

Putting NICE guidance into practice

Resource impact report: Joint replacement (primary): hip, knee and shoulder (NG157)

Published: June 2020

Summary

This report focuses on the recommendations from NICE's guideline on [joint replacement \(primary\): hip, knee and shoulder](#) that we think will have the greatest resource impact nationally (for England), and will need the most additional resources to implement or potentially generate the biggest savings.

They are:

- offer a choice of partial or total knee replacement to people with isolated medial compartmental osteoarthritis (**recommendation 1.7.1**)
- offer resurfacing of the patella to people having primary elective total knee replacement (**recommendation 1.7.2**).

Financial impact

The estimated financial impact of implementing this guideline for England in the next 5 years is a saving of around £0.7m in 2020/21 rising to a saving of around £3.7 million in 2024/25 as set out in table 1 and figure 1 below.

The net cash releasing saving for providers is estimated to be around £2.1 million by year 5, which is driven by an overall reduction in spend on components and consumables.

The net cash releasing saving for commissioners is estimated to be around £1.6m by year 5, which based on the anticipated reduction in the number of revisions. This saving is based on the reduction in activity evaluated at national tariff. This is not expected to be fully cash releasing for providers as the capacity benefit is not anticipated to release cash savings.

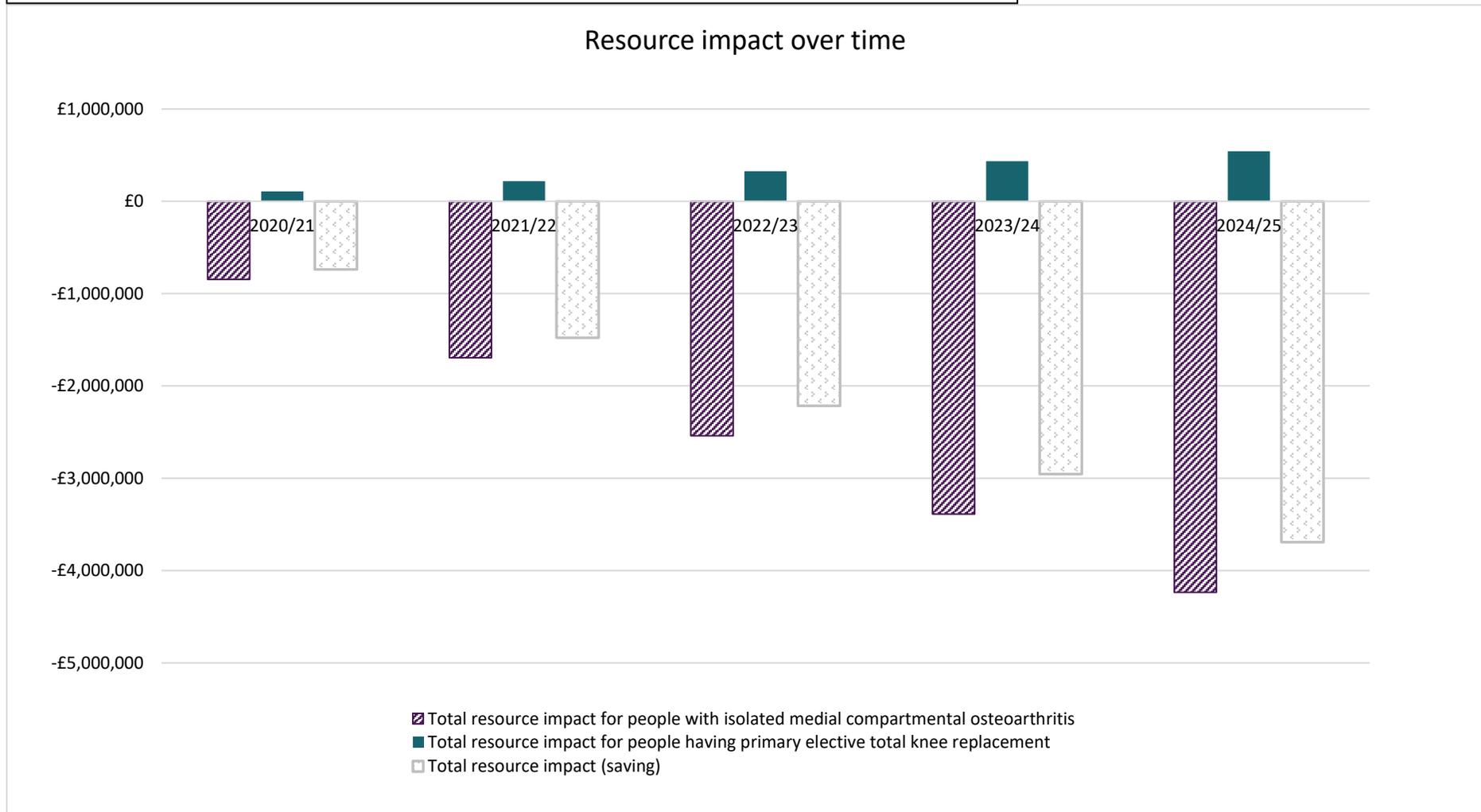
Table 1 Estimated budget impact of implementing the guideline for the population of England £m

