

## Benefits case study

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# **‘Patient Reported Outcome Measures (PROMs)’ outputs**

**Improving health outcomes for patients undergoing knee replacement, hip replacement, varicose vein and groin hernia treatments**

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## 2 Version History

Version	Date	Summary of key changes
1.0	13/03/2015	First release.
1.1	13/03/2015	Removed watermark. No other changes made.
1.2	17/04/2015	Minor grammatical changes to remove ambiguities and improve readability.
1.3	20/08/2015	<ul style="list-style-type: none"> <li>• Updated text in section 4.1 ('Primary purpose) to make it clear that the definition of improvement (for a PROMs measure) is only relevant for this case study.</li> <li>• For completeness purposes, included additional data in section 7.3.1 to show how Barnsley compared against the England average for Oxford Hip Score and Oxford Knee Score in 2011/12, 2012/13 and 2013/14 (2013/14 is provisional data).</li> <li>• Updated text in section 7.3.7 to elaborate on how The Royal Orthopaedic Hospital has used PROMs data to produce consultant-level PROMs scores.</li> <li>• Introduced an opening paragraph to section 7.7 ('National Frameworks') to explain the overarching link between PROMs data and national frameworks.</li> <li>• Grammatical improvements and rectification of spelling errors.</li> </ul>

## 3 Introduction

Patient Reported Outcome Measures (PROMs) is a NHS programme in which patients undergoing elective treatment for knee replacements, hip replacements, varicose veins and groin hernias are asked to complete a pre-operative ('pre-op') questionnaire and a post-operative ('post-op') questionnaire, with the aim of assessing whether patients feel their health has improved following treatment<sup>1</sup>. A key objective of PROMs is to enable providers and other stakeholders to improve quality of care.

As part of the programme, the Health and Social Care Information Centre (HSCIC) collates, analyses and disseminates PROMs data. The PROMs data is disseminated to users through two outputs:

1. Periodic publications,<sup>2</sup> including:
  - monthly reporting of headline provisional PROMs scores at a national level
  - quarterly reporting of provisional PROMs scores at national, provider and clinical commissioning group (CCG) levels, including releases of record-level data and interactive tools
  - annual reporting of finalised PROMs data (usually published in August) containing a statistical commentary, interactive tools and record-level data.

2. A monthly record-level data extract, which contains PROMs data for all procedures with an eligible Hospital Episode Statistic (HES) episode. The data extract, which is in patient-identifiable form, is only available to providers that register with the HSCIC and only contains data for procedures they are recorded as having performed.

## **4 Purpose of case study**

### **4.1 Primary purpose**

This case study describes:

- how stakeholders, such as providers (NHS acute trusts and private healthcare providers) and clinical commissioning groups, have used the PROMs outputs; and
- whether those uses have contributed to improved patients outcomes and measureable benefits, as assessed against measures such as PROMs scores, service delivery costs and length of stay.

For the purposes of this case study:

- a provider is considered to have shown an improvement on a PROMs measure if:
  - the provider has moved from being below the England average to being above the England average; or
  - the provider has moved from being below a control limit (for example the lower 95% control limit) to being above the same control limit.
- finalised (2009/10 – 2012/13) and provisional PROMs data (2013/14, as based on May 2015 PROMs data release) is used to evidence improvements (i.e. measurable benefits).

It should be noted that, from 2012/13, hip and knee surgeries were split into primary and revision surgeries. 2012/13 PROMs data shows that patients undergoing primary operations had, on average, higher health gains than patients undergoing revisions. It is, therefore, possible that increases in PROMs scores for primary procedures in 2012/13 may have been due, in part, to this change.

### **4.2 Secondary purpose**

This case study showcases examples of good practice, where providers, with varying performance levels, have used the PROMs data to inform service changes, with the aim of improving quality of care. Other providers may find the examples useful in reviewing their local services and, where appropriate, implementing changes.

### **4.3 How PROMs outputs link to outcomes and benefits**

The PROMs outputs do not directly deliver improved outcomes or measurable benefits. They provide information that enables providers, commissioners and other stakeholders to make informed changes about the delivery of their services. These changes may

generate improved outcomes and measurable benefits. This case study shows the connection between the PROMs outputs and the improved outcomes and measurable benefits discussed in [section 7](#).

## **5 Drivers and objectives**

### **5.1 Why were PROMs developed?**

Prior to the reporting of PROMs data, there was little information to assess how patients perceived the effectiveness of clinical quality of care<sup>3</sup>. In 2004, research was commissioned by Department of Health (DH) to understand whether PROMs could fill this gap. The research, which was piloted with 2,400 patients across 24 sites, showed that PROMs was cost-effective, and that patients were happy to participate.

In 2008, DH set out the reporting of PROMs data in two directions:

1. The Standard NHS Contract for Acute Services included a requirement in Schedule 5 for providers to report on PROMs from April 2009<sup>4</sup>.
2. Lord Darzi published the *High Quality Care For All*<sup>5</sup> report, in which he stated that:
  - there are three components to quality of care – patient safety, patient experience and effectiveness of care; and
  - effectiveness of care will be measured through clinical measures, such as mortality rates, and a patient feedback measure - PROMs<sup>6</sup>.

PROMs were set up in response to these directions.

### **5.2 Objectives of the PROMs outputs**

The objectives of the PROMs outputs are to enable:

- DH and NHS England to monitor progress towards strategic objectives, such as those specified in the NHS Outcomes Framework (NHSOF).
- local commissioners and service providers to assess, from the perspective of the patient, the provision of treatment and care, with the aim of improving quality of care<sup>6</sup>
- patients and clinicians to make an informed choice on the course of treatment.

## **6 PROMs overview**

The PROMs programme began in April 2009<sup>7</sup>. It assesses self-reported outcomes for hip replacement, knee replacement, varicose vein and groin hernia procedures, based on questionnaires that patients complete before their procedure and after their recovery. As a self-reporting tool, the questionnaires allow patients to provide feedback on the state of their health. Patient participation in PROMs is voluntary.

Each pre-operative and post-operative questionnaire consists of:

- a series of generic questions about the patients' health and wellbeing (through the EQ-5D™ Index and the EQ Visual Analogue Scale (VAS)) – see Appendix E for further information
- a series of condition-specific questions (for hip replacement, knee replacement and varicose vein procedures. There are no condition-specific questions for groin hernia procedures).

The post-op questionnaire is sent out three and six months after treatment (or nine months after treatment if the pre-op questionnaire cannot be linked to a HES episode), with the specific timescale dependent on the procedure. The post-op questionnaire includes additional questions about patients' experience of surgery<sup>8</sup>.

The pre-op and post-op questionnaires feed into five PROMs measures, which are reported in the PROMs outputs. The five measures are:

1. EQ-5D™ Index - used for all procedures
2. EQ VAS - used for all procedures
3. Oxford Hip Score (OHS) – used for hip replacement procedures only
4. Oxford Knee Score (OKS) - used for knee replacement procedures only
5. Aberdeen Varicose Vein Questionnaire (AVVQ) - used for varicose vein procedures only.

Further detail on the five measures is available in [Appendix E](#).

## **7 Users and uses of PROMs outputs**

### **7.1 Context**

This section describes how a sample of users have utilised the PROMs outputs and whether those uses have contributed to improved outcomes and measurable benefits. It is important to recognise and emphasise that the uses have played a contributory role to the outcomes and measurable benefits, as the improvements are likely to have been realised in conjunction with other initiatives and activities (which are outside the scope of this case study).

### **7.2 Terminology**

This case study uses a few terms interchangeably. These are:

- 'Lower 95% control limit', which is the same as 'negative outlier'
- 'Upper 95% control limit', which is the same as 'positive outlier'

### **7.3 Service providers**

#### **7.3.1 Barnsley Hospital NHS Foundation Trust**

##### **Description of uses of PROMs data**

Barnsley Hospital NHS Foundation Trust ('Barnsley') has used the PROMs data to support two activities:

#### **1. Evaluate the success of the Enhanced Recovery Pathway**

Enhanced recovery seeks to deliver an optimal pathway<sup>9</sup> that is focused on quicker recovery and discharge. In 2009, DH and partners set up the Enhanced Recovery Partnership Programme to accelerate and provide support for the spread and adoption of enhanced recovery in four elective surgical pathways, which included musculoskeletal surgery.<sup>10</sup>

In 2010, Barnsley commenced implementation of a local Enhanced Recovery Pathway (also referred to as Enhanced Recovery Programme in other organisational settings) for hip and knee replacement surgeries. The Pathway consists of nine stages<sup>11</sup>, which includes stages and components (components are within stages) such as pre-operative therapy classes and standardised surgical and anaesthetic protocols. Barnsley has used the PROMs data to evaluate the success of specific stages and components of the Enhanced Recovery Pathway and, where appropriate, implement pathway revisions.

