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Understanding competition and choice in the NHS

Choosing the place of care

The effect of patient choice on treatment location
in England, 2003–2011

Research report

Elaine Kelly and Gemma Tetlow

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The Health and Social Care Act 2012 paves the way for an extension of competition and market mechanisms in the NHS in England, with more competition for the provision of health services. To inform these developments, and help evaluate their progress, the Nuffield Trust and the Institute for Fiscal Studies have formed a partnership to conduct a joint research programme that will aim to establish a long-term expertise in the use of competition and market mechanisms in health care – both in the NHS in England and internationally. This report is the first output from this three-year joint research programme.

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Executive summary

Over the past 10 years, governments have sought to increase patient choice and promote competition for clinical care among providers within the English National Health Service (NHS). Patients have been affected most directly by two policies: first, the reforms in 2006 and 2008, which offered patients a choice over where they attended a first outpatient appointment; second, since 2007, the expansion in the number and capacity of independent sector treatment centres (ISTCs). ISTCs are privately owned but treat NHS-funded patients. This report examines the extent to which patients (or their referring doctors) have been choosing a different location of care since 2006.

By 2010/11 there were almost half a million outpatient attendances funded by the NHS across 161 ISTCs, and ISTCs accounted for 3.5 per cent of all first outpatient attendances in the English NHS. The majority of patients in 2006/07 and 2010/11 still received outpatient care from their nearest NHS trust, and the volume of patients seen at the nearest trust increased from 2006/07 to 2010/11. But, interestingly, there was a decrease in the proportion of patients that attend their nearest NHS trust, an increase in those attending ISTCs, and no change in those attending NHS trusts that are not the nearest to where they live. The magnitude of the changes varies across specialties – it is greatest for trauma and orthopaedics and smallest for ophthalmology.

By 2010/11, ISTCs accounted for 17 per cent of hip replacements, 6 per cent of cholecystectomies (gallbladder removals) and 17 per cent of elective unilateral inguinal hernia repairs funded by the NHS. Analysis of inpatient admissions for elective operations in these three areas reveals that the majority of patients were still treated at their nearest NHS trust in 2010/11, and that for all procedures but inguinal hernia repair there was a rise in volume of admissions. But again there was a significant decrease in the proportion of patients admitted to their nearest trust, coinciding with a corresponding increase in the proportion admitted to ISTCs. The closer patients live to an ISTC site, the more likely they were to receive care at ISTCs. However, ISTCs still treated a significant number of patients who were travelling more than 15 km further than their nearest trust. Analysis of counterpart emergency operations for appendectomy, hip replacements and hernia repair revealed no change in the proportion of patients treated at the nearest trust or other NHS trusts over the same period.

It is not possible to separate the effects of the two policies – increasing patient choice and the expansion of ISTCs – on changes in the proportion of patients treated at different locations over time. From 2006, patients were referred for elective treatment to a wider variety of providers, and a substantial proportion of this change was attributable to increased use of ISTCs. The extent to which this finding was driven by active patient choice or by a change in referral behaviour by GPs, or some other mechanism, is as yet unclear. However, the advent of ISTCs and competition from other NHS trusts do not appear to result in a reduction in the volume of care in the nearest NHS trust to where patients live, except perhaps in the case of elective inguinal hernia repair, which merits further investigation.

The twin policies are resulting in a change in the flow of patients. Further work should consider: which types of patients are more likely to be treated at different locations; to what extent are patients or their referring GPs choosing new locations of treatment; and the extent to which choice versus growth of alternative providers – like ISTCs – are important in promoting competition within the NHS?

1. Introduction

Over the last decade a number of changes in the English National Health Service (NHS) have offered patients a greater choice about where they receive their treatment.¹ Further reforms now being introduced by the Health and Social Care Act 2012 are designed to increase further competition in the provision of public health care, with the explicit aim of driving improvements in quality. Thus there is considerable interest in understanding how earlier reforms have affected patient behaviour. In this report we examine how the location of NHS care and treatment has changed since the introduction of two policy reforms in the mid-2000s.

The first major policy reform that happened during this period was the introduction and expansion of explicit choice for patients over where to attend their first outpatient appointment. The initial policy was introduced in 2006 and required GPs to offer patients a choice of four to five hospitals.² This replaced a system in which patients could state preferences, but GPs were under no obligation to inform patients that they had a choice. The limit on the number of providers offered to patients was removed in 2008. Collectively, in this report the 2006 and 2008 reforms are termed the ‘patient choice reforms’.

The second important policy reform was the growth in the number and capacity of independent sector treatment centres (ISTCs). These centres are privately owned, but are under contract to provide planned diagnostic tests and operations to NHS patients (Naylor and Gregory, 2009). ISTCs were introduced first in 2003, but experienced rapid growth after 2007. In 2006/07, NHS outpatient data indicate that there were 10 ISTC sites, reporting 15,000 first outpatient attendances; by 2010/11 this had grown to 475,000 attendances across 161 sites.³ In combination with the patient choice reforms, the expansion of ISTCs ensured that NHS patients had both formal choice over where to receive treatment, and more options from which to choose.



Understanding how choice relates to the quality of outpatient and inpatient care is vital... to assessing the possible effects of any future reforms

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1. Scotland, and to some degree Wales, introduced a different set of policies over the period considered. This report focuses solely on the NHS in England.
 2. More formally, NHS trusts or private providers under contract to provide services to NHS-funded patients.
 3. These figures exclude patients treated by Care UK, which currently operates seven sites, but as the company only provides one site code for Hospital Episodes Statistics (HES) records, its sites have been excluded from these statistics.

The two policy reforms are best viewed within the context of changing priorities and objectives of health policy-makers. Up until 2006, a principal objective of NHS reform was to reduce waiting times (Propper and others, 2008, 2010). To achieve the necessary increased capacity, the government sought to encourage NHS hospitals to perform more elective procedures through Payment by Results, and to harness the spare capacity in the private sector. Therefore, ISTCs were introduced in England in 2003 (Department of Health, 2002; House of Commons Health Committee, 2006).⁴

As waiting times fell, the focus shifted towards improving quality through the use of market mechanisms: typically, this has involved expanding the objectives and remits of existing policies. Hence, the objectives of offering patients choice grew from giving patients a choice that they valued, to using patient choice to drive quality improvements (Naylor and Gregory, 2009). Equally, while the first wave of ISTCs, introduced between 2003 and 2005, was used to reduce waiting times, the second wave, opened from 2007 onwards, was intended to increase competition for NHS providers and so create incentives to improve quality (Naylor and Gregory, 2009; House of Commons Health Committee, 2006).⁵ The underlying assumptions behind these new objectives were that there was variation in measures of quality across providers that could be observed by patients and/or GPs, and that patients' and/or GPs' decisions are influenced by that variation in quality.

The patient choice reforms have been the main subject of academic focus, with a particular interest in whether indeed choice did lead to quality improvements. Cooper and others (2011) find that higher competition is associated with faster falls in the 30-day mortality rate for acute myocardial infarction (heart attack). Gaynor and others (2010) use variation in potential competition over time and space, and find that the patient choice reforms were associated with significant improvements in mortality and reductions in length of stay. In both cases, the indicator of quality (death rates from an acute emergency condition) is far removed from the choice that patients were exercising (where to receive a first outpatient appointment for a non-life-threatening complaint).

Understanding how choice relates to the quality of outpatient and inpatient care is vital to the evaluation of past policies and to assessing the possible effects of any future reforms to patient choice. A necessary condition for increasing choice leading to greater competition and improvements in quality among providers is that at least some patients select a provider on the basis of quality. Patients may choose either to attend their pre-choice default hospital (usually the nearest) or to switch to another NHS trust or an ISTC. As such, we would expect the introduction of greater patient choice to be accompanied by some change in the distribution of patients across providers (NHS trusts or companies that own ISTCs).⁶ This report will seek to assess the extent to which NHS data do show movements of patients across providers.

4. In this publication, the term 'trusts' is used to refer to NHS providers, while the term 'providers' encompasses both trusts and the companies that own ISTCs.

5. In 2006, the Department of Health listed the objectives of the ISTC programme as: stimulating competition, so as to encourage NHS providers to improve the quality of their services; providing a greater choice of providers to patients; creating space for innovation; and providing a more cost-effective way to utilise private sector capacity (Department of Health, 2006; House of Commons Health Committee, 2006; Naylor and Gregory, 2009).

6. The limiting case is where all providers adjust all possible quality measures simultaneously and that patients have identical preferences, so that no patient chooses to move hospital. We assume that there is sufficient heterogeneity in both hospital quality measures and patient preferences to ensure that some patients move.

The objectives of this report are twofold. The first is to add to the existing academic and policy literature on the impacts of reforms of the past decade on the health care market and patient care in England. The second is to highlight questions and issues that are underexplored by the current literature and warrant future investigation.

This report makes two contributions to the existing literature on NHS reforms in England. The first contribution is to describe how the location where patients are treated has changed since 2006. In addition to documenting and quantifying those changes, the analysis serves as a first step in attempting to understand the mechanisms behind the estimated relationships between patient choice and hospital quality (for example, Cooper and others, 2011; Gaynor and others, 2010). This is vital, both to assessing the effectiveness of previous policies, and to the successful design of future reforms.

The second contribution is to the relatively small literature on ISTCs. Existing work has considered the quality of care offered (Chard and others, 2011) and the impact on waiting times (Naylor and Gregory, 2009). There is very little information on a large number of issues, ranging from which patients use ISTCs and where patients move from, to the potential impacts on local NHS trusts. This report will describe how the proportion of patients using ISTCs has changed over the past decade, how usage varies across procedures, and the role of distance in determining whether patients receive care from ISTCs. In addition, it will highlight a series of questions that we aim to address in forthcoming publications.

Throughout the report, data are used from the Hospital Episodes Statistics (HES). Section 2 describes these data in more detail, including their relative strengths and weaknesses.

Section 3 considers how the location of first outpatient attendance changed between 2006/07 and 2010/11. It focuses on major outpatient specialties: orthopaedics and trauma, gastroenterology and ophthalmology. The limitations of outpatient data mean that it is not possible to include any data prior to the patient choice reforms, and that only broad treatment specialties can be considered. The principal outcomes used for analysis in Section 3 are the proportions of patients who attend three types of provider: their nearest NHS trust, another NHS trust and an ISTC.

Section 4 examines changes in patterns of admission between 2003/04 and 2010/11 for three inpatient procedures: hip replacements, cholecystectomies (surgical removal of the gallbladder) and unilateral inguinal hernia repair. Although the patient choice reforms did not give patients a direct choice over the location of inpatient admittance, between one quarter and one third of patients who attend a first outpatient appointment are eventually admitted as elective inpatients. Again, this study considers changes in the distribution of treatment (admittances) across the three provider types. Further analysis in Section 4 examines whether those changes were driven by patients who live closer to ISTCs.

Even after full implementation of the patient choice reforms, the decision over where to attend an outpatient appointment is described more accurately as a joint choice between the GP and the patient. Hence, GPs potentially have a crucial role to play in determining how the patient choice reforms and the introduction of ISTCs translate into changes in treatment location. Section 5 describes changes in the distribution of referrals to different providers by individual GP practices. The section addresses two issues: how the overall distribution of GP referrals across providers has changed since 2006/07; and to what extent variations in the patterns of referral across GP practices are explained by factors at the primary care trust (PCT) level.

Section 6 provides some concluding remarks and identifies features of the data that warrant further analysis.

2. Data

This report draws upon data from the HES, which contain the records of all NHS-funded hospital care in England. This includes both care provided by NHS hospitals and care received by NHS-funded hospital patients treated elsewhere.

HES outpatient data provide a census of all outpatient appointments paid for by the NHS. Observations are at the appointment level. Information about the patient includes age, sex, GP practice and local area (Lower Super Output Area, LSOA).⁷ Information pertaining to the appointment includes the date, whether the patient attends, the specialty and who referred the patient. It is rare to have any more detailed information about diagnoses or the content of the treatment. Provider information includes codes for the provider and site of treatment. The data have been collected since 2003/04, but are considered reliable by the Nuffield Trust only since 2006/07.⁸

HES admitted patient care or inpatient data contain details of all admissions to hospitals in England. Observations are at the episode level (a period of care under a single consultant). The inpatient data contain the same patient and provider-level information as the outpatient records, but have far more information about the conditions of patients and the treatments that they receive. All episodes record diagnoses (up to 20) and any operations performed, along with dates of admittance, discharge and any procedures. Inpatient data have been collected since 1989/90, but this report uses information from 2003/04 onwards to focus on the patient choice reforms and ISTC expansion.