	2020/21	2021/22	2022/23	2023/24	2024/25
Implementation rate for recommendations 1.7.1 and 1.7.2	20%	40%	60%	80%	100%
Total resource impact (saving) for people with isolated medial compartmental osteoarthritis (£m)	-0.8	-1.7	-2.5	-3.4	-4.2
Total resource impact (cost) for people having primary elective total knee replacement (£m)	0.1	0.2	0.3	0.4	0.5
Total resource impact (saving) for England (£m)	-0.7	-1.5	-2.2	-3.0	-3.7
Total Resource Impact by provider/commissioner	2020/21	2021/22	2022/23	2023/24	2024/25
Total resource impact (saving) for England (providers) (£m)	-0.4	-0.8	-1.2	-1.7	-2.1
Total resource impact (saving) for England (commissioners) (£m)	-0.3	-0.7	-1.0	-1.3	-1.6

Table 2 Estimated budget impact of implementing the guideline per average 100,000 population for commissioners and providers £000

	2020/21	2021/22	2022/23	2023/24	2024/25
Implementation rate	20%	40%	60%	80%	100%
Total resource impact (saving) for providers (£000) per average 100,000 population	-0.8	-1.5	-2.3	-3.0	-3.8
Total resource impact (saving) for commissioners (£000) per average 100,000 population	-0.6	-1.2	-1.8	-2.3	-2.9
Total resource impact (£000) per average 100,000 population	-1.3	-2.7	-4.0	-5.3	-6.7

Figure 1- The budget impact of guideline over the next 5 years



1 Introduction

- 1.1 The guideline offers evidence-based recommendations on primary joint replacement.
- 1.2 This report discusses the resource impact of implementing our guideline on [joint replacement \(primary\): hip, knee and shoulder](#) in England. It aims to help organisations plan for the financial implications of implementing this NICE guideline.
- 1.3 A resource impact template accompanies this report to help with assessing the resource impact at a local level in England, Wales or Northern Ireland.
- 1.4 We have considered direct costs and savings to the NHS and not those for the individual, the private sector or the not-for-profit sector. Any cost savings arising from a change in practice have been offset against the cost of implementing the change.
- 1.5 Joint replacement surgeries are commissioned by clinical commissioning groups. Providers are NHS hospital trusts.

2 Background

- 2.1 Hip, knee and shoulder joint replacements are among the most common orthopaedic operations performed in the UK. Around 90% of joint replacements are done to reduce pain and restore function in joints affected by osteoarthritis.
- 2.2 The type of surgical procedure performed for joint replacements varies nationally. In addition, a wide range of joint implants are used. These can be made of metal, plastic or ceramic, and can be fixed into place using a variety of methods. All these factors can affect the longevity of the implant. They also have an effect on short-term outcomes such as postoperative pain and complications.

3 Significant resource impact recommendations

3.1 There are 2 guideline recommendations that are likely to lead to a significant resource impact when implemented. These are:

- Offer a choice of partial or total knee replacement to people with isolated medial compartmental osteoarthritis. Discuss the potential benefits and risks of each option with the person (**recommendation 1.7.1**).
- Offer resurfacing of the patella to people having primary elective total knee replacement (**recommendation 1.7.2**).

Background

3.1.1 Knee replacement is an established treatment for people with end-stage arthritis of the knee that have exhausted non-surgical treatment options.