#### **2. Use PROMs as a catalyst for clinical and reporting changes**

Although the implementation of the Enhanced Recovery Pathway had delivered improved patient outcomes, Barnsley has used the PROMs data to instigate further changes to the hip and knee surgery pathways. The 2010/11 PROMs data, as presented in [Appendix A](#), showed that Barnsley was:

- below the lower 95% control limit for OHS

- below the England average for OKS (but above the lower 95% control limit).

Barnsley implemented seven key changes, with the majority linked to enhanced recovery principles, to make improvements on these scores. These changes, which were implemented in or after late-2012, were:

1. introduction of local PROMs reporting at two stages – at 8 weeks post-discharge and 3 months post-discharge.
2. replacement of a home-based physiotherapy assessment with a new hospital-based hip class, which runs 6 weeks post-discharge.
3. production of an enhanced recovery video, covering the Enhanced Recovery Pathway for a total knee replacement (TKR) procedure. This video is shown during the pre-op class.
4. modifications to pre-op therapy classes to better prepare patients for rehabilitation. Examples of changes include issuing patients with equipment in these classes and improving the provision of information on rehabilitation.
5. analysis of PROMs data to identify activities patients struggled with post-discharge and, based on those results, included relevant exercises in post-op appointments.
6. using PROMs data, in conjunction with other information sources, to successfully present the case for an additional qualified physiotherapist, who has the aim of providing support to patients during hospital stay.
7. introduced a follow-up phone call three days post-discharge, in order to provide support and respond to concerns.

More detail on these changes is available in [Appendix B](#).

### Improved outcomes and measurable benefits from PROMs uses

The stated changes have **contributed** to improvements in adjusted health gain for OHS and OKS. These improvements, which are measured against the lower 95% control limit thresholds, are set out in the table below.

<b>Improved outcome</b>	Barnsley improving the patient care pathway, with specific focus placed on improving improved rehabilitation services for knee and hip replacement surgeries from late-2012
<b>Measurable benefits realised</b>	<ul style="list-style-type: none"> <li>• For primary hip replacement surgeries, Barnsley moving above the lower 95% control limit threshold for OHS between 2012/13 and 2013/14</li> <li>• For primary knee replacement surgeries, Barnsley moving above the lower 95% control limit threshold for OKS between 2012/13 and 2013/14</li> </ul>

**Benefits case study for PROMs outputs – Improving health outcomes for patients undergoing knee replacement, hip replacement, varicose vein and groin hernia treatments**

Measures evidencing benefits	2011/12 (finalised)	2012/13 (finalised)	2013/14 (provisional, Feb 2015 release)
<b>Hip replacement surgeries (Primary surgeries only from 2012/13) – PROMs scores</b>			
OHS - adjusted average health gain	16.144	18.488	20.365
OHS - lower 95% control limit	18.467	19.724	19.891
<b>OHS – is provider above the lower 95% control limit (i.e. not a negative outlier)?</b>	<b>No</b>	<b>No</b>	<b>Yes</b>
OHS – England average	20.077	21.299	21.340
<b>OHS – is provider above the England average?</b>	<b>No</b>	<b>No</b>	<b>No</b>
<b>Knee replacement surgeries (Primary surgeries only from 2012/13) – PROMs scores</b>			
OKS - adjusted average health gain	15.956	14.575	15.181
OKS - lower 95% control limit	13.862	14.861	15.108
<b>OKS – is provider above the lower 95% control limit (i.e. not a negative outlier)?</b>	<b>Yes</b>	<b>No</b>	<b>Yes</b>
OKS – England average	15.148	15.996	16.248
<b>OKS – is provider above the England average?</b>	<b>Yes</b>	<b>No</b>	<b>No</b>

## 7.3.2 CircleBath

### Description on uses of PROMs data

Circle is a private healthcare provider that treats private and NHS patients. Circle has various hospital locations across England, with one based in Bath ('CircleBath'). CircleBath opened in January 2010.

In late-2011, CircleBath set up their own Enhanced Recovery Programme and used PROMs to help shape the Programme. Five components of the Programme were either introduced or influenced as a result of PROMs data analysis. These were:

#### **1. Revisions to care pathways**

In January 2012, CircleBath used a multidisciplinary approach to revise the hip replacement surgery and knee replacement surgery pathways, with the aim of providing patients with a standardised care and treatment service. To introduce and implement the revised pathway as seamlessly and effectively as possible, the following initiatives were introduced:

- clinical pathway booklets were produced for hip and knee replacement surgeries, which contained information on what the 'daily goals' were during inpatient stay. These daily goals set out what care activities are routinely performed on each day of inpatient stay. Examples of goals include:
  - hourly observations for first 6 hours on day of surgery (day 0)
  - bed exercises on day 1.
- the pathway-based daily goals were reproduced on easy-to-use mini hand-out cards and placed on ID badges of all staff. These cards act as aid memoirs to help staff meet the daily goals.
- all pathway deviations are recorded on a variance form, which are then reviewed on a weekly basis to identify trends and implement corrective actions.

#### **2. Launching of Joint School sessions**

In June 2012, group-based Joint School sessions were introduced. These sessions take place around 2 weeks pre-op, and aim to educate patients on the importance of their role in rehabilitation and familiarise them with the standardised patient pathway.

#### **3. Creation of a clinical network to standardise surgical practice**

In October 2012, CircleBath set up a hip and knee clinical network, which aimed to standardise the surgical process and, thus, reduce variations. The network agreed on various surgical and anaesthetic protocols, including:

- agreeing on standardised prosthesis from December 2012.
- usage of drainage for knee replacement ceased in January 2013.
- anaesthesia protocol was standardised from January 2013, which includes:

- For knee replacement procedures, increasing the amount of local anaesthetic infiltrated into the knee prior to closure, which has dramatically reduced the need for post-op opiates.
  - For knee replacement procedures, using local anaesthetic infusion pumps for 48 hours after surgery, which has dramatically reduced the need for strong post-op painkillers.
4. From November 2014, to complement the NHS physiotherapy service, CircleBath started **providing an additional physiotherapy appointment** to NHS patients. Knee replacement surgery patients are seen 2 weeks post-op and hip replacement surgery patients are seen 12 weeks post-op. This change is a specific example where a component was introduced to the Pathway as a result of PROMs data.
5. **Using PROMs data to monitor the Enhanced Recovery Programme** and measure the success of pathway changes. In-house PROMs reports are developed (using record-level PROMS data) and shared regularly with operational teams and strategic officers as part of this monitoring process.

A more complete description of the stated changes is available in [Appendix C](#).

**Improved outcomes and measurable benefits from PROMs uses**

The stated changes have **contributed** to improvements in adjusted health gain for OHS and OKS, reduction in length of (hospital) stay (LoS) and reduction in procurement costs. These improvements are set out in the tables below.

**Benefit 1 – Improvements in OKS and OHS**

<b>Activities contributing to benefit</b>	Changes 1-3 and 5, which all commenced implementation on or after Jan 2012
<b>Improved outcomes</b>	<ul style="list-style-type: none"> <li>● Improved knee replacement surgery care pathway</li> <li>● Improved hip replacement surgery care pathway</li> </ul>
<b>Measurable benefits realised</b>	<ul style="list-style-type: none"> <li>● For primary hip replacement surgeries, CircleBath moving above the upper 95% control limit threshold for OHS between 2011/12 and 2012/13 (and maintaining the upper 95% control limit performance in 2013/14)</li> <li>● For primary knee replacement surgeries, CircleBath moving above the upper 95% control limit threshold for OKS between 2011/12 and 2012/13 (but moving back below the upper 95% control limit in 2013/14)</li> </ul>

Measures evidencing benefits	2011/12 (finalised)	2012/13 (finalised)	2013/14 (provisional, Feb 2015 release)
<b>Hip replacement surgeries (Primary surgeries only from 2012/13) – PROMs scores</b>			
OHS - adjusted average health gain	20.78	23.991	23.316
OHS – England average	20.077	21.299	21.340
<b>OHS – is provider above the England average?</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>
OHS - upper 95% control limit	22.295	22.764	22.475
<b>OHS – is provider above the upper 95% control limit (i.e. a positive outlier)?</b>	<b>No</b>	<b>Yes</b>	<b>Yes</b>
<b>Knee replacement surgeries (Primary surgeries only from 2012/13) – PROMs scores</b>			
OKS - adjusted average health gain	16.472	18.621	17.081
OKS – England average	15.148	15.996	16.248
<b>OKS – is provider above the England average?</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>
OKS - upper 95% control limit	17.652	17.790	17.754
<b>OKS – is provider above the upper 95% control limit (i.e. a positive outlier)?</b>	<b>No</b>	<b>Yes</b>	<b>No</b>

