisation improve its quality for costing. They are often the first port of call when a clinician spots data quality problems and are ideally placed to feed this into the organisation's data quality management process.

This guidance paper suggests ways in which costing practitioners and informatics colleagues can work with others in their trust to achieve improved data quality. The good practice and case studies in this document come from costing practitioners, often working jointly with clinicians or informatics leads, demonstrating the partnership approach needed to improve data quality.

Clinical and operational engagement is key to improving data quality. Experience shows that by sharing cost information across the trust, the quality of the source data used to build the costs improves as staff identify data quality issues. And clinical and other operational staff have an important role to play in ensuring that the data input to the systems is accurate at the point of entry.

> "The greatest established need with regard to accuracy of cost data is the extent to which the information and analysis derived from clinical feeder systems is fit for purpose. Almost without exception, stakeholders feel that the quality of non-financial data used in the development of cost information and cost collections is one of the more significant barriers to the credibility of cost information for all uses."
>
> **BDO: Costing Roadmap 2014**

The trust's informatics function should be responsible for the management of all source data required for costing, and for checking and assuring its quality. Costing practitioners need to work closely with their informatics colleagues to support the design of systems that ensure high-quality data.

Apart from working with others in their trust to improve the overall quality of data, costing practitioners typically get involved in resolving a wide variety of specific data quality challenges. These include linking clinical staff costs to patient-level activity, measuring patient dependency, and issues for service areas such as operating theatres and outpatient departments. This guidance paper describes practical approaches that costing practitioners have adopted to support their trust to resolve such challenges.

Introduction

Understanding the cost of NHS patient care is vitally important, both locally and nationally, in making decisions about how to plan, manage and deliver sustainable high-quality services. Robust cost information should ensure local decisions are informed not only by a clear understanding of current costs, but also the likely costs of any new ways of working.

Improving value is a high priority in the NHS. Linking patient-level costs with health outcome data allows the NHS to promote value for patients – that is improve the quality of care using scarce resources sustainably. Reliable cost data will also provide the basis for the new payment systems required to deliver the new care models outlined in the *Five-Year Forward View*.

The HFMA has been actively involved in driving better standards in NHS costing for a number of years, working closely with its costing practitioner groups. The HFMA was commissioned first by the Department of Health, and subsequently Monitor, to develop the clinical costing standards and supporting guidance, which reflect best practice and are intended to drive improvement.

It is a time of change for NHS costing, with the launch of Monitor's *Costing Transformation Programme*, which aims to transform costing over the next six years. The HFMA programme of work this year has focused on supporting costing practitioners to build on the excellent progress made in costing and to lay a solid foundation in preparing and supporting costing practitioners for the changes to come.

Extracting accurate costs from the general ledger and accurate activity data from feeder systems is key to deriving robust patient-level costs.

The HFMA has worked with the HFMA Acute and Community Costing Practitioner Groups to develop two guidance papers:

- *Understanding the general ledger*
- *Improving the quality of source information.*

Although the guidance papers have been produced by the Acute and Community Costing Practitioner Groups, much of the good practice described is just as relevant to mental health services. It is strongly recommended that mental health costing practitioners read both guidance papers and share them with colleagues in their trust.

Costing practitioners require accurate data from clinical and operational feeder systems to support the costing process. No matter how detailed and accurate costing methodologies are, if the activity data used to inform them is inaccurate, this will lead to inaccurate costing information.

This guidance paper is aimed at costing practitioners, and addresses the following questions:

- Section 1: What are the data quality issues facing costing?
- Section 2: What can costing practitioners do to work with others in their trust to improve data quality?
- Section 3: What approaches have costing practitioners taken to resolve specific data challenges?

Most of the issues described in this guidance paper are relevant to both the acute and community service sectors. Section 3 includes sub-sections that are relevant specifically to either acute-based or community-based services.

Case studies have been used in Sections 2 and 3 to give practical support and illustrations. The main report includes a brief summary of each case study with a link to the full case study in Appendix 5.

Section 4 provides a checklist for costing practitioners on how they might work to improve the quality of source data for costing in their organisation.

Section 1

What are the data quality issues facing costing?

High-quality costing data requires high-quality source data. Monitor's latest reference cost audit report indicated that 49% of trusts audited had made materially inaccurate reference cost submissions[1]. One of the causes of error was poor-quality activity data in some trusts.

Source data for costing includes:

- Clinical staff activity data – for example, time spent in different patient settings, acuity and dependency

- Patient-level activity data – for example, admissions, length of stay, contacts, operating theatre use, diagnostics and medication

- Information to allocate indirect and overhead costs – for example. floor plans and workforce.

While the data in a trust's centralised information system can be of high quality, this is rarely the case for all of the feeder systems, where the data may be inaccurate or incomplete.

For acute services in particular, the relatively good quality of data from the patient administration system (PAS) has been driven by the robust assurance processes trusts have in place because of PAS data driving income. Most acute PASs have well-established data quality checks, roles and responsibilities for quality are clear and system users tend to be trained and supported.

However, more peripheral clinical systems – for example, those providing data on diagnostic services – may lack clear processes to assure high-quality data. Such systems have an important role to play in providing source data for patient-level costing and will increasingly contribute to how trust income is determined.

For community services, a number of long-established issues mean that the quality of source data for costing is often unreliable. These continue to make improving quality challenging:

- The use of block contracts for the majority of community services has resulted in less focus on the relationship between resources and activity. There has been little or no incentive to collect and use the data underpinning this relationship, which is key for costing

- The lack of national currencies and standard service definitions means that currencies have been developed by providers locally with their commissioners

- There is currently no mandated minimum data set, so the data for costing varies widely[2].

However, some trusts with community services recognise the need for business intelligence to inform decision-making, and to demonstrate more effectively to commissioners how their investment is deployed. This requires accurate activity data and clear links to staff costs.

Common root causes of poor-quality source data include:

- A lack of corporate-wide recognition of what it takes to achieve high-quality costing, and the comprehensive processes that need to be in place to achieve it

- Poor engagement of clinical and other front-line staff with the costing process, leading to a lack of ownership of the quality of underpinning data

- A lack of understanding of how source data feeds into or impacts on the costing system.

Section 2

What can costing practitioners do to work with others in their trust to improve data quality?

Capturing and recording high-quality source data for costing is not the responsibility of costing practitioners. However, by using their expert knowledge, costing practitioners do have an important role to play in helping their trust improve the quality of its source data for costing.

This section outlines how costing practitioners are working within their organisations to improve data quality. The good practice and case studies described are intended to encourage and support costing practitioners in identifying who within their trust they can work with to improve source data quality, and how they might go about it.

The section covers:

- Clinical and operational engagement

- Accountability for data quality

- Joint working between informatics, information and costing functions

- Designing systems to support high-quality source data

- Targeting data quality improvement

- Training clinical and operational staff.

Clinical and operational engagement

The key to improving data quality is engaging with clinical staff, and recognising them as significant users of the costing information. Experience of implementing patient-level information and costing systems (PLICS) has shown that as cost information is shared across the organisation, the quality of the activity data used to build these costs is improved. This is often because it raises the profile of information that may not be reported elsewhere in the organisation. This in turn can improve data capture.

For example, a service may see that by capturing data such as time spent with a patient, the quality of the cost information produced can significantly be improved, and at the same time the information collected is clinically meaningful and can support the performance and development of the service.

Only clinicians and operational managers can put in place the changes to care plans and pathways that costing information indicates will improve value. Their confidence that the source information for costing is of a high quality is therefore vital.

One trust has provided two examples of how it is engaging with colleagues to achieve better-quality data for PLICS.

case study

The costing team at **Nottingham University Hospitals NHS Trust** has put clinical involvement at the heart of its efforts to improve source data for costing.

The team has identified clinical 'champions' across the trust, to support improvements to the quality of data and information from all departments. The success stories are celebrated in posters that are displayed widely throughout the trust's two hospital sites.

These include improvements in outpatient coding for a number of specialities.

- *See full case study 1*

case study

Nottingham University Hospitals Trust has put in place a data quality panel (DQP) focused on the needs of PLICS. It was set up in 2010 to support the project and drive through improvements and developments to the system.

The panel provides a critical review of the system using a combination of data quality reports and materiality and quality score (MAQS) outputs, to identify where improvements in costing may be made and how best to allocate resources to achieve this.

- *See full case study 2*

Trusts need to proactively support clinical and operational staff so that they can be fully engaged with data and information requirements and opportunities. Making sure that the data requirements for costing make sense for clinical staff is important to improving the quality of the data collected. Using data that services already collect, or which have more than one useful purpose, is best practice.

If this is done well, front-line staff become proactive in identifying ways to improve source data quality for costing.

Two case studies demonstrate the benefits of working closely with services, to share information and improve everyone's understanding of the challenges and opportunities.

case study

Maidstone and Tunbridge Wells NHS Trust was aware that it had significant costs invested in therapies, but insufficient information on activities being undertaken.

A working group was set up with the aim of providing much richer information about where staff were working, who they were with and where they would be going next. As a byproduct, this has also provided previously unavailable information to the costing team.

- *See full case study 3*

case study

Plymouth Hospitals NHS Trust identified a problem with outpatient attendances not being coded with appropriate chemotherapy coding for oncology and haematology patients.

The answer – which is relevant to improving any outpatient activity data – was to work with clinicians to develop a shared understanding of requirements.

- *See full case study 4*

Accountability for data quality

Trusts should have clear and recognised senior accountability structures for data quality. Effective trust board engagement to support costing is crucial to driving improvements in the quality of underlying source data. The extent to which boards are actively engaged in the development and use of costing information varies widely.

The costing practitioner has an important part to play in supporting improvements to the quality of source data. Clinicians often raise data quality problems directly with costing practitioners, who can then make sure issues are picked up through their organisation's data quality management process. This is typically managed through an informatics function, which should have an organisation-wide remit for data quality. For some trusts, performance management teams lead on data quality.

Trusts should make it clear who is accountable for the data from all feeder systems – and this should include setting out the sanctions for poor-quality source data. In most cases, clinical staff and operational managers at service level will have key accountability in making sure everyone records high-quality data. One trust's approach is set out here.

case study

East Kent University NHS Foundation Trust has taken decisive steps to establish clear accountability for the quality of all its data and information. This included putting in place an information assurance board.

The trust's aim is to develop a culture where it is unacceptable to have poor data quality.

- *See full case study 5*

The need for good-quality data should be well integrated with the trust's informatics ambitions. One example of the way in which a trust has changed its informatics governance structure to achieve an integrated approach and to better involve clinicians is shown below.

case study

Information governance arrangements at **Birmingham Community Healthcare NHS Trust** have been designed to support improvements to the quality of source data for costing. These arrangements involve clinicians from across all divisions.

- *See full case study 6*

Joint working between informatics, information and costing functions

All source data required for costing should be managed and its integrity maintained centrally by the trust's informatics function. In order to achieve this, the informatics team – or in some cases the performance management team – should also be responsible for checking the quality of the data.

Costing practitioners should not have to go directly to each service for activity data. The role of the informatics team should be clearly specified in the costing plan, and signed up to by senior managers responsible for data management and data quality.

This does not always happen in practice. Informatics policies and procedures typically focus on trust-wide systems, in particular the patient administration system (PAS) and the electronic staff record. Other larger trust systems might also be included – for example, for operating theatres and key diagnostics. However, some clinical feeder systems providing data for costing can be overlooked, even where cost and income are material – for example, therapy data.

Trusts should clearly set out their arrangements to assure data quality and to highlight opportunities for improvement. For one trust, the business intelligence team plays a key role.

case study

The costing team at **Wrightington, Wigan and Leigh NHS Foudation Trust** has prioritised building strong communication channels with its business intelligence (BI) team, to help improve the quality of source data. For example, the BI team supports costing colleagues with:
- Alerts about issues with current data feeds
- Advice on how to improve feeds to increase source data quality
- Updates on potential new data feeds.

- *See full case study 7*

An increasing number of trusts have identified a chief clinical information officer (CCIO), whose responsibility it is to help improve health services through better use of clinical information. These clinicians – chiefly doctors or nurses – work together across the NHS in a network, to develop and share good practice.

CCIOs work across their trusts to support colleagues in identifying and using robust information for managing service and in decision-making. This includes information that costing practitioners can use for PLICS.