3.1.2 Currently over 100,000 knee replacement procedures are performed in the United Kingdom in each calendar year. In 2018 the [National Joint Registry](#) reported that 89% of all primary knee replacement surgeries were total knee replacements, 10% were partial knee replacements and 1% were patellofemoral knee replacements.

3.1.3 Partial knee replacements involve replacing only the affected area of the knee joint. It is a less invasive procedure than a total knee replacement and has fewer surgical complications. However, a partial knee replacement leaves behind the non-affected joint which may develop symptomatic arthritis and need future surgery.

3.1.4 Total knee replacements replace all of the knee joint. Although this procedure is more invasive, by replacing the total knee joint with patella resurfacing in one operation, the need for further surgeries may be reduced.

3.1.5 Patella resurfacing involves the removal of the under surface of the kneecap and the insertion of a plastic surface in its place. Current

practice suggests that there are inconsistencies in the use of patella resurfacing in total knee replacements.

- 3.1.6 According to the National Joint Registry around one third of people have their patella resurfaced and two thirds do not.

Assumptions made

- 3.1.7 Expert clinical opinion is that around 40% of people who are having a knee replacement are eligible for a partial knee replacement.
- 3.1.8 Currently around 28% of people who are eligible for a partial knee replacement receive one ([HES 18/19](#)). Around 20% have a total knee replacement with patella resurfacing and 52% have a total knee replacement without patella resurfacing ([HES 17/18 using first and second procedure codes](#)).
- 3.1.9 Expert clinical opinion is that in future practice, as a result of recommendations 1.7.1 and 1.7.2, 70% of people who are eligible for a partial knee replacement will have one, 24% will have a total knee replacement with patella resurfacing and 6% of people will have a total knee replacement without patella resurfacing.
- 3.1.10 Currently, around 29% of people who are not eligible for a partial knee replacement, have a total knee replacement with resurfacing and 71% have a total knee replacement without resurfacing ([HES 18/19 using first and second procedure codes](#)).
- 3.1.11 Expert clinical opinion is that in future practice, as a result of recommendation 1.7.2, 80% of those people who are not eligible for a partial knee replacement will have a total knee replacement with patella resurfacing and 20% will have a total knee replacement without patella resurfacing.
- 3.1.12 It is assumed that in the first 5 years after surgery that the average annualised revision rate will be 0.82% for partial knee replacements ([National center for biotechnology information](#)), 0.5% for total knee

replacements with patella resurfacing and 0.74% for total knee replacements without patella resurfacing ([The Lancet/TOPKAT](#)).

3.1.13 It is assumed that there is no impact on the number people that can be treated per theatre list, as the difference in time taken in theatre is negligible. Patella resurfacing takes around an additional 3 minutes to complete ([TOPKAT](#)), and a total knee replacement takes an additional 2 minutes to a partial knee replacement ([BMJ](#)).

3.1.14 All 3 procedures, partial knee replacement (OPCS W581), total knee replacement with patella resurfacing (OPCS W401, first procedure code and W581, second procedure code) and total knee replacement without resurfacing (OPCS W401) all lead to the same Healthcare Resource Group (HRG), HN22 Very Major Knee Procedures For Non-Trauma ([NHS grouper 19/20](#)). Therefore, the resource impact template looks at the cost of components for providers because the change in procedure has no impact on the tariff paid by commissioners or the complexity of case mix.

3.1.15 The change in the mix of the 3 procedures, leads to a change in total revisions as the 3 procedures have different revision rates associated with them (see 3.1.12). This has an impact on commissioners.

3.1.16 According to information provided by the clinical experts the average cost for components to providers that are used in partial knee replacements is £915 and components used in total knee replacements without patella resurfacing cost £1,205, a difference of £290 per knee replacement.

3.1.17 The cost of the additional components (to a provider) for a patella resurfacing in a total knee replacement are around £80 per operation ([TOPKAT](#)) leading to a total cost of £1,289.

3.1.18 The tariff for a major knee revision, HN81 Complex, Hip or Knee procedures for non-trauma has an average price of around £8,900

[\(National tariff 19-20\)](#) using the activity from [reference costs 17/18](#) to weight the cost.

3.1.19 It has been assumed that there is no growth, over the five year period, in the number of patients that would require knee replacement surgery.

