DOES HOSPITAL OWNERSHIP AFFECT PATIENT EXPERIENCE? AN INVESTIGATION INTO PUBLIC-PRIVATE SECTOR DIFFERENCES IN ENGLAND[*]

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ABSTRACT

Using patient experience survey data, the paper investigates whether hospital ownership affects the level of quality reported by patients whose care is funded by the National Health Service in areas other than clinical quality. We estimate a switching regression model that accounts for (i) some observable characteristics of the patient and the hospital episode; (ii) selection into private hospitals; and (iii) unmeasured hospital characteristics captured by hospital fixed effects.

We find that the experience reported by patients in public and private hospitals is different, i.e., most dimensions of quality are delivered differently by the two types of hospitals, with each sector offering greater quality in certain specialties or to certain groups of patients. However, the sum of all ownership effects is not statistically different from zero at sample means. In other words, hospital ownership in and of itself does not affect the level of quality of the average patient's reported experience. Differences in mean reported quality levels between the private and public sectors are entirely attributable to patient characteristics, the selection of patients into public or private hospitals and unobserved characteristics specific to individual hospitals, rather than to hospital ownership.

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1. Introduction

An important element of the recent reforms of the health care system in England has been the introduction of private-sector providers alongside National Health Service (NHS) ones. Thus, 36 Independent Sector Treatment Centres (ISTCs) from the private sector have been contracted by the NHS, in two waves since 2002, to provide elective surgery and diagnostic procedures to NHS patients. Although health care remains free to the patient, it may be provided by a private, for-profit hospital or by a public-sector (i.e., NHS) hospital. The use of ISTCs is intended to increase capacity in order to cut waiting lists for routine procedures. Patients, advised by their General Practitioners (GPs) are also gradually being offered an increased degree of choice among providers[1]. More generally, some of the aims of the introduction of private-sector providers have been to encourage cost reductions and promote innovation and responsiveness to patients throughout the health care system (Allen 2009).

Private, for-profit organizations are generally thought to have greater incentives to minimise costs than public sector ones. There is evidence that management practices in ISTCs are on average closer to manufacturing good practice than in NHS hospitals (Bloom et al. 2009) a difference which could reflect stronger incentives to control costs in ISTCs. However, the effect of ownership on service quality is less certain. International empirical findings on the compared clinical quality of for-profit, non-profit and state-owned hospitals are inconclusive (see, e.g., Sloan et al. 2001, Eggleston et al. 2008, Lien et al 2008). A growing body of literature suggests that profit incentives may have complex effects in public service provision. Certain aspects of quality may be under-supplied by private firms commissioned to provide public services, while in other areas quality may improve with for-profit supply, depending on the contracting situation, the incentives provided to staff and staff motivation (Hart et al. 1997, Bénabou and Tirole 2006, Besley and Ghatak, 2003).

In this paper, we use new patient experience survey data to examine whether hospital ownership has an effect on the level of quality reported by patients in the areas of information and interpersonal care, respect for privacy, dignity, and hospitality and delays. We also investigate whether different aspects of patients' experience are affected in different ways by hospital ownership. Severe informational asymmetries imply that patients may not always be well placed to assess the clinical

[1] For a review of the competition aspect of the reforms, see Sussex (2009).

quality of health care. However, other dimensions of care quality such as cleanliness or privacy can be observed by patients. Indeed, it can be argued that certain aspects of quality are best measured by patients, as for example whether patients are given explanations they can understand about the operation or side-effects of medication, or whether they are treated with dignity. The data we use come from surveys carried out annually among in-patients of NHS hospitals by the Care Quality Commission and among ISTC patients by the Department of Health. The surveys cover large samples of patients in both state and for-profit hospitals and include identical questions about the patient's experience, ranging from the cleanliness of facilities and food quality to explanations provided by medical staff, delays, privacy and dignity[2]. The data also include information about patients' characteristics, their state of health and overall area of treatment (hospital specialty).