One example of how costing practitioners are working with CCIOs is set out here.

case study

Liverpool Heart and Chest NHS Foundation Trust has appointed a chief clinical information officer (CCIO) who is also the electronic patient record lead. The trust's costing lead has worked closely with the CCIO, including resolving a data quality problem with information from the trust's clinical data system in the catheterisation laboratory.

• *See full case study 8*

Designing systems to support high-quality source data

Costing practitioners need to be involved in system developments that have an impact on costing. Costing practitioners can help at the procurement stage to make sure that new systems are suitable for future planned PLICS requirements.

Ideally, trust systems should be set up to ensure incorrect data cannot be input – for example, by including:

• Mandated fields to ensure complete data

• Not allowing data to be entered in the wrong format or sequence

• Instantly flagging where data is outside the expected range.

This has been important in the approach that one trust has taken when procuring a new system.

case study

Plans to procure a single clinical system for **Coventry and Warwickshire Partnership NHS Trust** provided an opportunity for the costing practitioner to make sure that PLICS requirements were built in to the specification from the start.

• *See full case study 9*

The accuracy of source data should be checked on a regular basis and trust systems should help achieve this. A number of trusts have developed lists of data checks that are undertaken either 'manually' or automatically by costing systems or feeder systems. These checks are typically based on a trust's experience of common data errors and omissions, and good practice is that the list is generated through joint work between a trust's costing team and data quality leads.

Examples of data checking lists are in Appendix 1, built up from the lists submitted by a number of costing practitioners in acute and community services. These represent the data checks felt to be most important to improving source data quality from key feeder systems.

Data errors that do get through to the costing practitioner need to be managed so that those collecting and entering the data understand and do not repeat the error.

Data quality should be assured as close as possible to the point of capture so that front-line staff including clinicians 'add value' to the process, guide improvements and 'own' the quality of their activity data.

Three organisations have shared their approaches:

case study

At **Nottingham University Hospitals NHS Trust** data checks are automatically performed within the costing system.

The source data report runs in about 15 minutes for the trust's 1.4m patients and 32 data feeds. The speed of this automated approach means that data errors can be quickly flagged and sent back to those staff collecting and entering the data for correction.

- *See full case study 10*

case study

Having to undertake manual data quality checks was holding back PLICS development at **St George's University Hospitals NHS Foundation Trust**.

This led to the trust procuring a system to undertake a fully automated activity and data matching process, which has increased the trust's capacity to roll out PLICS to all areas.

- *See full case study 11*

case study

In Wales, the **Abertawe Bro Morgannwg University Health Board** has designed a data quality process for PLICS. The key principle is that data checks are undertaken on inputs and outputs on a monthly or quarterly basis.

- *See full case study 12*

Targeting data quality improvement

Trusts need to know how the quality of source data affects their business. From a financial perspective, areas of high spend where data quality is poor or unknown should be key trust targets for improvement.

For acute (and mental health) services, the HFMA's materiality and quality score (MAQS) template can help trusts to prioritise areas of material spend where data quality needs attention. The following case study sets out how one trust achieves this. Community trusts do not have a bespoke MAQS template but the same evidenced-based approach to identifying high spend areas where data quality is poor can still be adopted.

case study

Nottingham University Hospitals NHS Trust has used the HFMA's materiality and quality score (MAQS) self-assessment to prioritise areas where data quality needs attention.

Joint work between clinicians, informatics and costing colleagues has enabled the trust to identify relatively 'quick wins' as well as longer term projects to achieve improvement. This evidence-based approach means the trust is able to target its resources to deliver important improvements in the quality of data in areas where spend is material.

- *See full case study 13*

Training clinical and operational staff

Trusts should actively identify and address the training and support needs of clinical and operational staff to enable them to accurately collect the activity data required for costing. The following two case studies provide examples of how this can be achieved.

case study

As an early implementer of PLICS for community services, **Lincolnshire Community Health Services NHS Trust** identified that, over time, the type and accuracy of information being recorded by clinicians varied between services and teams.

In response, the information management and technology team developed a group of trainers specifically focused on the community activity system.

- *See full case study 14*

case study

In 2012, the **University Hospitals of Leicester NHS Trust** recognised the need for clinicians – particularly doctors – to better understand trust finances. The associate medical director worked with the deputy finance director to develop a training programme, and the senior costing accountant contributed a session on costing, PLICS and service line reporting.

In an effort to sustain engagement with new clinicians, the trust has developed an online voluntary training package and more than 500 staff have accessed the modules within two months of launching.

- *See full case study 15*

Section 3

What approaches have costing practitioners taken to resolve specific data quality challenges?

This section describes approaches that members of the Acute and Community Costing Practitioner Groups have taken to resolving specific data quality challenges. Some of the challenges are relevant to both acute and community services, while some are relevant to only one sector. The challenges are listed below.

Relevant to acute and community services	Relevant to acute services	Relevant to community services
• Capturing timely activity data • Date and time stamps • Monitoring use of stock and other assets • Pharmacy weightings • Wasted products • Pooled budgets	• Diagnostics • Operating theatres • Emergency department activity • Using job plans	• Linking clinical staff costs to patient-level activity • Capturing staff travel time • Overcoming issues of mobile working • Achieving accurate information on use of buildings

Relevant to acute and community services

Capturing timely activity data

Clinical activity must be recorded in a timely manner on the clinical system. Long delays between an activity being carried out and it being recorded can lead to information never being recorded or being inaccurate.

Trust policies on data capture need to reflect this, so that the trust can be confident that the data it s using for decision-making is current. Professional requirements within clinical practice can be helpful in achieving this.

case study

Lincolnshire Community Health Services NHS Trust has put in place a clinical records management policy, which states what should and should not be recorded in a clinical record. It also states all entries must be recorded within 24 hours of treatment or care. The benefits to PLICS are:

• The patient record is reasonably up to date when activity extracts are run, supporting data matching requirements

• The record contains all relevant information – activity will not be missing.

For services where there is a time lag in receiving data – for example, with outsourced services – it is important that costing practitioners understand enough about the service and the underlying data processes to decide how to manage the delay. As part of this, it is important to explain the impact on the output from PLICS.

case study

Where in any one month the cost information is available but activity data might not be received in time for the PLICS run, **Lincolnshire Community Health Services NHS Trust** has developed a way to reduce the impact on PLICS accuracy.

• *See full case study 16*

Date and time stamps

The day of the week and the time of day when services are provided can have a direct bearing on the cost. For example, theatre sessions outside scheduled operating hours might mean paying staff working at premium rates. Currently not all activity data-capture systems and PLICS software take this into account.

case study

North Tees and Hartlepool NHS Foundation Trust uses date and time stamps to 'weight' costs. This is enabled through the software which produces the trust's PLICS outputs.

The system is able to produce an itemised daily bill for each patient. If the date and time stamp is collected in any data set, then the trust's built-in processes flex the costs based on:

- The number of staff providing the service
- The unit cost at the specific time at which the patient activity takes place.

This has been implemented for theatres (including endoscopy), wards and the emergency department. The next stage is to understand the staffing levels for other areas so that this can be applied to services such as radiology, pathology, pharmacy and therapies.

Monitoring use of stock and other assets

Barcode technology can enable trusts to directly link the use of products, consumables and even staff resources to a patient record. As well as improving data for PLICS, this approach can also improve patient safety. One trust has set out how it has applied this technology in its operating theatres.

case study

Derby Teaching Hospitals NHS Foundation Trust identified that it needed a stock control system, especially for theatre consumables including high-value items. By introducing a bar coding system to log product use, the trust has not only improved source data for costing, but enabled better engagement with clinicians on how their practice compares with others.

- *See full case study 17*

Pharmacy weightings

Trusts use different methods to allocate pharmacy overheads, including by sharing the cost:

- Across all patients
- Across all patients issued with a prescription
- Based on the number of prescriptions
- Based on the value of the drugs prescribed.

None of these provides a good proxy of the actual pharmacy overheads absorbed by particular patients and so lead to inaccurate source data for costing. One trust has worked to improve on this.

case study

In order to improve the allocation of pharmacy overheads, the costing team at **Plymouth Hospitals NHS Trust** undertook a joint piece of work with pharmacy department leads. Pharmacy colleagues came up with a series of 'weightings' that are determined by the type of medication being issued.

- *See full case study 18*

Wasted products

There are times when a product or consumable is issued for a patient but not used. This might be because of a mistake in issue, a change in need, or when a product is dropped or in some other way compromised. When this happens, the way in which the source data is managed can make a significant difference to the accuracy of patient-level costing.

case study

Plymouth Hospitals NHS Trust has undertaken work with the pathology department to ensure that the data the costing team receives on blood products issued also includes any wasted products.

- *See full case study 19*

Pooled budgets

Where pooled budget arrangements are in place, the information available from partners might not always be adequate to meet PLICS requirements. Trusts should ensure that arrangements are put in place within partnership contracts to support costing needs.

case study

When **Lincolnshire Community Health Services NHS Trust** started using PLICS, it quickly realised that the data available about the use of pooled budgets – for example, the 'home loan' service run jointly with social services – was not good enough.

The trust's approach now is that, as part of the contract negotiation process, any joint service arrangements must include agreement of a minimum dataset.

- *See full case study 20*

Relevant to acute services

Diagnostics

Diagnostic services are high intensity and generate a lot of activity data for inclusion in the costing system. This includes data from 'direct access' to diagnostics by primary and community referrers. Ensuring the information required for costing is part of the referral process is important, regardless of how the patient is referred. Two trusts have worked to improve data quality for diagnostics as follows.

case study

Plymouth Hospitals NHS Trust had problems with the quality of referral data it received from its imaging information system. This made it difficult to match activity data to the PAS.

In response, the costing team developed an automatic data quality check within its costing system.

- *See full case study 21*

case study

Lack of a key piece of information from **Doncaster and Bassetlaw Hospitals NHS Foundation Trust**'s 'direct access' radiology and pathology services has made the trust's costing practitioner think creatively to fill in the gap.

- *See full case study 22*

Operating theatres

For most acute trusts, operating theatre costs are significant and so ensuring that these can be accurately assigned to patient activity is important. Most trusts use theatre management systems to provide information on the stages of a patient procedure, enabling specific analysis of time (and therefore resources) used in patient anaesthesia, surgery and recovery.

Theatres need to be able to provide a significant amount of data important to patient-level costing. The following case studies explore four key areas.

Managing missing timing information

Trust data quality procedures and systems should ensure that all theatre timing points recorded for costing and other information needs are accurate and complete. Where this is not the case, trusts need to understand how best to substitute missing or incorrect data.

case study

The process for recording theatre timing points at **Liverpool Heart and Chest NHS Foundation Trust** is known to cause data quality issues. To fill in some of the data blanks, the costing lead uses the information in PAS about patient movement from one area of the hospital to another, which is typically available, complete and reliable.

- *See full case study 23*

case study

At **Princess Alexandra Hospital NHS Trust**, when theatre timing data is missing, the emphasis is on using the data that *is* available to provide as accurate a picture as possible.

A list of potential 'best substitute' timing points has been developed.

- *See full case study 24*

Accounting for staff resources in theatres

Job plans are not always a good basis for noting which staff are involved in a patient procedure in an operating theatre, as they are not always accurate or up to date. There are also times when additional 'unplanned' staff are required to attend some part of a procedure.

case study

Working with theatre staff, **North Tees and Hartlepool NHS Foundation Trust** has identified a way to capture data on all staff resources that are being used in an operating theatre at any particular time.

The trust's theatre manager alerted the costing practitioner to the fact that, for clinical governance purposes, theatres must keep a written log of all staff in the operating theatre for each patient. The trust has now built this data field into its PLICS model to ensure the correct staff costs are calculated for each patient, covering all grades and specialties.

This is particularly helpful where a specialist from another specialty is required for a specific procedure, as this probably will not be scheduled in their job plan.

Understanding the use and cost of consumables in theatres

Where NHS organisations do not yet have access to individual patient-level detail on consumables used as part of a theatre procedure, 'profiling' typical usage can improve the quality of data for costing.

case study

To improve information for costing, the costing practitioner at **Doncaster and Bassetlaw Hospitals NHS Foundation Trust** has initiated some project work with the trust's operating theatre practitioners. This has centred on jointly developing a 'profile' of the consumables typically used in specific theatre procedures.

- *See full case study 25*

Health boards in NHS Wales vary in their ability to assign the cost of prosthetics at patient level. Those that are not yet able to do this can benefit from those that can.

case study

The **NHS in Wales** reviewed the methodology used in 2013/14 by each health board to allocate prosthetic costs. It was concluded that those health boards able to identify costs per prosthetic per individual patient would be able to provide a useful benchmark against which others could test (and possibly revise) their standard costs.