3.1.20 The net saving of recommendations 1.7.1 and 1.7.2 is summarised in tables 3, 4, 5 and 6.

Table 3 Estimated budget impact summary of implementing the guideline for the population of England £m

	2020/21	2021/22	2022/23	2023/24	2024/25
Implementation rate for recommendations 1.7.1 and 1.7.2	20%	40%	60%	80%	100%
Total resource impact (saving) for people with isolated medial compartmental osteoarthritis (£m)	-0.8	-1.7	-2.5	-3.4	-4.2
Total resource impact (cost) for people having primary elective total knee replacement (£m)	0.1	0.2	0.3	0.4	0.5
Total resource impact (saving) for England (£m)	-0.7	-1.5	-2.2	-3.0	-3.7
Total Resource Impact by provider/commissioner	2020/21	2021/22	2022/23	2023/24	2024/25
Total resource impact (saving) for England (providers) (£m)	-0.4	-0.8	-1.2	-1.7	-2.1
Total resource impact (saving) for England (commissioners) (£m)	-0.3	-0.7	-1.0	-1.3	-1.6

Table 4 Estimated budget impact of implementing the guideline per average 100,000 population for commissioners and providers £000

	2020/21	2021/22	2022/23	2023/24	2024/25
Implementation rate	20%	40%	60%	80%	100%
Total resource impact (saving) for providers per average 100,000 population (£000)	-0.8	-1.5	-2.3	-3.0	-3.8
Total resource impact (saving) for commissioners per average 100,000 population (£000)	-0.6	-1.2	-1.8	-2.3	-2.9
Total resource impact (saving) per average 100,000 population (£000)	-1.3	-2.7	-4.0	-5.3	-6.7

Table 5 Estimated annual saving of recommendations 1.7.1 and 1.7.2 for people with isolated medial compartmental osteoarthritis £m

	Current Practice	2020/21	2021/22	2022/23	2023/24	2024/25
Implementation rate	-	20%	40%	60%	80%	100%
<u>Activity</u>	Current Practice	2020/21	2021/22	2022/23	2023/24	2024/25
Number of partial knee replacements	10,234	13,384	16,534	19,684	22,834	25,985
Number of total knee replacements with patella resurfacing	7,548	7,820	8,092	8,364	8,636	8,909
Number of total knee replacements without patella resurfacing	19,340	15,917	12,494	9,071	5,649	2,227
Number of knee revisions on people operated on in year	265	267	268	270	272	273
Number of knee revisions on people that had surgery in the previous 4 years	1,061	1,061	1,063	1,066	1,071	1,077
<u>Costs £m</u>	Current Practice	2020/21	2021/22	2022/23	2023/24	2024/25
Partial knee replacements (provider) (£m)	9.4	12.2	15.1	18.0	20.9	23.8
Total knee replacements with patella resurfacing (provider) (£m)	9.7	10.1	10.4	10.8	11.1	11.5
Total knee replacements without patella resurfacing (provider) (£m)	23.3	19.2	15.1	10.9	6.8	2.7
Knee revisions on people operated on in year (commissioner) (£m)	2.4	2.4	2.4	2.4	2.4	2.4
Knee revisions on people that had surgery in the previous 4 years (commissioner) (£m)	9.4	9.5	9.5	9.6	9.6	9.6
Total cost (£m)	54.2	53.4	52.5	51.7	50.8	50.0
Total resource impact (saving) for people with isolated medial compartmental osteoarthritis (£m)	-	-0.8	-1.7	-2.5	-3.4	-4.2
Total Resource Impact by provider/commissioner £m	Current Practice	2020/21	2021/22	2022/23	2023/24	2024/25
Resource impact (saving) for providers for knee replacements (£m)	-	-0.8	-1.8	-2.6	-3.6	-4.4
Resource impact (cost) for commissioners for knee revisions (£m)	-	0.0	0.1	0.1	0.2	0.2

Table 6 Estimated annual saving of recommendation 1.7.2 for people having primary elective total knee replacement £m