The principal outcome for both the outpatient and inpatient analysis is whether a patient attends their nearest trust. Prior to the choice and ISTC reforms, the nearest trust was the predominant provider of both outpatient and inpatient care. Distances are measured in straight lines from the centroid (centre) of the patient's LSOA to the trust headquarters. The set of trusts includes all acute trusts that HES records show were providing the same type of outpatient appointment or inpatient admission in the year that the patient received treatment.⁹ The two other major categories of provider are NHS acute trusts that are not the closest and ISTCs.¹⁰

Nearest trust attendance or admittance is preferred to the outcome of distance travelled for treatment, for three reasons. First and most importantly, the growth of ISTCs means that changes in where patients are treated have an ambiguous effect on distance. Switches to private providers may increase or decrease the distance travelled, as an ISTC might be further away or closer than the nearest trust. Second, the distance travelled is a 'noisy' measure that is easily biased by outliers or the miscoding of the exact site at which treatment took place. Third, the use of three categories of provider makes it far easier to understand the extent and direction of the movement of patients across providers.

7. LSOAs contain four to six Office for National Statistics output areas, and have a mean population of 1,500.

8. For example, the number of attendances in the data jumps dramatically between 2005/06 and 2006/07, which is not consistent with the year-on-year rises in subsequent years. Data in earlier years should be regarded as experimental (labelled as such in 2003/04).

9. Trusts are excluded if they perform fewer than 50 procedures in each year of the data.

10. Some patients receive care from other provider categories: these include private hospitals (not ISTCs), PCTs, mental health trusts and care trusts. For the specialties and procedures considered in this study, these providers represent a tiny fraction of all episodes.

The calculation of a patient's nearest trust is subject to two sources of measurement error: the patient might live nearer to a site operated by another trust that is nearer than the nearest trust headquarters; and the measure includes specialist acute trusts that do not offer a full range of services. Consequently, the nearest trust offering the treatment required is not necessarily the nearest acute trust. However, both sources of measurement error should be unrelated to the patient choice; therefore, ISTC policy changes will have no effect on the observed changes in treatment locations.

All HES records provide an individual, anonymised patient identifier, which allows health episodes and treatments to be linked over time. This report does not attempt to link the outpatient and inpatient episodes of the same patient. Any impact of the reforms on so-called treatment pathways will be addressed in a future publication.

3. Changes in the location of outpatient treatment

The patient choice reforms of 2006 and 2008 offered patients – referred for outpatient treatment by their GP or an A&E consultant – an explicit choice over where to book a first appointment. This section examines how the location of outpatient treatment for three treatment specialties (orthopaedics and trauma, gastroenterology and ophthalmology) changed from 2006/07 onwards. Together, these specialties accounted for 26.1 per cent of all first outpatient attendances in 2006/07.

As the number of first outpatient appointments is very large, all analysis in this section uses a 10 per cent random sample of the HES outpatient data by year and specialty. These data are available from 2003/04 onwards. However, the quality of the data has improved gradually over time and is not considered reliable before 2006/07. This represents a serious limitation, as only data from the post-reform period can be used.

3.1 Summary statistics for first outpatient attendances

Table 3.1 gives the average distance travelled for a first outpatient appointment, the proportion of patients that attend the nearest trust and the sample size. In 2006/07, average distance ranged from 11.2 km for ophthalmology, to 8.7 km for gastroenterology. Table 3.1 confirms that the nearest trust is the dominant provider for all three specialties: in 2006/07, approximately two thirds of orthopaedics and trauma and ophthalmology patients and three quarters of gastroenterology patients received treatment from their nearest trust. Orthopaedics and trauma is the largest treatment specialty by volume of first outpatient appointments. The 10 per cent sample of 169,000 in 2006/07 equates to a total number of approximately 1.7 million appointments. Gastroenterology is the smallest specialty by volume, with a 10 per cent sample of 20,000 in 2006/07.

Table 3.1 also provides the first indication of how treatment patterns have changed over time. Between 2006/07 and 2010/11, the average distance travelled for both orthopaedics and trauma and gastroenterology treatment increased by 0.8 km. These increases were accompanied by corresponding falls in the percentage of patients attending their nearest trust (by 8.5 and 7.7 percentage points, respectively). The pattern for ophthalmology is less clear, with a fall in the percentage attending the nearest trust, but no clear pattern for the distance travelled. The increase in sample size across all specialties indicates a general rise in NHS activity over the period. However, some proportion of this increase might be attributable to improvements in data quality.

Table 3.1: Distance travelled for a first outpatient attendance, percentage attending their nearest trust and sample size, 2006/07 to 2010/11

	Orthopaedics and trauma			Gastroenterology			Ophthalmology		
	Distance (km)	Percentage nearest trust	N	Distance (km)	Nearest trust	N	Distance (km)	Nearest trust	N
2006/07	10.6 (17.4)	67.9%	168,923	8.7 (12.2)	73.7%	19,715	11.2 (15.2)	66.7%	96,442
2007/08	10.8 (17.4)	66.8%	169,589	8.9 (11.4)	73.9%	22,194	10.9 (14.7)	69.3%	98,154
2008/09	11.1 (17.9)	63.9%	194,126	9.2 (11.3)	70.3%	27,376	11.1 (14.9)	67.8%	107,775
2009/10	11.2 (17.9)	62.4%	206,980	9.4 (12.7)	67.7%	33,318	11.2 (15.2)	66.1%	117,655
2010/11	11.4 (18.2)	59.4%	214,568	9.5 (13.1)	66.0%	35,963	11.4 (15.6)	65.7%	119,630

Notes: Ten per cent sample of total outpatient appointments in each year. Average km travelled for a first outpatient appointment from the centroid of the patient's LSOA to the provider site; N gives the sample size in each year.

Figure 3.1 shows the share treated by each of the three types of provider (nearest trust, another trust and ISTC), by treatment specialty, in each year between 2006/07 and 2010/11. For all three specialties there has been a fall in the percentage of patients attending appointments at their nearest trust, and an increase in the percentage treated by ISTCs. There was no apparent change in the percentages treated by other trusts. By 2010/11, ISTCs accounted for 8.0 per cent of first orthopaedics and trauma attendances, 4.8 per cent of gastroenterology attendances and 2.3 per cent of ophthalmology attendances.

3.2 Multivariate analysis: changes in treatment locations holding the composition of patients constant

The concern with drawing conclusions from changes in the location where patients are treated over time is that the effects of policy reforms will be conflated with any underlying time trends or other contemporaneous shocks. For example, if there is an unrelated increase in the age composition of patients and older patients are more likely to be treated by their nearest trust, the proportion attending their nearest trust may rise independently of any reforms to the NHS. This is particularly troublesome in the present sample, as there are no pre-reform data to check for prior trends. To reduce the scope for such a bias, observable changes in patient composition (geographic, demographic and socioeconomic) were controlled for or adjusted. The advantage of this approach is that results will indicate whether treatment locations have changed for patients with a fixed set of characteristics. However, this comes at the cost of removing any impact on distance that is driven by any direct impact of the reform on the composition of patients. Examples include any change in patients' propensity to seek treatment, or GPs to refer patients for secondary care after the introduction of a local ISTC.

Figure 3.2 shows the change in the proportion treated by each provider type between 2006/07 and 2010/11, controlling for changes in patient composition.¹¹ Each plotted point gives the difference between the proportion treated in 2006/07 and the year on the horizontal axis. The capped vertical lines give the 95 per cent confidence intervals. The top panel shows the results for orthopaedics and trauma, the middle for gastroenterology and the bottom for ophthalmology.

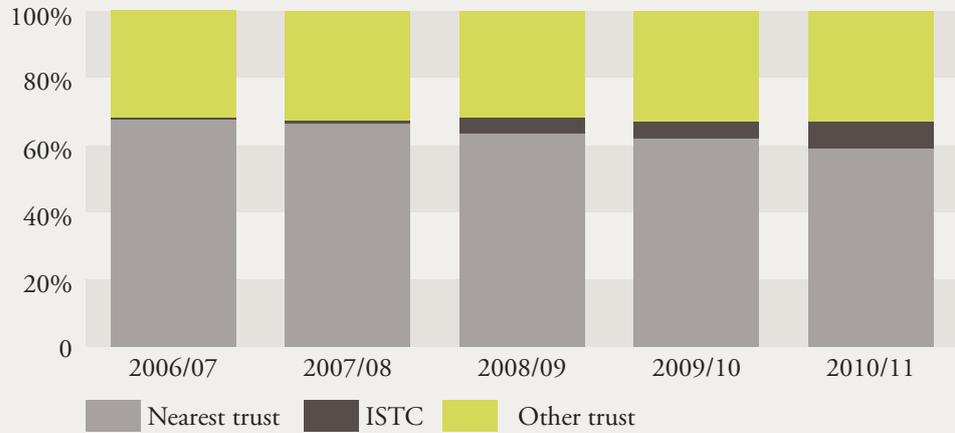
The figure highlights four points of note. First, from 2009/10 onwards there are statistically significant declines in the proportion treated by their nearest trust for all three specialties. Second, the falls are largest and fastest for orthopaedics and trauma. Third, from 2008/09, a statistically significant proportion of orthopaedics and trauma and gastroenterology outpatients are treated by private providers. ISTCs play only a minor role in ophthalmology outpatient attendances.

Fourth, there is no significant change in the proportion attending an NHS trust that is not the nearest to them, in any year and for any specialty.

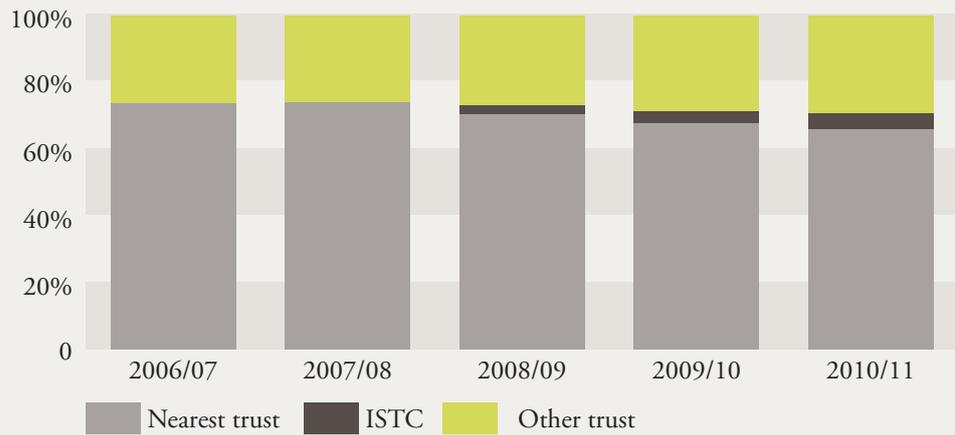
11. The study controlled for the patient's age (cubic) and sex, local deprivation (cubic in the Index of Multiple Deprivation (IMD) 2004 rank of the patient's LSOA), and the patient's PCT of residence.