## Benefit 2 – Reduction in length of (hospital) stay (LoS) at CircleBath

<b>Activities contributing to benefit</b>	<p>Two key changes have influenced LoS. In order of effectiveness, these are:</p> <ol style="list-style-type: none"> <li>1. introducing pre-op Joint School sessions in June 2012. These sessions have been the most effective process change in reducing LoS, as they've empowered patients in taking charge and becoming more involved in the recovery process.</li> <li>2. introducing clinical changes in the surgical pathway from January 2012, with the following two changes the key factors affecting LoS: <ol style="list-style-type: none"> <li>a. standardising anaesthesia protocols, which has improved pain relief for patients and enabled physiotherapy team to start mobilising patients early.</li> <li>b. ceasing drainage for knee replacements</li> </ol> </li> </ol>
<b>Improved outcome</b>	Improved optimisation of the hip and knee replacement surgery pathways

<b>Measurable benefits realised</b>	Reduction in average LoS between 2011/12 and 2013/14 for: <ul style="list-style-type: none"> <li>hip replacement surgeries</li> <li>knee replacement surgeries</li> </ul> <p>Note: The measurable measures below also include measures on bed day costs, as a reduction in average LoS has also reduced total bed day cost per procedure.</p>		
<b>Measures evidencing benefits</b>	<b>2011/12</b>	<b>2012/13</b>	<b>2013/14</b>
<b>Hip replacement surgeries (Primary surgeries only from 2012/13)</b>			
<b>Average LoS (relates to private and NHS patients)</b>	<b>3.9</b>	<b>3.6</b>	<b>3.1</b>
Total knee replacement procedures (NHS only, as based on HES data)	180	185	277
Average bed day cost (per day) <sup>1</sup>	£295	£315	£313
Total bed day cost	£207,090	£209,790	£268,773
<b>Total bed day cost per procedure (average)</b>	<b>£1,151</b>	<b>£1,134</b>	<b>£970</b>
<b>Knee replacement surgeries (Primary surgeries only from 2012/13)</b>			
<b>Average LoS (relates to private and NHS patients)</b>	<b>3.9</b>	<b>3.7</b>	<b>3.4</b>
Total knee replacement procedures (NHS only, as based on HES data)	184	135	195
Average bed day cost (per day) <sup>2</sup>	£316	£308	£316
Total bed day cost	£226,762	£153,846	£209,508
<b>Total bed day cost per procedure (average)</b>	<b>£1,232</b>	<b>£1,140</b>	<b>£1,074</b>

### Benefit 3 - Reduced procurement costs for hip and knee replacement implants at CircleBath

<b>Activity contributing to benefit</b>	CircleBath standardising implant brands for hip and knee replacement surgeries, which has enabled bulk ordering of the chosen implants, which, in turn, has generated improved procurement rates.
<b>Improved outcome</b>	Cost saving to the hospital through improved procurement rates for hip and knee implants

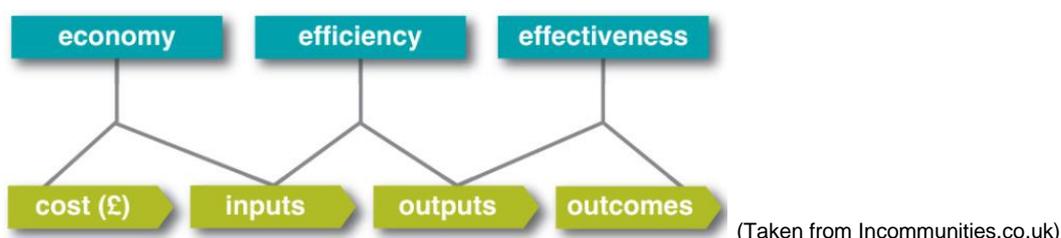
<sup>1</sup> The average bed day cost is based on 'Elective Inpatient Excess Bed Days' cost for 'major hip procedures for non-trauma', as available from NHS reference costs (HRG code HB12C)

<sup>2</sup> The average bed day cost is based on 'Elective Inpatient Excess Bed Days' cost for 'major hip procedures for non-trauma', as available from NHS reference costs HRG code HB21C)

<b>Measurable benefits realised</b>	Reduction in procurement cost for: <ul style="list-style-type: none"> <li>hip replacement implants of approximately £290 per implant from Nov 2014</li> <li>knee replacement implants of approximately £600 per implant from Nov 2014</li> </ul>
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### Value for Money assessment

'Value for money' (VFM) is a term used to assess whether an organisation has obtained the maximum benefit from the goods and services it both acquires and provides, within the resources available to it.<sup>12</sup> For the purposes of this case study, VFM considers three components - economy, efficiency and effectiveness. The elements used within each VFM component are depicted in the diagram below:



Whilst this case study does not seek to demonstrate whether the PROMs service in England has delivered VFM, this case study is able to evaluate for CircleBath whether the improvements in PROMs scores have been at the expense of increased costs or reduced efficiencies. The full array of cost, efficiency and effectiveness measures are not available for any single provider, but, for CircleBath, a minimum of one measure is available in each of the three VFM components.

The measures used in CircleBath's VFM assessment are shown in the table below.

Economy	Efficiency	Effectiveness
<ul style="list-style-type: none"> <li>Reduced procurement costs for hip and knee implants from November 2014</li> <li>Reduced bed day costs for hip and knee replacement procedures between 2011/12 and 2013/14</li> </ul>	Reduced average LoS for hip and knee replacement surgeries between 2011/12 and 2013/14	<ul style="list-style-type: none"> <li>Moving above the upper 95% control limit threshold for OHS between 2011/12 and 2012/13 (and maintaining the upper 95% control limit performance in 2013/14)</li> <li>Moving beyond the upper 95% control limit threshold for OKS between 2011/12 and 2012/13 (but falling back being below the upper 95% control limit in 2013/14)</li> </ul>

Based on the changes in performance, as shown in the table above, it is possible to crudely assess that CircleBath has been able to improve patient outcomes (Effectiveness) and, in parallel, reduce implant costs (Economy), bed day costs (Economy) and average LoS (efficiency).

A more complete VFM assessment would have been viable had other measures been readily available. These measures could have included cost of physiotherapy assessment, cost of pre-op sessions, average length of time in pre-op sessions, average length of time per physiotherapy appointments, readmission rates and mortality rates.

### 7.3.3 Derby Hospitals NHS Foundation Trust

#### Description on uses of PROMs data

On a quarterly basis, Derby Hospitals NHS Foundation Trust ('Derby') uses the provider-level PROMs data to compare local performance against the England average. This information is fed through to the Trust's Audit and Effectiveness committee and, if Derby is reported as a negative outlier for any measure (i.e. below the lower 95% control limit), the issue is escalated to the Trust's Management Executive Committee.

PROMs data, as presented in [Appendix A](#), shows that Derby Hospitals NHS Foundation Trust ('Derby') was:

- below the lower 95% control limit for adjusted average health gain for OKS in 2009/10
- below the England average for OKS in 2010/11 (although above the lower 95% control limit) .

To make improvements in PROMs scores for knee replacement surgeries, Derby set up a multi-disciplinary team (consisting of divisional nursing team, acute pain relief team and consultant anaesthetists) to review the knee replacement surgery care pathway. The review concluded that post-discharge pain was affecting OKS, as it was impacting patients' mobilisation and speed of recovery. In 2011/12, Derby changed their pain relief protocol by dispensing oral morphine, rather than codeine-based medications.

Derby is also looking to make improvements in the hip surgery care pathway. 2013/14 provisional data shows that Derby is performing below the 95% lower control limit for OHS and EQ-5D™ Index, for primary hip replacement surgeries. To assess whether quality of care is impacting performance, Derby has reviewed a sample of case notes. No quality of care issues could be identified though.

Derby is also planning on undertaking a sample case review for groin hernia surgeries.

#### Improved outcomes and measurable benefits from PROMs uses

The stated changes have contributed to the improvement in adjusted health gain for OKS. This improvement, which is measured against the England average and the upper 95% control limit thresholds, is described in the table below.

