

A grayscale X-ray image of a human knee joint is positioned in the background of the central text area. The image shows the femur (thigh bone) at the top, the tibia (shin bone) at the bottom, and the patella (kneecap) on the right side. The joint space and surrounding bone structure are clearly visible.

Finalised Patient Reported Outcome Measures (PROMs) in England

April 2011 to March 2012

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Erratum note

The first edition of this report, published on 15 October 2013, contained some wrong percentages in Table 2 on page 24, although the numbers in the table are believed to all be correct.

This edition has been published with correct percentages in the table.

Statement as to the relevance of this product to patients

This product may be of interest to members of the public and other stakeholders to enable them to gain an understanding of the range of services available and make informed decisions about providers.

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Executive Summary

For the period 1 April 2011 to 31 March 2012

Health Gain

Based on patients' responses to questionnaires before and after surgery, the percentages of respondents who had improved health, and the average change in their measures of health between pre- and post-operative, were as follows—

Measure	Year	Groin Hernia		Hip Replacement		Knee Replacement		Varicose Vein	
		Improved	Average Health Gain	Improved	Average Health Gain	Improved	Average Health Gain	Improved	Average Health Gain
EQ-5D Index	2011-12	49.9%	0.080	87.3%	0.414	78.4%	0.299	53.2%	0.094
	2010-11	50.5%	0.082	86.7%	0.405	77.9%	0.295	51.6%	0.091
	2009-10	49.3%	0.078	87.2%	0.407	77.6%	0.292	52.4%	0.092
EQ VAS	2011-12	38.9%	-0.8	63.6%	9.9	53.8%	4.3	42.0%	0.0
	2010-11	39.1%	0.5	61.4%	9.4	50.8%	3.4	39.8%	-0.2
	2009-10	38.2%	-1.0	61.4%	8.9	50.2%	3.0	40.4%	-0.4
Condition Specific	2011-12	No condition specific measure		95.7%	20.0	91.6%	15.0	83.1%	7.9
	2010-11			95.8%	19.7	91.4%	14.8	82.5%	7.4
	2009-10			95.7%	19.7	91.4%	14.6	83.4%	7.9

There has been little movement over the three years in the percentage of respondents reporting improved health on the various measures or in the extent of their reported health gain.

Surgical Success and Satisfaction

Success of surgery was reported at between 87.0% and 94.0%, depending on procedure.

Satisfaction with surgery was reported at between 82.4% and 91.5%, depending on procedure.

Organisation Level Analysis

Average health gains at provider organisations were significantly different (outside 99.8% control limits) from the England average on the EQ-5D™ Index¹ and/or one or more condition-specific measures in **47 cases — 14 significantly better and 33 significantly worse** — when compared to the England averages using statistical models which account for the providers' differing case-mixes.

Participation in PROMs

There were 247,699 PROMs-eligible procedures carried out in hospitals, an increase of about 1% over 2010-11. Patients completed 185,034 pre-operative questionnaires, a headline participation rate of 74.7%, which is rather higher than the 2010-11 rate of 69.9% and the 2009-10 rate of 66.1%. Patients returned 79.6% of the post-operative questionnaires they were sent, a little less than the 81.0% rate of 2010-11.

¹ EQ-5D™ is a trademark of the EuroQol Group. See *Acknowledgements* on page 26.

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Introduction

Background

Since April 2009, English providers of NHS healthcare have been inviting patients undergoing four common elective inpatient surgical procedures (**hip replacement, knee replacement, groin hernia and varicose vein surgery**) to complete pre-operative questionnaires on their general and condition-specific health. Follow-up post-operative questionnaires are sent to patients either 3 months (for groin hernia and varicose vein) or 6 months (for hip and knee replacements) after surgery.

The responses to these questionnaires have been analysed to assess the outcomes of the surgical procedures based on patients' self-reported health status.

Measures of Health

The answers to patients' questionnaires are amalgamated in the calculation of up to 3 summary measures of health. These include two generic measures – EQ-5D Index and EQ VAS – which are calculated the same way for all procedures, and, except for Groin Hernia patients, a condition-specific measure.

EQ-5D Index captures in a single value a range of generic health issues in a broad but clearly-defined way.

EQ VAS is a simple and easily understood 'thermometer'-style measure based on a patient's self-scored general health on the day that they completed their questionnaire but which provides an indication of their health that is not necessarily associated with the condition for which they underwent surgery and which may have been influenced by factors other than healthcare.

Oxford Hip Score / Oxford Knee Score / Aberdeen Varicose Vein Questionnaire combine into a single score a patient's answers to a number of health questions of particular relevance to hips, knees or varicose veins.

Coverage

Analysis in this report is based on:

- Pre-operative patient questionnaires completed between 1 April 2011 and 31 March 2012 and any associated post-operative questionnaires.
- Episodes of inpatient hospital care ('HES episodes') where the episode started between 1 April 2011 and 31 March 2012 and which included one of the four types of surgical procedure eligible for PROMs (a small number of episodes recorded more than one eligible procedure; where this is the case, each procedure has been treated independently for analysis).

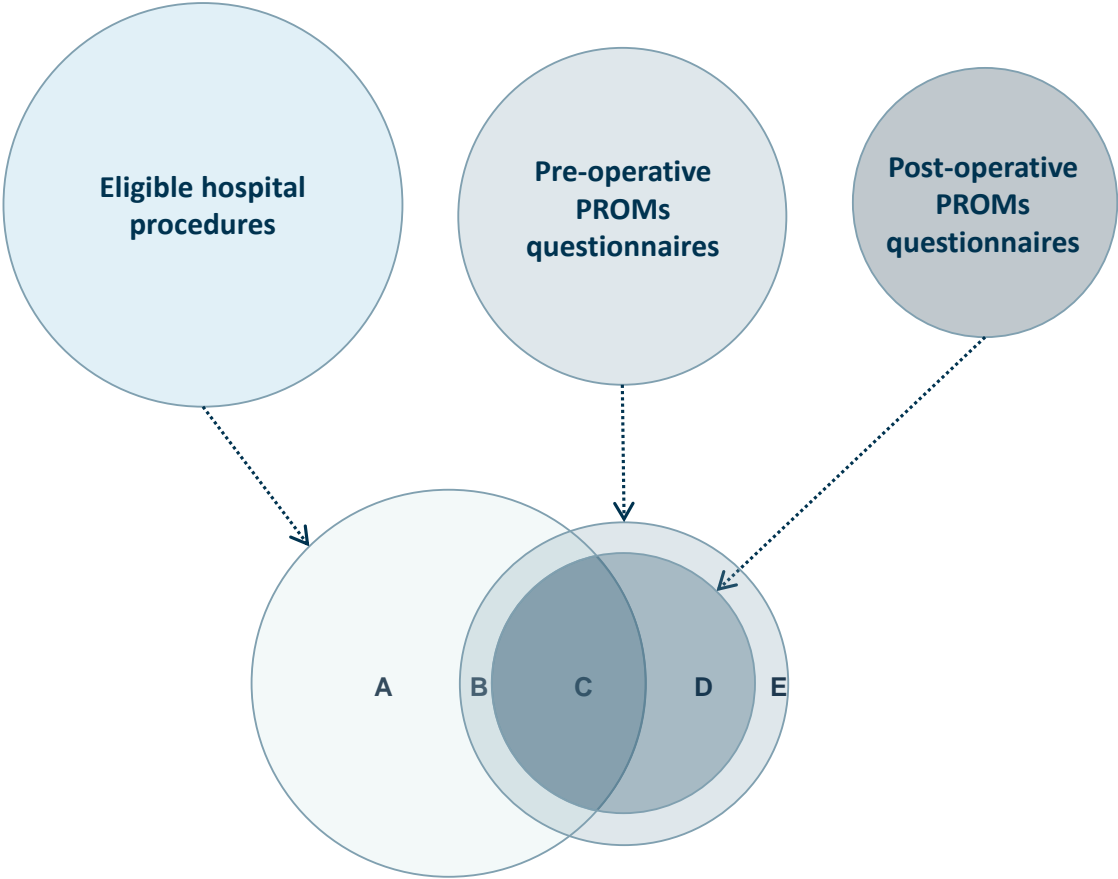
Questionnaires are administered to all patients (who choose to take part) undergoing elective inpatient treatment for one of the four eligible procedures, whether the procedure is in an NHS hospital in England or in an independent sector hospital in England funded by the English NHS.

Post-operative questionnaires are sent to and returned by patients following their surgery. Not all patients undergoing the relevant operations return questionnaires; the reasons for this will vary, but patients are not obliged to complete or return their questionnaires and some will simply have chosen not to do so.

Relationship between PROMs Questionnaires and Hospital Records

Where possible, PROMs questionnaires have been linked to records of hospital inpatient activity in the Hospital Episode Statistics data warehouse ('HES') in order to deliver a richer dataset for analysis.

Figure 1: Relationships between hospital procedures and PROMs questionnaires [not to scale]



A	Eligible hospital procedures not linked to PROMs questionnaires	103,664 ²
B	Pre-operative questionnaires linked to hospital procedure records; post-operative questionnaires not returned	27,301
C	Post-operative questionnaires returned and linked to hospital records	116,734
D	Post-operative questionnaires returned but not linked to hospital records	22,803
E	Pre-operative questionnaires returned but no post-operative questionnaires and not linked to hospital records	18,196

Key figures

A + B + C	PROMs-eligible procedures conducted in hospitals	247,699
B + C + D + E	Pre-operative questionnaires returned	185,034
C + D	Post-operative questionnaires returned	139,537
B + C	Pre-operative questionnaires linked to hospital records	144,035
C	Post-operative questionnaires linked to hospital records	116,734

² Note that some 2011-12 questionnaires will have linked to other years' HES procedures — for clarity, these procedures from other years are not shown in Figure 1.

Participation in PROMs

Key findings

- Eligible hospital procedures: 247,699 (2010-11: 245,516)
- Pre-operative questionnaires returned: 185,034 (2010-11:171,499)
- Headline participation rate: 74.7% (2010-11: 69.9%)
- Rate of participation fluctuated more widely from month to month than in previous years

PROMs surgeries and questionnaires

Over the three years of the PROMs programme, there has been a rise in the number of eligible surgical procedures carried out in hospitals which are included in PROMs, standing at 247,699 for 2011-12, almost 1% more than the previous year and 3% more than 2009-10 (the first year of the PROMs programme) when there were 239,683 (Table 1). Over the same period, the rate of participation by patients in PROMs has also grown, from 66.1% to 74.7%, with 185,034 pre-operative questionnaires returned in 2011-12 and available for analysis, up 17% from the 158,342 questionnaires in 2009-10.