Our approach is to use multivariate regression—an approach still relatively little used with patient experience data (Glick 2009)--in order to test whether hospital ownership affects the quality of the experience reported by patients once we take into account observed patient characteristics and other relevant factors that may influence the quality of patients' reported experience. In particular, we control for the selection of patients into one of the two sectors and for confounding factors associated with unobserved individual hospitals' characteristics. Quality is measured using scores constructed from patients' answers along several "domains" of care quality defined by the Care Quality Commission from some of the survey questions, as well as three dimensions we identify using factor analysis on the whole data set. We estimate a switching regression model in order to test not only for an overall effect of ownership on the level of quality, but also for the possibility that public and private hospitals deliver quality differently, so that patients' characteristics, self-rated state of health, length of stay and hospital specialty play a different role in determining the level of quality reported by patients in public and private hospitals. ISTCs have been contracted to treat routine cases, while patients with more severe, complex or risky conditions, which may affect the quality of their reported experience, are directed to NHS hospitals. Non-random factors, such as co-morbidity and risk, can therefore cause individual patients to be referred to a public or to a private hospital. We incorporate this selection into the model. Finally, we use hospital fixed effects to control for unobserved hospital-specific characteristics such as resources or the age of the premises that are not systematically related to ownership but may be correlated with it and affect patient-observed quality (for example by influencing staffing levels or spare capacity). Hospital fixed effects keep these unobserved hospital-specific characteristics constant and focus the analysis

[2] The surveys do not cover clinical quality or the effectiveness and safety of emergency procedures.

on variations among patients in each hospital (Glick 2009). Our approach thus makes it possible to isolate ownership effects from the components of the level of care quality reported by patients that are attributable to observed and unobserved patient characteristics determining the choice of hospital and unobserved hospital-specific characteristics that are present in both public- and private-sector hospitals but may be relatively more frequent in one of the two sectors (such as new premises, for example) for reasons other than ownership.

We find that the experience reported by patients in public and private hospitals is different, i.e., most dimensions of quality are delivered differently by the two types of hospitals, with each sector performing better in some areas of quality in certain specialties and/or for certain groups of patients. However, the sum of all ownership effects is not statistically different from zero at sample means. In other words, hospital ownership in and of itself does not affect the level of quality of the average patient's reported experience. Differences in average quality levels reported by patients in the private and public sectors are entirely attributable to patient characteristics, the selection of patients into public or private hospitals and hospital-specific characteristics that are not systematically dependent on ownership.

Theoretical hypotheses and their applicability to the case of NHS hospitals and ISTCs are briefly reviewed in the next section. The data, empirical issues and our empirical strategy are presented in Section 3, the empirical model in Section 4 and our findings in Section 5. Conclusions are drawn in Section 6.

2. Ownership and Quality of Care

Hart et al. (1997) argue that in a for-profit organization contracted by a government to provide public services on the basis of a fixed fee for service the incentive to minimise costs will dominate incentives to innovate and improve quality (for which higher prices would have to be negotiated). As a result, the private provider will under-supply quality in areas where the level of quality is not specified in precise terms in the "contract" (the set of regulations applying to the private contractor) but is directly related to costs[3]. If reducing costs does not damage quality, the private firm will supply higher quality in that model. On the other hand, if there is little opportunity to reduce costs

[3] "Incomplete contracts" in this sense are the rule, as uncertainty makes it impossible to specify all eventualities in a contract or regulation and instead makes it desirable (i.e., cheaper) to allow flexibility in the contract, for example by allocating control over decisions regarding how to respond to new events (Coase 1937). In Hart et al's terms, the level of quality provided in the areas not fully specified in the contract is observable (e.g., by patients here) but not verifiable.

and public sector employees are able to derive significant benefits from improvements in quality, public provision may dominate (ibid). A key feature of this model is that demand comes from state procurement rather than directly from the consumers of the service, so that the for-profit provider has little incentive to respond to consumer demand in areas that are not fully specified in its contract with the government.

The ISTCs are all for-profit providers. They have been contracted by the NHS for five years to provide routine procedures, with the more severe or complex cases being directed to NHS hospitals. The contracts are of the form assumed by Hart et al (ibid.), namely, offering a fee for a certain number of procedures[4]. No incentives related to quality or outcomes were provided for in the contracts of either phase (Sussex 2009) though financial penalties could be imposed in case of persistent problems (King's Fund 2009). However, the prices received by ISTCs are not the same as in the public sector. In the first wave (26 contracts) ISTCs were guaranteed payment for a certain number of procedures, regardless of whether they were all carried out. The price paid to ISTCs included a provider-specific premium over and above the price paid to NHS hospitals in order to reflect entry costs. On average, the prices received by ISTCs were 11.2% higher per procedure than the NHS equivalent[5] if the contract was fully used. By 2008, it seemed only about 85% of the procedures contracted for were actually carried out on average (Department of Health 2008a) which would result in an average price 28.9% higher than the NHS cost. The second wave of ISTC contracts only guaranteed payment for a certain minimum number of procedures lower than the total contract. If the minimum was fully used the price per procedure worked out at about 7.3% lower than average NHS costs, but if significantly less procedures were carried out the price would be higher than the NHS equivalent (Sussex 2009). On average, the second-wave ISTCs have been carrying out 85% of the operations and 25% of the diagnostics they were contracted for (Department of Health 2008b). Overall, the procedures carried out by ISTCs have represented a very small percentage of NHS activity, though in some specialties the proportions are significant (4% of cataract operations and 7% of hip procedures in 2005-06) and in some geographical areas all non-emergency surgery in particular specialties has been performed by ISTCs (King's Fund 2009).