<b>Improved outcome</b>	Improved rehabilitation of patients through changes to post-op analgesia from 2011/12, which has supported earlier mobilisation
<b>Measurable benefits realised</b>	<ul style="list-style-type: none"> <li>• For primary knee surgeries:             <ul style="list-style-type: none"> <li>○ Derby moving above the England average threshold for OKS between 2010/11 and 2011/12</li> <li>○ Derby retaining their above-England average position for OKS in 2013/14, after moving below the England average threshold in 2012/13</li> </ul> </li> </ul>

**Benefits case study for PROMs outputs – Improving health outcomes for patients undergoing knee replacement, hip replacement, varicose vein and groin hernia treatments**

Measures evidencing benefit	2009/10 (finalised)	2010/11 (finalised)	2011/12 (finalised)	2012/13 (finalised)	2013/14 (provisional, Feb 2015 release)
<b>Knee replacement surgeries (Primary surgeries from 2012/13) – OKS</b>					
OKS - adjusted average health gain	13.292	14.506	15.439	15.606	16.836
OKS – England average	14.624	14.873	15.148	15.996	16.248
OKS - lower 95% control limit	13.541	13.842	14.330	15.196	15.441
<b>OKS – is provider above the England average?</b>	<b>No</b>	<b>No</b>	<b>Yes</b>	<b>No</b>	<b>Yes</b>
<b>OKS – is provider above the lower 95% control limit (i.e. not a negative outlier)?</b>	<b>No</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>

### **7.3.4 East Kent Hospitals NHS Foundation Trust**

#### **Description on uses of PROMs data**

In December 2014, East Kent Hospitals NHS Foundation Trust ('East Kent') started reporting PROMs-based outcomes data at consultant-level. The Trust links PROMs data with local Finished Consultant Episode (FCE) data to generate this data. The Trust has started to share the consultant-level outcomes data through the trust-wide QlikView system. In the future, it is expected that the consultant-level PROMs data will be reported at departmental level.

#### **Improved outcomes and measurable benefits from PROMs uses**

The Trust is in the infancy stages of using PROMs data, so any changes in care and treatment (and subsequent improved outcomes and measurable benefits) are likely to materialise in the future.

### **7.3.5 Harrogate and District NHS Foundation Trust**

#### **Description on uses of PROMs data**

On a quarterly basis, Harrogate and District NHS Foundation Trust ('Harrogate') uses the provider-level PROMs data to compare their PROMs scores, against the England average. In 2012/13, all three measures for hip replacement were below the England average. These scores are shown in [Appendix A](#).

To investigate the reasons for the below-England average scores, Harrogate analysed PROMs' provider-level and patient-level data extracts. The analysis showed that Harrogate's average pre-op questionnaire score was higher than the England average (see Appendix A). Although the Trust appreciates that the adjusted health gain scores uses the pre-op score as one of its case-mix variables, Harrogate concluded that the higher baseline could possibly still be one of the factors impacting below-England average performance.

Harrogate also understands that quality of care, including rehabilitation support, could also be affecting the PROMs scores. In response, Harrogate has shared the patient-level data extract with the orthopaedics department, with the aim of contacting patients with worsened scores and establishing in more detail what issues are affecting their health state.

#### **Improved outcomes and measurable benefits from PROMs uses**

Although no changes in the hip replacement care pathway have resulted from the stated PROMs uses, it is important to note that Harrogate is investigating the underlying cause of PROMs scores, which is one of the key uses the PROMs data is aimed at promoting.

### 7.3.6 Northumbria NHS Healthcare Foundation Trust

#### Description on uses of PROMs data

Finalised PROMs data for 2009/10 and 2010/11, as presented in [Appendix A](#), shows that Northumbria NHS Healthcare Foundation Trust ('Northumbria') was below the England average for adjusted health gain for OKS. To make improvements in this area, Northumbria used the PROMs data to inform clinical decisions:

1. **Changing implant brand** – a study conducted by Baker et al (2012)<sup>13</sup>, which linked PROMs data with National Joint Registry (NJR), analysed the correlation between PROMs scores and various surgical factors, including implant brand. The study reported that one specific brand had a significantly higher adjusted health gain for OKS. Using this finding as the catalyst for change, in late-2011, Northumbria switched implant brands. Post-change analysis of PROMs data for Northumbria procedures showed that adjusted health gain score for OKS was significantly better with the switched implant brand, so the change had proved effective. For the duration of this case study, the switched implant brand will be referred to as 'implant brand C'/'implant C'.
2. **Moving away from resurfacing patella during surgery** – Baker et al (2013)<sup>14</sup> linked PROMs data with NJR data to investigate whether there was an early functional benefit to resurfacing the patella (i.e. replacing the kneecap surface). The study reported that, for the 3,381 procedures in the study which related to implant C, the absence of patella resurfacing (i.e. leaving the kneecap alone) showed a positive trend for adjusted health gain for OKS. This improvement, though, was not quite statistically significant.

In 2013, the majority of Northumbria consultants were already rarely resurfacing the patella, so the journal paper allowed Northumbria to re-affirm the effectiveness of existing practice. However, some consultants changed practice in line with the journal paper findings.

3. **Circumpatellar electrocautery (diathermy) during surgery** – van Jonbergen et al (2011)<sup>15</sup> undertook a randomised trial to understand the efficacy of circumpatellar electrocautery (making a small burn around the surface of the kneecap) during knee replacement surgery. The study, which was based on implant C, reported that participants receiving circumpatellar electrocautery had better outcomes for knee pain and function.

In 2011, the majority of Northumbria consultants were already performing circumpatellar electrocautery, so the journal paper allowed Northumbria to re-affirm the effectiveness of existing practice. However, some consultants changed practice in line with the journal paper findings.

4. **Preservation of infra-patella fat pad during surgery** – a study conducted by Moverley et al (2014)<sup>16</sup> reported that the preservation of the infra-patella fat pad during total knee replacement is associated with improved patient outcomes. Based on this finding, Northumbria linked PROMs data with local data to report at surgeon-level the impact on PROMs scores of excising the fat pad during surgery. The analysis showed that consultants who routinely excised the fat pad had significantly better mean adjusted health gain for OKS and EQ-5D<sup>TM</sup> Index. Due to the short lead

time between the analysis being presented locally (in late-2014) and the publication of this case study, it is not possible to ascertain whether subsequent change in practice has realised improved PROMs scores.

For more detail on the four clinical decisions, see [Appendix D](#).

**Improved outcomes and measurable benefits from PROMs uses**

The first three clinical decisions have contributed to the improvement in adjusted health gain for OKS. This improvement, which is measured against the upper 95% control limit threshold, is set out in the table below.

<b>Improved outcomes</b>	Improved surgical treatment for knee replacement procedures				
<b>Measurable benefit realised</b>	For primary knee replacement surgeries, Northumbria moving above the upper 95% control limit threshold for OKS between 2011/12 and 2012/13 (and retaining their upper 95% control limit performance in 2013/14)				
<b>Measures evidencing benefit</b>	<b>2009/10 (finalised)</b>	<b>2010/11 (finalised)</b>	<b>2011/12 (finalised)</b>	<b>2012/13 (finalised)</b>	<b>2013/14 (provisional, Feb 2015 release)</b>
<b>Knee replacement surgeries (Primary surgeries from 2012/13) – OKS</b>					
OKS - adjusted average health gain	14.623	14.683	15.807	17.310	17.073
OKS – England average	14.624	14.873	15.148	15.996	16.248
<b>OKS – Is provider above England average?</b>	<b>No</b>	<b>No</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>
OKS – upper 95% control limit	15.574	15.798	16.124	16.902	16.875
<b>OKS – Is provider above the upper 95% control limit (i.e. a positive outlier)?</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>Yes</b>	<b>Yes</b>

### 7.3.7 The Royal Orthopaedic Hospital NHS Foundation Trust

#### Description on uses of PROMs data

The Royal Orthopaedic Hospital NHS Foundation Trust (‘The Royal Orthopaedic Hospital’) is a provider that specialises in orthopaedic services. Since 2011/12, on a quarterly basis, the Trust has used the provider-level PROMs data to compare PROMs scores against the England average, specialist orthopaedic trusts and neighbouring trusts.

2011/12 finalised PROMs data, as presented in [Appendix A](#), showed that The Royal Orthopaedic Hospital’s adjusted average health gain for OHS and OKS was below the lower 95% control limit. Provisional 2013/14 PROMs data, though, showed that:

- OHS for primary hip replacement surgeries is above the upper 95% control limit
- OHS for revision hip replacement surgeries is above the England average
- OKS for primary knee replacement surgeries is above the England average
- OKS for revision knee replacement surgeries is below the lower 95% control limit.