Table 1: Numbers of eligible hospital procedures and pre- and post-operative questionnaires, by procedure and year

Procedure	Year	Eligible hospital procedures ³	Pre-operative questionnaires returned	Post-operative questionnaires returned
Groin Hernia	2011-12	70,786	42,971	29,950
	2010-11	68,120	37,966	26,870
	2009-10	68,640	37,765	26,718
Hip Replacement	2011-12	72,354	59,585	47,392
	2010-11	69,818	55,037	44,687
	2009-10	63,625	48,515	39,404
Knee Replacement	2011-12	77,457	69,200	54,062
	2010-11	75,307	63,087	50,719
	2009-10	72,563	56,925	45,773
Varicose Vein	2011-12	27,102	13,278	8,133
	2010-11	32,271	15,409	9,420
	2009-10	34,855	15,137	9,544
TOTAL	2011-12	247,699	185,034	139,537
	2010-11	245,516	171,499	131,696
	2009-10	239,683	158,342	121,439

³ Figures shown for 2009-10 and 2010-11 are PROMs-eligible hospital inpatient episodes. There are slightly more inpatient episodes than procedures in each year as some episodes were eligible for more than one PROMs procedure. This was the case for 73 episodes in 2010-11.

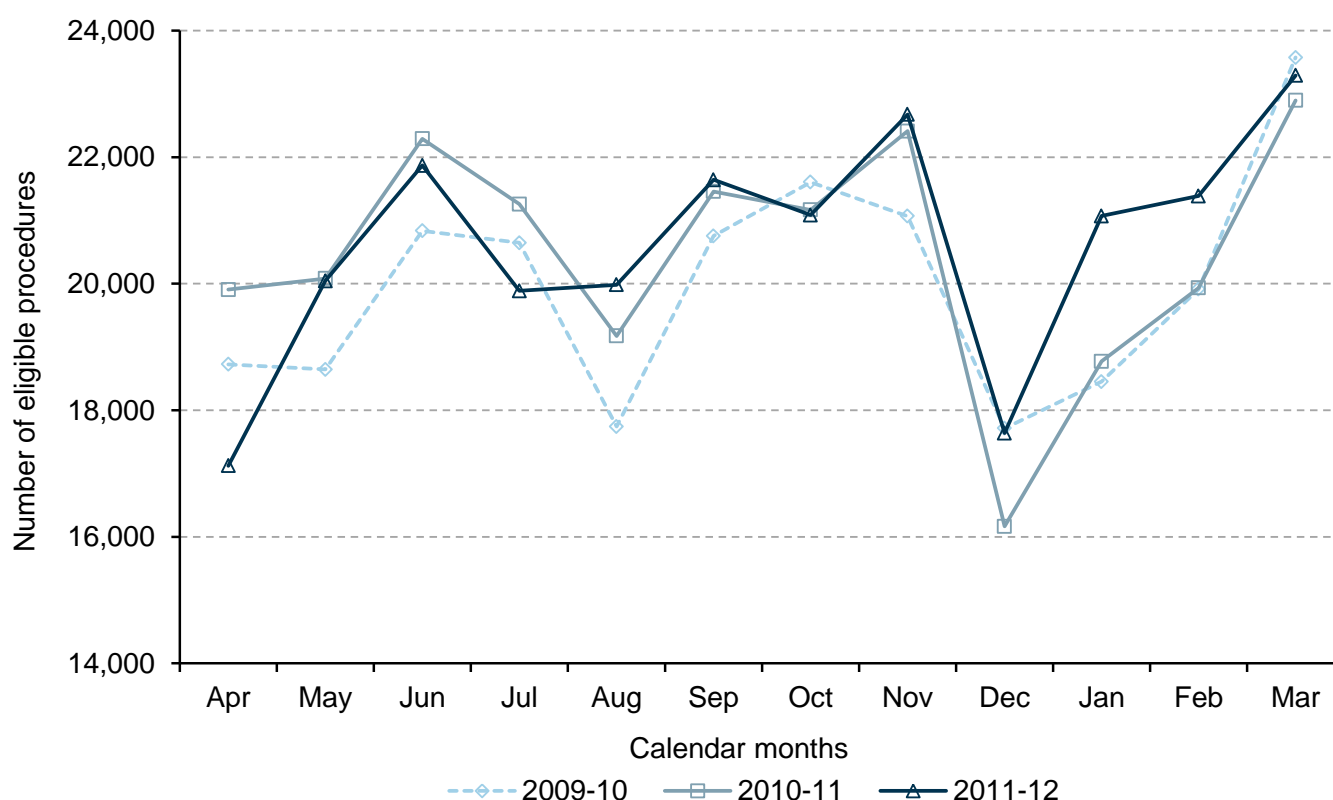
The growth in surgical procedures and questionnaire completion over the three years has been broadly consistent for each PROMs procedure (Table 1), although volumes of eligible varicose vein surgeries have been falling year on year. It is possible that this may reflect a shift in varicose vein surgeries from elective inpatient and day-case treatments, which are eligible for inclusion in PROMs, to outpatient treatments, which are not.

Chart 1 through Chart 3 show that there has been a consistent seasonal pattern for all three years in the number of eligible hospital procedures and pre- and post-operative questionnaires, with small peaks in March, marked dips in December and the winter months and smaller summer dips. Although the reasons for the patterns are not known with certainty, December and mid-summer dips would be expected given that PROMs procedures are elective surgeries which patients might be disinclined to undergo during the summer or around Christmas; it may also be that hospitals would prefer not to schedule so many of these surgical procedures during these times owing to staffing constraints and the need to prioritise emergency admissions.

The relatively low number of questionnaires in April 2009 (Chart 2) is likely to be an artefact of that being the first month of the PROMs programme in its current form.

Chart 1: Number of eligible hospital procedures, by month, all years⁴

Note: vertical axis starts at 14,000



⁴ Figures shown for 2009-10 and 2010-11 are PROMs-eligible hospital inpatient episodes

Chart 2: Number of pre-operative questionnaires returned, by month, all years

Note: vertical axis starts at 6,000

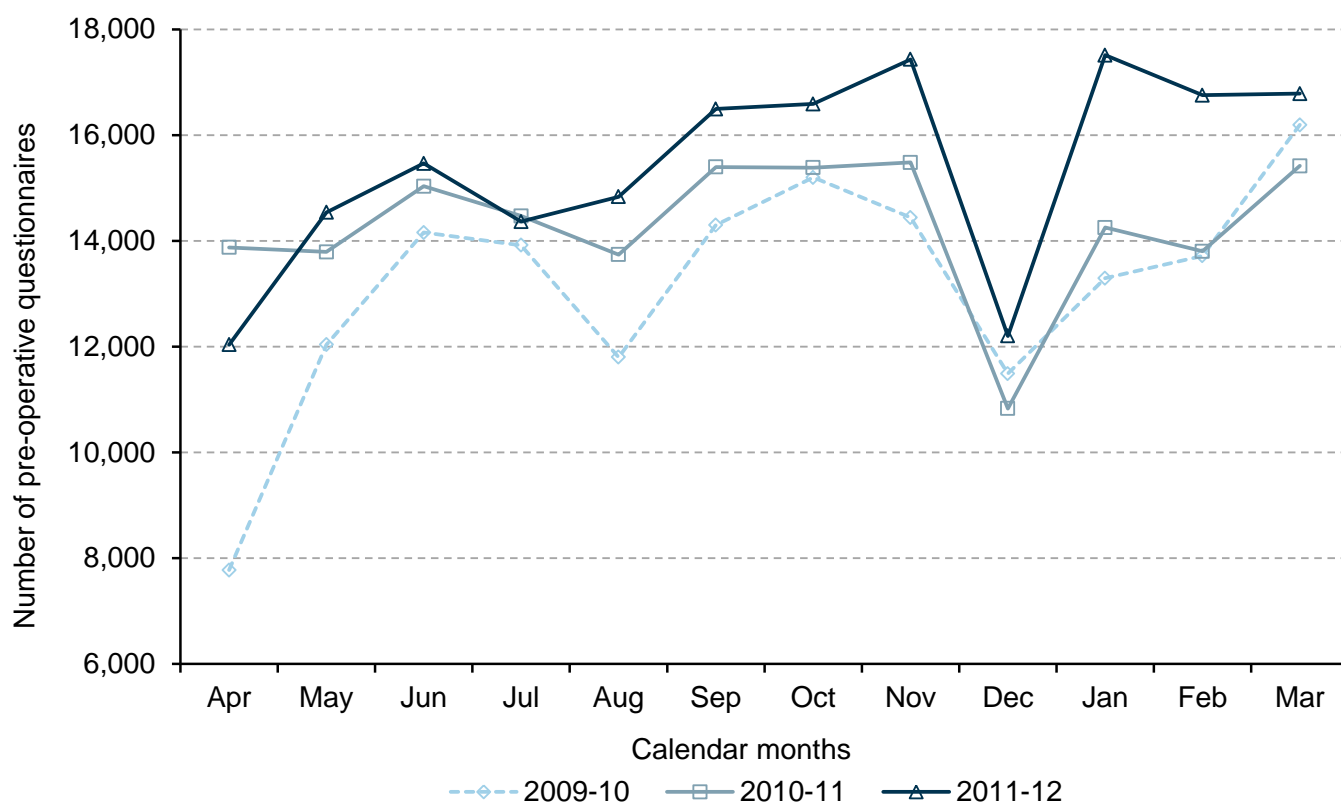
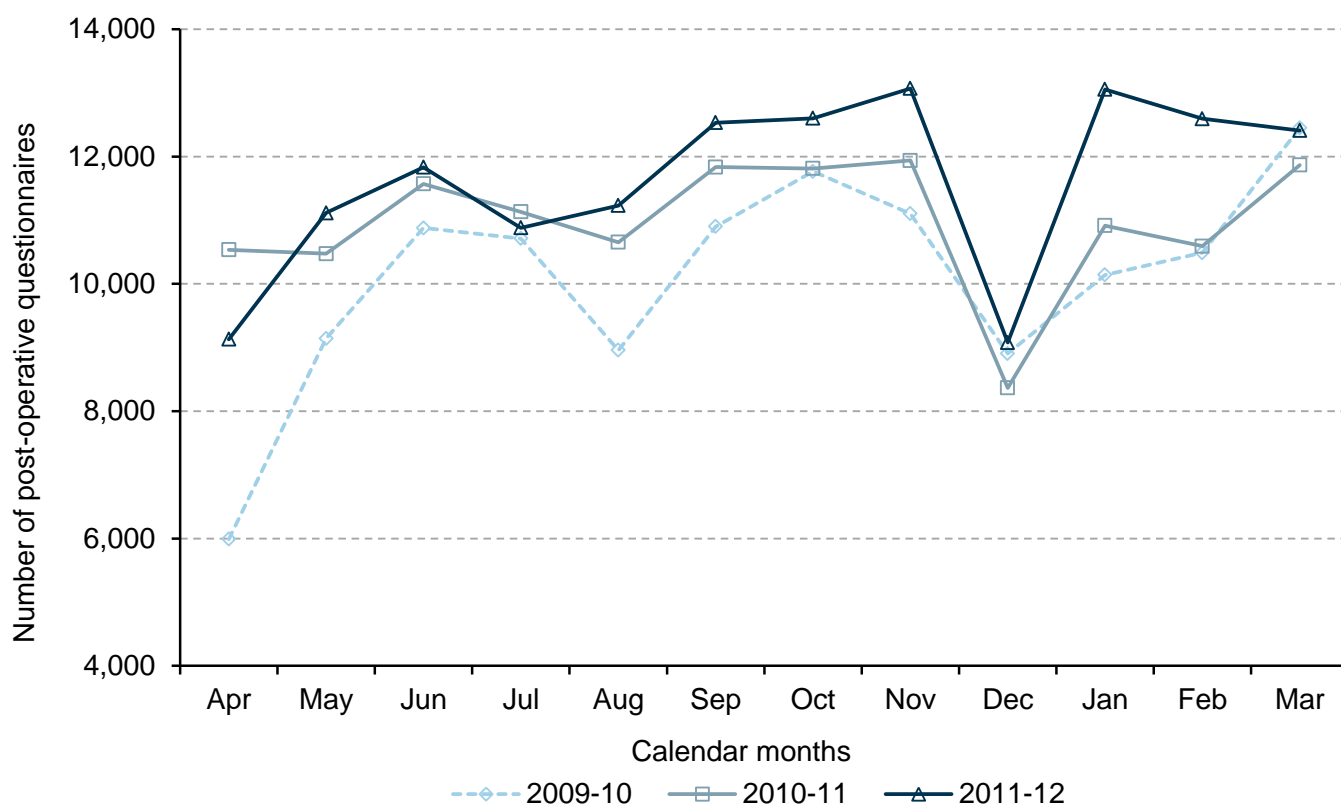