	Current Practice	2020/21	2021/22	2022/23	2023/24	2024/25
Implementation rate	-	20%	40%	60%	80%	100%
<u>Activity</u>						
Number of total knee replacements with patella resurfacing	16,131	21,814	27,497	33,180	38,863	44,546
Number of total knee replacements without patella resurfacing	39,551	33,868	28,185	22,502	16,819	11,136
Number of knee revisions on people operated on in year	375	361	347	333	320	306
Number of knee revisions on people that had surgery in the previous 4 years	1,499	1,499	1,486	1,458	1,417	1,362
<u>Costs £m</u>	Current Practice	2020/21	2021/22	2022/23	2023/24	2024/25
Total knee replacements with patella resurfacing (provider) (£m)	20.8	28.1	35.4	42.8	50.1	57.4
Total knee replacements without patella resurfacing (provider) (£m)	47.7	40.8	34.0	27.1	20.3	13.4
Knee revisions for people operated on in year (commissioner) (£m)	3.3	3.2	3.1	3.0	2.9	2.7
Knee revisions on people who had surgery in the previous 4 years (commissioner) (£m)	13.4	13.1	12.9	12.6	12.4	12.1
Total cost (£m)	85.2	85.3	85.4	85.5	85.6	85.7
Total resource impact (cost) for people having primary elective total knee replacement (£m)	-	0.1	0.2	0.3	0.4	0.5
Total Resource Impact by provider/commissioner £m	Current Practice	2020/21	2021/22	2022/23	2023/24	2024/25
Resource impact (cost) for people having primary elective total knee replacement (provider) (£m)	-	0.5	0.9	1.4	1.9	2.3
Resource impact (saving) for people having primary elective total knee replacement (commissioner) (£m)	-	-0.4	-0.7	-1.1	-1.5	-1.8

Benefits and savings

- 3.1.21 Implementing the recommendations will lead to an increase in the number of partial knee replacements as well as an increase in the number of total knee replacements with patella resurfacing. The recommendations will also lead to a corresponding decrease in total knee replacements without patella resurfacing. These changes will lead to cost savings for providers because of an overall decrease in component costs.
- 3.1.22 Implementing the recommendations will lead to an overall decrease in the number of revision surgeries each year which will lead to cost savings for commissioners. We expect these savings to continue after the guideline has been fully implemented (at year 5), because of the reduced number of revision surgeries needed. Providers need to be aware of the change in the mix of components needed as a result of the small reduction in revisions per year.
- 3.1.23 The increase in partial knee replacements and corresponding decrease in total knee replacements may lead to a reduced pressure on beds for providers. This is because the average length of stay is around one day less for partial knee replacements than for total knee replacements.

Other considerations

- 3.1.24 Some providers may need to assess if any members of their orthopaedic surgery team need training in partial knee replacements (if they currently only perform full knee replacements) in order to accommodate the expected increase in demand. We anticipate that this knowledge will cascade down to the junior members of their team and not incur any significant costs.

4 Resource impact over time

- 4.1 The estimated annual saving of implementing this guideline for the population of England based on the uptake in the resource impact assumptions is shown in table 7.
- 4.2 The saving from year 5 is equivalent to around £6,700 per 100,000 population, this shown in table 8.
- 4.3 The net cash releasing saving for providers from year 5 is £2.1 million which is equivalent to £3,800 per 100,000 population. This is calculated as the net saving from:
- a reduction in component costs as result of the anticipated change from total knee replacements to partial knee replacements.
 - an increase in component costs because of the anticipated increased number of patients having resurfacing of the patella during primary elective total knee replacement.
- 4.4 The net cash releasing saving for commissioners from year 5 is £1.6 million which is equivalent to £2,900 per 100,000 population. The saving is calculated from an anticipated reduction in the number of revisions and associated activity evaluated at national tariff. Savings are expected to increase after the guideline has been fully implemented (at year 5), because of the reduced number of revision surgeries needed as a result of the guideline recommendations. This is not expected to be fully cash releasing for providers as the capacity benefit is not anticipated to release cash savings.