The Royal Orthopaedic Hospital has been taking steps since 2012/13 to improve performance. The key steps it has taken are as follows:

- since 2012/13, the provider has used PROMs’ patient-level data extracts to link PROMs data with local patient administration, theatre and orthopaedic systems, to understand care and treatment patterns in patients for whom improvements were not reported. One example where care and treatment patterns have been investigated has been the review of the number of physiotherapy appointments patients had received.
- since 2012/13, on a quarterly basis, the Hospital has produced a consultant-level PROMs report. This report, when shared with consultants, is supplemented with patient identifiers for all patients under their care who did not report an improvement. The purpose of this is to aid case note review. One change that has emanated from this has been one consultant updating the implant brand (prosthesis) for knee replacement surgeries.
- The provisional 2013/14 data PROMs data shows that the Trust is a negative outlier for revision knee surgeries. The Trust has started looking into patient and pathway details to understand the reasons for this low performance.

## 7.4 Clinical Commissioning Groups (CCGs)

CCGs commission most of the hospital and community NHS services in the local areas they are responsible for. Commissioning involves deciding what services are needed, and ensuring that they are provided.<sup>17</sup> Below is an example of a CCG using HSCIC's PROMs outputs to aid decision making.

### 7.4.1 NHS Vale of York CCG

#### Description on uses of PROMs data

Shared Decision Making (SDM) is a national programme led by NHS England,<sup>18</sup> which aims to help patients become more involved in the decision making process. It is a process in which patients and clinicians collaboratively review all treatment options and choose a preferred course of action.<sup>19</sup>

NHS Vale of York is locally implementing SDM by using HSCIC's PROMs data to produce analytical outputs and subsequently sharing these outputs with clinicians and patients via the NHS Vale of York CCG's website<sup>20</sup>. The outputs show how local providers' PROMs scores compare against:

- each other
- the CCG average
- the England average.

The aim of the analytical outputs is to enable patients and clinicians to jointly discuss the PROMs data when prospective patients are considering PROMs-eligible surgery.

To increase the coverage and usage of the PROMs-based analytical outputs, the CCG has recently used GP bulletins to inform its 30 GP practices on the availability of the PROMs-based analytical outputs and how the data is aimed at informing patient choice.

The CCG is also encouraging providers (in secondary care) to increase the uptake of the PROMs outputs through the proposed introduction of PROMs-related requirements within contracts. One example of such a requirement is PROMs-related key performance indicators (KPIs).

#### Outcomes being contributed to through PROMs uses

The improved outcome to which NHS Vale of York is contributing is:

- Patients within the boundaries of NHS Vale of York CCG making a more informed choice on treatment options and becoming more involved in the decision making process.

## 7.5 Quality observatories

### 7.5.1 North East Quality Observatory System (NEQOS)

#### Description on uses of PROMs data

NEQOS was established by the North East Strategic Health Authority (SHA) in 2009 in response to Lord Darzi's High Quality Care For All report<sup>21</sup>. It provides a quality measurement service<sup>22</sup> to NHS acute trusts and commissioners (i.e. CCGs) in the North East region. The service is available on a subscription-only basis.

NEQOS aims to drive improvements in healthcare by making information and data available that enables frontline quality improvements<sup>23</sup>. In line with this aim, NEQOS provides a range of analytical outputs to subscribers. Three that use PROMs data are as follows:

- A bi-annual national trauma & orthopaedic (T&O) dashboard, produced for each provider, which reports on two PROMs-based and various non-PROMs-based measures. The two PROMs measures, which are based on adjusted health gain scores, are OHS for primary hip replacement surgeries and OKS for primary knee replacement surgeries.
- A bi-annual detailed PROMs report that allows providers and CCGs to compare and contrast performance against each other and regional and national averages.
- A quarterly Best Practice Tariff (BPT) report for primary hip replacement and primary knee replacement surgeries, which evaluates whether each provider in the North East region will meet the BPT criteria (and therefore be eligible for full payment).

## 7.6 Care Quality Commission (CQC)

### Description on uses of PROMs data

CQC, the independent regulator that inspects health and social care services in England<sup>24</sup>, uses the PROMs data to support two activities:

#### **1. Informing inspection data packs**

In September 2013, CQC introduced a new inspection methodology for acute trusts<sup>25</sup>. The methodology consists of three phases and, under phase 1 - 'preparing for an inspection', CQC produces a data pack for each provider it inspects. The data packs aim to inform the makeup of the inspection team and identify areas of care that may require specific attention during the inspection. Each data pack contains various sets of data, which are based on patient and staff surveys data, hospital performance data and other data sources<sup>26</sup>. Some data sources are classed as base data, meaning they are routinely included in all data packs. PROMs is one of these data sources.

#### **2. Informing intelligence monitoring**

CQC introduced an Intelligent Monitoring tool to assign risk ratings to acute trusts, mental health trusts and, very recently, GP practices. For each provider type, CQC uses a set of indicators to establish whether there are any risks to quality of care.

The Intelligent Monitoring tool for acute trusts uses various data sets, such as HES, national inpatient surveys, NHS staff survey<sup>27</sup> and PROMs. PROMs data is reported under three Intelligent Monitoring indicators:

1. Groin hernia surgery EQ-5D<sup>TM</sup> Index score.
2. Composite of hip related PROMs indicators – this considers the EQ-5D<sup>TM</sup> Index and OHS measures for hip replacement surgeries.
3. Composite of knee related PROMs indicators – this considers the EQ-5D<sup>TM</sup> Index and OKS measures for knee replacement surgeries.

For each of these three PROMS indicators, an acute trust is flagged as 'risk', 'elevated risk'<sup>28</sup> or 'no evidence of risk'. The total number of Intelligent Monitoring indicators that are at 'risk' and 'elevated risk' determines which of the 6 bands a trust is categorised as, with band 1 representing the highest risk.

Three times a year, the CQC publishes an Intelligent Monitoring report for each acute trust. The most recent report was published in May 2015.<sup>29 30</sup>

Prior to the new inspection methodology, CQC operated a Quality and Risk Profile (QRP) tool to monitor compliance against essential standards of quality and safety for each commissioner and provider.<sup>31</sup> PROMs data was also routinely included in the provider-based QRPs.

**Improved outcomes and measurable benefits from PROMs uses**

The improvements realised from CQCs two uses of PROMs is noted in the table below.

<p><b>Improved outcomes</b></p>	<ul style="list-style-type: none"> <li>• For Intelligent monitoring publications:                             <ul style="list-style-type: none"> <li>○ Outcome - ensuring risks to quality of care, with regards to groin hernia, hip replacement and knee replacement surgeries, are appropriately prioritised and, where relevant, investigated</li> </ul> </li> <li>• For data packs:                             <ul style="list-style-type: none"> <li>○ Outcome - key issues, as highlighted by PROMs data, are given sufficient importance during inspections</li> <li>○ Outcome - inspections are focused in the right areas</li> </ul> </li> <li>• For provider-based QRPs:                             <ul style="list-style-type: none"> <li>○ Outcome – ensuring risks to quality of care, with regards to the four PROMs treatments, are included in the monitoring framework to prioritise investigations</li> </ul> </li> </ul>			
<p><b>Measurable benefits realised</b></p>	<ul style="list-style-type: none"> <li>• For Intelligent monitoring publications - inclusion of PROMs data in intelligent monitoring publications</li> <li>• For data packs - inclusion of PROMs data in inspection data packs</li> <li>• For QRPs – inclusion of PROMs data in QRP publications</li> </ul>			
<p><b>Measures evidencing benefits</b></p>	<p><b>2011/12</b></p>	<p><b>2012/13</b></p>	<p><b>2013/14</b></p>	<p><b>2014/15 to Jan 2015)</b></p>
<p>Number of inspection data packs containing PROMs data</p>	<p>N/A</p>	<p>N/A</p>	<p>0</p>	<p>37</p>
<p>Number of intelligent monitoring publications containing PROMs data</p>	<p>N/A</p>	<p>N/A</p>	<p>2</p>	<p>2</p>
<p>Number of QRP publications that contained PROMs data</p>	<p>3</p>	<p>9</p>	<p>5</p>	<p>N/A</p>

## 7.7 National frameworks

A number of data sets and indicators are used by the NHS to drive improvements in quality and outcomes. This section describes the national frameworks that use PROMs data. It is expected that providers and commissioners will have used these frameworks as the catalyst for making improvements in quality of care in the four PROMs procedures.

### 7.7.1 Best Practice Tariff (BPT)

A BPT is a national price that is designed to incentivise high quality and cost effective care. The aim is to reduce unexplained variation in clinical quality and to spread best practice.<sup>32</sup>

In 2010/11, BPTs were introduced for four service areas<sup>33</sup>. In 2011/12, this extended to six additional service areas, which included primary knee replacement and primary hip replacement outcomes. From 2014/15, PROMs data has been used to inform the payment criteria for primary knee replacement and primary hip replacement BPTs. Providers have to meet PROMs and National Joint Registry (NJR) based targets to achieve full payment. The 2014/15 PROMs-based targets are:

- PROMs participation rate being at least 50%
- Average health gain for OHS and OKS not being below the lower 99.8% control limit<sup>34</sup>

The 2014/15 BPT payments for primary knee replacement and primary hip replacement outcomes is likely to be based on 2013/14 provisional PROMs data.