Chart 3: Number of post-operative questionnaires returned, by month of completion of pre-operative questionnaire, all years

Note: vertical axis starts at 4,000



Rates of participation in PROMs

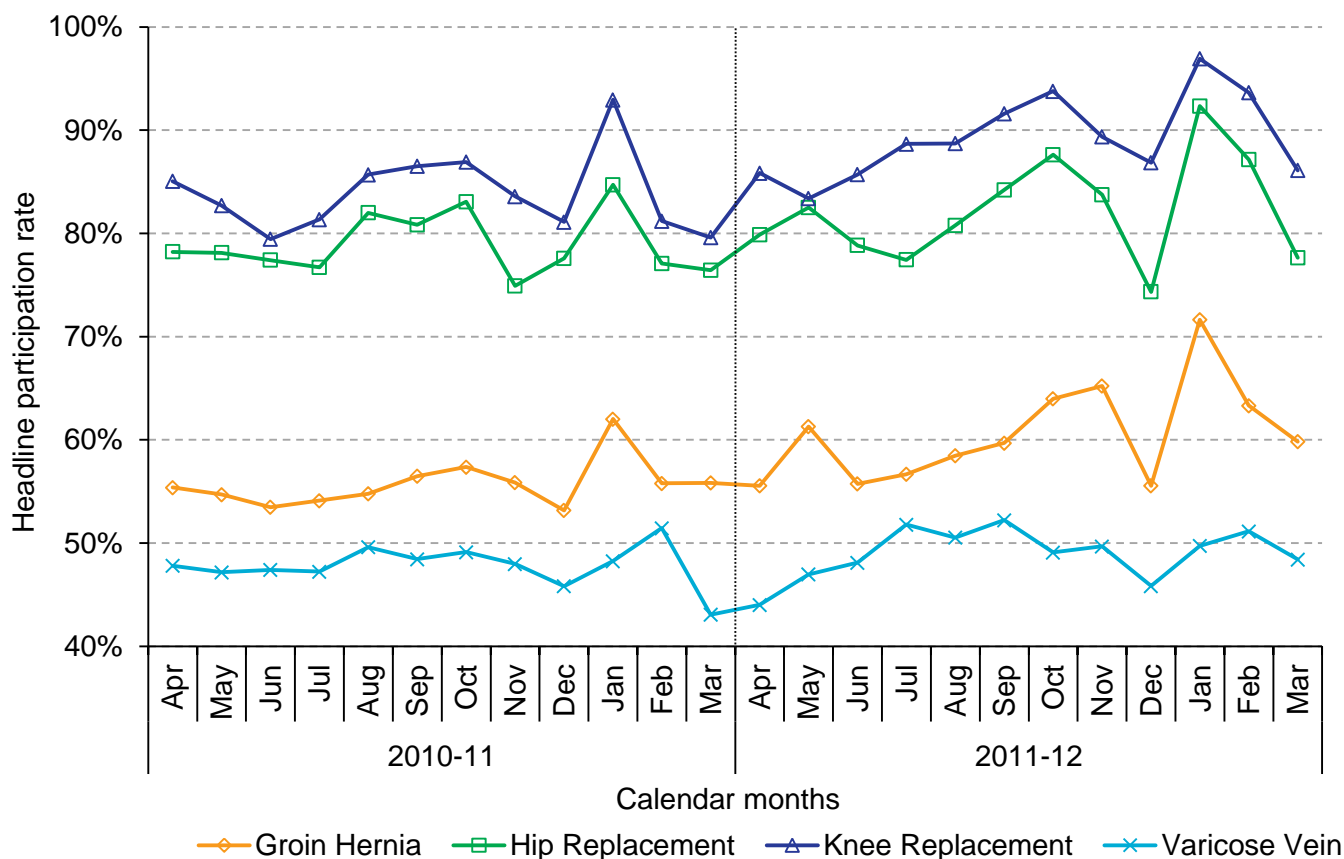
The number of pre-operative questionnaires compared to the number of eligible hospital procedures gives an indication of patients' participation in PROMs (Chart 4). Patients completed a total of 185,034 pre-operative questionnaires in 2011-12, giving an overall headline participation rate in PROMs of 74.7%. Over the three years, this participation rate has risen substantially, from 66.1% in 2009-10 and 69.9% in 2010-11. Although it cannot be said with certainty, the rise might have been partly due to the bedding-down of PROMs in pre-operative clinics, with clinical staff having the benefit of experience in administering and explaining the PROMs questionnaires to patients.

The clear peaks in participation rate for each January are thought to be due at least in part to questionnaires completed at pre-operative clinics in mid to late December in respect of surgeries carried out in January, the holiday period accentuating this lag more than in other months.

Whereas the headline participation rate for each PROMs procedure has been generally bound within a range of a few percentage points throughout the PROMs programme, the rates appear to have been fluctuating more in the latter part of the 2011-12 year than previously; there is no obvious reason why this should be.

Chart 4: Headline participation rate, by month of completion of pre-operative questionnaire, all procedures

Note: vertical axis starts at 40%.

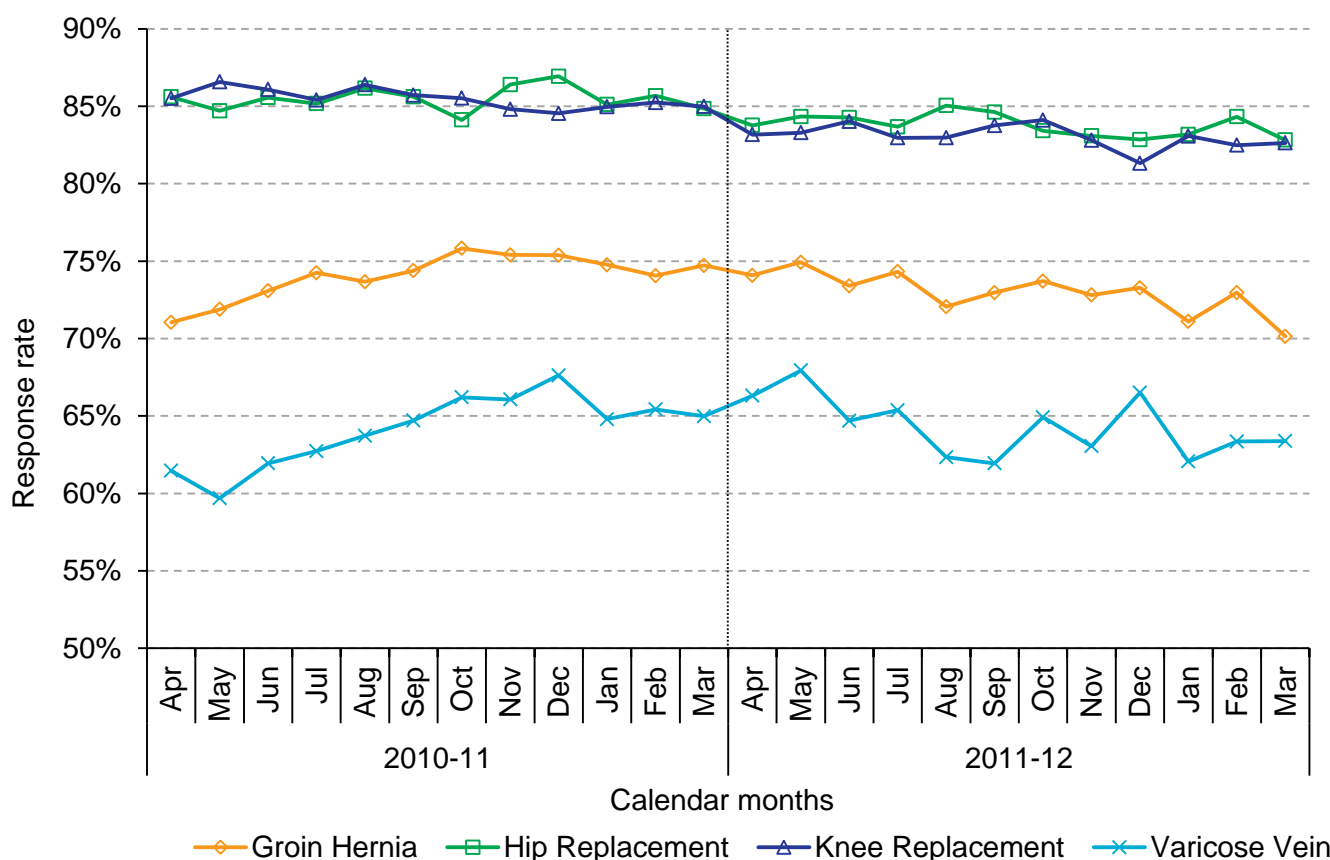


For the 185,034 pre-operative questionnaires, 175,378 post-operative questionnaires were sent out of which 139,537 were returned and available for analysis, a return rate of 79.6%. This rate is a little lower than but similar to the rates in the two previous years (80.0% in 2009-10 and 81.0% in 2010-11). Reasons for non-return vary but include operations being cancelled and patients choosing not to complete and return their post-operative questionnaires.

The post-operative return rates (Chart 5) were lower for groin hernia and lower still for varicose vein surgery than for knee and hip replacements; this might in part arise from knee and hip replacements being typically more major and life-changing than groin hernia and varicose vein procedures leading patients to be more willing to complete and return their questionnaires. There may also be an effect arising from the differing time lag between procedures: hip and knee replacement patients are sent their post-operative questionnaires 6 months after their procedure as against 3 months for varicose vein and groin hernia patients.