- *See full case study 26*

Matching unutilised theatre time

Unutilised operating theatre time can occur because not enough patients are scheduled to fill the available session, or when planned patient procedures do not happen because the patient is cancelled or 'did not attend'.

In many trusts, unutilised time might be allocated as an overhead to all patients, or to all theatre patients, or to all theatre patients in a particular specialty. In any of these cases, this inaccurate source data for costing significantly distorts costing outputs.

case study

North Tees and Hartlepool NHS Foundation Trust has built in an additional feature to its costing model, so that the cost of unutilised time in a theatre list is allocated specifically to the patients on the particular list in question. This reduces the distortion and does not penalise other surgical teams that use their lists effectively.

Emergency department activity

Using time and date stamps (as described earlier) to weight emergency department (ED) activity is important – a high proportion happens at weekend and out of hours. This relies on accurate recording of the times of admission, discharge and transfer on the PAS.

However, the time a patient spends in the ED is not necessarily a good indicator of the resources that patient used. This is because a seriously ill patient would be seen immediately, have significant resource input, but probably be transferred to an admitting ward in a short timeframe. However, a patient with a minor injury might wait up to four hours but then be seen by a junior member of staff for only a few minutes.

If time in the department is used as the basis for cost calculation, the minor case would cost significantly more than the major case.

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case study

North Tees and Hartlepool NHS Foundation Trust is calculating costs based on the treatment time rather than the overall time a patient spends in the emergency department (ED).

In the example below, patient A has been in the ED for three hours 50 minutes and patient B has been there for three hours 25 mins.

	Patient A	Patient B
Arrived in ED	19:00	19.05
First seen by clinician	22.30	19.05
Discharged/transferred	22.50	22.30

But the level of resource each patient has used is very different. Based on treatment time, patient A would attract 20 minutes of clinical staff cost, whereas patient B would attract three hours 25 minutes.

Using job plans

Better source information about how clinicians use their time in a trust helps costing practitioners assign costs to patient- and non-patient-related activities. However, typically job plans, service rotas and timetables can be quickly out of date. One trust is making some progress in some areas.

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case study

Sheffield Teaching Hospital NHS Foundation Trust has been challenging specialities and sub-specialities to improve the quality of their job plans. This information is utilised in the costing system by analysing programmed activities into a number of different categories.

Advantages include allowing more accurate sessional recharges to be made between departments.

• *See full case study 27*

Relevant to community services

Linking clinical staff costs to patient-level activity

As upwards of 70% of patient-level costs in community services are staff costs, being able to directly link the time spent with a patient to the cost of the staff delivering the care makes a big impact on the quality of source data for PLICS.

Many trusts with community services are currently unable to allocate the costs of a member of staff to the patient they have cared for, and are more likely to average staff costs across a number of patients. A few trusts have developed solutions to this problem by automating links between activity data systems and staff payroll systems (electronic staff records – ESRs). They can identify at a patient level:

- Type of intervention
- Staff involved in patient intervention
- Time spent by each member of staff
- Cost of individual members of staff time.

One approach to achieving this is set out here.

case study

Lincolnshire Community Health Services NHS Trust recognised that pooling the total cost of a clinical team across the total team activity would not be good enough to meet PLICS requirements. The trust found new ways of using and linking its existing systems to significantly improve the accuracy of the 'cost per patient' and 'cost per contact' metric.

- *See full case study 28*

Capturing staff travel time

Community staff can spend considerable time travelling between patient homes and clinics. Without information on staff travel time, trusts cannot assess whether allocating actual travel costs at a patient level would make a material difference to the overall patient cost.

Not all trusts separately collect travel time. The approach of one that does is set out below – although there are still problems to resolve in how the information is used.

case study

Humber NHS Foundation Trust has been collecting staff travel time in its PAS. Staff are required to log all travel related to clinical activity against individual clients. Currently the trust is reviewing how this is managed, to make further improvements.

- *See full case study 29*

Overcoming issues of mobile working

Making sure that information on patient contacts and interventions is accurately and quickly recorded is particularly challenging for clinicians working in the community. Even with mobile technology, issues with connectivity can lead to duplication of effort and, in some cases, a need to 'return to base' to upload data. This delay can mean that the quality of the data is poorer.

case study

For several years, **Humber NHS Foundation Trust** has been seeking ways to overcome the difficulties of accessing and uploading data for community-based staff. The recent 'mobile worker' project has delivered big benefits in a number of areas, including the quality of source data for PLICS.

- *See full case study 30*

Achieving accurate information on use of buildings

Trusts need comprehensive, high-quality and current information about their buildings and facilities to assess whether they support current and future service ambitions. For community trusts, this can mean taking an integrated view across health, social care, private and third sector partners.

To provide accurate source data for costing, information requirements include:

- Who and where – the staff, including grade, who operate clinics and other services from specific parts of buildings

- What and how – the level and type of activity the buildings are used for

- When – the timings of clinical service delivery and other types of healthcare activity.

case study

As part of the Transforming Community Services initiative, **Lancashire Care NHS Foundation Trust** took over the management of community services across Lancashire,. This brought together around 7,000 staff operating from more than 700 premises across a wide geographical area.

The premises and facilities were transferred with only scant information on how they were being used. The trust did not have good enough source information for its costing procedures and this meant it had unreliable service-level costs. To resolve this problem, in 2013 the trust began a piece of work to map the use of all of its premises and facilities.

- *See full case study 31*

In addition, some community hospital outpatient departments are used as satellite sites for clinics run by acute trusts. In such cases it is essential to capture information on what resources are being used, as demonstrated below.

case study

Gloucestershire Care Services NHS Trust routinely hosts outpatient sessions operated by local acute providers. To be able to properly allocate costs and make relevant recharges, the trust captures information about:

- Which rooms are used, and for how long, so that the square metre calculations for the outpatient department can be applied

- Which acute sessions use the community trust's outpatient nursing staff (for example, occupational therapy hand clinics) and which arrive as fully-contained services (for example, tissue viability clinics), so that staffing costs can be apportioned.

The trust uses a bespoke room-booking tool to capture usage of the different rooms on different days, making it straightforward to calculate estates costs by service line.

Section 4

'Things to think about' checklist for costing practitioners

Costing practitioners should share and promote the good practice case studies from this guidance with colleagues in their trusts, and specifically consider the following programme of activity:

- Identify who within your trust is responsible for the quality of the data from each of your key feeder systems used for costing. Make sure they are aware of your role and how you can work jointly on shared issues

- Understand your trust's approach to clinical involvement in data quality and, where this is not strong, actively promote the good practice examples from this report

- Work with colleagues to identify source data that has multiple uses – for example, as an indicator of service quality as well as cost – so that data collected is as meaningful as possible. This includes being aware of information already routinely collected and understanding its potential use in costing

- With clinical and finance colleagues, make the case for targeting specific feeder systems or data by identifying where the trust spend is significant but data quality is relatively poor. This might be done using HFMA's materiality and quality score (MAQS), although this is not yet in place for community services.

Costing practitioners should also review the findings from Monitor's *Reference cost assurance programme*[3] and work with colleagues to identify areas for improvement. For example:

Focus	Key good practice
Trust board engagement in costing	• Senior clinical support to costing across the services, and costing viewed as a clinical tool
	• Quarterly PLICS report and draft reference costs submission presented to board or delegated committee, including unit costs level information
	• Use of internal audit to measure compliance with national standards as part of board assurance process
	• A non-executive is nominated to lead on costing issues
Ensuring good source data quality for costing	• Clear and recognised senior accountability for data quality
	• All data quality issues monitored through a data quality group with a robust risk log
	• Issues identified through data quality audits followed through and addressed
	• Data audit programme with formal reviews of the accuracy and completeness of data for service line reporting
	• Informatics team has ownership of all data, not just admitted patient care, and provides all information for costing
	• Formal and ad hoc checks on all areas of activity

Appendix 1

Data validation/checking list

This appendix lists the most common data checks identified by the costing practitioners who contributed to this report. These are undertaken manually or automated within a system.

Good practice in identifying and managing data errors through validation checks is described in case studies 10 and 11. In summary, trusts should:

- Build in automated checks within systems, to capture data errors
- Feedback errors to those entering data so that:
  - Missing or invalid data is corrected
  - Colleagues are aware of the need to improve data entry practice in the future
- Consider options for ensuring all feeder systems for costing have mandated fields and specified data formats, so that validation is moved as close to the point of data entry as possible.

The following sample of validation checks is listed by type of data feed. Some of these checks point clearly to data quality issues, but some only indicate where there are potential errors which need further investigation.

For all data feeds

- Records with mandatory data values missing
- Data not in expected format – for example, alphanumeric, length of entry.

Episode/appointment data from PAS/similar system

- Episodes with no start date
- Episodes with zero or negative length of stay
- Episode duration unusually low or unusually high compared to the median
- Episode end date greater than spell end date
- Combined episode length of stay greater than duration of spell
- Critical care length of stay longer than episode length of stay
- Variance to run rate
- Patient-level data and manual data resulting in duplicates – for example, in community systems when teams move from manual to electronic systems.

Support services such as pharmacy, stock management system

- Records with matching key (patient ID/NHS number/episode or appointment number) missing, or of wrong length or format
- Records with item identification flag – for example, name of item – missing/new to system
- Records with item quantity and price missing/improbable values.

Appendix 1 continued

Data validation/checking list

Support services such as radiology, pathology, electrophysiology and physiotherapy

- Records with matching key (patient ID/NHS number/episode or appointment number) missing, or of wrong length or format

- Records with timing data missing/duration unusually low or unusually high compared with the median; start time greater than end time

- Records with procedure flag missing/new to system – for example, chest x–ray or stress echocardiogram.

Theatre module/special procedure suites, such as catheter laboratories or endoscopy rooms

- Records with matching key (patient ID/NHS number/episode or appointment number) missing, or of wrong length or format

- Records with timing data missing/duration unusually low or unusually high compared with the median; start time greater than end time

- Records with main operators (consultant, anaesthetist, radiographer) missing/new to system.

Team-based data

- Activity with no team codes

- Activity with no service codes

- Teams with no activity data

- Incomplete activity for teams

- Team ID and team descriptions do not match (issues with mapping from clinical systems to data warehouse to organisation structure)

- Merged teams where not all activity data is included.

Staff data

- Multiple names for one member of staff – for example, different spelling or level of detail (initials vs first name)

- Agency staff – no activity recorded or not linked to correct team

- Group activity – for some groups several members of staff record activity, for other groups only one staff member records it all.

Appendix 2

Typical data feeder systems

Trusts with acute and/or community services may have a number of feeder systems covering a wide variety of data. This list of typical data feeds for costing, based on suggestions from costing practitioners, is intended as a prompt to help trusts identify key systems that provide material information for costing. Different trusts might use different terminology – for example, 'imaging' for some is 'radiology' for others.

Admitted care	Electronic staff record	Pathology
Anaesthetics rota	Ear nose and throat activity	Patient food/catering
Anthony Nolan invoices	First trimester screening	Payroll
Assets	Floor areas/occupancy	Pharmacy/pharmacy technical services
Audiology	GUM attendances	Physiotherapy
Bereavement services	Histopathology	Podiatry
Blood products	Housekeeping	Portering
Breast screening	Imaging	Post room
Cardiology consumables	Implants/prosthetics	Procurement orders
Catheterisation laboratory	Income	Psychology
Chemotherapy	Interpreters	Radiotherapy
Clinical Negligence Scheme for Trusts	Job plans	Renal dialysis
Clinical perfusion	Junior doctor rotas	Respiratory medicine
Consumables	Maternity	Rheumatology
Contraception	Medical equipment maintenance	Sexual health
Contracted out activity	Microbiology	Social care services
Community contacts	Mortuary	Speech and language therapy
Critical care (adult/paediatric)	Neonatal ICU transport	Sterile services
Dental/community dentistry	Neurophysiology	Theatre activity/recovery
Devices	Nuclear Medicine Cancer Drugs Fund	Transport
Dietetics	Nurse rostering	Trial balance
Discharge management	Occupational therapy	Vascular access consumables
Drugs/homecare drugs	Orthotics	Vascular access team
Endoscopy	Outpatients	Wards
Emergency department	Pain clinics	Wards acuity

Appendix 3

Acknowledgements

We are grateful to the following people who contributed to the case studies in this guidance paper.