### 7.7.2 NHS Outcomes Framework

The Government's white paper 'Equity and excellence: Liberating the NHS'<sup>35</sup> established the NHS Outcomes Framework<sup>36</sup>. The Framework, which was introduced in 2010/11, sets out the health outcomes and indicators NHS England will be accountable for<sup>37</sup>. Since the Framework's inception, the EQ-5D<sup>TM</sup> Index measure has been used to measure progress against indicator 3.1. In 2014/15, this indicator was presented as follows<sup>38</sup>:

Domain	Indicator	Status
Domain 3 - Helping people to recover from episodes of ill health or following injury	3.1 Total health gain as assessed by patients for elective procedures: <ul style="list-style-type: none"> <li>i Hip replacement</li> <li>ii Knee replacement</li> <li>iii Groin Hernia</li> <li>iv Varicose veins</li> </ul>	Live

Domain	Indicator	Status
	3.1 Total health gain as assessed by patients for elective procedures: v Psychological therapies	In development

Part v of indicator 3.1 does not use PROMs data.<sup>39</sup>

### **7.7.3 Mandate**

The ‘Mandate’ from the Government to NHS England sets out the ambitions for the health service.<sup>40</sup> It was introduced in 2013/14 and sets out the five objectives NHS England is legally required to pursue.<sup>41</sup> The Mandate’s five objectives mirror the five domains of the NHS Outcomes Framework, meaning the Mandate also uses PROMs data to measure progress (i.e. indicator 3.1 - total health gain as assessed by patients for elective procedures).<sup>42</sup>

## **8 Contributions**

This case study has had contributions from, and been reviewed and approved by:

- Leigh Jones, Principal Information Analyst, Barnsley Hospital NHS Foundation Trust
- Katharine Watson, Advanced Orthopaedic Physiotherapist, Barnsley Hospital NHS Foundation Trust
- Krishna Kallianpur, Divisional Nurse Director, Derby Hospitals NHS Foundation Trust
- Simon Pejicic, Clinical Outcomes Lead, CircleBath Hospital
- Jo Eke, Marketing Lead, CircleBath Hospital
- Daniel Grierson-Hill, Senior Analyst, Strategy and Intelligence Directorate, CQC.
- Simon Bailey, Deputy Head of Information, East Kent Hospitals University NHS Foundation Trust
- Rachel McDonald, Head of Performance & Analysis, Harrogate and District NHS Foundation Trust
- Daniel Blagdon, Patient Experience Lead, NHS Vale of York CCG
- Mr Mike Reed, Consultant Trauma and Orthopaedic Surgeon, Northumbria Healthcare NHS Foundation Trust
- Chris Warrilow, Senior Information Analyst, The Royal Orthopaedic NHS Hospital Foundation Trust
- Giles Foster, Adele Smaill and Paul Jennings, PROMs team, HSCIC
- Jo Partington, Laurence Bruce and Rafael Goriwodo, NHS England
- Mr Paul Baker, Consultant Orthopaedic Surgeon, South Tees NHS Trust

## 9 Appendix A – Data tables

The data tables in this Appendix show how the providers were performing against relevant PROMs measures, prior to change initiatives. For context purposes, the tables also set out PROMs scores for other relevant measures and the England average. The measures supplied for context purposes are shown in grey font.

### 9.1 Health state scores

Barnsley Hospital NHS Foundation Trust						
Surgical procedure	Measure	2010/11 adjusted average health gain			Above England average?	Above lower 95% control limit?
		Lower 95% control limit	Barnsley	England		
Hip replacement	EQ VAS	5.917	6.186	9.184	No	Yes
	EQ-5D	0.363	0.335	0.405	No	No
	OHS	18.151	15.942	19.716	No	No
Knee replacement	EQ VAS	0.393	2.586	3.112	No	Yes
	EQ-5D	0.238	0.258	0.299	No	Yes
	OKS	13.522	13.863	14.873	No	Yes

Barnsley Hospital NHS Foundation Trust						
Surgical procedure	Measure	2011/12 adjusted average health gain			Above England average?	Above lower 95% control limit?
		Lower 95% control limit	Barnsley	England		
Hip replacement	EQ VAS	6.687	10.148	9.964	Yes	Yes
	EQ-5D	0.366	0.377	0.416	No	Yes
	OHS	18.467	16.144	20.077	No	No
Knee replacement	EQ VAS	1.982	5.926	4.472	Yes	Yes
	EQ-5D	0.262	0.333	0.302	Yes	Yes
	OKS	13.862	15.956	15.148	Yes	Yes

Barnsley Hospital NHS Foundation Trust						
Surgical procedure	Measure	2012/13 adjusted average health gain			Above England average?	Above lower 95% control limit?
		Lower 95% control limit	Barnsley	England		
Hip	EQ VAS	8.349	9.429	11.634	Yes	Yes

Barnsley Hospital NHS Foundation Trust						
Surgical procedure	Measure	2012/13 adjusted average health gain			Above England average?	Above lower 95% control limit?
		Lower 95% control limit	Barnsley	England		
replacement - primary	EQ-5D	0.393	0.397	0.438	No	Yes
	OHS	19.724	18.488	21.299	No	No
Knee replacement - primary	EQ VAS	3.048	5.013	5.191	No	Yes
	EQ-5D	0.287	0.297	0.318	No	Yes
	OKS	14.861	14.575	15.996	No	No

Derby Hospitals NHS Foundation Trust						
Surgical procedure	Measure	2009/10 adjusted average health gain			Above England average?	Above lower 95% control limit?
		Lower 95% control limit	Derby	England		
Knee replacement	EQ VAS	0.981	0.042	3.043	No	No
	EQ-5D	0.263	0.267	0.295	No	Yes
	OKS	13.541	13.292	14.624	No	No

CircleBath						
Surgical procedure	Measure	2011/12 adjusted average health gain			Above England average?	Above upper 95% control limit?
		Upper 95% control limit	Circle Bath	England		
Hip replacement	EQ VAS	14.499	14.294	9.964	Yes	No
	EQ-5D	0.483	0.434	0.416	Yes	No
	OHS	22.295	20.78	20.077	Yes	No
Knee replacement	EQ VAS	9.438	7.062	4.472	Yes	No
	EQ-5D	0.381	0.343	0.302	Yes	No
	OKS	17.652	16.472	15.148	Yes	No

Harrogate and District NHS Foundation Trust					
Surgical procedure	Measure	2012/13 adjusted average health gain		Above England	Above upper 95%

**Benefits case study for PROMs outputs – Improving health outcomes for patients undergoing knee replacement, hip replacement, varicose vein and groin hernia treatments**

		Upper 95% control limit	Harrogate	England	average?	control limit?
Hip replacement - Primary	EQ VAS	13.819	11.488	11.634	No	No
	EQ-5D	0.467	0.425	0.438	No	No
	OHS	22.318	21.245	21.299	No	No

Northumbria NHS Healthcare NHS Foundation Trust						
Surgical procedure	Measure	2009/10 adjusted average health gain			Above England average?	Above lower 95% control limit?
		Lower 95% control limit	Northumbria	England		
Knee replacement	EQ VAS	1.228	2.415	3.043	No	Yes
	EQ-5D	0.267	0.262	0.295	No	No
	OKS	13.674	14.623	14.624	No	Yes

Northumbria NHS Healthcare NHS Foundation Trust						
Surgical procedure	Measure	2010/11 adjusted average health gain			Above England average?	Above lower 95% control limit?
		Lower 95% control limit	Northumbria	England		
Knee replacement	EQ VAS	1.268	2.449	3.112	No	Yes
	EQ-5D	0.269	0.309	0.299	Yes	Yes
	OKS	13.948	14.683	14.873	No	Yes

The Royal Orthopaedic Hospital NHS Foundation Trust						
Surgical procedure	Measure	2011/12 adjusted average health gain			Above England average?	Above lower 95% control limit?
		Lower 95% control limit	The Royal Orthopaedic Hospital	England		
Hip replacement	EQ VAS	8.699	No	Yes	Yes	No
	EQ-5D	0.397	No	Yes	Yes	No
	OHS	19.463	No	No	No	No
Knee replacement	EQ VAS	2.984	Yes	Yes	Yes	Yes
	EQ-5D	0.278	No	Yes	Yes	No
	OKS	14.386	No	No	No	No