Chart 5: Rate of return of post-operative questionnaires, by month of completion of pre-operative questionnaire, all procedures

Note: vertical axis starts at 50%.



Health Gain

Key findings

- General improvement in health in **49.9% to 87.3%** of all PROMs cases (generic EQ-5D Index), according to procedure, with the average gain being between **0.080 to 0.414** points (out of a maximum possible 1.594)
- Improvement in health in **95.7%** of hip replacement cases (Oxford Hip Score) with the average gain being **20.0** points (out of maximum possible 48)
- Improvement in health in **91.6%** of knee replacement cases (Oxford Knee Score) with the average gain being **15.0** points (out of maximum possible 48)
- Improvement in health in **83.1%** of varicose vein cases (Aberdeen Varicose Vein Questionnaire) with the average gain being **7.9** points (out of maximum possible 100)

Overview

There has been little change over the three years of the PROMs programme in the extent to which questionnaires recorded improvements in patients' health or in their conditions.

For all procedures, substantially lower rates of health improvement were recorded on the EQ VAS measure than the EQ-5D Index. This difference is thought to reflect the two measures' differing nature: for the EQ VAS, patients identify a summary score of their general health by marking a 'thermometer'-style drawing and, whilst the measure is easy to understand, it can encompass underlying factors that do not relate to patients' healthcare or to the PROMs procedure they have undergone; in contrast, the EQ-5D Index captures several specific surgery-related matters in a single measure.

Rates of recorded health improvement were higher for the condition-specific measures — Oxford Hip Score, Oxford Knee Score, Aberdeen Varicose Vein Questionnaire — than for the two generic measures. This is not unexpected given that these condition-specific measures focus on clearly defined aspects of clinical conditions which would be expected to be affected by the procedures.

Aggregate data tables from which the charts in the Procedural Analysis section are derived are set out in Appendices 2 and 3. A detailed breakdown of the distribution of pre- and post-operative scores and health gains, aggregated by dimensions of equality, is available to download in the *Equality data file* published alongside this report.

Procedural Analysis

For a guide to interpreting the box-and-whisker diagrams shown in this section, refer to Appendix 1

EQ-5D Index

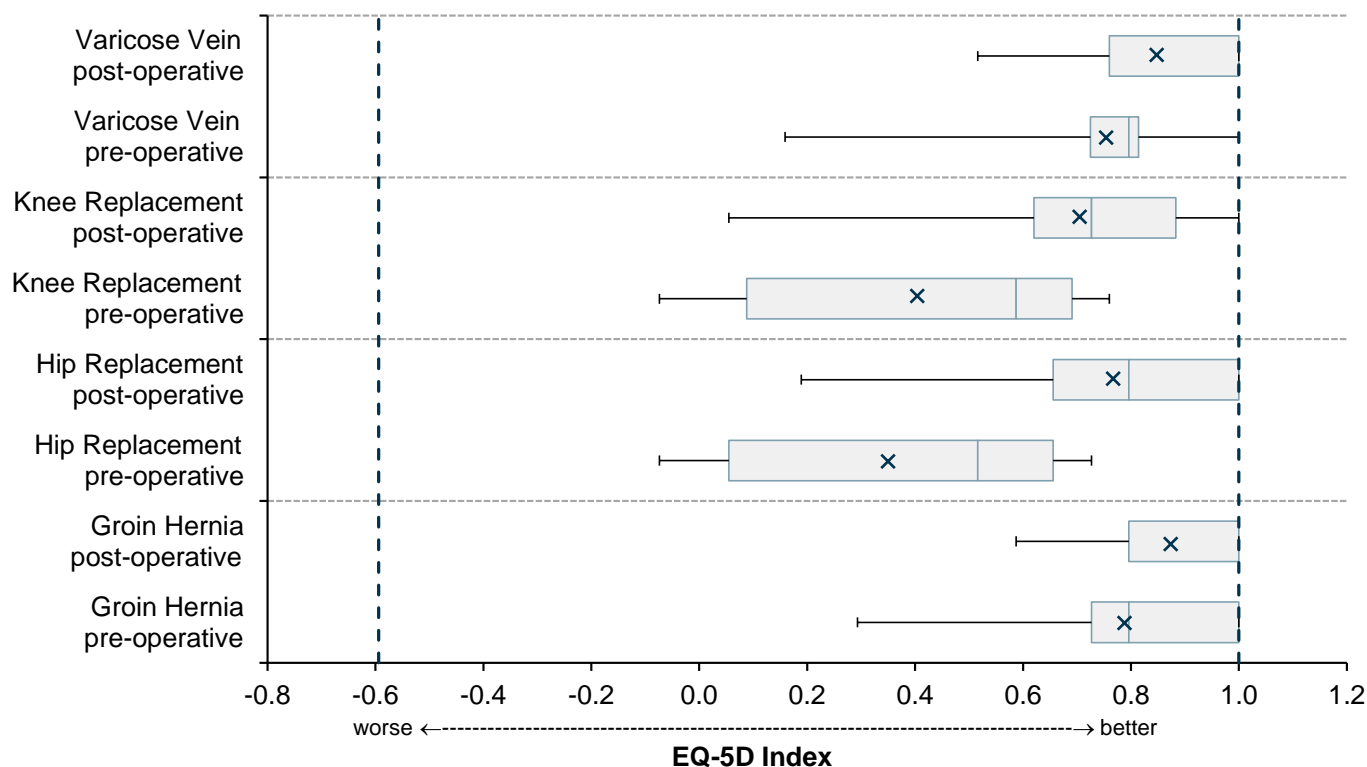
The average health gain (where it was possible to calculate a score on both pre- and post-operative questionnaires) varied between procedures, being greater for the orthopaedic than the two general surgery procedures. With a maximum possible of 1.594, the average gains were⁵:

- Groin Hernia: 0.080
- Hip Replacement: 0.414
- Knee Replacement: 0.299
- Varicose Vein: 0.094

There was less opportunity for varicose vein and, especially, for groin hernia patients to show health gains (Chart 6) because of the already high pre-operative scores. Indeed, more than quarter of groin hernia patients for whom pre- and post-operative scores could be calculated were already scoring 1 – the highest possible score – on their pre-operative questionnaires and so would not be able to show any improvement on this measure.

A markedly greater percentage of hip and knee replacement respondents recorded any health gain on the EQ-5D Index (87.3% and 78.4%) than groin hernia and varicose vein respondents (49.9% and 53.2%), not much changed from the previous two years (Chart 7). This is not surprising given the lesser scope for vein and groin patients to show a health improvement on this measure.

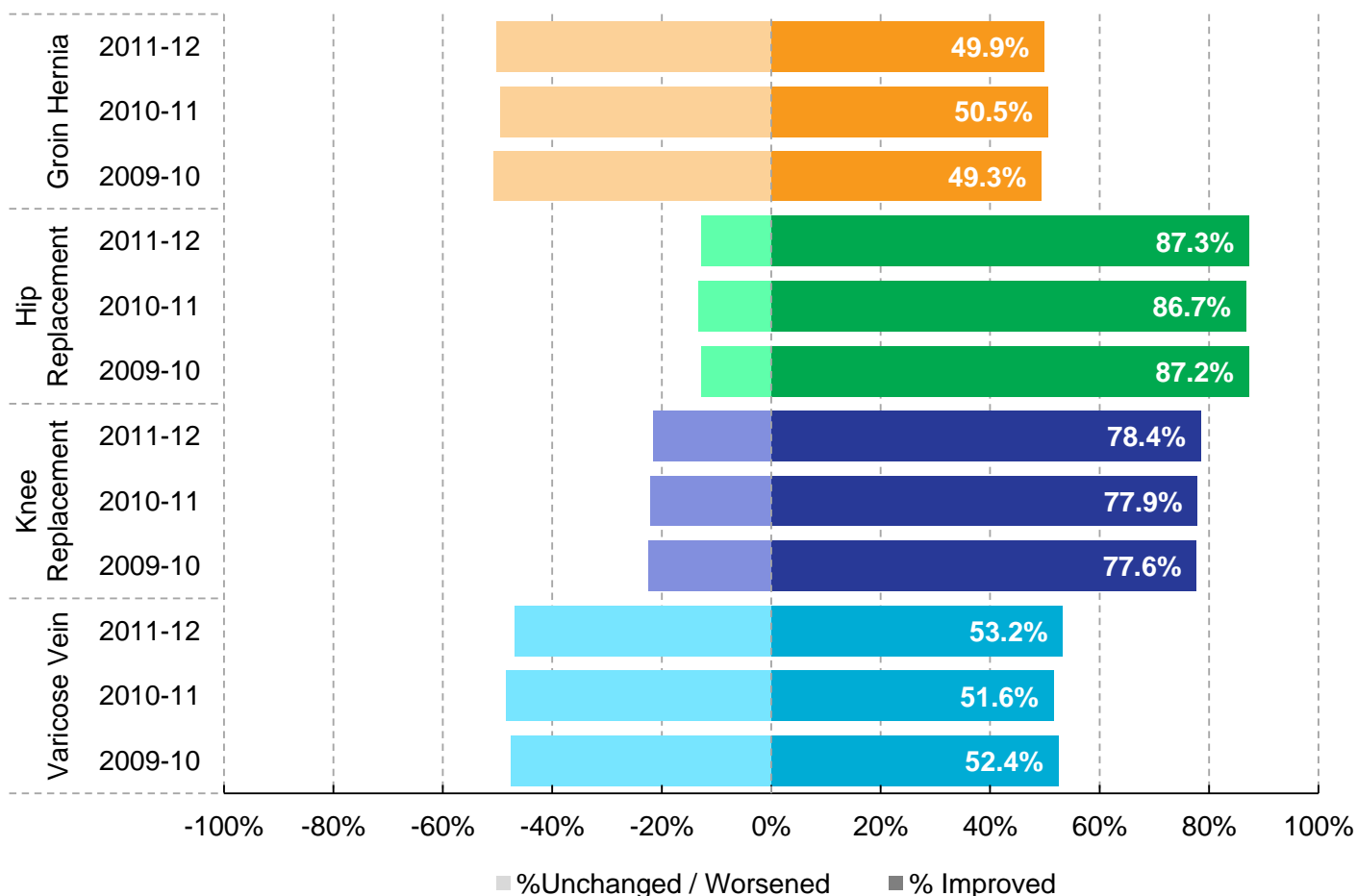
Chart 6: EQ-5D Index: distribution of scores, by procedure, 2011-12



⁵ The EQ-5D Index is not continuous; it runs from -0.594 ('worst') to 1.000 ('best') but it can take only certain values within this range.

For knee and, especially, hip replacements, the average health gains of 0.299 and 0.414 are high, but the overall picture is less clear-cut: the long negative 'whiskers' on the post-operative boxes in Chart 6 show that about one-fifth of patients' post-operative scores are spread out amongst much lower values.