The model proposed by Hart et al (1997) may apply to services supplied by ISTCs in areas in which not all possible contingencies can be specified in the regulation. Among the aspects of quality that

[4] The details of the contracts have not been made public. Sussex (2009) and King's Fund (2009) discuss the information available on the contracts.

[5] The NHS equivalent includes the corresponding NHS national tariff price paid by the NHS to NHS hospitals plus an estimate of extra costs supported by the NHS like pension costs (King's Fund 2009).

can be observed by patients, an example might be answering patients' questions and generally providing them with information about their care and health, or treating them with dignity[6]. National Minimum Standards applicable to the private sector[7] specify mainly process requirements for information provision (Department of Health 2002) just as in one of the examples considered by Hart et al. (1997). While being difficult to specify, providing information to patients in a way that will satisfy them may require costly staff time and perhaps training. Given that referral decisions have tended to be made primarily by GPs or to be constrained by supply rather than entirely determined by patient preferences, profit objectives may therefore cause private providers to under-supply quality in the area of patient information, all else being equal, with for example lower staffing levels, spare capacity or qualifications. On the other hand, the prospect of increased patient choice may also provide ISTCs with sufficient incentives to supply increased quality in areas in which it can be measured by patients.

Better quality may be provided by the public sector if state employees are more intrinsically motivated and choose to work for organizations that will not expropriate in the form of profit the social benefits accruing from their work (Grout and Stevens 2003, Besley and Ghatak 2003). This possibility is ignored in the model proposed by Hart et al. (1997) though it can be accommodated in that model as one of the cases in which government employees receive high rewards from improving quality (a case only envisaged with extrinsic incentives in the model).

A growing body of international evidence indicates that public sector employees are more likely than private sector ones to have values consistent with intrinsic motivation (e.g., Lyons et al 2006, Lewis and Frank 2002). In the UK, strong evidence indicates that employees are more likely to act like intrinsically motivated agents in the public sector, including the NHS, because that sector attracts more intrinsically motivated people than the private for-profit sector (Georgellis et al 2011, Gregg et al 2011). Studies of motivation in UK (public) Hospital Trusts have shown intrinsic motivation to be present not only among consultants (specialists) but also Trust managers (Mannion et al 2007). However, Trust managers were found to be a heterogeneous group from the point of view of intrinsic motivation and the balance of intrinsic and other motivation depended on the individual and local circumstances (Crilly and Le Grand 2004). At other levels, there have been regulatory limitations on ISTCs' capacity to hire NHS staff. Although these restrictions have been

[6] For clinical quality, which we do not examine here, safety precautions might be an example. Recent evidence suggests that hospitals with less tight budget constraints provide care of better clinical quality to Medicare patients in the US (Shen and Eggleston 2009).
[7] Until 2010, different, more demanding standards applied to the NHS (King's Fund 2009).

partly lifted (Sussex 2009) they may explain the better part of any differences between NHS and private-sector staff in this particular part of the health care industry at the time at which the data we use were collected. Self-selection along intrinsic motivation and preference for the public sector may therefore not be a major feature differentiating NHS staff from private-sector staff here (for example, extrinsically motivated staff with the NHS may not have been able to join the private sector, although moves into the NHS from the private sector would have been possible).

Intrinsic motivation needs to be supported by certain conditions, such as autonomy, recognition and respect, in order to flourish (Frey and Jegen 2005, Ellingsen and Johannesson 2007) and extrinsic incentives can be counterproductive with intrinsically motivated agents (e.g., Bénabou and Tirole 2006, Besley and Ghatak 2003, Frey and Jegen 2005). Mannion et al (2007) suggest that the recent reforms did not always provide senior Trust managers with the degree of genuine autonomy or recognition that would foster intrinsic motivation[8]. However, the nature of incentives may still differ between the two sectors, with more incentives to cut costs provided to senior staff in the private sector.