The Royal Orthopaedic Hospital NHS Foundation Trust						
Surgical procedure	Measure	2013/14 adjusted average health gain (Provisional, Feb 2015 release)			Above England average?	Above lower 95% control limit?
		Low 95% control limit	The Royal Orthopaedic Hospital	England		
Hip replacement - Primary	EQ VAS	9.968	14.496	11.487	Yes	Yes
	EQ-5D	0.417	0.479	0.436	Yes	Yes
	OHS	20.674	23.165	21.340	Yes	Yes
Hip replacement - Revisions	EQ VAS	0.871	5.855	4.803	Yes	Yes
	EQ-5D	0.208	0.296	0.255	Yes	Yes
	OHS	10.319	13.304	12.096	Yes	Yes
Knee replacement - Primary	EQ VAS	3.748	4.751	5.640	No	Yes
	EQ-5D	0.299	0.331	0.323	Yes	Yes
	OKS	15.388	16.982	16.248	Yes	Yes
Knee replacement - Revisions	EQ VAS	Data suppressed by HSCIC, due to small numbers				
	EQ-5D	0.155	0.100	0.245	No	No
	OKS	8.295	7.749	11.348	No	No

## 9.2 Pre-op questionnaire scores

Harrogate and District NHS Foundation Trust				
Surgical procedure	Measure	2012/13 average pre-op questionnaire score		Above England average?
		Harrogate	England	
Hip replacement - Primary	EQ VAS	65.505	64.776	Yes
	EQ-5D	0.381	0.351	Yes
	OHS	19.430	17.904	Yes

## **10 Appendix B – clinical changes implemented at Barnsley**

This appendix provides a more elaborate description on the uses of the PROMs data by Barnsley Hospital NHS Foundation Trust (“Barnsley”).

### **10.1 Barnsley Hospital NHS Foundation Trust**

To support governance reporting, on a quarterly basis, Barnsley produces a PROMs report. These reports have been used to inform two activities:

#### ***1. Evaluate success of Enhanced Recovery Pathway***

Enhanced recovery has been delivered in the UK since the early 2000s.<sup>43</sup> It seeks to deliver an optimal pathway that is focused on optimal recovery and discharge.<sup>44</sup> The Enhanced Recovery Partnership Programme was set up by DH and partners in 2009 to accelerate and provide support for the spread and adoption of enhanced recovery in four elective surgical pathways – colorectal, musculoskeletal (which include hip and knee replacement surgeries), gynaecology and urology.<sup>45</sup>

In 2010 Barnsley started locally implementing the Enhanced Recovery Pathway (the pathway is also referred to as Enhanced Recovery Programme in other organisational settings) for hip and knee replacement surgeries, with a drive to increase uptake across consultants in 2011. The Enhanced Recovery Pathway at Barnsley consists of nine stages<sup>46</sup>, which includes components such as:

- a pre-operative therapy class, where key pathway information is shared, and the importance of self-rehabilitation
- a standardised surgical and anaesthetic protocol, where various practices have been harmonised including:
  - ceased use of drains
  - ceased use of catheters (unless required)
  - infiltration of local anaesthetic during surgery.

Barnsley has used the PROMs data to evaluate the success of various components of the Enhanced Recovery Pathway and, where appropriate, implement pathway changes.

#### ***2. Using PROMs as a catalyst for changes, with the view to improving PROMs scores***

Although the implementation of the Enhanced Recovery Pathway had delivered improved patient outcomes, as measured against PROMS scores, Barnsley has used the PROMs data as a catalyst for making additional improvements in the hip and knee surgery pathways. The 2010/11 and 2011/12 PROMs data, as presented in [Appendix A](#), shows that:

- in 2010/11, Barnsley was below the lower 99.8% control limit for OHS and below the England average for OKS
- in 2011/12 Barnsley was below the lower 95% control limit for OHS and above the England average for OKS (but below the upper 95% control limit).

To make improvements on PROMs scores, Barnsley implemented seven key changes, with the majority of these linked to enhanced recovery principles. The seven changes, each one implemented in or after late-2012, are as follows:

1. introduced local PROMs reporting at two stages – at 8 weeks post-discharge and 3 months post-discharge. Locally-developed surveys, which are largely based around PROMs questionnaires, inform these PROMs reports.
2. replaced a home-based physiotherapy assessment with a new hospital-based hip class, which runs 6 weeks post-discharge.
3. produced an enhanced recovery video, covering the Enhanced Recovery Pathway for a total knee replacement (TKR) procedure. This video is shown during pre-op class and, for improved accessibility purposes, is also available from the Barnsley website<sup>47</sup>.
4. adapted pre-op therapy classes to better prepare patients for rehabilitation. Examples of changes include:
  - issuing patients with equipment at pre-op therapy classes, so that patients could practise with the equipment at home. Examples of equipment issued for hip replacement procedures include raised toilet seat, grabber and elbow crutches. Equipment issued for knee replacement surgeries only consists of elbow crutches
  - Improving and increasing the provision of information on rehabilitation.
5. analysed PROMs data to identify activities patients struggled with post-discharge and, based on those results, included relevant exercises in post-op appointments. Examples of activities where patients encountered difficulties were climbing stairs, washing & dressing and walking (limping whilst walking).
6. used PROMs data, in conjunction with other information sources, to successfully present the case for an additional qualified physiotherapist, who has the aim of providing more support to patients during hospital stay.
7. introduced a follow-up phone call three days post-discharge, in order to provide support and respond to concerns.

## **11 Appendix C – clinical changes implemented at CircleBath**

This appendix provides an elaborated description on the uses of the PROMs data by CircleBath.

### **11.1 CircleBath**

Circle is private healthcare provider that treats private and NHS patients. Circle has various hospital locations across England, with one based in Bath ("CircleBath"). All Circle hospitals are partnerships co-founded, co-run and co-owned by clinicians. CircleBath hospital opened in January 2010 and, 12 months later, employed a dedicated Clinical Outcomes Lead to analyse PROMs data for hip and knee replacement surgeries, with the aim of improving patient outcomes. This aim was to be achieved in parallel to four other aims (for hip and knee surgeries):

1. Increase participation rate in the PROMs surveys
2. Reduce length of stay (LoS)
3. Optimise theatre efficiency
4. Standardise costs

In late-2011, CircleBath started implementing the Enhanced Recovery Programme. PROMs data is continuously being used to shape the Programme. The following five components of the Programme have been influenced or introduced as a result of PROMs-based data analysis.

#### **1. Revised care pathways**

In January 2012, CircleBath revised the hip replacement surgery and knee replacement surgery pathways to provide all patients with standardised care and treatment. The pathway was revised through a multidisciplinary approach, which consisted of clinical professional groups such as physiotherapists, orthopaedic consultants, anaesthetists, day-case nurses, pre-assessment nurses and theatre lead. To introduce and implement the new pathway as seamlessly and effectively as possible, the following change initiatives were introduced:

- clinical pathway booklets were produced for hip and knee replacement surgeries, which includes what the 'daily goals' are during inpatient stay. Examples of daily goals include:
  - hourly observations for first 6 hours on day of surgery (day 0)
  - bed exercises on day 1
  - mobilise with sticks on day 2.
- the daily goals were reproduced in an easy-to-use hand-out card and placed on ID badges of all staff. This ensured that all staff were clear in what was expected of them whilst patients were in inpatient care. This, in fact, proved to be very effective in providing continuity of care during instances when new-starters and agency staff join the hospital.

- all pathway deviations are recorded on a variance form. The forms are reviewed on a weekly basis by unit leads, to identify trends and address relevant issues. An example of an identified variance includes:
  - younger patients progressing slower than expected - this variance was investigated and the reason for the slow progress was because of poor pain management and clinicians not following the anaesthetic protocol. This also had a knock-on impact on physiotherapists, as they were unable to go through all exercises with patients whilst they were in inpatient care. This issue was discussed with the anaesthetic lead and addressed through an update to consultant anaesthetists' induction programme, which now includes specific references to the anaesthetic protocol.

## **2. Introduction of Joint School sessions**

In June 2012, group-based Joint School sessions were introduced. These sessions take place around 2 weeks before surgery, and, through two-way communication, aim to educate patients on the importance of their role in rehabilitation, familiarise them with the typical patient pathway and respond to queries. These sessions have empowered patients to take charge and become more involved in the recovery process, which has led to patients having a higher expectation of recovery. This has been one of the key changes in realising improvements in PROMs scores.