Figure 3.1: Distribution of first outpatient appointments across provider types for selected specialties, by year, 2006/07 to 2010/11

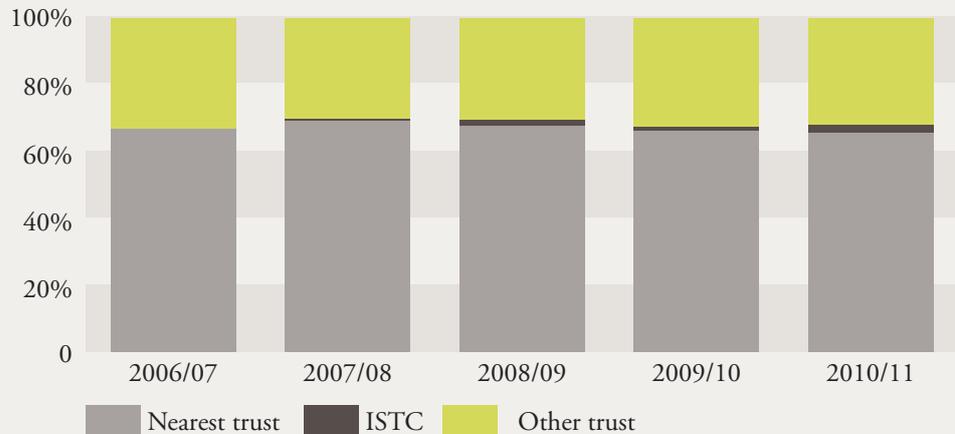
Orthopaedics and trauma



Gastroenterology

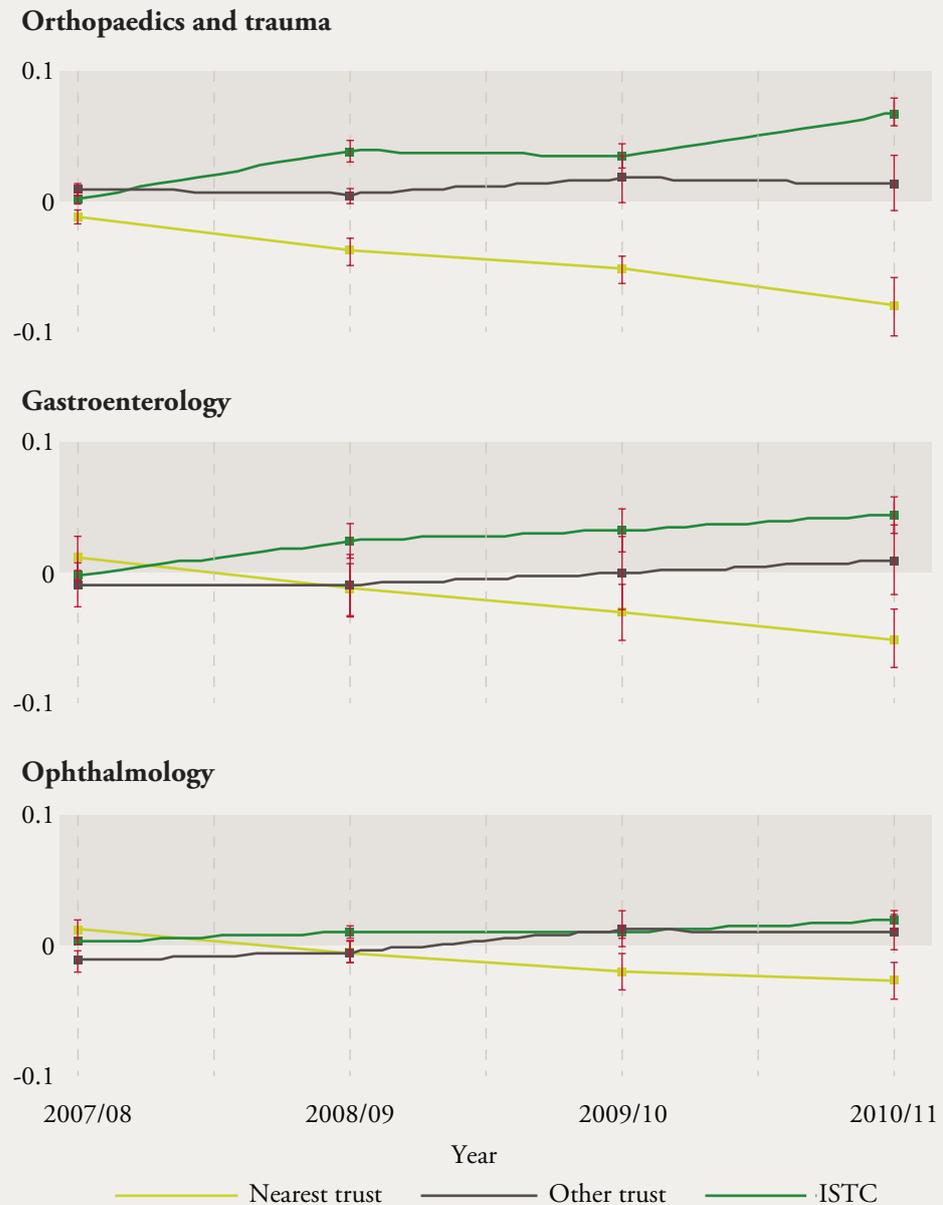


Ophthalmology



Notes: Ten per cent random sample of first outpatient attendances within each treatment specialty. HES outpatient records 2006/07 to 2010/11.

Figure 3.2: Change in the proportion of patients attending a first outpatient appointment at each provider type, relative to 2006/07



Notes: For each specialty, each line plots results from a separate logit regression where the dependent variable is an indicator for whether the patient attended the provider type. All specifications include PCT fixed effects, cubics in patient age and LSOA Index of Multiple Deprivation (IMD) score and patient sex. Each point plotted corresponds to the estimated change in the proportion treated by that provider type between the year in question and 2006/07. The capped vertical lines give the 95 per cent confidence intervals for each point estimate. Standard errors are robust to the presence of heteroskedasticity and clustered at the PCT level. The sample includes a 10% sample of those who had outpatient appointments in each treatment specialty between 2006/07 and 2010/11 inclusive. Patients are excluded if there are missing values for age, sex, LSOA or PCT.

Overall, the results using first outpatient attendances reveal a shift away from the patient's nearest NHS trust to ISTC providers. This indicates that there was a change in the location where patients were treated, and that ISTC capacity was used to provide NHS-funded care. However, the analysis provides little information about why patients moved or the relationship between the observed shifts and patient choice. In particular, the same pattern is consistent with both patients choosing to attend ISTCs, facilitated by the expansion in their number and capacity, and the allocation of patients to ISTCs by GPs or PCTs using the Department of Health-sanctioned increase in capacity created by ISTCs. The relative roles of patient choice and PCT-level policies in driving the expansion in the use of ISTCs could vary over time and across PCTs.¹²

Summary

- Reforms in 2006 and 2008 gave patients a more explicit choice about where to attend their first outpatient appointment. These reforms were accompanied by a post-2007 expansion in the number and capacity of ISTCs.
- Records of first outpatient attendance indicate a substantive decline in the proportion of patients who attended their nearest trust between 2006/07 and 2010/11. However, the majority of patients still receive care from the trust that is closest to them.
- The fall in the proportion attending their nearest trust was accompanied by a rise in the proportion of patients who attended appointments at ISTCs. By 2010/11, ISTCs accounted for 8.0 per cent of first orthopaedics and trauma attendances, 4.8 per cent of gastroenterology attendances and 2.3 per cent of ophthalmology attendances.
- There is no evidence of any statistically significant increase in the number of patients that attend other NHS trusts rather than the trust nearest to them.

12. Gaynor and others (2010) find that NHS hospitals with shorter waiting times and lower acute myocardial infarction mortality rates experienced greater increases in elective inpatient admissions. This suggests that there was some movement across NHS hospitals consistent with patient choice. However, the sample period ends in 2007/08, before the growth in ISTCs; therefore, it is hard to assess the relative roles of patient choice and the expansion of ISTCs in the subsequent years.

4. Changes in the location of inpatient treatment

The patient choice reforms did not offer patients a direct choice over where to receive inpatient treatment. However, typically the choice of where to attend a first outpatient appointment will affect the rest of the treatment pathway. Overall, one quarter to one third of first outpatient attendances eventually result in inpatient admission (Department of Health, 2012).

The inpatient data have a number of advantages over the outpatient data, even though they do not directly relate to the choice that patients were offered by the reforms. First, the data go back much further, which means that it is possible to observe levels of, and trends in, the distances travelled before the reforms began. Second, operation and diagnosis codes enable us to identify particular operations. As such, it is possible to identify more accurately the range of treatment location options available to patients, and to reduce any bias resulting from a change in the mix of conditions being treated. Third, inpatient data provide a record of both elective and emergency procedures. Finally, as emergency care should not be affected by the patient choice reforms or expansion of ISTCs, it is possible to examine changes in the location of emergency treatment to see whether there were any other contemporaneous changes in the organisation of NHS services which could explain the results found for elective care, rather than the patient choice reforms themselves.

This section considers three elective operations: hip replacement, cholecystectomy (surgical removal of the gallbladder) and elective inguinal hernia repair.¹³ Each falls under an outpatient speciality considered in Section 3 of this report: the first under orthopaedics and trauma, and the remaining two under gastroenterology.¹⁴ The analysis in Section 4.1 is similar to that for outpatients in Section 3, and considers the proportion treated by three types of providers (nearest trust, other trust and ISTCs). In addition, it is possible to compare the results for these elective operations to emergency operations carried out by the same surgical teams. The emergency procedures considered here are:

- fractured neck of femur repair – a counterpart to hip replacements
- appendectomy – a counterpart to cholecystectomy
- emergency inguinal hernia – a counterpart to elective inguinal hernia.¹⁵

Section 4.2 considers how changes in the distribution of patients across provider types vary with the distance of patients to ISTCs.

13. Hip replacements include those operations with Office of Population Censuses and Surveys (OPCS) Classification of Interventions and Procedures codes (4th edition) beginning W37, W38, W39, W93, W94 and W95. Each operation code defines a different type of hip replacement. Cholecystectomies include operations beginning J18. Elective hernias include operations beginning T20, with International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10) diagnosis codes of K40.3 or K40.9. For a full list of OPCS codes see: www.surginet.org.uk/informatics/opcs.php. A full list of ICD-10 diagnosis codes are available at: <http://apps.who.int/classifications/icd10/browse/2010/en>.

14. Each of the three procedures accounted for between 0.6 and 0.9 per cent of all elective admissions in 2004/05. Hip replacements account for nine per cent of all admissions in the orthopaedics and trauma speciality.

15. Fractured neck of femur procedures include OPCS4 codes W19, W46, W47, W46, where the primary ICD-10 diagnosis code is S70.2; appendectomies include OPCS operation codes beginning H01; emergency hernias include OPCS4 operation codes beginning T20, with ICD-10 diagnosis codes of K40.3 or K40.9. See footnote 13, above, for more detail.

4.1 Summary statistics for elective procedures

Table 4.1 gives the number of procedures performed in each year, the mean distances travelled and the proportion attending their nearest trust. Between 2003/04 and 2010/11 the number of hip replacements increased by approximately one third (from 49,000 to 66,000) and the number of cholecystectomies rose by almost a quarter (43,000 to 53,000). By contrast, the number of elective hernia procedures fell by eight per cent (from 58,000 to 53,000).

In each year, hip replacement patients travelled on average around 14 km for inpatient treatment, which was on average 4 km further than those admitted for cholecystectomies or hernias. The majority of patients are admitted to their nearest trust. Prior to 2006/07, nearest trusts accounted for more than two thirds of hip replacements and three quarters of cholecystectomies and elective hernia procedures.

Table 4.1: Distance travelled for admittance, percentage admitted to their nearest trust and sample size, 2003/04 to 2010/11

	Hip replacement			Cholecystectomy			Elective hernia		
	Distance (km)	Percentage nearest trust	N	Distance (km)	Nearest trust	N	Distance (km)	Nearest trust	N
2003/04	14.2 (17.9)	68.7%	49,368	9.5 (12.2)	76.4%	42,758	9.4 (12.1)	77.1%	57,520
2004/05	13.5 (18.7)	68.4%	48,435	9.8 (13.0)	76.4%	40,097	9.6 (12.1)	77.4%	55,055
2005/06	13.5 (17.9)	68.1%	50,573	10.0 (12.5)	76.5%	42,954	9.5 (12.4)	77.5%	54,738
2006/07	13.7 (18.2)	65.9%	54,090	10.0 (13.3)	75.5%	45,678	10.1 (12.7)	74.6%	54,067
2007/08	13.9 (17.5)	64.8%	60,212	10.1 (12.4)	74.0%	51,084	10.3 (12.3)	71.9%	57,580
2008/09	13.8 (16.9)	60.3%	62,908	10.2 (13.5)	72.9%	50,729	10.2 (12.4)	69.3%	54,907
2009/10	13.9 (17.2)	58.0%	63,065	10.3 (13.0)	70.0%	52,814	10.3 (13.1)	66.6%	53,285
2010/11	14.1 (17.9)	54.2%	66,059	10.2 (12.6)	68.9%	53,195	10.0 (12.2)	60.8%	53,068

Notes: For the procedures included, see footnote 13, page 15. Distance travelled for admittance is measured in km from the centroid of the patient's LSOA to the provider site. Standard deviations are in brackets. Percentage nearest trust gives the percentage treated by their nearest trust. N gives the sample size in each year.

Comparing the pattern of change in the distance travelled by patients and the percentage attending their nearest trust illustrates why nearest trust attendance is the preferred measure in this study. Table 4.1 shows that the mean distance travelled has tended to rise over time, but that the increases are not year-on-year. The pattern for the percentage of patients that are admitted to their nearest trust is much stronger, with continuous falls from 2006/07 onwards. In 2003/04, 68 per cent of hip replacements, 76 per cent of cholecystectomies and 77 per cent of hernia operations were performed at the patient's nearest trust. By 2010/11, this had fallen to 54 per cent, 69 per cent and 61 per cent, respectively.