Chart 7: EQ-5D Index: percentage of responses indicating improved or worsened health, by procedure, all years



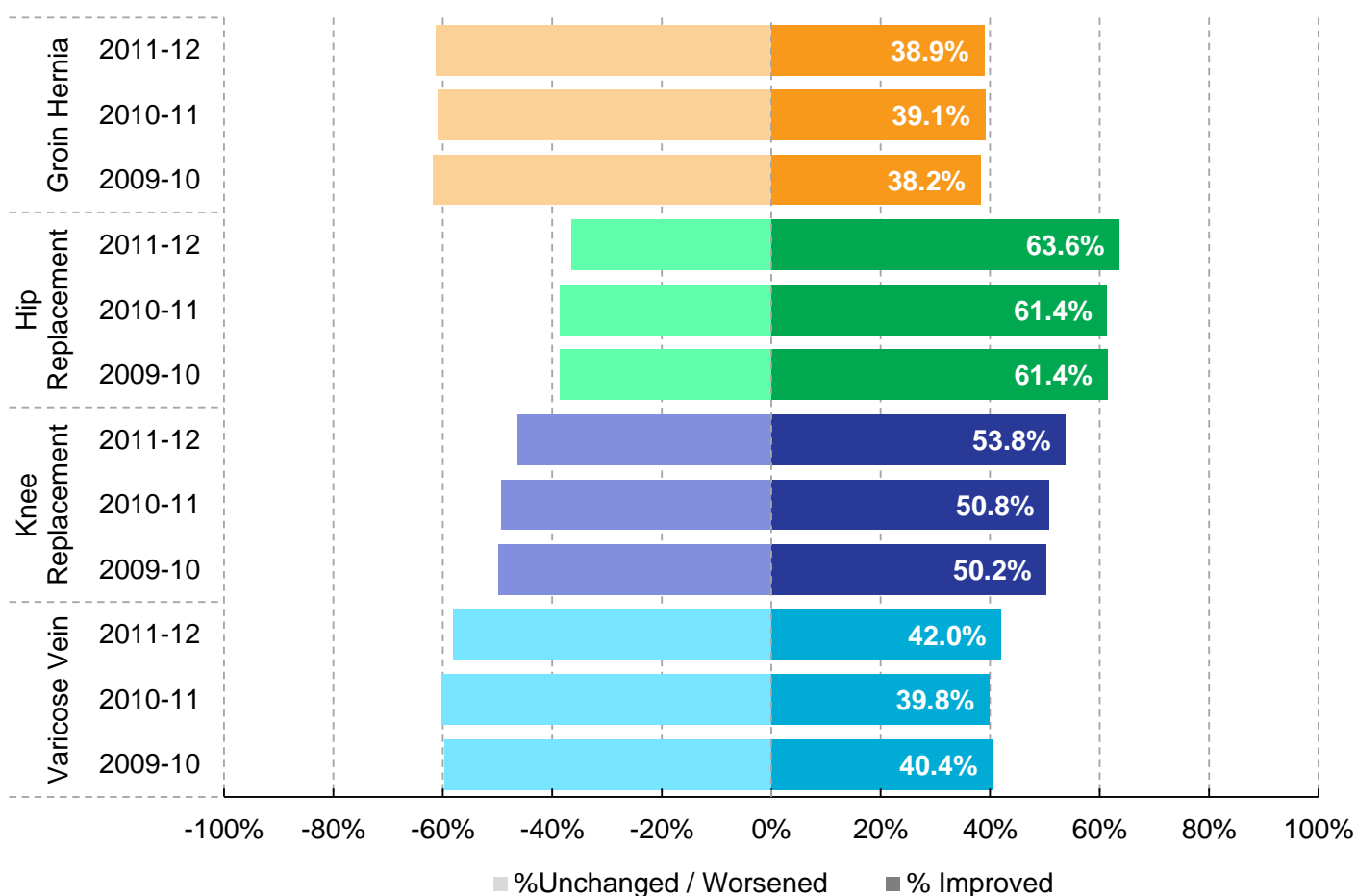
EQ VAS

A breakdown of EQ VAS improvement rates by procedure (Chart 8) paints a similar picture to that of EQ-5D Index, albeit that the rates of improvement are lower than on the EQ-5D Index for each procedure, which would be expected given the differing nature of the measures.

Average results on this measure varied widely between procedures. Hip replacement patients reported superficially the best outcome of the four procedures, recording an average health gain of 9.9 points⁶ (amongst those where it was possible to calculate a score on both pre- and post-operative questionnaires) with 63.6% of them recording some improvement (Chart 8). On the other hand, only 38.9% of groin hernia respondents recorded any improvement, the average change in fact being a fall of 0.8 points, and varicose vein patients recorded almost no change on average.

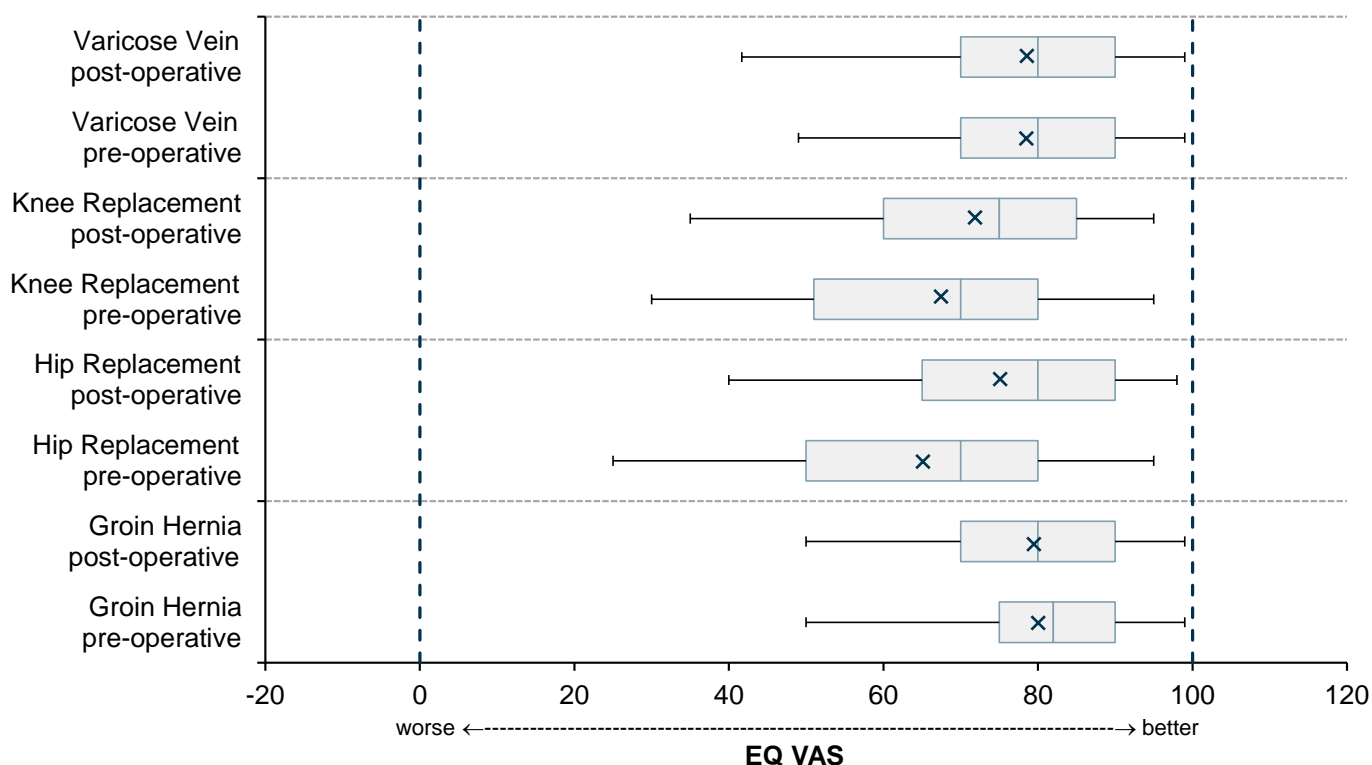
⁶ The EQ VAS measure is not continuous; it is an integer from 0 ('worst') to 100 ('best')

Chart 8: EQ VAS: percentage of responses indicating improved or worsened health, by procedure, all years



However, these findings should not be taken as too strong an indication of health change. Not only is the EQ VAS measure more broad-based than the others, possibly reflecting matters not related to patients' PROMs surgeries, but also the more comprehensive indications of the spread of the EQ VAS scores (Chart 9) identify that the wide spread of EQ VAS scores, for each of the procedures, showed little change between pre- and post-operatively.

Chart 9: EQ VAS: distribution of scores, by procedure, 2011-12



Condition-specific measures

For all three procedures with a condition-specific measure, the recorded rates of improvement were higher than the generic EQ-5D Index and EQ VAS measures, with an improvement in health being recorded in at least 83.1% of cases (Chart 10).

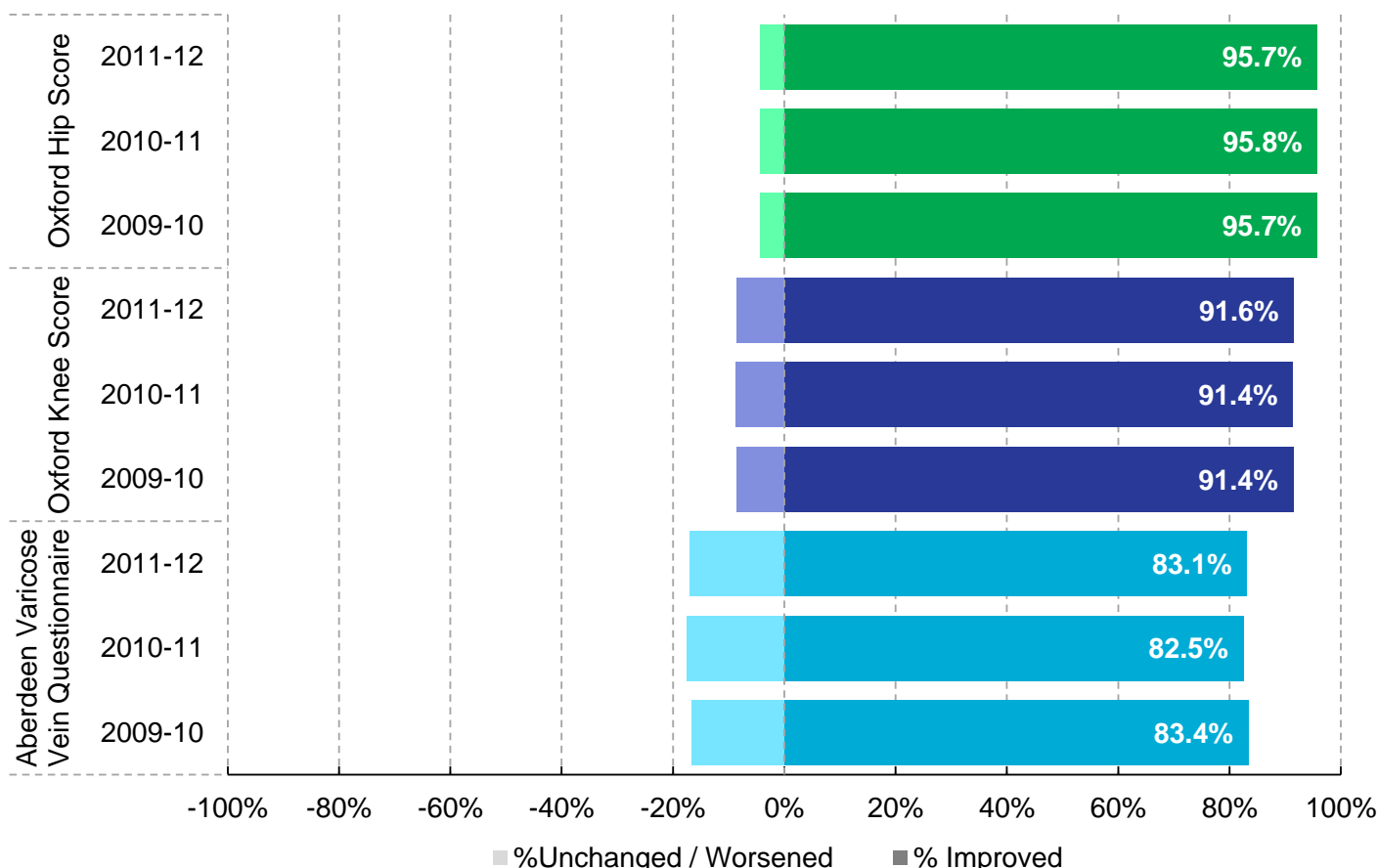
Hip and knee replacement patients had recorded particularly good levels of health gain: for hip replacements, the average gain (where it was possible to calculate a score on both pre- and post-operative questionnaires) was 20.0 points⁷ with almost all questionnaire pairs – 95.7% – showing some improvement; knee replacement patients did almost as well with an average gain of 15.0 points⁸ and an improvement rate of 91.6%. But the good average gains mask some disparity, for although almost all patients recorded some improvement and the average gain was high, the box—and-whisker plots (Chart 11 and Chart 12) indicate that there was a substantial core of patients who recorded little, if any, health gain.