Table 7 Estimated budget impact of implementing the guideline for the population of England £m

	2020/21	2021/22	2022/23	2023/24	2024/25
Implementation rate	20%	40%	60%	80%	100%
Total resource impact (saving) for people with isolated medial compartmental osteoarthritis (£m)	-0.8	-1.7	-2.5	-3.4	-4.2
Total resource impact (cost) for people having primary elective total knee replacement (£m)	0.1	0.2	0.3	0.4	0.5
Total resource impact (saving) for England (£m)	-0.7	-1.5	-2.2	-3.0	-3.7
Total Resource Impact by provider/commissioner	2020/21	2021/22	2022/23	2023/24	2024/25
Total resource impact (saving) for England (providers) (£m)	-0.4	-0.8	-1.2	-1.7	-2.1
Total resource impact (saving) for England (commissioners) (£m)	-0.3	-0.7	-1.0	-1.3	-1.6

Table 8 Estimated budget impact of implementing the guideline per average 100,000 population for commissioners and providers £000

	2020/21	2021/22	2022/23	2023/24	2024/25
Implementation rate	20%	40%	60%	80%	100%
Total resource impact (saving) for providers per average 100,000 population (£000)	-0.8	-1.5	-2.3	-3.0	-3.8
Total resource impact (saving) for commissioners per average 100,000 population (£000)	-0.6	-1.2	-1.8	-2.3	-2.9
Total resource impact (saving) per average 100,000 population (£000)	-1.3	-2.7	-4.0	-5.3	-6.7

5 Implications for commissioners and providers

- 5.1 Joint replacement falls under programme budgeting category 15X Problems of the Musculo Skeletal System.
- 5.2 The savings resulting from recommendations 1.7.1 and 1.7.2 will lead to a combined saving of around £3.7 million per year for England by year 5. We expect these savings to continue after the guideline is fully implemented as a result of reduced revision surgeries.
- 5.3 Savings for providers are expected to be around £2.1 million per year for England by year 5 because of the reduced cost of consumables used in knee replacement surgeries.
- 5.4 Savings for commissioners are expected to be around £1.6 million per year for England by year 5 because of the reduced number of revision surgeries.

6 Other considerations

- 6.1 Starting inpatient rehabilitation within 24 hours of surgery (recommendation 1.10.1) might mean that some providers will need to reorganise or increase physiotherapy and occupational therapy services to ensure they are available throughout weekends for people who have surgery on a Friday or Saturday. It is believed that many providers already offer this level of cover.
- 6.2 The resource impact of this recommendation will need to be assessed locally. It is not anticipated that the recommendation will lead to an increase in staffing but may lead to an increase in unsocial hours payments. However, there may also be some productivity benefits for providers resulting from a shorter length of stay.

7 Sensitivity analysis

7.1 There are some assumptions in the model for which no empirical evidence exists, so we cannot be as certain about them. Appropriate minimum and maximum values of variables are used in the sensitivity analysis to assess which variables have the biggest impact on the net cost or savings. This enables users to identify the significant cost drivers.

Appendix A is a table listing all variables modified. The key conclusions are discussed below.

7.2 Changing the cost of components for a partial knee replacement from £815 to £1,015 leads to a saving ranging from £5.3 million to £2.1 million.

7.3 Changing the total knee replacement component costs (with and without patella resurfacing) from £1,189 to £1,389 and £1,105 to £1,305 respectively leads to a saving ranging from £2.1 million to £5.3 million.

7.4 Changing the cost of the patella component, for a total knee replacement with patella resurfacing, from £1,259 to £1,319 leads to a saving ranging from £2.8 million to £4.6 million.

Appendix A. Results of sensitivity analysis

<u>Individual variable sensitivity</u>	Baseline value	Minimum value	Maximum value	Baseline resource impact (£000s)	Minimum resource impact (£000s)	Maximum resource impact (£000s)	Change (£000s)	Sensitivity ratio
Cost of partial knee replacement components	£915	£815	£1,015	-3,693	-5,268	-2,118	3,150	0.38
Cost of total knee replacement components (including with and without patella resurfacing)	£1,205	£1,105	£1,305	-3,693	-2,118	-5,268	-3,150	0.49
Total knee replacement with patella resurfacing component costs (changing the patella resurfacing part only)	£1,289	£1,259	£1,319	-3,693	-4,586	-2,800	1,786	1.00
Number of people with isolated medial compartmental osteoarthritis (eligible for partial knee replacement)	40%	35%	45%	-3,693	-3,118	-4,267	-1,149	0.12
Number of people having patella resurfacing in current practice in the total knee replacement group	28.97%	23.97%	33.97%	-3,693	-3,640	-3,746	-106	0.01

About this resource impact report

This resource impact report accompanies the NICE guideline on [Joint replacement \(primary\): hip, knee and shoulder](#) and should be read in conjunction with it. See [terms and conditions](#) on the NICE website.

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