Figure 4.1 breaks down the percentage of elective operations by the three provider types (nearest trust, other trust and ISTC). All three operations reveal the same pattern: falls in the percentage of patients treated by their nearest trust are accompanied by increases in the percentage treated by ISTCs. Figure 4.1 also highlights that ISTCs play a much greater role in providing these elective procedures than in delivering first outpatient appointments within the orthopaedics and trauma and gastroenterology specialties. By 2010/11, ISTCs accounted for 17 per cent of hip replacements, six per cent of cholecystectomies and 17 per cent of elective inguinal hernia repairs funded by the NHS. This compares to 8.0 per cent of all first orthopaedics and trauma outpatient attendances and 4.8 per cent of all first gastroenterology attendances.

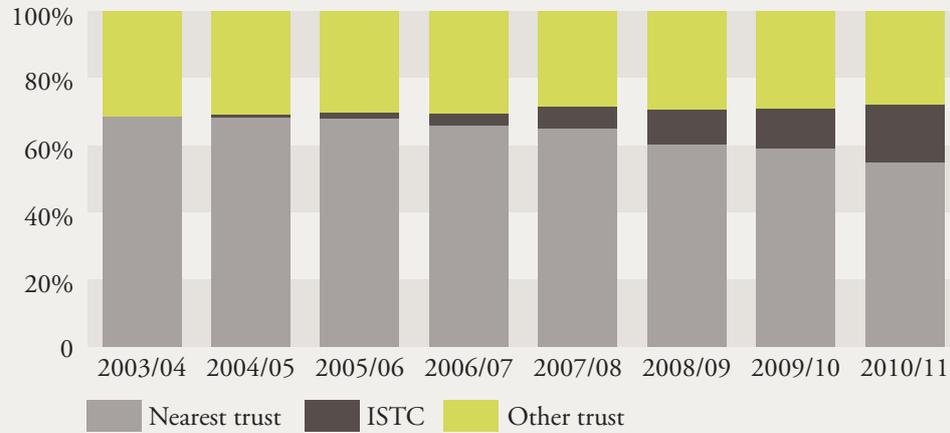


Between 2003/04 and 2010/11 the number of hip replacements increased by approximately one third.
... By contrast, the number of elective unilateral hernia procedures fell by eight per cent

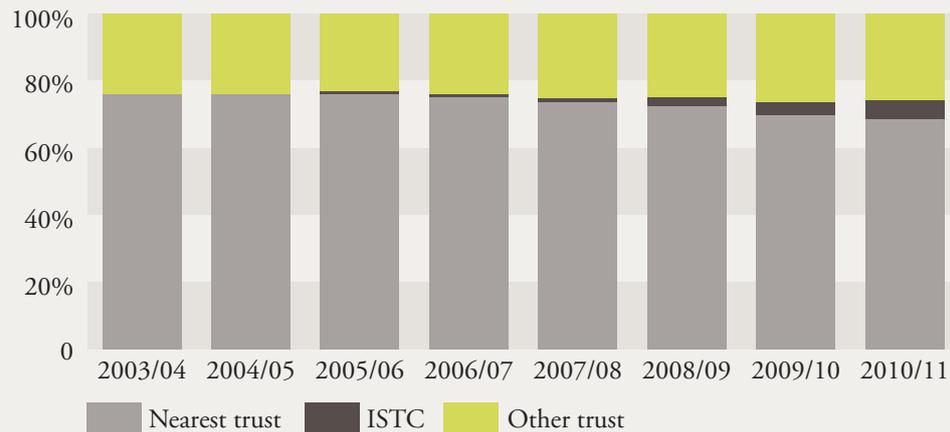
For all three procedures, there are substantial changes in market share across the three types of provider, but for hip replacement and cholecystectomy this took place against increases in the total size of the market. Hence, although the percentage of hip replacement patients treated by their nearest trust fell by 11.7 percentage points between 2006/07 and 2010/11, the number of hip replacement patients admitted to their nearest trust grew by 2.2 per cent. Equally, the nearest trust share of cholecystectomies fell by 6.6 percentage points, but the total number admitted to their nearest trust rose by 7.7 per cent.

Figure 4.1: Distribution of selected elective procedures across provider types by year, 2003/04 to 2010/11

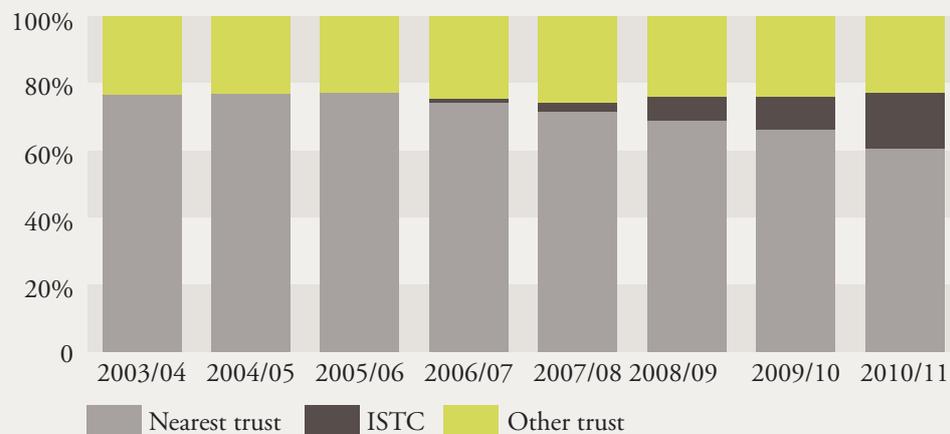
Hip replacement



Cholecystectomy



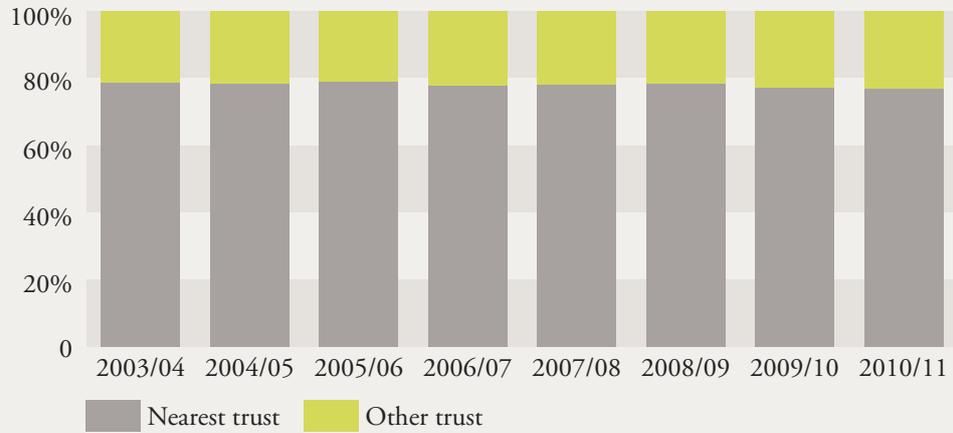
Elective hernia



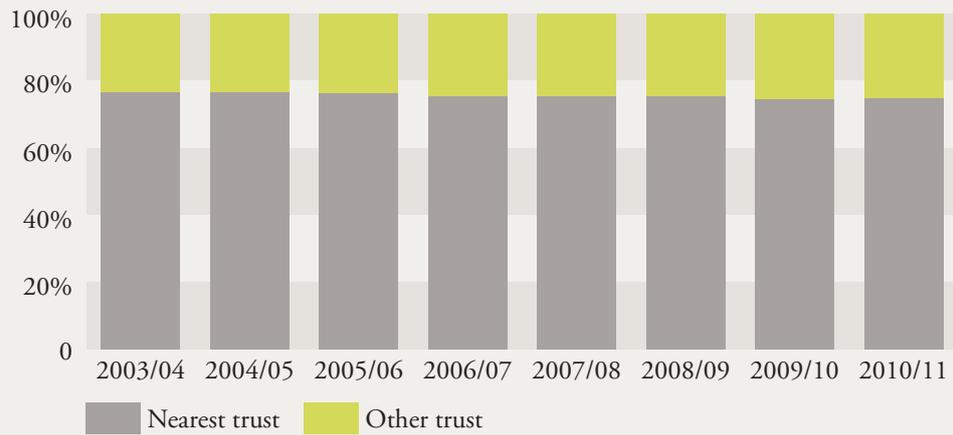
Notes: See footnote 13, page 15. Nearest trust is the nearest NHS trust performing the procedure at least once in the same financial year. First operations only.

Figure 4.2: Distribution of selected emergency procedures across provider types by year, 2003/04 to 2010/11

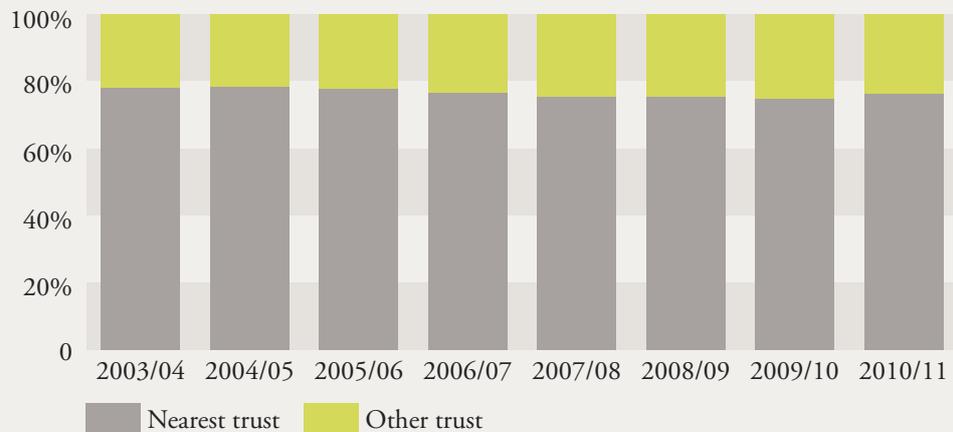
Fractured neck of femur



Appendectomy



Emergency hernia



Notes: See footnote 13, page 15. Nearest trust is the nearest NHS trusts performing the procedure at least once in the same financial year. First operations only.

Figure 4.2 provides the corresponding results for counterpart emergency operations. ISTCs do not treat any emergency cases, therefore emergency cases are treated either by their nearest or another trust.¹⁶ In 2003/04, 79 per cent of fractured neck of femur repair and hernia patients and 77 per cent of appendix patients were treated by their nearest trust. For appendectomies and emergency hernia repair, these figures are very close to those for elective cholecystectomies and elective hernia repair in the same year (76 per cent and 77 per cent, respectively).

Moving across the columns in Figure 4.2 from left to right reveals very little change in the composition of providers over time. By 2010/11, nearest trust admittance had fallen two percentage points for each emergency procedure, relative to 2003/04. This change is confined to areas that experienced a trust reorganisation over this period.¹⁷ By contrast, Figure 4.1 shows that nearest trust admittance for elective procedures fell by between seven and 16 percentage points. Therefore, the reorganisation of NHS services may explain some proportion of the very small change in the proportion of patients admitted to their nearest trust, relative to another NHS trust. However, it cannot account for the shift towards ISTCs, which is the predominant pattern in the data.

4.2 Multivariate analysis: changes in treatment locations, holding the composition of patients constant

As with the outpatient analysis, changes in the location where patients are treated over time may reflect both the impact of policy and any underlying alteration in the composition of patients. Figure 4.3 presents the estimated change in the proportion treated by each type of provider, relative to 2003/04, adjusting for changes in the age, sex and geographic composition of patients. As in Figure 3.2, the vertical capped lines show the 95 per cent confidence intervals for each point estimate.

Figure 4.3 shows that for cholecystectomies and hernias, the statistically significant decline in the proportion attending their nearest trust begins only in 2007/08, and is matched almost exactly one-for-one with increases in the proportion treated by ISTCs. There are no statistically significant changes in the proportion attending other trusts. For hip replacements, changes begin a year earlier and there are statistically significant declines in proportions admitted both to their nearest trust and other trusts. The shifts towards private sector provision are much larger for hip replacements and hernias than cholecystectomies. It is not clear from the data whether this is driven by factors on the demand side or the supply side.

16. The number of emergency procedures declined between two per cent (appendectomy) and 13 per cent (emergency inguinal hernia) from 2003/04 to 2010/11.

17. These include changes in the distribution of operations performed across hospitals in newly merged trusts, such as the South London Health Care Trust. Operations that were performed previously in all of the pre-merger trusts are now concentrated in certain hospitals within the merged trust. For example, if hospitals A, B and C performed emergency appendectomies prior to the merger, facilities might be concentrated in hospitals A and C post-merger.