⁷ The Oxford Hip Score is not continuous; it is an integer from 0 ('worst') to 48 ('best')

⁸ The Oxford Knee Score is not continuous; it is an integer from 0 ('worst') to 48 ('best')

Varicose vein patients recorded, on average, an improvement of 7.9 points on the Aberdeen Varicose Vein Questionnaire⁹, with 83.1% of the cases showing some improvement. This should not be seen as necessarily worse than for hip and knee patients as the three condition-specific measures are wholly different from each other and the results are not directly comparable. Although a large majority recorded some increase, the scores remained clustered and only slightly better as a whole (Chart 13); however, even pre-operatively, a large portion of the scores were already well towards the better end of the scale and so had less scope for improvements to show than for the hip and knee scores.

Chart 10: Condition-specific measures: percentage of responses indicating improved or worsened health, by year



NOTE: There is no condition-specific measure for Groin Hernia

⁹ The Aberdeen Varicose Vein Questionnaire is not continuous; it is an integer from 100 ('worst') to 0 ('best')

Chart 11: Oxford Hip Score: distribution of scores, 2011-12

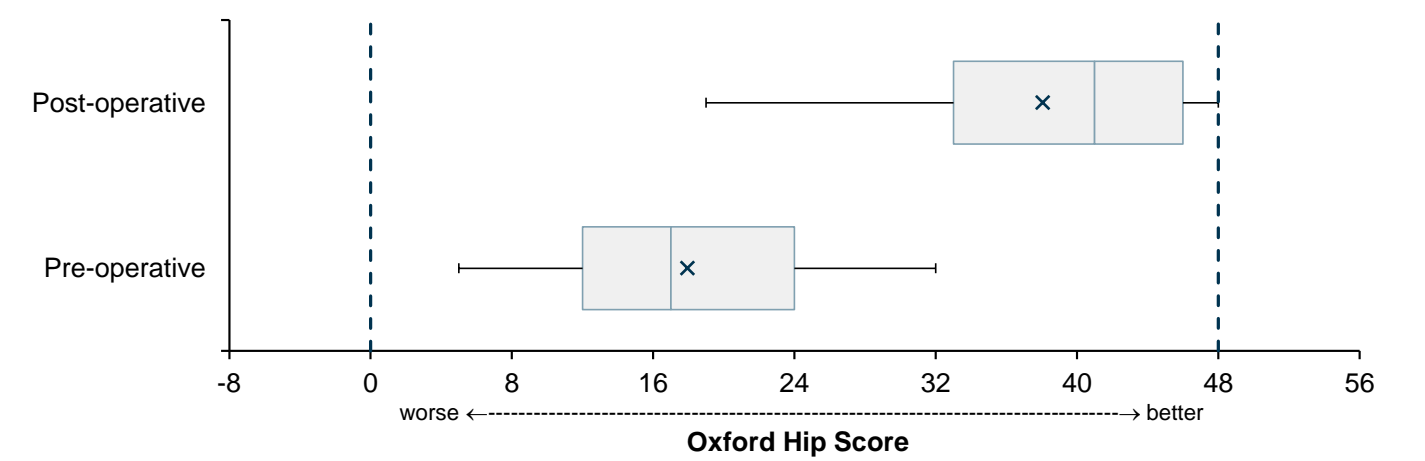


Chart 12: Oxford Knee Score: distribution of scores, 2011-12

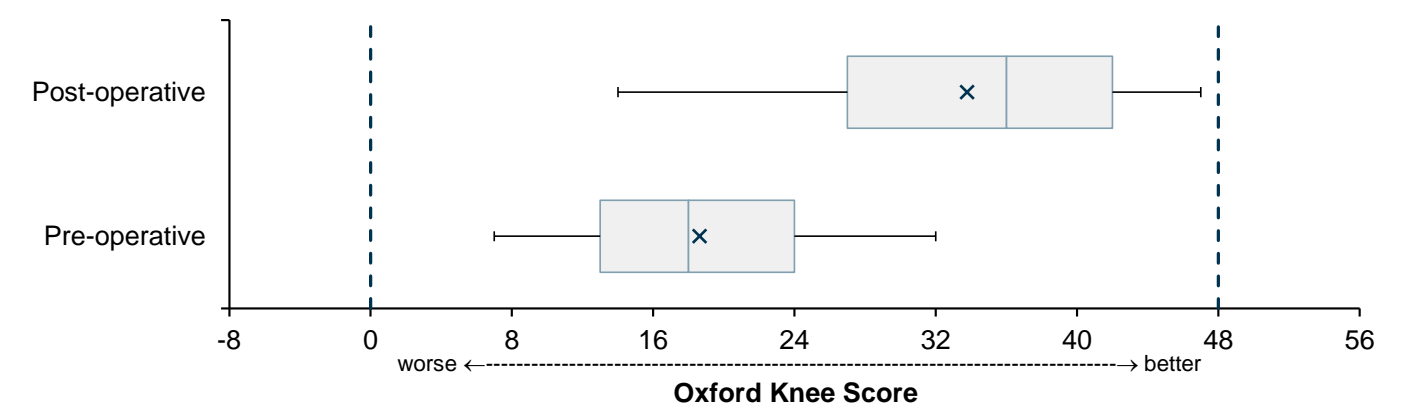
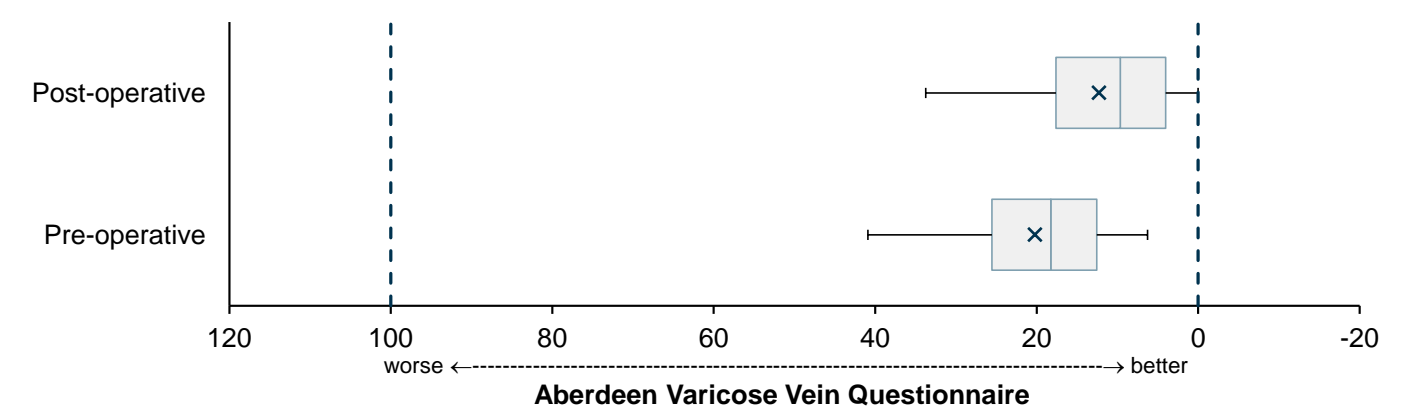


Chart 13: Aberdeen Varicose Vein Questionnaire: distribution of scores, 2011-12



Surgical Success and Satisfaction

Key findings

- Success of surgery was reported at between **87.0%** and **94.0%**, depending on procedure
- Satisfaction with surgery was reported at between **82.4%** and **91.5%**, depending on procedure

Patients are asked, on their post-operative questionnaires, to rate the **success of their surgical procedure** in response to the question, according to their procedure:

Groin Hernia: Overall, how are your hernia problems now, compared to before your operation?