The predictions of the theoretical literature regarding the compared quality of care provided in the two sectors as it is measured by patients' perceptions are therefore ambiguous, with the possible exception of cost-related but imprecisely regulated aspects of quality like patient information.

3. Data, Empirical Issues and Approach

Data

The data we use come from the 2007 round of the annual NHS trust Inpatient Survey and the 2007 and 2008 ISTC Inpatient and Day Case quarterly patient surveys. Both series of surveys are conducted by the Department of Health and the Care Quality Commission. The surveys collect data on questions concerning patients' experience in a range of areas including admission and delays, being given and asking for information about various aspects of the operation they undergo, comfort, cleanliness and food quality, privacy, etc (but do not cover clinical quality). The NHS

[8] The recent Mid Staffordshire Inquiry findings certainly suggest the conditions supporting intrinsic motivation are not always met in the public sector (Francis 2010) and as Kendall et al (2007) have shown with private nonprofit and for-profit social care suppliers, local circumstances may or may not offer these conditions in individual organizations of either sector.

survey has been running since 2001 and the ISTC survey has been designed to produce results that are directly comparable with the NHS survey. For both surveys, consecutive recently discharged patients are sent a postal questionnaire a few weeks after discharge and two reminders are sent to non-responders. In each acute NHS trust, 850 patients are surveyed annually, and 300 patients per participating ISTC are surveyed every quarter. Both surveys include adult patients aged 16 and over, and exclude maternity patients and patients who had a termination of pregnancy. The overall response rate for the NHS survey we use was 56% and for the ISTC surveys 62%[9].

For our analysis, we have selected elective admissions in the NHS hospital sample for comparability with ISTCs, where all patients are elective cases. We also remove London Strategic Health Authority (SHA) cases from the analysis because the ISTC sample doesn't include cases in the London SHA, and keep only cases in the nine specialties that are treated in ISTCs as well as NHS hospitals. The final sample includes 21,680 cases in NHS hospitals and 16,767 cases in ISTCs.

Patient experience data have not always been found to be systematically related to key aspects of clinical quality (Glick 2009, Leonard 2008). However, this type of data is appropriate to assess other aspects of quality that are observed by patients. Because many of the questions are of a subjective nature, as for example questions about how the patients rate their care, this type of data may not provide the most precise estimate of absolute levels of care quality at a particular time--though surveys administered some time after discharge from hospital, as here, are less subject to the "courtesy bias" that inflates answers in exit surveys administered as the patient leaves the hospital. The measures of quality provided by patient experience data may incorporate varying patient expectations, though the limited effect of social and demographic patient characteristics (for which we control here) on this type of measure of quality suggests it does not simply reflect the expectations of different groups of patients (Hall and Dornan 1990, Westaway et al 2003). The interpersonal quality of care, in particular, seems reliably measured by patient experience (Kane et al 1997). In addition, patient experience survey data are sensitive to differences in quality among patients treated by the same provider and are reliable for analysing the determinants of patient satisfaction and making comparisons across providers (Leonard 2008, Glick 2009).

[9] It is not possible to compute a response rate for elective surgery patients only, because elective patients are identified from their answer to a survey question (Q1:"Was your admission an emergency or by the waiting list?"). This question was introduced in the survey in order to ensure the route by which patients are admitted is consistently measured, as hospitals' admission records are not always fully comparable.

Empirical Issues

Table 1 shows the average scores obtained in our sample by NHS hospitals and ISTCs on each of the 39 questions on the (non-clinical) quality of care experienced by the respondents that are common to the two surveys[10]. Answers have been coded so as to obtain scores that always increase with better quality (see Appendix A1 for survey questions and coding). Overall, the scores obtained by both types of hospitals are very high, in line with findings elsewhere (see, e.g., Nguyen Thi et al 2002, Säilä et al 2008). On all but one question, patients report a better experience in the private sector, and all the differences are statistically significant. The one exception concerns having to share a room with members of the opposite sex, which is significantly less frequently reported by patients in NHS hospitals than in ISTCs.