Taken together, Figures 4.1, 4.2 and 4.3 indicate a growth in the share of patients treated by ISTCs at the expense of the patients' nearest trust. Therefore, the overall picture is very similar to that described for outpatient appointments in Section 3. However, Section 4 highlights that the shifts to ISTC provision are much larger for certain elective conditions than for overall NHS activity. Again, there is no evidence that other trusts are gaining market share at the expense of nearest trusts, but more analysis is needed to assess whether there are movements between NHS trusts that cannot be observed by looking at the overall pattern of admittances.¹⁸ There is only a small change in the location of any emergency procedure considered, which can be explained by acute trust reorganisations.

4.3 Expansion in the number and use of independent sector treatment centres

Existing work that models the determinants of hospital choice has shown that patients place a very high weight on having treatment close to home (Sivey, 2012; Varkevisser and others, 2010). In this section we explore the extent to which distance to ISTCs relative to trusts is driving the shifts towards ISTCs described in Section 4.2.

Figures 4.4 and 4.5 show the number of patients treated by ISTCs and the number of ISTC sites treating each condition by year. Prior to 2006/07, ISTCs had a presence in hip replacements but only performed a negligible number of cholecystectomies and hernias. The number of ISTCs and procedures performed increased rapidly in the years that followed. By 2010/11 there were a similar number of sites offering hip replacements and hernias (137 and 138, respectively), but the number of hip replacement procedures was 27 per cent higher. ISTCs have a smaller presence in cholecystectomy procedures, with 85 ISTC sites performing procedures and 3,000 operations conducted in 2010/11.

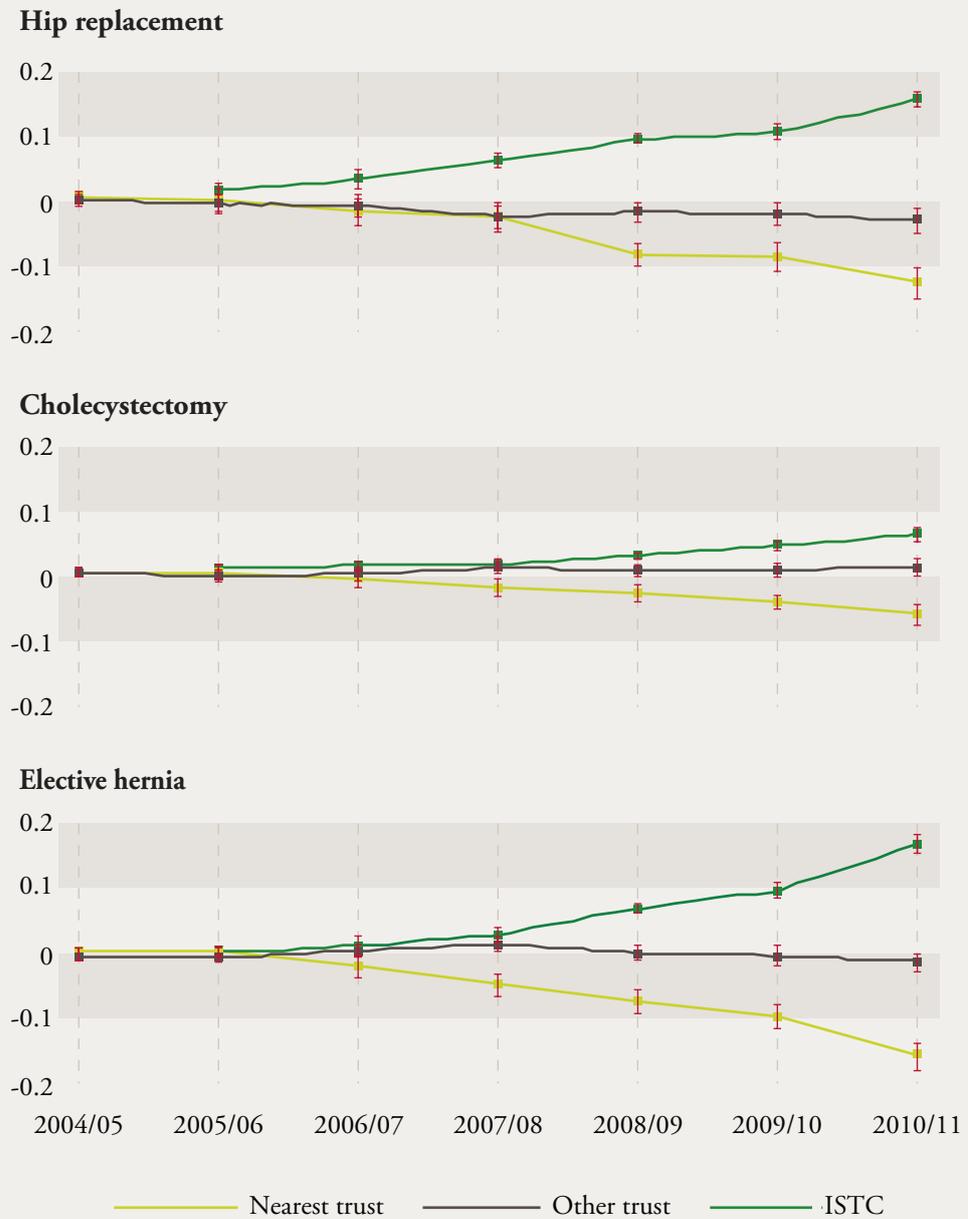
 **The expansion in the number and capacity of ISTCs since 2007 means that... a patient's nearest trust is not necessarily their nearest provider**

The expansion in the number and capacity of ISTCs since 2007 means that by the end of the period, a patient's nearest trust is not necessarily their nearest provider. Of the patients who had hip replacements in 2004/05, 23 per cent would have had a nearer ISTC, had they had the same operation in 2010/11.¹⁹ The same is true of 19 per cent of cholecystectomy patients and 32 per cent of hernia patients. One potential explanation for the movement of patients from the nearest trust to an ISTC is that they have switched to the nearest facility, whether public or private. This has important implications for the scope of competition, as it is very hard for providers to compete on distance, particularly within the NHS.

18. For example, patients A and B may move from their nearest trust to another trust, while patients C and D move the other way. In this case, the numbers attending each type of provider would be unaffected.

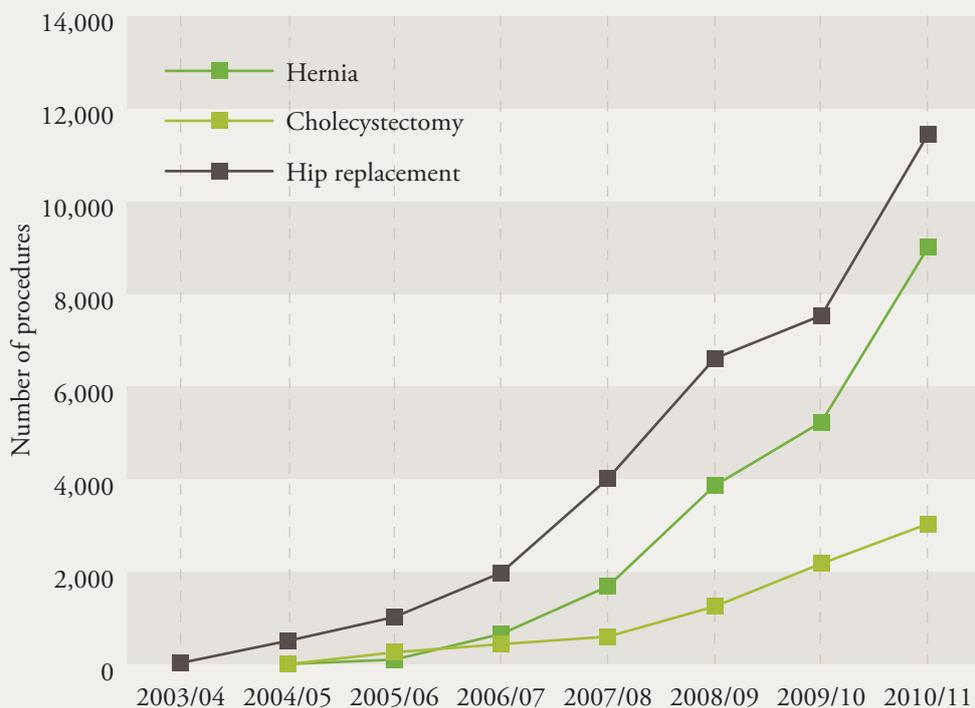
19. We focus on those who had operations before 2006/07, as ISTCs have the potential to affect the number and composition of patients.

Figure 4.3: Change in the proportion of patients attending to each provider type for elective procedures, relative to 2003/04, by procedure



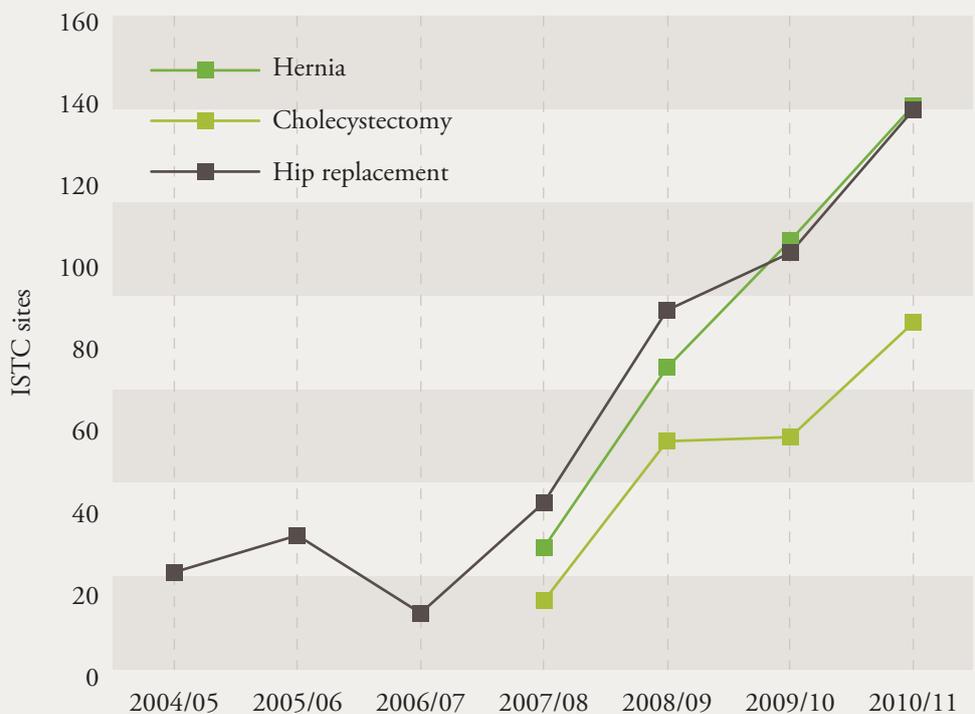
Notes: For each procedure, each line plots results from a separate logit regression, where the dependent variable is an indicator for whether the patient was admitted to the provider type. All specifications include PCT fixed effects, cubics in patient age and LSOA IMD score and patient sex. Each point plotted corresponds to the estimated change in the proportion treated by that provider type between the year in question and 2003/04. The capped vertical lines give the 95 per cent confidence intervals for each point estimate. Standard errors are robust to the presence of heteroskedasticity and clustered at the PCT level. See footnote 13, page 15, for information on OPCS codes and ICD-10 diagnosis codes. Patients are excluded if there are missing values for age, sex, LSOA or PCT.

Figure 4.4: Number of procedures conducted by ISTCs, 2003/04 to 2010/11



Note: Total number of procedures conducted on an ISTC site (provider code starting with N), in each financial year.

Figure 4.5: Number of ISTC sites in operation, 2003/04 to 2010/11



Notes: Number of ISTC sites that perform each type of operation. Excludes Care UK's seven ISTCs, as the company provides only one site code.