Name	Job title	Organisation
Alan Collinge	Information and data quality programme manager	Birmingham Community Healthcare NHS Trust
Sarah Green	Income and pricing lead	
Sandip Kandola	Income and pricing lead	
Alison McLennan	Principle finance manager (SLR and costing)	Abertawe Bro Morgannwg University Health Board, NHS Wales
Lisa Powell	Programme manager	NHS Wales Health Collaborative
Andy Weaver	Finance manager	Sheffield Teaching Hospitals NHS Trust
Attiq Ahmad	Head of costing and SLR	St George's NHS Foundation Trust
Clare Jacklin	Financial analyst	Humber NHS Foundation Trust
Christopher Jones	Costing and SLR accountant	Coventry and Warwick Partnership NHS Trust
Jane Flynn	Head of information	
Deborah McEvoy	Costing accountant	Lancashire Care NHS Foundation Trust
Ellen Rockley	Head of costing	Doncaster and Bassetlaw Hospitals NHS Foundation Trust
Gan Raman	Head of costing	Liverpool Heart and Chest NHSFoundation Trust
Dr Johan Waktare	Chief clinical information officer	
Helen Scott	SLR accountant	Wrightington, Wigan and Leigh NHS Foundation Trust
Jenny Richards	Costing and project accountant	Gloucestershire Care Services NHS Trust
Lela Parojcic	Costing lead	Derby Teaching Hospitals NHS Foundation Trust
Kevin Downs	Director of finance	
Marc Farr	Director of information	East Kent University Hospitals NHS Foundation Trust
Matt Miles	SLR/costing accountant	Lincolnshire Community Health Services NHS Trust
James Ingamells	Information manager	
Patrick McGinley	Head of costing and SLR	Maidstone and Tunbridge Wells NHS Trust
Ray Dunstone	Costing lead	Princess Alexandra Hospital NHS Trust
Sarah McQuarry	Finance systems and costing accountant	Plymouth Hospitals NHS Trust
Scott Hodgson	Costing lead	Nottingham University Hospitals NHS Trust
Steven Lee	Senior costing accountant	University Hospitals of Leicester NHS Trust
Sanjay Agrawal	Consultant in respiratory medicine and intensive care	
Stuart Burney	Head of costing and financial systems	North Tees and Hartlepool NHS Foundation Trust

Appendix 4

HFMA Acute and Community Costing Practitioner Groups

This guidance paper has involved debate and discussion with members of the HFMA Acute and Community Costing Practitioner Groups. The HFMA would like to thank all of those individuals and their teams who have been involved in the groups.

The **HFMA Acute Costing Practitioner Group** includes representatives from the following organisations:

- Alder Hey Children's NHS Foundation Trust
- Birmingham Children's Hospital NHS Foundation Trust
- Frimley Health NHS Foundation Trust
- Guy's and St Thomas' NHS Foundation Trust
- Liverpool Heart and Chest Hospital NHS Foundation Trust
- Maidstone and Tunbridge Wells NHS Trust
- NHS Wales Health Collaborative
- North Tees and Hartlepool NHS Foundation Trust
- Plymouth Hospitals NHS Trust
- Princess Alexandra Hospital NHS Trust
- Royal Bournemouth and Christchurch Hospitals NHS Foundation Trust
- Royal Devon and Exeter NHS Foundation Trust
- Royal Free Hampstead NHS Trust
- Royal Liverpool and Broadgreen University Hospitals NHS Trust
- Salford Royal NHS Foundation Trust
- Sheffield Teaching Hospitals NHS Foundation Trust
- The Christie NHS Foundation Trust
- The Walton Centre NHS Foundation Trust
- University College London Hospitals NHS Foundation Trust
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- Nisha Mistry, Department of Health
- Catherine Mitchell, HFMA head of costing and value
- Ben Renshaw, HFMA committees manager
- Gary Shield, National Institute for Health and Care Excellence
- Yang Tian, Monitor
- Ann Trudgeon, independent consultant
- Becky Vine, HFMA Healthcare Costing for Value Institute manager
- Terry Whittle, NHS Trust Development Authority

Appendix 4 continued

The **HFMA Community Costing Practitioner Group** includes representatives from the following organisations:

- Betsi Cadwaladr University Health Board
- Birmingham Community Healthcare NHS Trust
- Bridgewater Community Healthcare NHS Trust
- Cardiff and Vale University Health Board
- Coventry and Warwickshire Partnership NHS Trust
- Dorset Healthcare University NHS Foundation Trust
- First Community Health & Care
- Gloucester Care Services NHS Trust
- Homerton University Hospital NHS Foundation Trust
- Humber NHS Foundation Trust
- Lancashire Care NHS Foundation Trust
- Leeds Community Healthcare NHS Trust
- Lincolnshire Community Health Services NHS Trust
- Liverpool Community Health NHS Trust
- NHS Wales Health Collaborative
- Northamptonshire Healthcare Foundation Trust
- North East London NHS Foundation Trust
- North Essex Partnership NHS Foundation Trust
- North Tees and Hartlepool NHS Foundation Trust
- Oxford Health NHS Foundation Trust
- Pennine Care NHS Foundation Trust
- Shropshire Community Health NHS Trust
- Somerset Partnership NHS Foundation Trust
- Southern Health NHS Foundation Trust
- Wirral Community NHS Trust

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- Scott Hodgson, HFMA costing standards lead
- Nisha Mistry, Department of Health
- Catherine Mitchell, HFMA head of costing and value
- Mandy Nagra, NHS England
- Ben Renshaw, HFMA committees manager
- Yang Tian, Monitor
- Ann Trudgeon, independent consultant
- Becky Vine, HFMA Healthcare Costing for Value Institute manager

Appendix 5

Full case studies

Section 2 case studies: Clinical and operational engagement

case study 1

The costing team at **Nottingham University Hospitals NHS Trust** has put clinical involvement at the heart of its efforts to improve source data for costing.

The team has identified clinical 'champions' across the trust, to support improvements to the quality of data and information from all departments. The success stories are celebrated in posters that are displayed widely throughout the trust's two hospital sites. *See Materials to share case study 1* These include improvements in:

- **Consultant attribution in outpatients** By working with clinicians to improve practice, all outpatient clinics are now coded to the correct consultant. This has had a big impact on clinical engagement

- **Coding of multi-professional interventions** In just one directorate, 3,500 outpatient attendances were identified that were wrongly coded as single professional procedures. New outcome forms have been designed to improve capture of this information

- **Clinical coding** For example, the trust identified a number of patients within clinical haematology where coding should have reflected existing co-morbidities. Joint training sessions for coders and clinicians were established and the quality of coding has significantly improved.

case study 2

Nottingham University Hospitals NHS Trust has put in place a data quality panel (DQP) focused on the needs of PLICS. It was set up in 2010 to support the project and drive through improvements and developments to the system.

The DQP reports to the PLICS board, which has executive-level sponsorship. The panel meets monthly and is chaired by a consultant physician. It comprises:

- Head of costing

- Head of clinical coding

- Head of informatics

- ICT data warehouse colleagues

- The chair of the trust's PLICS board, a consultant ophthalmologist.

The panel provides a critical review of the system, using a combination of data quality reports and MAQS outputs, to identify where improvements in costing may be made and how best to allocate resources to obtain the highest MAQ score.

The trust's reporting system shows, month by month, the matching rates for feeder systems such as theatres, radiology, pathology, wards, cardiology implants and blood products. Reports also differentiate what proportion of the matched data is exactly matched by date, and what is a 'fuzzy' match – for example, up to seven days after an event. This gives the panel assurance on the quality of the feeder system data.

Occasionally, the DQP invites the suppliers of the feeder data to the panel to discuss issues or give explanations about the quality of the data they are supplying.

Unmatched data is also checked by the trust's main data quality team, in particular to identify why systems are unable to match some data. This could be due to:

- Errors in data entry – for example, incorrect medical record number

- Rogue data – for example, pathology tests for a patient under the care of mental health trust, and therefore a patient who should have been excluded from the pathology system feed.

An example dashboard is provided to show the sort of report the DQP receives. *See Materials to share case study 2*

Section 2 case studies: Clinical and operational engagement (continued)

case study 3

Maidstone and Tunbridge Wells NHS Trust was aware that it had significant costs invested in therapies, but insufficient information on activities being undertaken. Trust services cover speech and language therapy, physiotherapy, occupational therapy and dietetics, and include a service level agreement for paediatric physiotherapy services.

Work had been undertaken with therapy leads to support their budget responsibilities, but little was known about who the therapists saw and treated, how long that took and what the outcomes were. At the same time, therapy leads were expressing a wish for better performance management information for their service.

A working group was set up under the head of therapies, with leads from each discipline, an informatics lead, the head of costing and the finance manager. The aim was to develop a database so that individual therapists could enter their workload to a centralised system. This would provide much richer information about where staff were working, who they were with, and where they would be going next.

To keep the required inputs simple, for easy roll-out at minimum cost, the database was designed with a front end comprising a set of forms to guide the therapists in recording data. These forms also allowed work to be planned for the day and the week ahead.

This bespoke design by the informatics lead feeds a database. The process is tweaked for each discipline, recognising their individual clinical workloads. Extensive testing by a range of staff ensured that it was easy to use and would give the therapy leads the information that they need to performance-manage services.

As a by-product, it provides previously unavailable information to the costing team, including which patients therapy staff are seeing on wards and in outpatient clinics. For the costing team, this data is easy to use as part of quarterly service level reporting and costing updates, because it is loaded directly from the database into the trust's data warehouse.

The process took about nine months from inception to full roll-out, and is now seen as integral to the operation of the departments. All new staff are introduced to it from their first day.

case study 4

Plymouth Hospitals NHS Trust identified a problem with outpatient attendances not being coded with appropriate chemotherapy coding for oncology and haematology patients.

While admitted care is coded by the trust's clinical coding team, outpatient coding is done by the individual clinical teams using tick-boxes on the outcome forms.

The oncology business adviser worked with the clinical leads and clinical coding team to redesign the outcome form, to make it easier to record the chemotherapy attendances.

As soon as the new outcome form was implemented, there was an improvement in the quality of data recorded.

Work with clinicians to develop a shared understanding of requirements remains a key part of getting good-quality source data for coding. Data quality reports are used to identify where coding is not as expected, so that this can be fed back and corrected.

Section 2 case studies: Accountability for data quality

case study 5

East Kent University NHS Foundation Trust has taken decisive steps to establish clear accountability for the quality of all its data and information. Key to this has been the director of information's focus on 'socialising' data in real time – so that everyone has access to the data they need to do their job. Making sure data is not hidden or exclusive has led to staff at all levels using data for a wide variety of purposes and in meaningful ways.

A key driver was a recognition that, whereas in the past it might have been the case that 80% of available data was accessed by managers and 20% by frontline staff, this is now more likely to be the other way around. For example, most chief executives do not know how their trust's emergency department is performing in real time.

The trust has found that publicising and 'socialising' data has led to an improvement in data quality. The data quality domain on the trust's corporate scorecard is assessed as green.

The trust has also established an information assurance board with a strong data quality strategy, supported by a good operational policy and assurance framework. Job descriptions are aligned to clarify responsibilities across the trust.

The trust's aim is to develop a culture where it is unacceptable to have poor data quality. This includes making it clear to senior colleagues that it is not, for example, the costing practitioner's responsibility to assure the quality of clinical and administrative data.

One area the trust has focused on is improving the quality – particularly the completeness, accuracy and timeliness – of clinical coding. Under national tariff guidance, trusts have eight weeks after patient procedures to complete clinical coding. In the past, this has been difficult to consistently achieve as notes have not always been made easily available to coders.

By making it clear that it is the clinician's responsibility to make sure notes are available, and not the clinical coder's job to chase and track down notes, the trust has seen a significant improvement in performance, with almost no uncoded episodes.

This has been supported by the use of a dashboard to show coding rates for divisions and specialities. Debates between the director of information and clinicians have at times been 'quite crunchy'; it has required a director-level approach to make the necessary progress and start to change the culture. Information on the quality of data is part of clinicians' and other staff members' monthly and annual reviews.