In order to assess whether these differences are the effect of hospital ownership or of other factors such as patients' characteristics, the choice that assigns certain types of cases to one sector or the other, or the individual hospitals' characteristics, two key issues have to be addressed. The first issue is how to aggregate the data corresponding to different questions to make the analysis manageable and meaningful. Although the Care Quality Commission groups survey questions into five domains designed to capture particular areas of quality, the groupings are to a certain extent arbitrary, take no account of possible statistical relationships between questions and only include about half the survey questions. The second issue is that confounding factors that affect patient experience are correlated with hospital ownership but not due to ownership. These confounding factors may bias our estimates and produce spurious "ownership effects". Thus, we need to take into account the fact that different types of patients are selected into the two different types of hospitals (with lighter cases, which may be easier and/or cheaper to treat, directed to ISTCs for routine procedures and more severe cases to NHS hospitals). We also need to control for characteristics of individual hospitals that are not observed in the survey but may affect the quality of patient experience, because they may be partially correlated with ownership but due to other factors. For example, the prices paid by the NHS to ISTCs were higher for the first wave of ISTCs than the prices received at that time by NHS hospitals; but the second wave of ISTCs may receive a higher or a lower price than NHS hospitals given the changes introduced in ISTC contracts between the two waves (see Sussex 2009). As a result, hospital resources may vary in a way that is correlated with ownership. The ISTCs also seem to have carried out a lower number of operations

[10] Scores are presented in the order in which the questions appear in the questionnaires, from which we reproduce the section headings in Table 1.

than they were contracted for, so that they may have had more spare capacity than NHS hospitals, and perhaps extra staff time. It is possible that private sector hospitals also have newer premises on average, given their recent entry, and thus look cleaner or more pleasant.

We now turn to the way we have dealt with each of these empirical issues.

Aggregation of Survey Questions

The large number of survey questions means it might be difficult to interpret results if we were to analyse each individual question separately. We have aggregated answers in two different ways. We first used the groups of questions defined by the Care Quality Commission. The CQC identifies five domains of patient experience, into which 20 different questions are grouped, their scores being averaged to obtain five corresponding indexes of quality. The first index of experience quality, entitled "access and waiting" (hereafter “access”) includes scores on changes in admission date, the patients’ feeling about the time spent on a waiting list, and about the time spent waiting to get a bed once in the hospital (see Appendix A2 for the questions in each domain). The second domain, "safe, high quality, coordinated care" (“coordination”) aggregates scores on whether there were contradictions between statements made by different members of staff, discharge was delayed, and whether the patient was given explanations about danger signals after leaving the hospital. The third domain, "better information, more choice" (“information”) includes scores on patients’ involvement in their care and on explanations they’ve received about medication and its side effects. The fourth domain, "building relationships" (“relationships”) refers to scores on answers from doctors and nurses to patients’ questions and whether doctors and nurses talk in front of the patient as if the patient weren't there. The last domain, "clean, comfortable, friendly place to be" (“comfort”) aggregates scores on noise, cleanliness, quality of food, privacy, respect and dignity, and help in controlling pain.

In order to aggregate the answers to all the questions asked within each domain, possible relationships between questions need to be taken into account. For example, if two questions actually measure the same thing, giving each the same weight as all the other questions in the average score computed for a given domain will amount to asking the same question twice. In order to take into account these possible relationships, we use Principal Component Analysis (PCA) on the scores on the individual questions in each dimension. The scores on each of the five Care Quality Commission domains were originally computed as simple averages of the scores for each of

the questions the CQC had decided to include in the particular domain. For each of the CQC domains, the PCA score we present is the linear combination of the scores on the questions included in that dimension which captures the maximum variability of these original question scores. The resulting principal component scores for the five dimensions produce the same ranking of hospitals as the ranking obtained with the average scores used by the CQC[11]. We use these five principal components scores as dependent variables in our regression analyses.

The second approach we use to aggregate questions is factor analysis. The objective of this approach is to find a meaningful way of aggregating all the questions. While the five domains defined by the CQC (which only cover 20 questions) are to a certain extent arbitrary, factor analysis makes it possible to identify patterns in the relationships between questions that define dimensions of care quality emerging from the dataset, using all the questions available. The dimensions identified, or "factors", describe the variability of the data and reflect common underlying factors. The factors and the way each question enters each factor can then be used to aggregate questions. The score on each of these factors is a linear combination of the scores obtained on the individual questions where the coefficients are "factor loadings". The factor loadings measure the strength of the linear relationship between the factor and each one of the original question variables and can be interpreted as regression coefficients from a regression of the underlying factor on the original question variables. The first factor is the one that accounts for the largest percentage of the total variance in the data, the second factor the one that accounts for the second largest percentage of the variance, and so on. We carried out a factor analysis on all 39 questions. Table 2 presents the factor loadings of the variables for the first three factors, which together account for 86% of the variance[12].