In order to assess whether changes in the location where patients are treated is explained by switches to the nearest provider, all local areas in England were split into three groups, based on the location of their nearest ISTC in 2009/10:

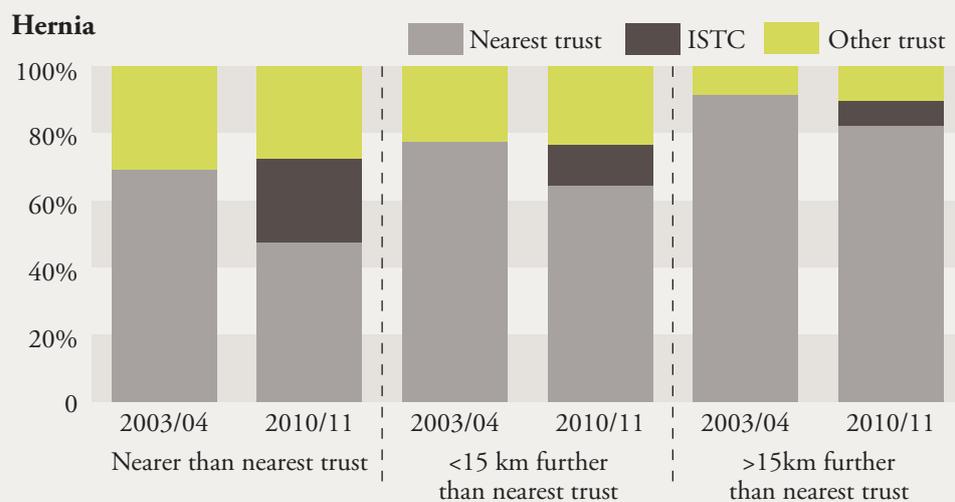
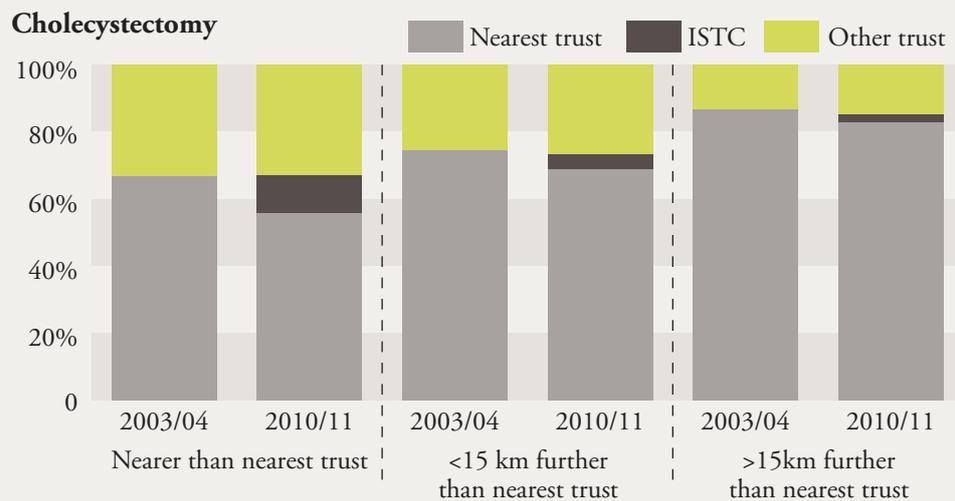
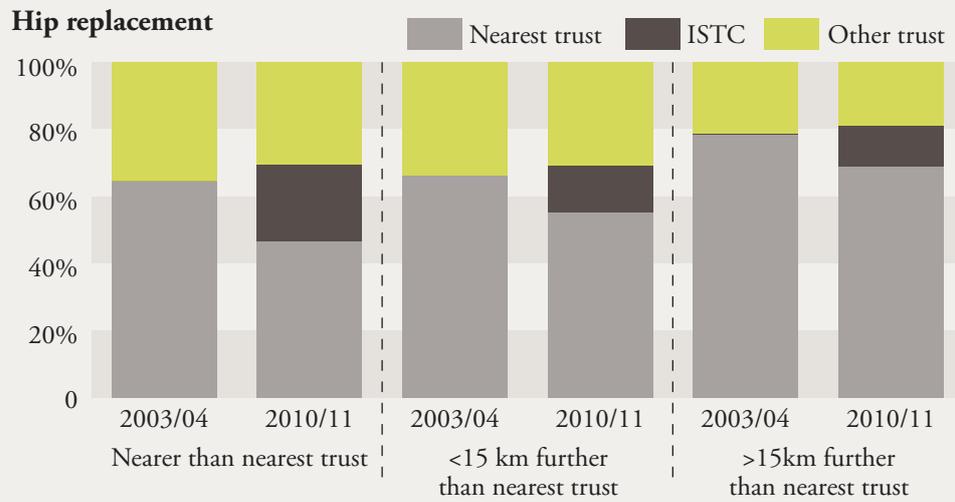
- nearer than the nearest NHS trust (Group 1)
- less than 15 km further than the nearest trust (Group 2)
- more than 15 km further than the nearest trust (Group 3).

A particular local area will remain in the same group in all years, irrespective of when the nearest ISTC opened. The LSOA composition of the groups is fixed over time, as the nature of areas with a nearer ISTC changes across the period.

Figure 4.6 shows the composition of providers by group (1, 2 or 3) and procedure in 2003/04 and 2010/11. There are three points of note. First, there were differences across the groups in the proportion attending their nearest trust in 2003/04, before the second wave of ISTCs: for all three operations, nearest trust attendance was lower in areas in Group 1 relative to areas in Group 3. For example, of the hip replacement patients living in a Group 1 area in 2003/04, 65 per cent were treated at their nearest trust, compared to 79 per cent of hip replacement patients in Group 3 areas. This is consistent with the initial aims of the policy: to locate ISTCs in areas that the Department of Health had identified as having long waiting times or lacking capacity, so as to reduce waiting lists (Naylor and Gregory, 2009).

Second, by 2010/11 ISTCs account for a significant proportion of operations in all three groups and for all three operations. It is clear that change in the distribution of patients across providers is not driven solely by patients switching to a nearer ISTC. The use of ISTCs for hip replacements appears less related to distance than for cholecystectomies or hernias.

Figure 4.6: Change in the percentage of patients treated by each provider type between 2003/4 and 2010/11, by relative distance to the nearest ISTC



Notes: See footnote 13, page 15, for OPCS codes and ICD-10 diagnosis codes. Nearest ISTC is the nearest ISTC site that performed the given operation at least once in 2009/10.

Third, as expected, growth in ISTC utilisation is higher for the residents of Group 1 than for Groups 2 and 3. For those who have a nearer ISTC than their nearest trust, 23 per cent of hip replacements, 11 per cent of cholecystectomies and 25 per cent of hernias were performed by ISTCs. This compares to 12 per cent, three per cent and eight per cent of procedures in Group 3.

Summary

- Inpatient admittance records reveal the same pattern for all three procedures considered: the proportion admitted to their nearest trust falls after 2006/07, with a corresponding increase in the proportion admitted to ISTCs.
- The percentage of patients treated by ISTCs is substantially higher for hip replacements and elective hernias (both 17 per cent in 2010/11) than for cholecystectomies (six per cent in 2010/11).
- For cholecystectomies and hernias, there is no evidence of any change in the proportion treated by other trusts. For hip replacements, there is a further shift towards ISTCs.
- There is very little change in the pattern of admittance for emergency procedures, indicating that this study's results are not driven by any contemporaneous reorganisation of NHS services.
- Patients are much more likely to receive treatment from an ISTC, the closer the nearest ISTC is to their home. However, ISTCs do still treat a significant number of patients where their nearest ISTC is more than 15 km further than their nearest trust.

5. How have the referral patterns of GP practices changed?

The patient choice reforms required GPs explicitly to offer patients a choice over where to book their first outpatient appointment. The relative roles that the GP and patient play in making the final decision cannot be observed and may vary by GP, patient and condition, but the GP is likely to play some part in determining where their patients end up being treated. In this section, GP practice level data are examined and the following considered:

- how the distribution of GP practice referrals for first outpatient appointments across providers has changed since 2006/07²⁰
- the extent to which variations in referral behaviour across GP practices are explained by factors at the PCT level, rather than the characteristics of the practice.

The objectives are to document changes in the distribution of referrals since the patient choice reforms, and to gauge the role that the GP practice might play in both patients' ability to exercise choice and how they exercise that choice. This analysis will present the results for all first outpatient appointments across all treatment specialties. However, the pattern of results remains the same when only first orthopaedics and trauma appointments are considered.²¹

The section will focus on two outcomes that capture different aspects of the distribution of referrals: the total number of providers to which a GP practice refers; and the Herfindahl-Hirschman Index of Concentration (HHI).²² The former will capture the introduction of ISTCs and could indicate the range of providers that a GP practice is willing to consider. The latter also will measure any change in dispersal across existing providers, and gives greater weight to providers that receive a higher proportion of referrals. Therefore, the outcome is less skewed by rare referrals to new providers.

The analysis presented here is the first step in understanding what aspects of GP behaviour and the GP–patient relationship require further investigation. However, the results are subject to a number of strong caveats. First, the analysis only considers the referral behaviour of GP practices, not individual GPs. Second, the characteristics of GP practices or practice lists have not been controlled for: therefore, cross-sectional variation in GP practice behaviour may be explained entirely by patient characteristics or the characteristics of the GPs. Third, changes over time may be explained by a combination of GP and patient behaviour. At this point, this study does not attempt to separate the two.

20. A provider is defined as an acute trust, mental health trust, care trust, PCT or private provider (company). PCTs do provide secondary care over this period, but the number of attendances is very small.

21. All analysis was repeated for orthopaedics and trauma appointments only. The scale of the changes differs, but the pattern of results remains the same.

22. This is given by the sum of the squared market shares for the 50 largest providers by referral volume for the given GP practice.

5.1 Number of providers

This section considers the number of different providers to which a GP practice makes referrals in a given year. Here, the analysis is restricted to first outpatient appointments only. Practices are excluded if they had fewer than 100 patients, or made fewer than 50 referrals in any year between 2006/07 and 2010/11, leaving a sample of 7,511 practices.²³ As shown in Table 5.1, GP practices had an average of 6,700 patients and made 1,200 referrals in 2006/07. Practices referred to a mean of 12 and a median of 11 providers.

Table 5.1: GP practice summary statistics – practice list size, number of referrals and number of providers used for first referrals, 2006/07 to 2010/11

	Number of providers						
	GP practices	Mean practice list	Mean referrals	Mean	25th percentile	Median	75th percentile
2006/07	7,511	6,740	1,217	12.1	8	11	15
2007/08	7,511	6,802	1,274	13.0	9	12	16
2008/09	7,511	6,872	1,488	15.7	11	15	19
2009/10	7,511	6,942	1,658	16.9	12	16	21
2010/11	7,511	6,993	1,772	18.1	13	17	22

Note: Includes GP practices in England that have a practice list of at least 100 and make at least 50 referrals in every year between 2006/07 and 2010/11.

Table 5.1 indicates that between 2006/07 and 2010/11, the number of providers increased at all points of the distribution. The mean and median rose to 18 and 17 providers, respectively, with accompanying increases at both the 25th and 75th percentiles. Over the same period, the mean number of first referrals increased by 45 per cent, while the mean practice list size only rose by three per cent. The number of referrals has increased at approximately the same rate as the number of providers, such that the number of providers used per 100 referrals has remained roughly constant over time.²⁴

Overall, the total number of providers remained roughly constant over time, fluctuating between 287 and 290. The number of private providers (companies owning ISTCs) increased from eight in 2006/07 to 19 in 2010/11.²⁵ The slight fall in the number of NHS providers can be explained by a series of NHS acute trust mergers.²⁶

23. This means that all GP practices in the sample are present in all years. The study's restrictions exclude six per cent of GP practices present in the original data.

24. This report focuses on the number of providers, rather than the number of providers per 100 referrals, as the number of referrals also might be affected by the patient choice reforms and expansion of ISTCs.

25. Patients are offered a choice of providers rather than ISTC sites. However, ISTC site location and characteristics might affect patient choice. The magnitude of the change in number of providers is larger when ISTC companies are replaced by treatment sites, but the pattern of results remains the same.

26. When the sample is restricted to first outpatient appointments with the orthopaedics and trauma specialty, the mean number of providers used by GPs increased by 43 per cent (6.6 to 9.6), while the mean number of first referrals rose by 30 per cent (228 to 298).

Figure 5.1 considers the distribution of the total number of providers used by each GP practice. There are two important features to note. First, in each successive year the entire distribution shifts to the right, indicating an overall increase in the number of providers used. The largest shift occurs between 2007/08 and 2008/09, which coincides with the period of fastest growth in ISTCs. Second, the rightwards shift between 2007/08 and 2008/09 is accompanied by a substantial flattening of the distributions, indicating a greater degree of dispersion in the number of providers used across GP practices in the same year.²⁷

Cross-sectional dispersion in the number of providers used by GP practices can be decomposed into two sources:

- variation generated by differences between PCTs
- variation associated by differences in referral patterns by practices within the same PCT.

GPs in a given PCT face a similar set of providers and constraints, which will drive their referral patterns in part. These common factors may include the number of local providers, transport networks and PCT-level policies such as referral management centres. If PCTs differ, so will the average referral patterns of the GP practices that they contain. However, GP practice referrals may be affected by the characteristics of their doctors, premises and the sociodemographic composition of the practice list. This could result in differences between the referral patterns of GP practice in the same PCT. Therefore, the expansion in ISTCs could generate a rise in dispersion of the number of providers because either ISTCs are concentrated in specific areas of the country, or GPs in the same PCT respond differently to the new providers.