The emphasis on data being made widely available for a variety of purposes means that improvement in quality is reflected in a number of areas – for example, information used for consultant appraisals and in calculating service quality indicators also provides source data for PLICS.

case study 6

At **Birmingham Community Healthcare NHS Trust** information governance arrangements have been designed that support improvements to the quality of source data for costing, through clear leadership, roles and responsibilities:

- The trust's income and pricing function sits within the finance, performance, contracting and informatics service, so is well integrated with trust-wide data management

- Each of the three divisions – specialist services; adults and community; and children – has a data manager responsible for data quality in their area

- The informatics steering group develops the trust's strategic approach, based on requirements from the management board

- The information programme board agrees delivery of the strategy and includes a clinician from each division

- A technical advisory group is in place specifically to look at data quality issues, including for costing, and resolve these.

Historically, the trust has operated 'cost and volume' or 'block' contracts. Improving information at service level and, in the near future, having a better understanding of patient-level costs, will enable the trust to understand the contribution made by each of the activities it undertakes. The structure the trust has put in place is designed directly to support this improvement.

The trust has shared its information governance structure. *See Materials to share case study 6*

Section 2 case studies: Joint working between informatics, information and costing

case study 7

The costing team at **Wrightington, Wigan and Leigh NHS Foundation Trust** has prioritised building strong communication channels with its business intelligence (BI) team.The BI team supports the costing team through:

- Alerts about issues with current data feeds

- Advice on how to improve feeds to increase source data quality

- Updates on potential new data feeds

- Specialist SQL scripting expertise to improve costing processes.

A strong working relationship has been achieved by senior managers in both areas, ensuring that sufficient resource is allocated to the costing development. This is particularly needed during reference cost production, when flexibility is paramount.

The teams sit within the finance department and work on the same site. They are fully aware of each other's workload and deadlines, and share a 'production timetable' that enables BI resources to be used flexibly to meet varying requirements.

A next step is to co-locate a member of the BI team with the costing team for a set number of days each month in order to further improve communication between teams. The trust holds monthly data quality meetings that involve members of the data quality, BI, 'PBR and income' and costing team. This is a forum to discuss: changes in data systems and recording; new data feeds; issues with existing data; and any other data quality-related items.

The trust is implementing a data warehouse, which makes it easy to find relevant data and provides one central team to contact with any issues. A few sets of data still held outside the warehouse will be included – for example, pharmacy data. The first phase of this project went live in autumn 2015.

case study 8

Liverpool Heart and Chest NHS Foundation Trust has appointed a chief clinical information officer (CCIO), who is also the electronic patient record (EPR) lead. The trust's costing lead has worked closely with the CCIO, including resolving a data quality problem with information from the trust's clinical data system in the catheterisation laboratory.

Instead of receiving information on timings for individual patients, the system defaulted to a standard time for each patient.

The costing lead discussed the problem with the CCIO and discovered that as part of a trust-wide approach to data management, the trust was planning to introduce a diary-based electronic scheduling system for catheterisation laboratory activity.

The scheduling system is run through the intranet in real time, so staff across the trust can see the current patient's progress in the catheterisation laboratory. This allows them to get ready to move the next patient from the ward to the catheterisation lab efficiently, enhancing the patient's experience.

The costing lead realised it was straightforward to add new data fields that would provide the 'feed' for high-quality catheterisation laboratory timing data for costing.

The system was trialled for five months, during which time the data was monitored but not used for costing. Working with the CCIO – a consultant cardiologist – the costing lead 'sense checked' the data provided by the system until it was judged to be 95% complete and accurate.

Since 2013/14 the scheduling system has been fully implemented as a costing feeder system for catheterisation lab activities. The trust is considering where else to use the system, and is currently in the beta testing phase for operating theatres. The plan is to implement this fully from January 2016.

The costing lead is also working with the CCIO, as EPR lead, to look at how to introduce outcomes into the costing system. The approach is to classify outcomes into five or six different 'outcome' groups that include the level of post-operative resources required. This would be based, for example, on additional length of stay due to infection, or services needed because of post-operative bleeding. The classifications also include any follow-on resources from community-based services.

This will enable cost comparisons between patients undergoing the same procedure but with different levels of intervention. From this the value of various interventions can be calculated.

Section 2 case studies: Designing systems to support high-quality source data

case study 9

Plans to procure a single clinical system for **Coventry and Warwickshire Partnership NHS Trust** provided an opportunity for the costing practitioner to make sure that PLICS requirements were built into the specification from the start.

Using a single system across community physical health services, mental health, learning disabilities and child and adolescent mental health services will enable the trust to capture clinical information about a patient in one place, regardless of what service or healthcare professional is providing care and interventions.

It also provides the opportunity to standardise data capture along the patient journey in terms of codes, clinical documentation and data items. Previously the trust relied on different paper-based systems to collect costing information; its previous IT system could not be adapted to meet the changing requirements.

Good-quality data is the foundation for PLICS. By standardising the 'how, what, who and where' data requirements, the trust has the baseline it needs to design a programme of work to drive improvements in the quality of data.

case study 10

At **Nottingham University Hospitals NHS Trust,** data checks are automatically performed within the costing system.

The trust has 32 data 'feeder' systems for activity, including, for example, theatres, pathology, radiology and pharmacy. There are common data checks across all systems – for example, patient identification and the date of the activity event. There are then system-specific checks – for example, for radiology, the automated checks include the test code; for theatres, the time stamps for timing points are checked against expected values.

The source data report runs in about 15 minutes for the trust's 1.4m patients and 32 data feeds. The speed of this automated approach means that data errors can be quickly flagged and sent back to those staff collecting and entering the data for correction. This is done before the data is loaded into the costing system.

The subsequent set of data checks considers the output once resources used have been matched to patient episodes. Data checks at this stage include, for example, looking for:

- Patients who seem to have had multiple tests on the same day with the same test code

- Patients with matched 'theatre' minutes but where there is no procedure code.

A crucial step in supporting data quality improvement is that missing or incorrect activity data is not changed at this stage, but flagged as high risk and returned to the person or department entering the data. This enables two important things to happen:

- Data flagged as potentially incorrect but which, it transpires, is accurate but exceptional (for example, a patient in theatre for more than 12 hours) is not mistakenly changed

- Clinicians and other front-line staff can understand how the error arose and avoid repeating it in future; they can also better appreciate the significance of getting data right first time and make suggestions for further improvements.

This approach has been further developed in two ways:

- Moving the data validation and reasonableness checks closer to the 'front line', so that those entering the data undertake them as a matter of course

- Analysing the types of error that occur and identifying any implications for underlying systems and processes. Where there are persistent data quality issues, the trust investigates reasons more closely through its data quality panel to identify and implement improvements.

Section 2 case studies: Designing systems to support high-quality source data (continued)

case study 11

Having to undertake manual data quality checks was holding back PLICS development at **St George's University Hospitals NHS Foundation Trust**.

Manual processes meant that the time and effort required to 'clean up' the data resulted in the PLICS information available being out of date, and restricted to a few key areas. This diminished its value to the trust for strategic and operational decision-making.

The trust concluded that its data quality would be significantly improved by improving its underlying system, and so procured a new utility. This undertakes a fully automated activity and data matching process and so has increased the trust's capacity to roll out PLICS to all areas.

The system produces reports that highlight weak areas of data quality, and these are sent back to the data providers to seek help in resolving underlying problems. This data assurance feedback loop works to continuously improve the overall data quality.

The trust works with those providing the data to involve them in the system set-up, clearly identifying the data needs and formats. Data quality reports are then shared to help improve, for example, the data match rate.

Feedback from the end users, general managers and clinicians is also used to make changes to the system's 'rules'. This is a continuous process that relies heavily on strong systems and relationships between data providers and end users.

case study 12

In Wales, the **Abertawe Bro Morgannwg University Health Board** has designed a data quality process for PLICS. The key principle is that data checks are undertaken on inputs and outputs, on a monthly or quarterly basis. This approach features:

- Integrated support from the informatics department for health board feeder systems, such as radiology, theatres and pathology, as well as the PAS, which ensures accountability for all elements of data included in costing

- Named informatics personnel with defined areas of accountability who investigate data quality issues encountered by the PLICS team, then assist in resolving them

- Sharing outputs with colleagues from other departments (for example, divisional leads, information colleagues, coding colleagues and theatre departments) to identify areas for joint improvement and refinement.

For example:

- A regular SQL query which lists theatre stays above a 10-hour threshold is used by the theatre manager to correct any theatre coding errors at source

- Any surgical episodes which have not been matched to theatre events are checked to ensure the procedure required a theatre setting; any remaining surgical episodes with no theatre events are discussed with information colleagues and coding errors corrected at source.

Section 2 case studies: Targeting data quality improvement

case study 13

Nottingham University Hospitals NHS Trust has used the HFMA's materiality and quality score (MAQS) self-assessment to prioritise areas where data quality needs attention.

The trust's data quality panel (DQP – also see case study 2) comprises clinicians and corporate managers, focusing on working jointly to improve the quality of the information used for PLICS. Since 2013 the costing team has produced a summary of MAQS for the DQP. This has enabled clinicians to see the materiality of each cost pool, and where the trust ranks against the 'gold/silver/bronze/baseline' scoring system.

For example, the trust currently scores at 'baseline' for the quality of source data for costing on prosthesis, implants and devices. This is a material cost pool for the trust. The surgeons on the DQP recognised that this indicates potential poor engagement with certain specialties that use high-cost implants, such as trauma and orthopaedics.

The DQP used the MAQS allocation methodologies for this particular costing pool to identify what would be required to move to each level, namely:

- Gold – cost per individual prosthetic for all implants used per patient

- Silver – average cost calculated and applied to each type of procedure

- Bronze – average cost by HRG.

It then agreed:

- What can be achieved in a relatively short timeframe with existing resources (quick wins)

- What it would take to get to gold standard.

The trust has now implemented standard costs by procedure, to achieve the silver standard.

This approach has led to the introduction of nursing acuity for ward pay costs and capturing new data feeds to improve the allocation of particular services such as implants in cardiology. The trust is also focusing on medical pay, and looking at options to procure a bar coding stock system, which would provide patient-level output at gold standard level. This is a longer-term project expected to take about two years. The trust's next two targets for improvement are outpatients and special procedure suites.

By adopting this evidence-based approach, the trust has taken its overall MAQS score from bronze to gold, but at the same time achieved a good understanding of continuing weaknesses and their significance. The DQP works to jointly understand what can be done to improve data quality as it upgrades systems and develops new patient feeds for PLICS. This supports the PLICS project board's aim to ensure that all of the trust's 629 consultants actively use PLICS to inform their decision-making.*See Materials to share case study 13*

Section 2 case studies: Training clinical and operational staff

case study 14

As an early implementer of PLICS for community services, **Lincolnshire Community Health Services NHS Trust** identified that, over time, the type and accuracy of information being recorded by clinicians varied between services and teams.

Data quality problems with patient contact information included:

- Contacts not recorded at all

- Contacts double-counted due to poor record-keeping

- Contact details not consistent or complete – for example, actual time of contact not recorded

- Patient contact time recorded, including both care activity and administrative events.

In response the information management and technology (IM&T) team developed a group of trainers specifically focused on the community activity system. The team has several roles:

- To train new starters

- To give refresher courses

- To provide sessions to staff after any changes to the clinical system.

A document is provided to clinicians, which gives a step-by-step guide to recording on the clinical activity system. This covers both clinical interventions with the patient or their proxy, and also administrative events – for example, record-keeping and communication with other clinicians regarding a patient. It is important that these are clearly defined and differentiated.

The introduction of this training approach and guide has resulted in recorded activity being increasingly consistent when viewed team by team.

The trust has learned from its early experience. When the clinical activity system was newly introduced, individual teams were able to request changes to the screens they use, including the way data fields were defined. Over time, these changes have meant that screens for different teams look quite different, and so standardised reporting and comparisons between teams became increasingly difficult.

The trust now has a formal process for any proposed changes to the system, to ensure that reporting is not comprised but to also enable a discussion with clinicians and managers on the proposed changes. Crucially, the finance function is now involved in discussions on changes to the system to gauge any impact to PLICS reporting.

Section 2 case studies: Training clinical and operational staff (continued)

case study 15

In 2012, the **University Hospitals of Leicester NHS Trust** recognised the need for clinicians – particularly doctors – to better understand trust finances. The associate medical director worked with the deputy finance director to develop a training programme, which began with specialist registrars and moved on to consultants.

Key session covered:

- NHS finance, funding flows and budgets

- Costing, PLICS and SLR

- Clinical coding

- Developing business cases.