A group environment has also provided various advantages to patients, including enabling them to share experiences and concerns with each other and also utilising the group as a support mechanism. Joint School also provided an effective platform for clinicians to provide consistent messages in the delivery of the treatment and care and for the hospital to discuss the importance of patient participation in PROMs.

## **3. Creation of clinical network to standardise surgical practice**

In October 2012 CircleBath set up a hip and knee clinical network, with the aim of standardising the surgical process and, thus, reducing variation. The network was led by an Orthopaedic Consultant and included all members of the care team, including booking coordinators, theatre staff, ward staff and physiotherapists. The group reviewed international best practice and also invited a group of Circle clinicians from different sites to agree on surgical and anaesthetic protocols. The changes implemented in these areas are as follows:

- **Agreed on standardised prosthesis from December 2012**

CircleBath standardised implants for both knee and hip surgeries, based on two factors: analysis of NJR data and implant cost. The chosen implant brands are as follows:

- Knee replacement surgeries – generally the hospital uses one of two implant brands

- Hip replacement surgeries – generally a hybrid is used. CircleBath stopped using uncemented stems as they are more expensive and do not have better outcomes, as based on NJR data.

- **Drainage ceased in January 2013**

Drains for knee replacements ceased with the introduction of Tranexamic acid 1g I.V. on induction (of surgery) and immediately post-op. Attempts were made to also cease catheter use, but mixed results were observed. Consequently, CircleBath now uses catheters only for patients who have spinal anaesthesia for 24 hours. The next step is to stop using spinal opiates and catheters.

- **Anaesthesia protocols were standardised from January 2013. Examples of standardised anaesthetic treatments now include:**

- Most patients undergoing knee and hip replacement surgeries administered with spinal anaesthesia (including opiates) with sedation.
- For knee replacement procedures, increased amounts of local anaesthetic is infiltrated into the knee prior to closure, which has dramatically reduced the need for post-op opiates.
- For knee replacement procedures, introducing the use of local anaesthetic infusion pumps for 48 hours post-op, which has dramatically reduced the need for post-op opiates.
- Femoral and sciatic blocks to manage post-surgical pain are no longer used, but CircleBath is currently assessing the use of adductor canal blocks (as effective adjuncts to opioids).

#### **4. Follow-up support post-operatively**

CircleBath introduced more proactive measures to support patients' recovery. From November 2014, to complement the NHS physiotherapy service, CircleBath started **providing an additional physiotherapy appointment** for NHS patients. Knee replacement surgery patients are seen 2 weeks post-op, which enables patients to have an early intervention with a clinician, and hip replacement surgery patients are seen 12 weeks post-op. This change is a specific example where the change was introduced (rather than adapted) as a result of PROMs data.

#### **5. Use of PROMs data to monitor programme**

CircleBath uses PROMs data to constantly measure the success of the changes they are implementing, with the aim of improving patient outcomes. In-house PROMs reports are developed (using the record-level PROMS data) and shared regularly with operational teams and strategic officers, such as the (hospital's) general manager, the lead nurse (who has the same function as a nursing director in a typical NHS acute trust), the medical director and the governance lead.

## 12 Appendix D – clinical decisions informed by PROMs data at Northumbria

This appendix provides an elaborated description on the clinical decisions informed by PROMs data at Northumbria NHS Healthcare Foundation Trust ('Northumbria').

### 12.1 Northumbria NHS Healthcare Foundation Trust

Northumbria has used the PROMs data to inform clinical decisions. These relate to knee replacement surgery and are described in more detail below.

#### 1. Changing implant brand

Finalised 2010/11 PROMs data showed that Northumbria was below the England average for adjusted health gain for OKS. During that period, a Northumbria-based consultant orthopaedic surgeon was part of a study group that linked PROMS data with National Joint Registry (NJR) data, for 22,691 primary total knee replacement (TKR) procedures performed between Aug 2008 and Feb 2011. The purpose of the study was to analyse the correlation between PROMs scores and various surgical factors, including implant brand (i.e. prosthetic device). The study, which was reported by Baker et al (2012)<sup>13</sup> showed that one implant brand ('implant brand C'/'implant C') returned the highest adjusted health gain for OKS. Using this finding as the catalyst, in late-2011, Northumbria moved from using two other implants ('implant brand A' and 'implant brand B') to using implant brand C.

To assess the effectiveness of the implant brand change on local patients, Northumbria analysed 1623 completed PROMs episodes, for the period April 2009 to March 2014. The analysis showed that the change to implant C significantly improved adjusted health gain scores for OKS. This analytical finding is shown in the table below.

Brand	Number of primary knee replacement procedures	Adjusted health gain for OKS
implant A	581	13.9
implant B	246	14.2
implant C	796	16.6
<b>Total</b>	<b>1623</b>	<b>N/A</b>

#### 2. Moving away from resurfacing patella during surgery

One dilemma that orthopaedic surgeons face is whether, during surgery, the kneecap should be resurfaced with polythene (i.e. replacing the kneecap surface) or whether it should be retained in its original form. Baker et al (2013)<sup>14</sup> linked PROMs data with national joint registry data for 23,393 procedures to establish whether there was an early functional benefit to resurfacing the patella. The study analysed this at implant brand level and on 3,381 implant C knee procedures in the study, and where the original kneecap was retained (i.e. leaving the kneecap alone), there was a trend towards better adjusted health gain for OKS (0.8 point), although this improvement was not quite statistically significant (P=0.08).

In 2013, the majority of Northumbria consultants were already rarely resurfacing the patella, so the journal paper allowed Northumbria to re-affirm the effectiveness of existing practice. Some consultants changed practice in line with the journal paper findings.

### **3. Circumpatellar electrocautery (diathermy) during surgery**

During knee replacement surgery, if the kneecap surface isn't resurfaced (i.e. patella is not replaced), then circumpatellar electrocautery can be performed (making a small burn around the surface of the kneecap). Van Jonbergen et al (2011)<sup>15</sup> undertook a randomised trial on the implant C implant and reported that participants receiving circumpatellar electrocautery had better outcomes with regards to knee pain and function.

In 2011, the majority of Northumbria consultants were already performing circumpatellar electrocautery, so the journal paper allowed Northumbria to re-affirm the effectiveness of existing practice. Some consultants changed practice in line with the journal paper findings.

### **4. Preservation of infra-patella fat pad during surgery**

Moverley et al (2014)<sup>16</sup> reported that the preservation of the infra-patella fat pad during total knee replacement is associated with improved patient outcomes. To establish how well this finding correlated to Northumbria procedures, Northumbria linked PROMs data with local data to assess, at surgeon-level, the impact of excising the fat pad. The analysis showed that, for consultants who routinely excised the fat pad, their mean adjusted health gain for OKS was 15.5 and for EQ-5D<sup>TM</sup> Index 0.29, but, for consultants who routinely preserved the fat pad, the mean adjusted health gain for OKS was 17.6 and for EQ-5D<sup>TM</sup> Index 0.297. Due to the short lead time between the analysis being presented locally (which was in late-2014) and the publication of this case study, it is not possible to ascertain whether subsequent change in practice has realised improved PROMs scores.

## 13 Appendix E – further detail on the five PROMS measures

PROMs outputs report on the following five measures:

### Generic measures

- EQ-5D<sup>TM</sup> Index – patients provide responses to five questions, each covering a distinct domain of health-related quality of life (mobility, self-care, performing usual activities, pain/discomfort, anxiety/depression). For each domain, patients rate their health state on one of three levels, ranging from ‘no problems’ to ‘severe problems’. Responses are combined and weighted to give a health-related quality of life (HQOL) score ranging between -0.594 and 1, with ‘1’ representing full health on the Index.<sup>8</sup>
- EQ Visual Analogue Scale (EQ VAS) – patients rate their general health on an analogue linear scale ranging between 0 and 100<sup>8</sup> (100 represents the best state of health<sup>48</sup>).

### Condition specific measures

- Oxford Hip Score (OHS) – patients undergoing hip replacement surgeries are asked to respond to 12 questions relating to their hip and how it affects their quality of life. The responses are combined into an overall score, ranging from 0 (the worst possible score) to 48 (the best possible score).<sup>49</sup>
- Oxford Knee Score (OKS) – patients undergoing knee replacement surgeries are asked to respond to 12 questions relating to their knee and how it affects their quality of life. The responses are combined into an overall score, ranging from 0 (the worst possible score) to 48 (the best possible score).<sup>49</sup>
- Aberdeen Varicose Questionnaire – patients undergoing PROMs-eligible varicose vein surgeries are asked to complete the Aberdeen Varicose Vein Questionnaire, which consists of 13 questions. The responses are combined into an index, ranging from 0 (the best possible score) to 100 (the worst possible score).<sup>49</sup>

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