 **There is a much smaller change in the total number of NHS trusts used than there was in the overall number of providers**

The role of PCT-level factors is assessed by calculating the share of overall variation in the number of providers used by GP practices that is explained by differences in PCT-level averages. These averages will reflect differences in both the provider options available to GPs, and the characteristics of the PCT population. In 2006/07, 41.8 per cent of the total variation across practices nationwide can be explained by differences in the average number of providers used across PCTs. This figure falls to 34.8 per cent by 2010/11, suggesting that heterogeneity in individual GP behaviour played a greater role in recent years than it did in 2006/07.²⁸

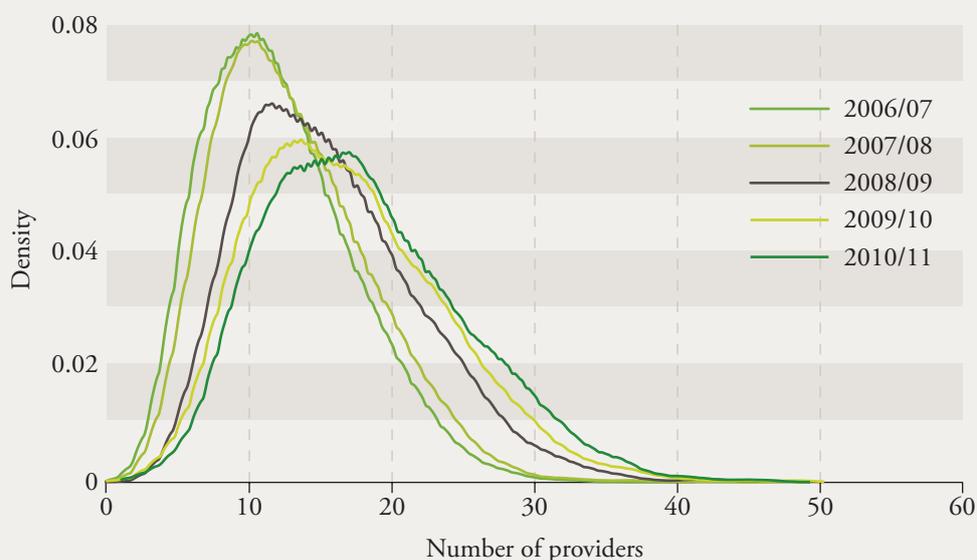
Another way to characterise the increased dispersal across GP practices is to consider the change in the number of providers used across the period. Figure 5.2 shows how the number of providers used changed between 2006/07 and 2010/11 for each GP practice.²⁹ The solid green line shows that on average, GP practices referred to 6.1 more providers in 2010/11 than they did in 2006/07; four per cent of practices used fewer providers in 2010/11 than in 2006/07; and another four per cent used exactly the same number. At the other end of the scale, 11 per cent of practices were referring to at least 12 more providers in 2010/11 than they had in 2006/07.

27. This is also demonstrated in Table 5.1, where the interquartile range for number of providers increases from seven in 2006/07 to nine in 2010/11.

28. These figures are calculated by regressing the number of providers used in a given year against PCT fixed effects.

29. This is given by providers in 2010/11 minus providers in 2006/07.

Figure 5.1: Number of providers used by GP practices for first outpatient appointments, by GP practice and year



Notes: Kernel density function of the number of providers used by GP practices when making referrals per 1,000 patients on the practice list. Practices are excluded if they have fewer than 100 patients in any given year or make 50 or fewer referrals.

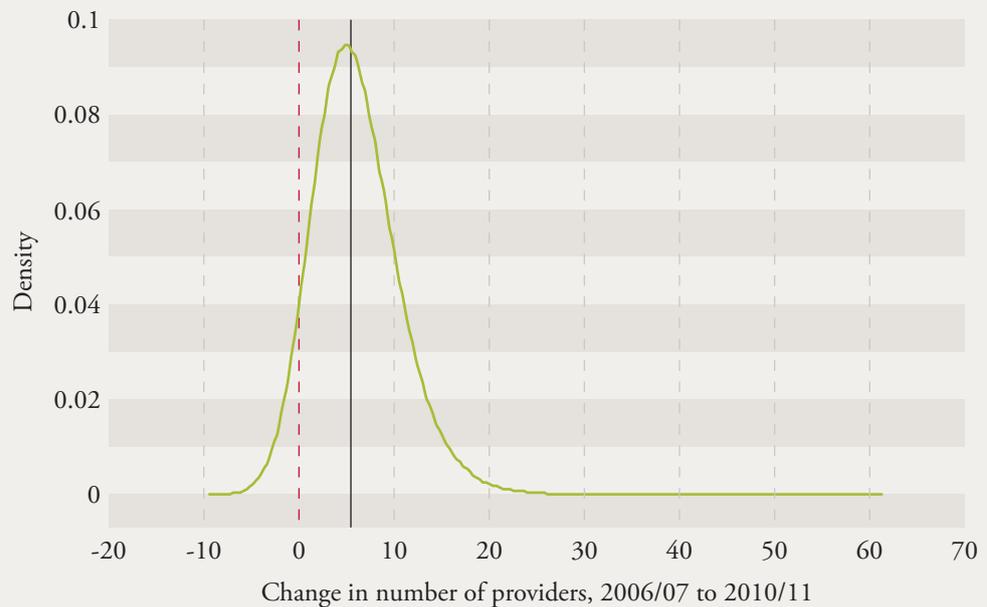
The results presented earlier in this report have demonstrated that the period under consideration coincides with a large expansion of ISTCs. Therefore, the patterns observed in Figure 5.1 are in part a consequence of the increase in the number of local providers. Figure 5.3 presents the same distributions, but includes only acute (non-specialist) NHS trusts.³⁰ This is the same sample of providers that most existing work has used when considering the impact of patient choice on hospital quality (Cooper and others, 2011; Gaynor and others, 2010). As would be expected, there is a much smaller change in the total number of NHS trusts used than there was in the overall number of providers. Overall, the expansion of ISTCs accounts for half of the change in the mean providers used by GP practices: the mean number of all providers rose from 12.1 to 18.1 between 2006/07 and 2010/11, while the mean number of acute NHS providers rose from 8.6 to 12.0. In keeping with Figure 5.1, the distribution of total trusts referred to by GP practices does become more dispersed over time.³¹

One implication of this analysis is that there is more movement across NHS providers than that suggested in Sections 3 and 4. ISTCs explain a high proportion of the change, but there is some movement between trusts.

30. The number of these trusts fluctuated between 149 and 146 over this period.

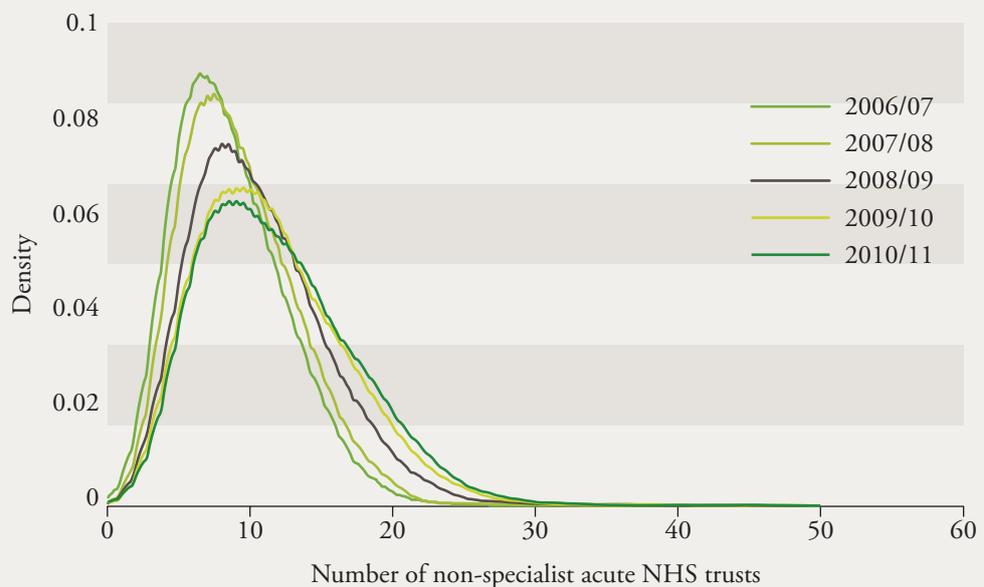
31. This is consistent with results from Gaynor and others (2010), who find that there is a change in the distribution of patients across NHS hospitals between 2003/04 and 2007/08.

Figure 5.2: Density of change in total providers used by GP practices, 2006/07 to 2010/11



Notes: Kernel density function showing the distribution the total number of providers used by a GP practice in 2010/11 minus total number of providers used by the same GP practice in 2006/07. The red dashed line is placed at zero. The vertical black line indicates the mean change in the number of providers (6.1).

Figure 5.3: Number of acute NHS trusts used by GP practices for first outpatient appointments, by GP practice and year



Notes: Kernel density function of the number of providers used by GP practices when making referrals per 1,000 patients on the practice list. Practices are excluded if they have fewer than 100 patients in any given year, or make 50 or fewer referrals.

5.2 GP referral concentration

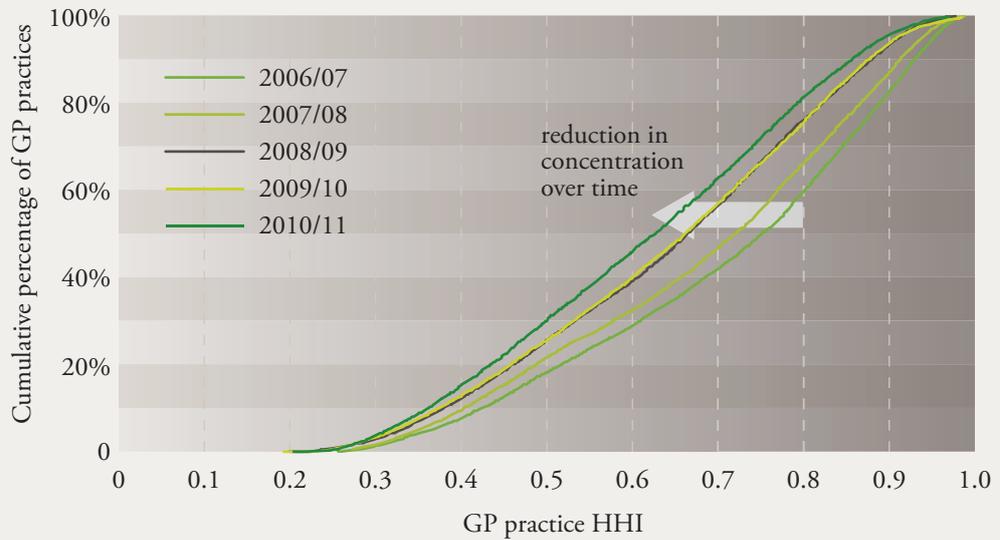
Section 5.1 considers whether GP practices are using an increasing number of providers. The following analysis examines changes in the concentration of referrals across providers, by calculating a GP practice-level HHI for each year between 2006/07 and 2010/11. The HHI is given by the sum of the squared market shares for the 50 largest providers by referral volume for the given GP practice. For example, a GP practice which referred all its patients to the same provider would have an HHI of 1.0, while another which referred exactly half of its patients to two different providers would have an HHI of 0.5. Numbers closer to one indicate a high degree of market concentration, while numbers close to zero indicate low market concentration.

Over the period considered, mean HHI fell from 0.71 to 0.61. In traditional applications, a market is defined as highly concentrated at an HHI of 0.25 or above. However, this is not a useful definition in an NHS context, where market mechanisms play a limited role and health care provision is dominated by large state providers or trusts. Therefore, it is the change in the HHI that is of interest rather than the level.

Figure 5.4 presents the cumulative distribution function of the HHI across all providers, by year. Between 2006/07 and 2008/09, the entire cumulative distribution function shifts to the left, indicating that referrals have become less concentrated at all points along the distribution. In 2010/11, 69.2 per cent of GP practices had indices above 0.5, a fall from 81.2 per cent in 2006/07. Hence, referrals have become less concentrated but local trusts still retain the dominant role. There was no change in the concentration of referrals between 2008/09 and 2009/10, but concentration fell again between 2009/10 and 2010/11.