The senior costing accountant took an interactive approach to his session, covering the theory of costing, demonstrating how data is recorded, analysed and reported, and then giving clinicians access to their own data to review. This proved to be powerful when, for example, a group of orthopaedic surgeons looked together at data and realised that outpatient physiotherapy costs were accrued by the orthopaedic department but commissioners did not pay for this service and so the trust received no income.

About 12 sessions were run over 10 months, and around 200 consultants and 60 trainees attended – approximately one third of the trust's doctors. Participation was voluntary.

In an effort to sustain engagement with new clinicians, the trust has developed an online voluntary training package and more than 500 staff have accessed the modules within two months of their launch. The modules cover similar areas as the training sessions.

The trust has found it difficult to gather intelligence on the impact of the programme on individual practice. Although there were some clear pockets of good engagement from some specialties and departments, and use of PLICS data increased, it is not easy to assess the impact. The trust realises it cannot assume this work made an ongoing difference.

As part of its response to this, the trust has identified that:

- Clinicians need help in making the most of the time they have to analyse data. Clinicians quickly expressed a need for more targeted information, including guidance on using costing data to support strategic priorities and resolve issues. The costing accountant is now putting together a different set of dashboards, currently in Excel, showing specific indicators and the key drivers of income. Examples include length of stay and variation in theatre procedure times. It is hoped this will reignite interest and engagement in costing, and in the quality of the underlying source data

- More work needs to be done with general managers. The focus has been clinicians, and in some cases their engagement has led to more interest from general managers and business analysts. However, some general managers are not as confident in using costing data in decision-making and managing the trust's business as they need to be

- An ongoing, consistent and iterative approach is needed if the trust is to successfully use data to change practice. This needs to become 'business as usual'

- Finance colleagues need to nurture relationships across the trust – and not assume that working with senior colleagues in a department or division will mean information and learning is cascaded.

The trust's associate medical director is now managing a stream of work within the Future-Focused Finance (FFF) initiative. FFF's Close Partnering action area aims to get the best value for each £1 spent in the NHS, by increasing the knowledge base and working relationships of clinicians and finance staff across the NHS, together with the input of patients and the public. Their guide gives clear examples of how different organisations go about achieving this aim.

Section 3 case studies: Relevant to acute and community services

Capturing timely activity data

case study 16

Where in any one month the cost information is available but activity data might not be received in time for the PLICS run, **Lincolnshire Community Health Services NHS Trust** has developed a way to reduce the impact on PLICS accuracy.

Where the trust receives activity data from another provider or service 'in arrears', rather than exclude the service from the PLICS process, it takes one of two approaches, by:

• Using the current cost information alongside the previous month's activity

or if that is not possible or likely to be accurate:

• Creating a 'dummy' activity for the service.

In both cases, the actual activity is updated when the data is available. Meanwhile, the service will be included in the PLICS process and will be shown in any reporting files. This means costs will balance for the service and the trust, and the service will still be able to drill down and compare costs on the understanding that the activity will be updated in the future.

Monitoring use of stock and other assets

case study 17

Derby Teaching Hospitals NHS Foundation Trust identified that it needed a stock control system, especially for theatre consumables including high-value items. The trust saw a demonstration of an mobile data capture system but this did not include stock control.

The trust agreed to work with the system's developers to merge in a stock control system, based on a barcode system linked to electronic ordering direct to suppliers. Consumables are barcoded – as are staff – which shows, for example, who was in the theatre at any time. The ability to record the timings of anaesthesia and in-theatre 'knife to skin' enables comparison between clinicians. The system can also record when education sessions are running.

In parallel, the trust has developed the system to improve the coding of operating procedures that supports the production of individual patient procedure related cost sheets. This also allows the comparison of clinical variation of consumable usage between clinicians undertaking the same procedure.

The trust has estimated that, after system rental costs, it is achieving a saving of £10,000 per month by ensuring:

• Stock is not wasted and excess stock is not held

• There is standardisation of products used, which has enabled prices to be driven down.

The system has also enabled better engagement with clinicians in discussion on use of specific equipment, and about how their practice compares with others.

How the information is presented is key to increasing accountability – for example, enabling the reasons for variation to be explored. Clinical directors can 'drill down' to show the factors that have an impact on cost and outcome, and discuss these with consultants and their teams. How resources are used can be assessed – for example, it might be cost-effective to have more people in theatre.

The data has taken a while to settle down, and needed to be validated in the early days of using the system. It took about six months to get meaningful and accurate data. The trust is currently working with clinicians to ensure the data is presented in a meaningful and user-friendly format.

Section 3 case studies: Relevant to acute and community services (continued)

Pharmacy weightings

case study 18

In order to improve the allocation of pharmacy overheads, the costing team at **Plymouth Hospitals NHS Trust** undertook a joint piece of work with pharmacy department leads.

Pharmacy colleagues came up with a series of 'weightings' that are determined by the type of medication being issued. These are designed to better reflect the staff input involved for more time consuming issues.

The data file now provided to the costing team contains a 'type' field to help categorise the type of prescription issued. Either this field or the drug description is used to create the weightings.

The most time-consuming issues are those that involve the pharmacist filling a tablet organiser for each patient. At the other end of the scale, ward stock issues take significantly less time. The ability to weight the pharmacy overhead means that PLICS data better reflects the resources used for each patient.

Wasted products

case study 19

Plymouth Hospitals NHS Trust has undertaken work with the pathology department to ensure that the data the costing team receives on blood products issued also includes any wasted products.

These are identified at patient level and matched back to the individual patient episodes in the same way as any used products.

Assigning these costs to the individual patients, rather than across a number of patients as an overhead, ensures a truer cost of patient treatment is calculated.

The same principle applies where drugs or prosthetics issued to an inpatient are not used and are returned to store for future use. The important thing is that the drugs or prosthetics are returned with all relevant patient details intact, so they can be removed from the patient's cost.

Pooled budgets

case study 20

When **Lincolnshire Community Health Services NHS Trust** started using PLICS, it quickly realised that the data available about use of pooled budgets – for example the 'home loan' service run jointly with social services – was not good enough.

In some cases, the data fields required for the costing process were not present in the dataset on pooled budget spend. This meant that the data either had to be excluded or the missing fields populated with 'dummy' data. Even key data, such as a patient's NHS number, was sometimes missing. Without that information, the true cost of a patient episode or journey cannot be accurately calculated.

The trust's approach is now that, as part of the contract negotiation process, any joint service arrangements must include agreement of a minimum dataset (MDS). The MDS should contain the fields that are most important for costing and reporting. As part of this, it should be agreed when the MDS will be available.

Getting this right means that data is received in a timely manner and the data contains all fields required for the costing and reporting process.

Section 3 case studies: Relevant to acute services

Diagnostics

case study 21

A few years ago, the costing team at **Plymouth Hospitals NHS Trust** had problems with the quality of referral data it received from its imaging information system. This made it difficult to match activity data to the PAS.

The key issue was that the information about the referring clinician was often incorrect. Further investigations showed that in many cases this was because the booking clerk had mistakenly selected a clinician with the same surname as the actual referrer.

In response, the costing team developed an automatic data quality check within its costing system. This compares the clinician's General Medical Council number against the PAS to ensure it is a valid record. The costing system's processes match against both the clinician and also the specialty, so this is an additional 'check', highlighting errors where these two bits of data do not correspond.

The team feeds back any errors to the imaging systems team who review and correct the data for the following month. Where recurrent errors have been identified, work has been carried out with booking clerks to minimise these.

Although the incidence of errors was not as great as for diagnostic imaging, the same work has been done with pathology, who also receive a monthly report on any errors identified.

The data quality reports are also discussed in a bi-monthly meeting held with the clinical support services, so any new problems of concern can be identified and investigated.

case study 22

Lack of a key piece of information from **Doncaster and Bassetlaw Hospitals NHS Foundation Trust**'s 'direct access' radiology and pathology services has led to the trust's costing practitioner thinking creatively to fill in the gap.

The trust has a number of sites that provide diagnostics, but the activity information received about direct access services does not include the site name. To improve the quality of information for costing, the costing team takes the patient's commissioner as a basis to identify the site most likely to have undertaken the service.

Thinking about the difference between types of access to diagnostics led the team to identify another opportunity to improve information for costing. As most direct access radiology involves people in the early stages of an investigation, these patients tend to be more mobile than, for example, patients who are referred through the emergency department.

The likelihood therefore is that they will typically need fewer resources for their radiology procedure than other types of referral. They will not, for example, often need:

- Portering services, as they will not be on trolleys

- More than one clinician to position them for a scan, as they will not be unconscious.

In recognising the differences for this patient group, the costing team found ways to improve the quality of activity data for all patients. They are working with the service to identify a local weighting that takes account of patient type and mobility.

Section 3 case studies: Relevant to acute services (continued)

Operating theatres

Managing missing timing information

case study 23

The process for recording theatre timing points – for example, the start of anaesthesia or the start of surgery – at **Liverpool Heart and Chest NHS Foundation Trust** is known to cause data quality issues. The theatre management system is dated and junior clinical and administrative staff often take responsibility for recording the times.

Sometimes the information is not recorded on the system at all. Timing information cannot be added until there is a record in the theatre management system for the patient – and this is not always the case for an emergency procedure.

This has resulted in a high proportion of non-elective procedures returning no useful timing data for costing purposes.

To fill in some of the data blanks, the costing lead has developed an SQL script to interrogate the PAS and to automatically identify which patients should have a theatre module record. Where one does not exist, it is inserted. The script uses the information in the PAS about patient movement from one area of the hospital to another, which is typically available, complete and reliable.

For patients where surgical procedure timings have not been entered at all, or where the data quality is suspect, a 'statistical' approach is used. The average procedure time for a particular surgeon undertaking a particular procedure is used to either fill in blank data, or as a benchmark to compare the entered data. Following specific statistical rules, data can be automatically flagged as outside a 'tolerance' and so likely to be incorrect.

For radiology, which has upwards of 3,000 records per month, this process has been completely automated using SQL scripts. Based on average times and standard deviations, a confidence interval is calculated for each entry. Data falling outside this is changed to the median value.

The trust is in the process of replacing the operating theatre data management system with the same system used in its catheterisation laboratory.

case study 24

At **Princess Alexandra Hospital NHS Trust**, when theatre timing data is missing, the emphasis is on using the data that *is* available to provide as accurate a picture as possible.

The data most useful for costing are the start and end times for anaesthesia, surgery and patient recovery. If one of these data items is missing, then the timing points before or after can be used as a proxy – for example, if 'surgery end' time is missing, the 'anaesthesia end' timing point that typically follows can be used. A full list of potential 'best substitute' timing points is available.
See Materials to share case study 24

A 'sense check' is then undertaken, taking the times produced by this substitution and comparing with the median time for that procedure. If the time produced is less than 50% or more than 200% of median, then the median value is used for that procedure.

Section 3 case studies: Relevant to acute services (continued)

Operating theatres (continued)

Understanding the use and cost of consumables in theatres

case study 25

To improve information for costing, the costing practitioner at **Doncaster and Bassetlaw Hospitals NHS Foundation Trust** has initiated project work with the trust's operating theatre practitioners. This has centred on jointly developing a 'profile' of the consumables typically used in specific theatre procedures.

By focusing on high-volume procedures, the trust has assessed for each procedure the consumables typically used, down to the type and number of gloves. This has enabled the average use of consumables for each high-volume procedure to be assessed and a weighting system developed that covers a significant volume of theatre activity.

The trust plans to improve this further using specific patient-level data and is in the process of tendering for a barcode system to support that ambition.

case study 26

The **NHS in Wales** reviewed the methodology used in 2013/14 by each health board to allocate prosthetic costs. The findings included that:

- Two health boards allocated costs for each individual prosthetics and devices at patient level for all procedures

- Two health boards achieved this about half the time, the rest being based on average cost

- One health board allocated most of its prosthetics and devices based on an average cost per HRG.

It was recognised that those health boards able to identify costs per prosthetic per individual patient would be able to provide a useful benchmark against which others could test (and possibly revise) their standard costs.

In addition, the health boards using similar methodologies felt it would be useful to benchmark costs to see whether any efficiency savings would be possible.

Data showing the average cost per prosthetic by HRG and OPCS codes, procedure code point of delivery, specialty code and health board has been saved on a shared data site so that all health boards can access it. A graphical analysis of the data clearly demonstrates outliers. An example is provided. *See Materials to share case study 26*

The group will continue this work and, if it is clearly beneficial, will extend the process to other direct patient-level cost types.