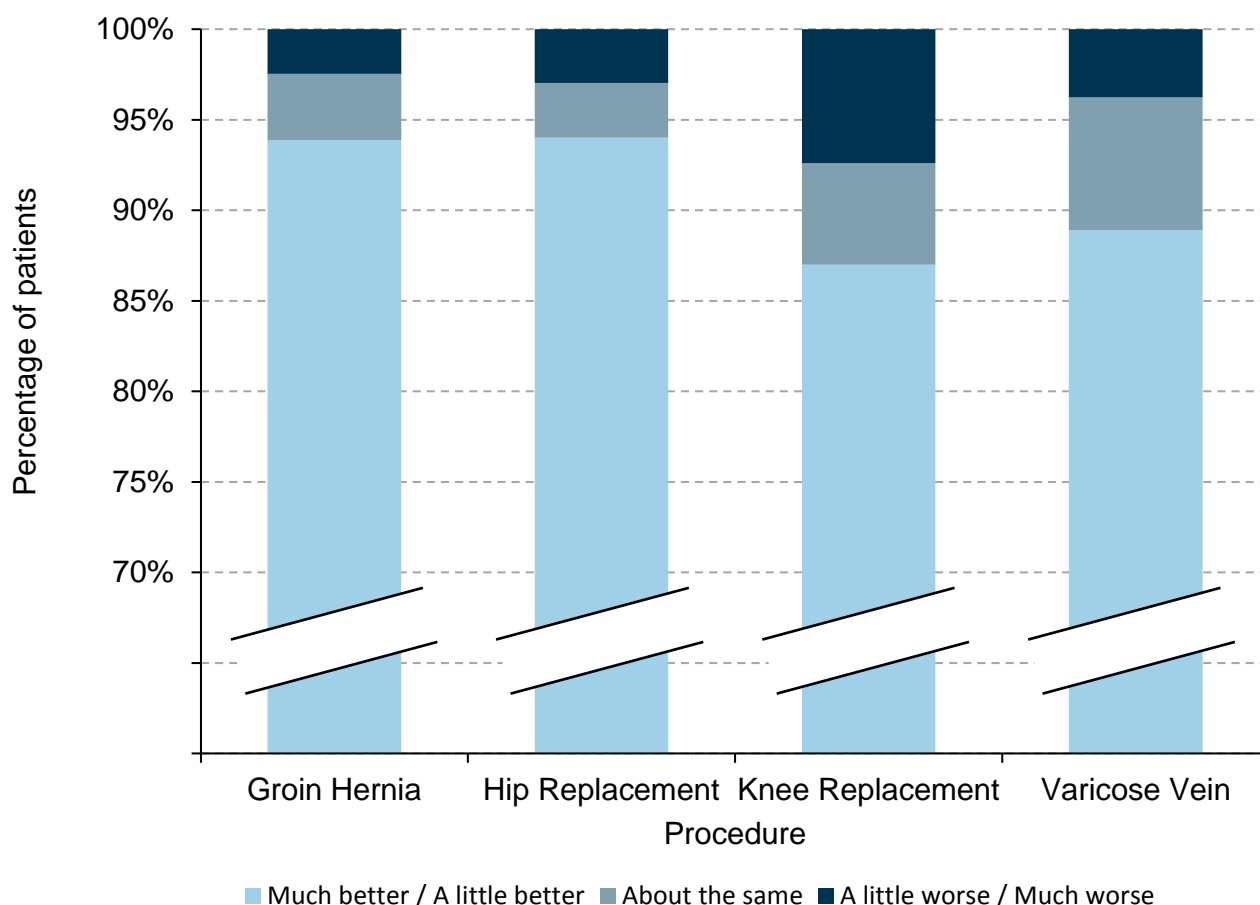
Hip Replacement: Overall, how are the problems now in the hip on which you had surgery, compared to before your operation?

Knee Replacement: Overall, how are the problems now in the knee on which you had surgery, compared to before your operation?

Varicose Vein: Overall, how are the problems now with your varicose veins on which you had surgery, compared to before your operation?

Patients are also asked to rate their **satisfaction with their surgery** by describing the results of their operation as 'Excellent', 'Very good', 'Good', 'Fair' or 'Poor'.

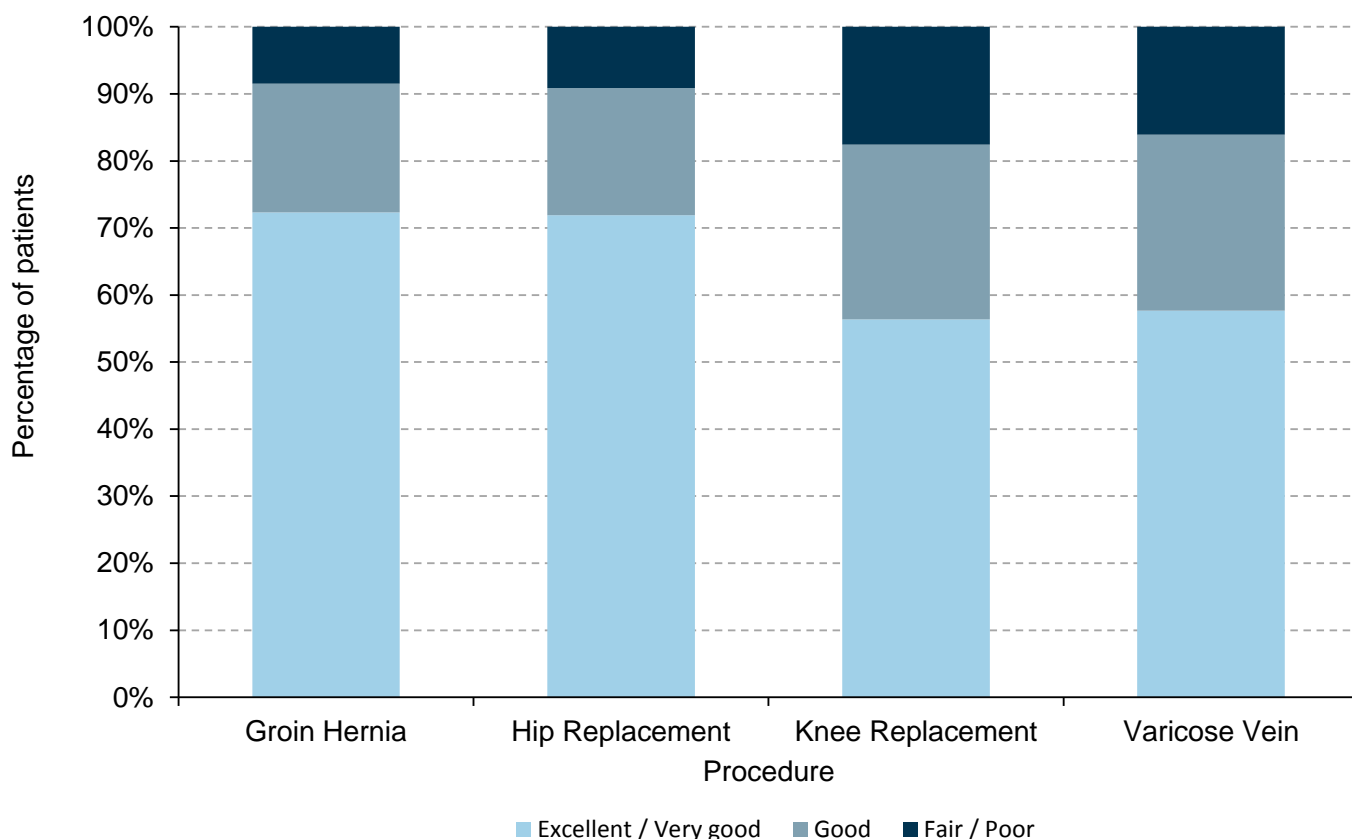
Chart 14: Success of surgery: breakdown of responses¹⁰, by procedure, 2011-12



¹⁰ Percentages of those post-operative questionnaires for each procedure with a valid response to this question.

As in previous years, knee replacement respondents reported the lowest rates of both success (Chart 14) and satisfaction (Chart 15), although any underlying reasons for this have not been identified. However, the rates for all four procedures were nevertheless high with at least 87.0% recording 'much better' or 'a little better' for surgical success and between 82.4% and 91.5% rating their satisfaction with surgery as 'excellent', 'very good' or 'good'.

Chart 15: Satisfaction with surgery: breakdown of responses¹¹, by procedure, 2011-12



Results of both the success and satisfaction questions have barely changed over the three years of the PROMs programme, all rates quoted in this section being within 1 percentage point of those for both 2010-11 and 2009-10.

¹¹ Percentages of those post-operative questionnaires for each procedure with a valid response to this question.

Surgical Complications, Re-admissions and Further Surgery

Key findings

One or more specified complications of surgery for between **22.6% and 33.4%** of cases, depending on procedure

Readmission to hospital for **5.3% to 9.6%** of cases, depending on procedure

Further surgery required for **2.7% to 16.0%** of cases, depending on procedure

Readmissions and further surgery

Patients are asked, on their post-operative questionnaires, whether they have been readmitted to hospital and whether they have had another operation on the same part of their anatomy as their PROMs operation. Between 2.7% and 16.0% of respondents, depending on the procedure, reported having had further surgery (Table 2).

Complications of surgery

Patients are asked, on the post-operative questionnaires whether, after their operation, they have experienced any of the following problems:

- allergy or reaction to drug
- urinary problems
- bleeding
- wound problems

The indicated complication rate varied by procedure with the orthopaedic procedure respondents (hip and knee replacements) having higher rates of complication than varicose vein and groin hernia respondents (Table 2). This might not be unexpected, given the relative severity of the operations.

Which problems patients had varied considerably, both between procedures and problems. For example, *allergy* and *wound* problems were the most common complications for hip and knee patients, with *bleeding* indicated at a considerably lower rate; on the other hand, *bleeding* was indicated at a much greater rate than *allergy* or *urinary* problems for varicose vein patients.

Summary of responses

Table 2: Number and percentage of respondents reporting having had one or more specified complications after PROMs surgery, having had further surgery, and having been re-admitted to hospital, 2011-12.

Except where stated, percentages are of total number of post-operative questionnaires returned.

Groin Hernia

One or more problems	Of those with one or more problems				Re-admitted	Further surgery
	Allergy	Bleeding	Urinary	Wound		
6,777	1,151	1,580	2,386	3,309	1,657	4,803
22.6%	17.0%	23.3%	35.2%	48.8%	5.5%	16.0%

Hip Replacement

One or more problems	Of those with one or more problems				Re-admitted	Further surgery
	Allergy	Bleeding	Urinary	Wound		
14,140	5,054	2,371	5,885	4,260	3,613	1,265
29.8%	35.7%	16.8%	41.6%	30.1%	7.6%	2.7%

Knee Replacement

One or more problems	Of those with one or more problems				Re-admitted	Further surgery
	Allergy	Bleeding	Urinary	Wound		
18,045	6,597	4,023	5,825	6,657	5,198	2,006
33.4%	36.6%	22.3%	32.3%	36.9%	9.6%	3.7%

Varicose Vein

One or more problems	Of those with one or more problems				Re-admitted	Further surgery
	Allergy	Bleeding	Urinary	Wound		
1,971	210	1,027	115	1,136	427	1,216
24.2%	10.7%	52.1%	5.8%	57.6%	5.3%	15.0%

Organisation Level Analysis

Key findings

Healthcare providers had results significantly different from England as a whole, on the EQ-5D Index and/or one or more condition-specific measures, in **47 cases**, based on 99.8% statistical control limits, of which **14 were significantly better** than the England average and **33 worse**.

Adjusted average health gains have been calculated for each provider of PROMS surgery – an NHS trust or independent sector hospital – based on statistical methods¹² which take account of the fact that provider organisations deal with patients with differing case-mixes. These scores can be explored in the interactive *Score Comparison* tool, which is published alongside this publication.

The health gains recorded for each provider of PROMs surgery have been compared to all-England averages using statistical models¹³ which take account of the differing case-mix seen by each provider. The models identify as 'outliers' those providers which have outcomes significantly different from the national average – a 'positive outlier' having a significantly better outcome than average, a 'negative outlier' significantly worse.

A provider identified as a 99.8% outlier has a roughly 1 in 500 chance of having had results so far from the England average merely because of random variation in their patients, giving a good indication that there was something within that provider's control to have caused so substantial a difference. It does not mean that the provider was necessarily doing something 'good' or 'bad', but it might warrant further investigation.