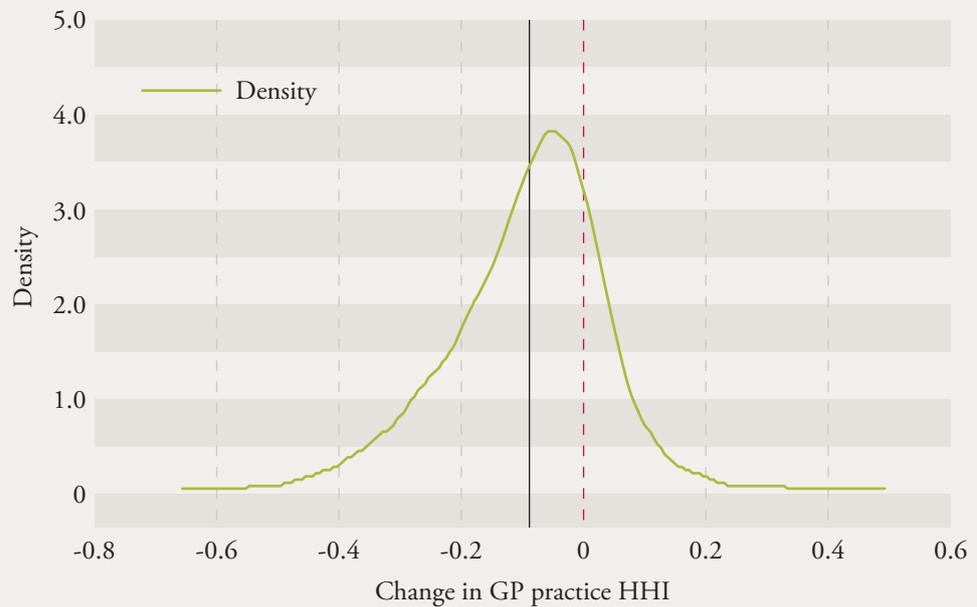
Figure 5.5 shows the distribution of the change in concentration across GP practices. The solid green line indicates the mean change (-0.084) and the dashed red line is positioned at zero. Although there is a general pattern of lower concentration of referrals, 21 per cent of GP practices experienced an increase in referral concentration.

Figure 5.4: Cumulative distribution functions of GP practice-level HHI for providers used for outpatient referrals by year, 2006/07 to 2010/11



Note: The HHI is the sum of the squared referral shares of the 50 largest providers by referral number, from a given GP practice in a given year.

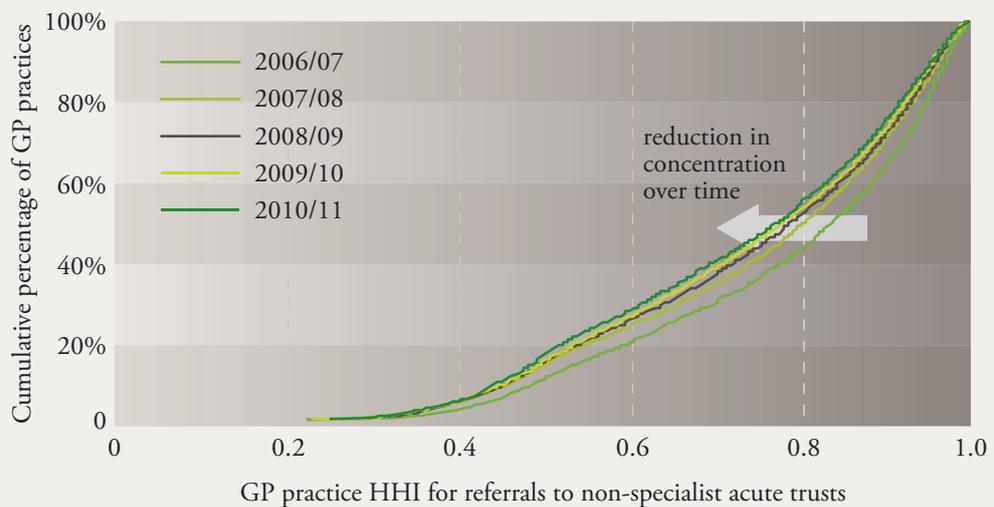
Figure 5.5: Density of change in GP practice HHI, 2006/07 to 2010/11



Notes: Kernel density function showing the distribution of GP practice HHI for 2010/11 minus GP practice HHI for 2006/07. The HHI in each year is given as the sum of the squared referral shares of the 50 largest providers by referral number from a given GP practice in a given year. The vertical black line indicates the mean change in HHI (-0.084).

When the sample is restricted to referrals to acute trusts (excluding ISTCs and any mental health trusts, care trusts, ambulance trusts or PCTs providing secondary care), in Figure 5.6, the picture looks very different to that for all providers in Figure 5.4. There was a decline in concentration between 2006/07 and 2010/11, but the change was more gradual. In most parts of the distribution, the largest shift occurs between 2006/07 and 2007/08, immediately after the first patient choice reform. As with the number of providers analysis in Section 5.1, the observed changes in the concentration across NHS acute trusts indicates movements across NHS providers not observed in Sections 3 and 4. However, it is the introduction of ISTCs that appears to drive the overall pattern observed in Figure 5.4.

Figure 5.6: Cumulative distribution functions of GP practice-level HHI for outpatient referrals to NHS trusts by year, 2006/07 to 2010/11



Note: The HHI is given as the sum of the squared referral shares of the 50 largest NHS (trust) providers by referral number from a given GP practice in a given year.

Of the total variation in HHI across GP practices in 2006/07, 52 per cent can be explained by PCT-level factors; this fell slightly to 48 per cent in 2010/11.³² These percentages are considerably larger than those for the number of providers, as the index is less skewed by the introduction of additional providers that receive a small number of referrals.

Summary

- On average, in 2006/07, GP practices referred to 12 providers; by 2010/11, this had increased to 18 providers.
- In all years there is a considerable degree of variation across different GP practices in the number of providers to which they refer. Around two-fifths of this variation is explained by PCT-level factors: for example, the concentration of providers in the local area or specific PCT policies.
- Although, since 2006/07, there has been a rise on average in the number of providers used by GPs when making first outpatient referrals, not all GP practices have changed their behaviour in the same way, and so this overall increase has been accompanied by an increase in the dispersion in the number of providers used by GP practices across England.
- The share of the variation across GPs in the number of providers used that is explained by PCT-level factors fell from 41.8 per cent to 34.8 per cent between 2006/07 and 2010/11.
- Approximately half of the increase in the number of providers used is explained by the entry of new ISTCs between 2006/07 and 2010/11. Even when the analysis focuses only on referrals to acute NHS trusts, there is an increase in the dispersion of number of acute trusts used across GP practices.
- GP practice-level concentration indices, which capture not only the number of providers referred to, but also what fraction of patients are treated by each provider, reveal a fall in concentration of first referrals across providers between 2006/07 and 2010/11.
- GP referrals remain very concentrated, with 62.9 per cent of GP practices having concentration indices of 0.5 or greater (0.5 is equivalent to referring equal proportions of patients to two providers).
- Around half of the variation in the cross-sectional concentration index across GP practices can be explained by PCT-level factors. This fell marginally from 52 per cent in 2006/07 to 48 per cent 2010/11.
- Taken together, the results suggest that there has been a change in how GP practices distribute first referrals across providers. However, there also has been an increase in the variation in referral behaviour across GP practices.

32. Again, this is calculated by regressing practice-level HHI against a full set of PCT fixed effects.

6. Conclusion

This report has described how locations of outpatient attendance and inpatient admission have changed since the introduction of patient choice in 2006 and the expansion of ISTCs from 2007 onwards. The study's results are fourfold.

- There has been a shift in the location where patients receive NHS-funded outpatient and elective inpatient care, from their nearest trust to ISTCs.
- There is no indication of any net change in the proportion of patients that receive care at other NHS trusts which are not the closest to them.
- There is no significant evidence of a change in the location where emergency inpatient procedures are carried out, confirming that the results in this study for elective treatment are not driven merely by reorganisation of NHS services.
- Analysis of GP referral patterns reveals that GP practices now refer to a greater range of providers, and that referrals are less concentrated across providers, although considerable variation across GP practices continues to exist.

Together, the study's results generate the following implications and opportunities for further work.

 **The expansion of ISTCs is not a marginal policy reform and deserves greater investigation**

The report makes two principal contributions to the literature on the impacts of recent NHS reforms. First, the analysis adds to the existing work on the impact of patient choice on hospital quality, most notably Cooper and others (2011) and Gaynor and others (2010), by illustrating that there has been a change in where NHS-funded patients receive treatment. However, the present study cannot isolate the role of patient choice in generating this change. While this is an expected precondition for the patient choice reforms, having increased quality among health care providers by increasing competition, a number of links in this chain remain to be explored.

Second, the present findings illustrate that ISTCs are of crucial importance in understanding how the previous decade of reforms has impacted competition within the NHS and patient care. The expansion of ISTCs is not a marginal policy reform and deserves greater investigation. At present, work on ISTCs has focused on describing how they operate (Naylor and Gregory, 2009), detailing how patient profiles differ from those of NHS providers and examining their clinical outcomes (Bardsley and Dixon, 2011; Chard and others, 2011).

Taken together, the results in this report raise a number of interesting questions and opportunities for future work, which may be summarised as follows.

- First, the analysis here has not demonstrated the extent to which the shift in treatment location represents a shift from lower- to higher-quality providers. Existing work has found some evidence that patients switch to better-quality NHS providers (Gaynor and others, 2010), but not whether choosing an ISTC is sensitive to the quality of the nearest hospital.
- Second, while there has been some shift away from treatment at the nearest NHS trust, the majority of patients with the conditions examined in this study are still treated by their nearest NHS provider. This suggests that while some patients may have exploited the reforms, others may not. Exploring which patients have been affected will be important in understanding how different types of individuals have been, and will be, affected by increasing choice and competition.
- Third, in all of this study's analysis, ISTCs play a central role in understanding how the location of patient care has changed since 2006/07. There is very little evidence of any net movements between NHS trusts, although this cannot be completely ruled out by the methods used in this study. It appears probable that ISTCs have a crucial part to play in any relationship between competition for patients and quality within the NHS over this period. The data say very little about the relative role played by patient choice and the introduction of ISTCs. The changes in the patterns of treatment location that emerge in the data are consistent both with patients choosing to relocate to ISTCs, and with ISTCs having created capacity that was then filled by GPs or PCTs. This study's analysis does not reveal how patterns of treatment would have changed if patient choice were introduced without ISTC expansion. Understanding more about how the capacity created by ISTCs was utilised by GPs and PCTs, and how this relates to active patient choice, is an important question for further work.
- Fourth, it is unclear how the shift in care from nearest trusts to ISTCs has affected the equality or inequality of access to NHS-funded services across different types of patients. Prior to the expansion of choice there was evidence of inequalities in health care utilisation in England by income, ethnicity and education (Morris and others, 2005), and variation in how far patients travelled for treatment, by local deprivation (Propper and others, 2007). It is unclear how the expansion in ISTC affected such inequalities. Moreover, ISTCs carry out a limited number of procedure types and tend to treat healthier patients (Bardsley and Dixon, 2011; Chard and others, 2011). As such, the policy has scope to provide direct benefits to some types of patients more than others. However, patients treated by NHS trusts may benefit indirectly through shorter waiting times. More work is needed to identify which groups have benefited from the expansion of ISTCs, both directly and indirectly.
- Fifth, the analysis provides very little information about how the growth of ISTCs has affected NHS trusts. There was a fall in the proportion of patients admitted to their nearest NHS trust for all three operations considered in this study. However, for hip replacements and cholecystectomies, the increase in overall volume means that a higher number of patients were treated at their nearest trust in 2010/11 than in 2006/07. A number of important issues remain unexplored. Principal among these are how the growth of ISTCs has affected the competitive pressures felt by NHS trusts, their incomes and their patient mix in terms of both severity and types of procedures (or health care resource groups).

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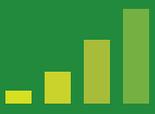
About the authors

Elaine Kelly

Elaine Kelly is a research economist at the Institute for Fiscal Studies. She gained a PhD in Economics from University College London, which focused on the economics of health at different points across the life cycle. Elaine leads the Institute for Fiscal Studies' work on health care, and has research interests in public health and the economics of education. Previously she has worked for the World Bank and the European Bank for Reconstruction and Development.

Gemma Tetlow

Gemma Tetlow is programme director of the Institute for Fiscal Studies' work on pensions, public finances and public spending. Her research interests include pensions and saving, older-age working and its interactions with health at older ages. Her work also includes analysis of the UK's public finances and public service spending, including health care.



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The Institute for Fiscal Studies
7 Ridgmount Street
London WC1E 7AE
Telephone: 020 7291 4800
Facsimile: 020 7323 4780
Email: mailbox@ifs.org.uk

The Nuffield Trust
59 New Cavendish Street
London W1G 7LP
Telephone: 020 7631 8450
Facsimile: 020 7631 8451
Email: info@nuffieldtrust.org.uk

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