Section 3 case studies: Relevant to acute services (continued)

Using job plans

case study 27

Sheffield Teaching Hospital NHS Foundation Trust has been challenging specialities and sub-specialities to improve the quality of their job plans (JPs). Clinician time is then allocated according to the split of workload.

Previously, the most robust data was that held within the costing system with ad hoc updates as changes occurred.

The trust recognised that it needed a central repository of JPs, agreed and signed off on a regular basis by clinical directors and the medical director. In response, it has implemented a new job planning system.

The detailed rotas in the JPs are translated into the quantity of programmed activities (PAs) for direct clinical care, supporting programmed activities and other PAs as designated by the specialties. JPs must be updated and signed off at least annually.

This information is utilised in the costing system by analysing PAs into activity by:

- Wards
- Day case theatres
- Main theatres
- Outpatients
- Activity for other organisations
- Ward and theatre on-call
- Multi-disciplinary teams.

PAs for clinical administration, research, postgraduate and undergraduate teaching and other supporting professional activities are also identified.

Clinician time is then allocated according to the split of workload – for example, if 80% of a consultant's time is spent on inpatient activity, the system uses that to allocate time to all inpatients.

Each consultant uses the same rate in the system. However, if the clinician is part time, then a reduced allocation rate is used. Starters and leavers are also identified from medical personnel records and an adjustment is made to these individual consultant codes to be reflected within the system.

One key advantage is the ability to identify where consultants have sessions for other areas, such as endoscopy. This has allowed more accurate sessional recharges to be made.

By holding data at this level, the trust has also been able to use the updated JPs to assist in the education and training reference cost collection, through discussions with clinicians and specialties.

However, there is a danger that too much detail can be provided. If JPs cover individual sub-specialties but are not revised frequently, then if there is relatively little patient activity assigned to those sub-specialties, individual patient costs can be heavily loaded.

Section 3 case studies: Relevant to community services

Linking clinical staff costs to patient level activity

case study 28

Lincolnshire Community Health Services NHS Trust recognised that pooling the total cost of a clinical team across the total team activity would not be good enough to meet PLICS requirements.

The impact of pooling was that the metric showing 'cost per patient' and 'cost per contact' became generic within a team rather than being treatment- or patient-specific. The overall cost and activity was correct but the patient-level detail was lost in the averaging.

The trust identified that the way it used its patient activity system could be enhanced to enable more accurate 'cost per patient' and 'cost per contact' to be calculated.

For all community activity, the trust's clinicians use the same system to record patient contacts and interventions. To log on, everyone uses a 'smartcard', so that every entry on the system can be tagged with the clinician's 'done by' details (first name and surname).

A reference table can then be used to map each 'done by' to an ESR assignment number. This assignment number can in turn be used to create cost pools from the payroll transactions in the general ledger.

It is important that any changes made to the payroll entries in the general ledger retain the original payroll format, otherwise the 'look up' does not work.

This approach has meant that the costing system can match the activity recorded by a clinician to the newly created cost pool. The clinician's payroll costs are allocated based on the length of time recorded for the patient contact.

A key lesson from the trust's experience is that organisations need to understand the full capacity of their systems, not just settle for the functions that have been implemented to date. By identifying what information is available and how it can be used and linked to other systems, new options might arise.

Capturing staff travel time

case study 29

Humber NHS Foundation Trust has been collecting staff travel time in its PAS *See Materials to share case study 29*. Staff are required to log all travel related to clinical activity against individual clients.

For example, if a clinician sees three clients (A, B and C) in one day:

- Record the outward journey to client A to A

- Record the journey from client A to client B as outward to B

- And from client B to C as outward to client C

- Returning to the office is recorded as inward to client C.

The travel time recorded against patients allows the individual staff member's pay costs to be allocated to patients based on more than just the recorded contact times, in an activity type and event by event basis.

Recording the travel time also means the travel expenses claimed by staff members can be allocated to patients. There are, however, a number of difficulties to overcome:

- The expenses system does not contain patient ID or event ID, just the number of miles and the value of the expense claimed for each journey and date of journey. So as yet the travel expense and cost cannot be exactly matched to a specific patient. Instead, travel costs claimed by a staff member is allocated across all the patients where that staff member has recorded travel duration data

- All travel expenses claimed by a clinician are set against travel time linked to patients – even where the travel is to a training course. The trust is seeking ways to resolve this

- The timeframe in which travel claims are submitted and ultimately paid can make matching travel cost to patient activity problematic, as the expenses are claimed in time periods that will occur in at least the following calendar month after the travel event has occurred.

The trust plans to develop a way of reporting travel data which will help it understand the impact of the difficulties still to be overcome.

Section 3 case studies: Relevant to community services (continued)

Overcoming issues of mobile working

case study 30

For a number of years, **Humber NHS Foundation Trust** has been seeking ways to overcome the difficulties of accessing and uploading data for community-based staff.

The trust trialled an approach in 2012, with limited success, for two key reasons:

- The technology at the time was not good enough

- The trust needed to introduce a culture where all relevant staff appreciated and understood the need for mobile working to support service improvement, leading to more efficient and effective ways of working.

Recent work has been much more successful.

All of the trust's community teams use the same patient activity recording system. Although there are significant benefits of having an electronic record, a major issue has been the ability to access the electronic system away from a health site.

The 'mobile worker' project enables electronic records to be accessed in a connected or disconnected way. In practice, what this means is that for planned visits electronic patient records can be downloaded ahead of time. Information entered while offline is stored until a connection is established and then automatically uploaded to the activity system. The primary aim is to enable mobile staff to update the patient's record in a timely manner, chiefly to improve patient safety. However, this approach also provides better quality source data to support costing.

This means that staff can enter data in real-time, even if the upload happens sometime later.

As well as improving the quality of source data for PLICS, there are other key benefits to this approach:

- Reduced clinical risk – staff have access to patient records when off site

- Time efficiency savings – staff no longer have to routinely return to base

- Reduction in use of bank and agency staff – employed staff have more time for clinical duties

- Improved patient care – staff have extra time to care

- Increased 'agile working' – barriers to data access are removed.

Section 3 case studies: Relevant to community services (continued)

Achieving accurate information on use of buildings

case study 31

In 2011-12, as part of the Transforming Community Services initiative, **Lancashire Care NHS Foundation Trust** (LCFT) took over the management of community services across Lancashire. This brought together about 7,000 staff operating from more than 700 premises across a wide geographical area.

The premises and facilities were transferred with only scant information on how they were being used. The primary care trusts and NHS Property Services did not set out clearly exactly which services and staff operated from which parts of the estate. Where the trust did have information, it was often partial and sometimes out of date.

This gap in business information affected the trust's ability to evaluate service efficiencies and plan sustainable models of care. It did not have good enough source information for its costing procedures and this meant it had unreliable service-level costs.

To support a planned large-scale reorganisation and rationalisation exercise, in 2013 the trust began a piece of work to map the use of all of its premises and facilities. This included:

- How other organisations used parts of the estate – for example, social care and the third sector

- Which trust staff used other organisations' facilities.

The trust invested in a proprietary planning and documenting software tool, and set up a joint venture partnership with a construction, development, maintenance and investment company.

A joint project team was set up involving members from estates, costing and corporate services finance, who all took part in a training and planning day at the outset. It was important that this was seen as a joint project and roles and responsibilities were shared across the teams.

The financial coding hierarchy was replicated in the planning system and kept up to date by the costing team, who liaised closely with the estates department to identify changes in reporting structures.

The estates team produced an up-to-date list of all properties where LCFT had a significant presence and ensured that drawings of buildings were uploaded for each property.

A dedicated costing assistant (with full knowledge of the coding hierarchy) was employed to work with building managers to 'walk the floors' and document all occupancy and usage of the buildings identified. This was then input into the planning system, together with financial codes.

In order to ensure that occupancy is kept up to date, building plans are sent out to building managers on a quarterly basis, showing the current recorded occupancy and requesting updates where required.

The property services division also copies in the costing team on any request for building moves, which gives them advanced warning of change.

The corporate services accountant inputs the budgeted costs at a building level to allow costed occupancies to be calculated by building. Reports can be generated at a service line, cost centre and building level, across the whole patch. This information is used for costing but also for service tenders, space utilisation reviews and rationalisation plans.

A next step would be to look at 'reciprocal' arrangements – where, for example, LCFT and social services use each other's buildings – to understand the balance and whether any charges are appropriate.

The trust also has plans to integrate the room booking system for 'agile working areas' (used by various teams on an ad hoc basis), to allocate occupancy to cost centres based on usage, rather than treating it as an overhead.

Appendix 6

Materials to share from the case studies

Case study 1 (right)

Example of the type of information Nottingham University Hospitals NHS Trust puts on posters around its hospital sites
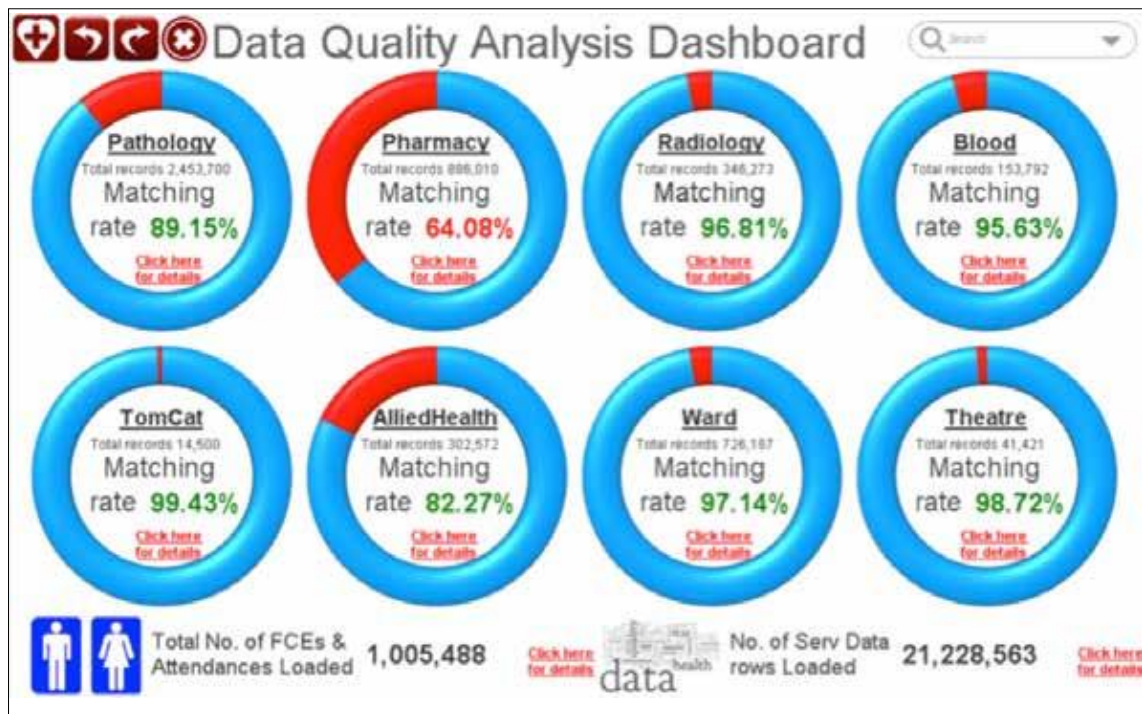

Nottingham University Hospitals NHS Trust

PLICS Success stories – ongoing projects

- Ophthalmology

  Theatre list efficiency, looking at standard deviation across most common procedures e.g. CATERACTS and TRABECULECTOMIES.

- Plastics & Burns

  Variation in cost of theatres for common procedures e.g. PRIMARY CLOSURE OF CLEFT LIP. Costs of Plastic surgeons that support other specialties.

- Infectious Diseases

  Effects of Critical Care costs on Infectious Diseases position.