Table 3: Number of outlier providers (99.8% control limits) for EQ-5D Index and condition-specific measures, by procedure and measure, all years

	2009-10				2010-11				2011-12			
	EQ-5D Index		Condition-specific score		EQ-5D Index		Condition-specific score		EQ-5D Index		Condition-specific score	
	+ve	-ve	+ve	-ve	+ve	-ve	+ve	-ve	+ve	-ve	+ve	-ve
Groin Hernia	0	0			0	1			1	1		
Hip Replacement	3	0	5	9	5	9	6	8	2	3	5	14
Knee Replacement	2	3	9	4	1	6	9	10	0	3	4	7
Varicose Vein	0	2	0	4	0	0	0	1	0	0	2	5
Total	5	5	14	17	6	16	15	19	3	7	11	26

Owing to changes in methodologies, numbers of outliers should not be compared from year to year

Full tables of adjusted scores and identified outliers are available in the *Provider and Commissioner-level data files* that have been published alongside this publication.

¹² Casemix adjustment methodology developed by the Department of Health, with the aid of independent contractors, in conjunction with the HSCIC. Further information is available from <https://www.gov.uk/government/publications/patient-reported-outcome-measures-proms-in-england-the-case-mix-adjustment-methodology>

¹³ Statistical models developed by the Department of Health / NHS England in conjunction with the HSCIC. Further information is available from <http://www.england.nhs.uk/statistics/statistical-work-areas/proms/>

Further information

PROMs Guide

For more details on the background to the PROMs programme, an overview of data collection, processing, scoring and linking, refer to *A Guide to PROMs Methodology*, which is available at <http://www.hscic.gov.uk/proms>.

Data Quality

Important information about the quality of the data from which these statistics are derived is set out in the accompanying *Data Quality Note*, available at <http://www.hscic.gov.uk/catalogue/PUB11359>.

Hospital Episode Statistics

For more information about Hospital Episode Statistics, and to access the many published analyses and datasets, please visit the HES homepage at <http://www.hscic.gov.uk/hes>.

Acknowledgements

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¹⁴ <http://www.euroqol.org>

¹⁵ <http://www.isis-innovation.com/outcomes/orthopaedic/>

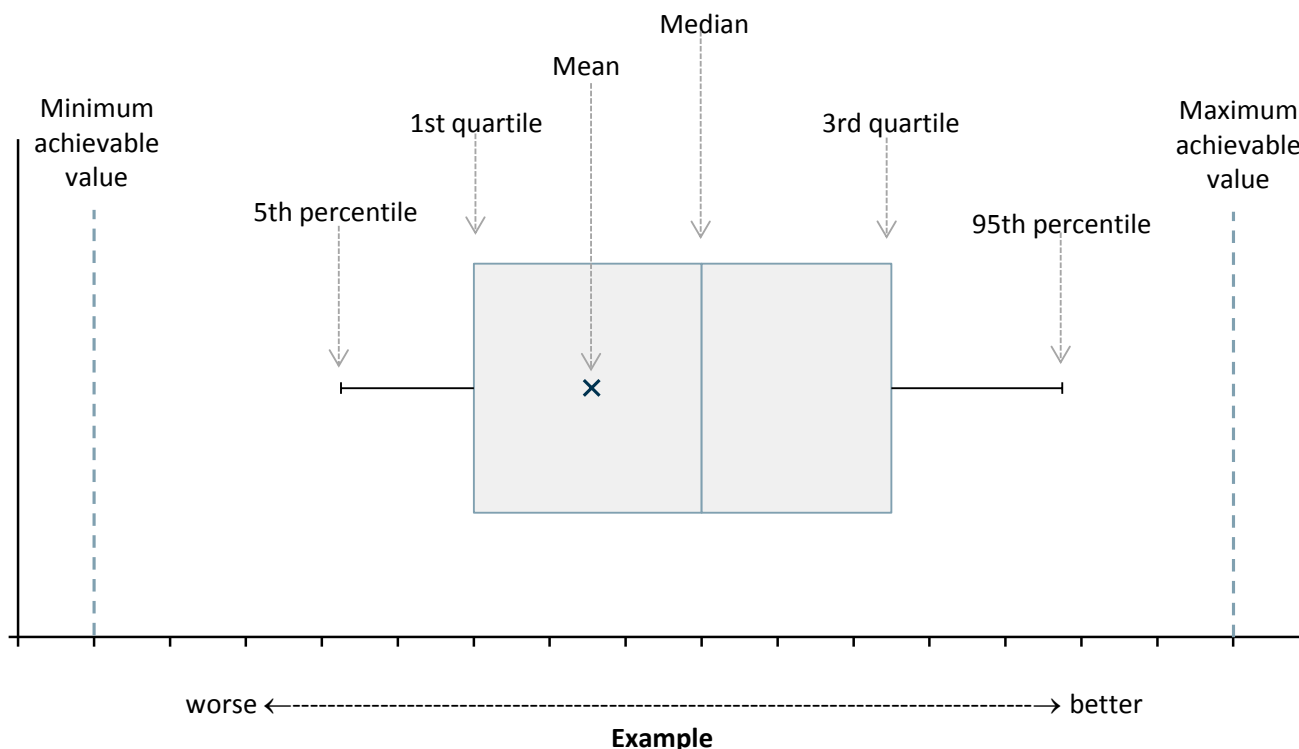
Appendix 1: Understanding box-and-whisker diagrams

It can be useful to compare average health scores between categories of patients or between pre- and post-operative responses. But the average can be a rather crude summary of a more complex picture. For instance, one group of patients could mostly report a modest health gain following a procedure whilst another group reports wildly disparate gains across the spectrum from greatly decreased health to greatly increased; yet the average health gain for both such groups of patients could conceivably be the same.

The box-and-whisker diagrams presented in the Health Gain section (on page 14) show several aspects of the scores which together provide a more complete summary of how scores are distributed across the group of patients.

The example diagram below shows how the diagrams indicate the following information¹⁶:

- minimum and maximum possible values – the dotted lines
- 5th and 95th percentiles – the tips of the whiskers – a broad indication of the range of scores: 90% of scores fall between these values
- 1st and 3rd quartiles – the left and right hand edges of the shaded box – a more tight indication of the extent of the spread: half of the scores fall between these values
- median – the vertical line inside the shaded box – indicating the middle-of-the-road, splitting the set of scores into two, half above and half below this value
- mean – marked with an x – the idiomatic ‘average’, the position of which relative to the median can sometimes reveal telling information about the existence and/or extent of extreme values.



¹⁶ Definitions of the median, quartiles and percentiles have been simplified slightly for clarity

Appendix 2: Breakdowns of Health Gains

Figures in these tables are for completed pairs of pre- and post-operative questionnaires. Figures for 'improved', 'unchanged' and 'worsened' are calculated only for questionnaire pairs where there were valid scores recorded in both the pre- and post-operative questionnaires such that the health gain could be calculated; where scores could not be calculated for one or both questionnaires, the change has been treated as unknown and the record excluded from these calculations.

Table 4: EQ-5D Index – number and percentage of improved, unchanged and worsened scores, 2011-12

	Groin Hernia		Hip Replacement		Knee Replacement		Varicose Vein		Total	
	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
Improved	14,004	49.9%	36,235	87.3%	36,993	78.4%	3,967	53.2%	91,199	73.4%
Unchanged	8,974	31.9%	2,628	6.3%	4,944	10.5%	2,291	30.7%	18,837	15.2%
Worsened	5,113	18.2%	2,667	6.4%	5,236	11.1%	1,194	16.0%	14,210	11.4%
Total	28,091	100.0%	41,530	100.0%	47,173	100.0%	7,452	100.0%	124,246	100.0%

Table 5: EQ VAS – number and percentage of improved, unchanged and worsened scores, 2011-12

	Groin Hernia		Hip Replacement		Knee Replacement		Varicose Vein		Overall	
	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
Improved	10,721	38.9%	25,724	63.6%	24,634	53.8%	3,077	42.0%	64,156	52.9%
Unchanged	4,837	17.5%	3,845	9.5%	5,093	11.1%	1,236	16.9%	15,011	12.4%
Worsened	12,031	43.6%	10,881	26.9%	16,072	35.1%	3,017	41.2%	42,001	34.7%
Total	27,589	100.0%	40,450	100.0%	45,799	100.0%	7,330	100.0%	121,168	100.0%

Table 6: Condition-specific scores – number and percentage of improved, unchanged and worsened scores, 2011-12

	Groin Hernia		Hip Replacement		Knee Replacement		Varicose Vein		Overall	
	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
Improved	There is no condition-specific scoring for Groin Hernia		44,230	95.7%	47,280	91.6%	6,564	83.1%	98,074	92.7%
Unchanged			348	0.8%	709	1.4%	*	*	*	*
Worsened			1,644	3.6%	3,649	7.1%	*	*	*	*
Total			46,222	100.0%	51,638	100.0%	7,900	100.0%	105,760	100.0%

* = suppressed to protect patient confidentiality

Appendix 3: Breakdowns of Measure Distributions

Table 7: Pre- and post-operative mean and quartiles, by procedure and measure, 2011-12

	Mean		1st Quartile		Median		3rd Quartile	
	Pre-operative	Post-operative	Pre-operative	Post-operative	Pre-operative	Post-operative	Pre-operative	Post-operative
EQ-5D Index								
Groin Hernia	0.788	0.874	0.727	0.796	0.796	1.000	1.000	1.000
Hip Replacement	0.350	0.767	0.055	0.656	0.516	0.796	0.656	1.000
Knee Replacement	0.404	0.705	0.088	0.620	0.587	0.727	0.691	0.883
Varicose Vein	0.754	0.848	0.725	0.760	0.796	1.000	0.814	1.000
EQ VAS								
Groin Hernia	80.039	79.482	75.000	70.000	82.000	80.000	90.000	90.000
Hip Replacement	65.140	75.138	50.000	65.000	70.000	80.000	80.000	90.000
Knee Replacement	67.481	71.873	51.000	60.000	70.000	75.000	80.000	85.000
Varicose Vein	78.495	78.565	70.000	70.000	80.000	80.000	90.000	90.000
Condition-specific measures (Oxford Hip Score; Oxford Knee Score; Aberdeen Varicose Vein Questionnaire)								
Groin Hernia								
Hip Replacement	17.942	38.070	12.000	33.000	17.000	41.000	24.000	46.000
Knee Replacement	18.635	33.785	13.000	27.000	18.000	36.000	24.000	42.000
Varicose Vein	20.191	12.289	12.555	4.014	18.246	9.656	25.541	17.603

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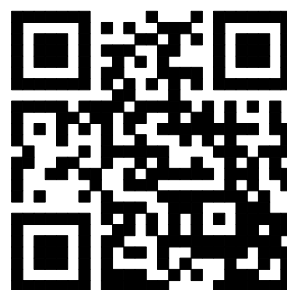


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