- Obstetrics & Gynaecology

  Consultant attribution was a problem in Outpatients (OP) but now introduced a practice that has meant all OP clinics are being coded to the correct consultant which will have a big impact on clinical engagement. Also focus on Hysterectomy procedures and reducing the variation and number of follow-up OP attendances

Case study 2 (below)

Nottingham University Hospitals NHS Trust example dashboard showing percentage of data matches in different feeder systems

Data Quality Analysis Dashboard

Pathology	Pharmacy	Radiology	Blood
Total records 2,453,700	Total records 886,010	Total records 346,273	Total records 153,792
Matching rate 89.15%	Matching rate 64.08%	Matching rate 96.81%	Matching rate 95.63%
Click here for details	Click here for details	Click here for details	Click here for details

TomCat	AlliedHealth	Ward	Theatre
Total records 14,500	Total records 302,572	Total records 726,187	Total records 41,421
Matching rate 99.43%	Matching rate 82.27%	Matching rate 97.14%	Matching rate 98.72%
Click here for details	Click here for details	Click here for details	Click here for details

Total No. of FCEs & Attendances Loaded 1,005,488   No. of Serv Data rows Loaded 21,228,563

Materials to share from the case studies continued

Case study 6

Birmingham Community Healthcare NHS Trust information governance structure
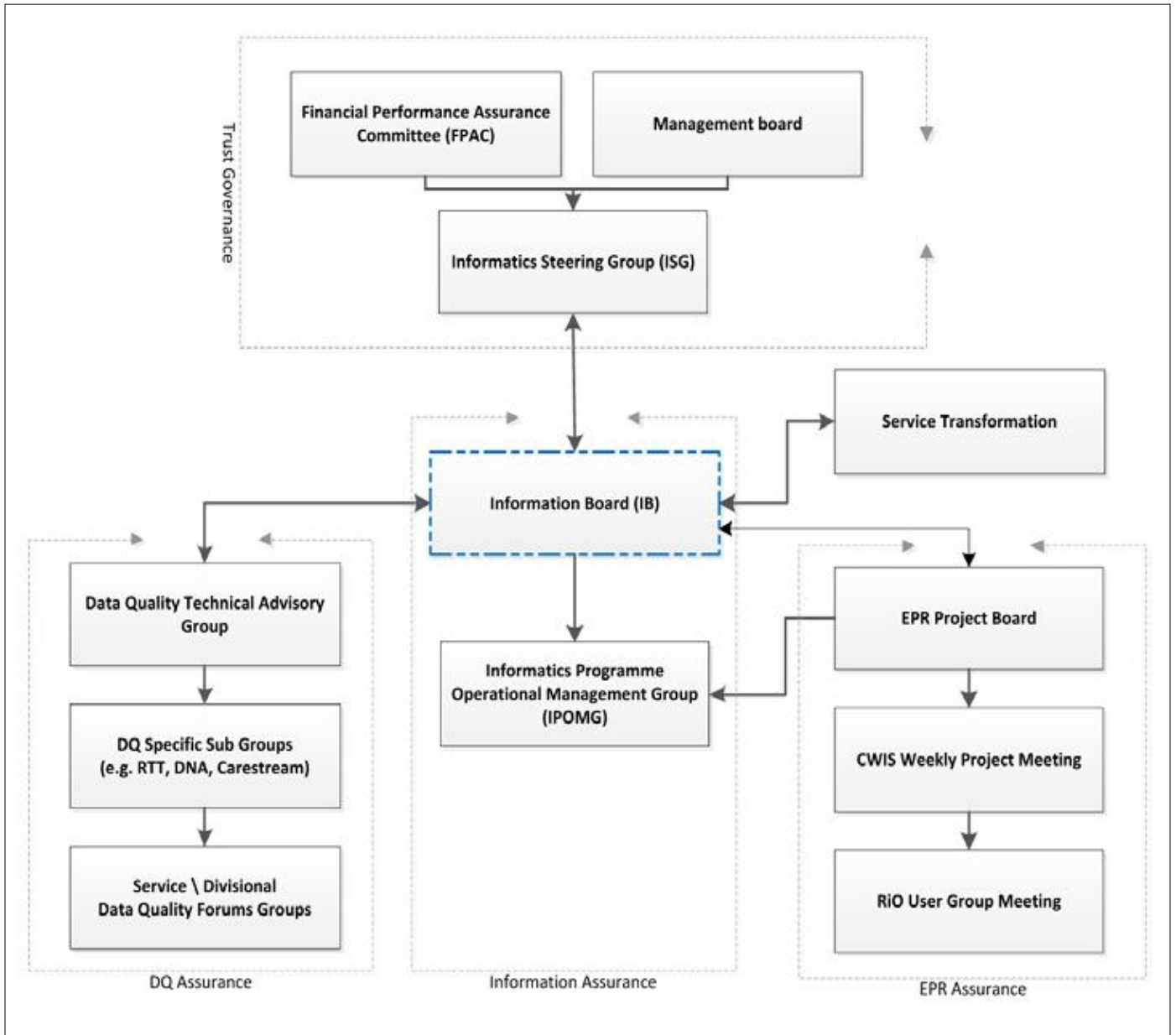
Materials to share from the case studies continued

Case study 13

Nottingham University Hospitals NHS Trust's use of MAQS to identify data quality improvement priorities.

Please note: this contains 'dummy' data to demonstrate the approach.

Total MAQS:	71.3%	Silver	
Expected MAQS if improvement achieved:	76.2%	Gold	

■ (red)	Baseline (below 44.9%)
■ (orange)	Bronze(45% ~ 59.9%)
■ (grey)	Silver(60% ~ 74.9%)
■ (yellow)	Gold(75% ~ 100%)

Cost pool groups or cost pools	Total costs	MAQS for cost pool and cost pool groups and other reporting categories		Cost pool groups or cost pools above materiality level but below baseline	Enter the intended MAQS for the cost pool group after improvement work to see effect on total MAQS
Direct Costs					
Blood and blood products	£2,096,781	72.0%	Silver		
CNST	£9,121,506	64.9%	Silver		
Critical care	£7,805,469	100.0%	Gold		
Drugs	£9,880,684	88.6%	Gold		
Drugs - chemotherapy	£3,547,396	93.9%	Gold		
Drugs - high cost drugs	£14,689,595	75.0%	Gold		
Emergency department	£4,476,122	89.3%	Gold		
Imaging	£9,175,499	97.0%	Gold		
Medical staffing	£50,194,470	66.0%	Silver		76.0%
Operating theatres	£17,387,162	55.8%	Bronze		79.2%
Other clinical services	£37,625,518	71.2%	Silver		
Other diagnostics	£2,630,701	100.0%	Gold		
Outpatients	£1,900,775	25.0%	Baseline	Area for improvement	61.6%
Pathology	£12,139,024	90.0%	Gold		
Pharmacy costs	£5,617,621	50.0%	Bronze		
Prostheses/implants/devices	£1,505,891	25.0%	Baseline	Area for improvement	75.0%
Radiotherapy	£1,335,131	50.0%	Bronze		
Special procedure suites	£3,757,645	24.8%	Baseline	Area for improvement	61.6%
Specialist nursing	£1,448,570	25.0%	Baseline	Area for improvement	
Therapies	£12,327,613	63.0%	Silver		84.0%
Wards	£41,650,584	75.3%	Gold		
Non patient Care activities*	The costs in this cost pool group are currently excluded from the MAQS scoring system				
Secondary commissioning costs	The costs in this cost pool group are currently excluded from the MAQS scoring system				
Total of Cost Pool Groups	£250,313,756				
Indirect	£6,994,849	97.5%	Gold		
Overhead	£41,538,396	65.3%	Silver		
Grand total	£298,847,002				

Materials to share from the case studies continued

Case study 24

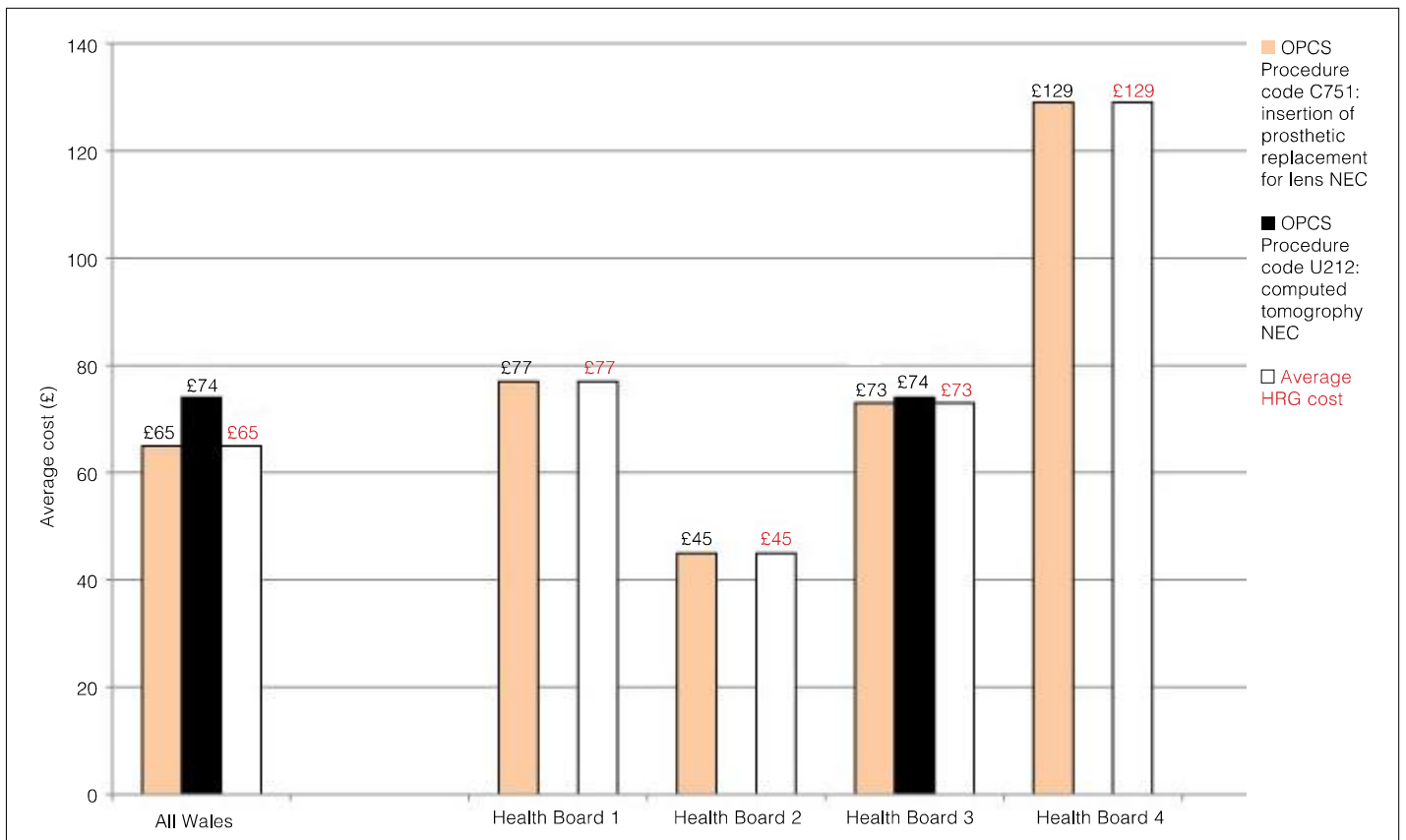**Princess Alexandra Hospital NHS Trust – best proxies for missing theatre timing data**

Potential substitute data is ranked in first, second and (in some cases) third choice, according to likely proximity to the missing data.

Time Stamps normally available	Into Anaesthetic Room	Start Anaesthetic	Into Theatre	Start Surgery	End Surgery	End Anaesthetic	Out of Theatre	Into Recovery	Out of Recovery	Onto Ward	Into Anaesthetic Room	Into Theatre
Start Anaesthetic	1st Choice	MISSING	2nd Choice									
Into Theatre			MISSING	1st Choice								
Start Surgery			1st Choice	MISSING								
End Surgery					MISSING	1st Choice						
End Anaesthetic					2nd Choice	MISSING	1st Choice				3rd Choice	
Out of Theatre						1st Choice	MISSING	2nd Choice				3rd Choice
Into Recovery						2nd Choice	1st Choice	MISSING		3rd Choice		
Out of Recovery									MISSING	1st Choice		
Onto Ward									1st Choice	MISSING		

Case study 26

NHS Wales – variation in cost of implants across the four health boards

HRG code BZ02B – Phacoemulsification cataract extraction and lens implant, with CC score 0-1

Legend:
- OPCS Procedure code C751: insertion of prosthetic replacement for lens NEC
- OPCS Procedure code U212: computed tomography NEC
- Average HRG cost

Average cost (£):

	OPCS C751	OPCS U212	Average HRG cost
All Wales	£65	£74	£65
Health Board 1	£77		£77
Health Board 2	£45		£45
Health Board 3	£73	£74	£73
Health Board 4	£129		£129

Materials to share from the case studies continued

Case study 29

Humber NHS Foundation Trust-PAS screenshot showing how travel data is entered

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