Overall, all 39 questions are positively related to each other (suggesting that aggregation is warranted) so that a factor reflecting the all-round quality of the patient's experience (Factor 1) accounts for 69 percent of the variability of the data. A second factor (9.6% of the variance) is dominated by questions on delayed discharge and assigns some negative loadings to questions

[11] We have obtained Spearman rank correlations of around 0.99 for each of the five pairs of CQC and principal component scores. To study the relationships among these five experience domains, we have performed a rank correlation test across these domains and observe positive rank correlation among the five areas. The access domain ranks the hospitals from best to worse quite differently to the other domains (rank correlation of 0.23). The remaining pairwise correlations range from 0.5 to 0.6. An additional advantage of using PCA scores over simple averages is that the PCA score is a continuous variable with a better approximation to the Normal distribution.

[12] For robustness checks (reported below in Section 5) we also used the next three factors, which account for much smaller portions of the variance (13% altogether, or 99% of the variance together with the first three).

about explanations regarding the operation or procedure. This second "prompt discharge factor" may thus score better for hospitals that are better organized (modest positive factor loadings correspond to questions regarding comfort and hospitality). The third factor (7.1% of the variance) assigns the largest positive weights to questions on explanations relating to medicines, the operation, danger signals, side effects, whom to contact in case of problems after discharge, and explanations for delayed discharge. It also assigns high negative weights to questions related to comfort (cleanliness, noise and food). This factor, which we call "more information, less comfort", suggests a pattern according to which some hospitals score well on providing information in different ways to patients, but poorly on comfort aspects, while other hospitals, at the other end of a comfort-information axis, provide a clean and comfortable environment but are generally less good at supplying information. We also use the scores from these three factors as dependent variables in our model to capture other dimensions of experience emerging from the variability of the data.

In addition to being useful ways of aggregating questions, scores are continuous, which allows us to use estimation methods that deal with unobserved hospital characteristics.

Empirical Strategy

In order to estimate the effect of hospital ownership on scores in our eight dimensions (the five CQC areas and the three dimensions of experience quality identified by factor analysis) while controlling for patient and hospital characteristics (including gender, age, state of health, etc) we use multivariate regression. Dependent variables are the set of principal-component and factor-analysis scores obtained in the eight dimensions. As explanatory variables in the model, we include some of patients' demographic characteristics--gender and interval of age. We also observe the treatment specialty. To control for the severity of the patient's medical condition we use the patient's self-assessment of health, ranging from worst at 1 to best at 6, and length of stay at the hospital. This is a standard specification (Kane et al 1997, Quintana et al 2006). If the state of health and length of stay of the patient are affected by the quality of care, estimates of their effect on care quality may be biased. This might be the case if the dependent variables measured clinical quality, which may affect both the patients' length of stay and their state of health, but is unlikely to be a major problem here. There is a strong correlation between patients' self-assessed state of health before and after a hospital stay, and patients' rating of the quality of care seems much more strongly affected by the constant component of their state of health (i.e., the severity of their condition) than by changes in their health between the times before and after their hospital stay

(Kane et al 1997). We will nonetheless take into account, in our discussion of the results, the possibility that a bias may be present. We insert a dummy variable for ISTCs, and allow all estimated parameters to vary with hospital ownership, in order to test whether there are ownership effects specific to patient groups, hospital specialty, etc. For example, it is possible that more intrinsically motivated staff in the public sector offer better care to groups that are less vocal, like the very old.

The mean scores obtained by NHS and private hospitals in each of the eight dimensions of care quality reported by patients appear on Table 3a (scores are normalized to sum up to zero for the whole sample). As with scores on individual questions, the ISTCs perform better in each of the five CQC areas. However, the picture that comes out of the factor analysis is slightly different. ISTCs offer better all-round quality and less delay in discharge, but provide less satisfactory information to patients, and more comfort, than NHS hospitals, which rate better on information for the same level of comfort and less well on comfort for the same level of information provided to patients. It is interesting to note here that findings are sensitive to the way data for different questions are aggregated. The sample means of the explanatory variables for NHS hospitals and ISTCs are presented in Table 3b. Compared with NHS organisations, ISTCs treat younger patients who are in better health, more often men and stay in hospital for shorter periods of time. This is consistent with other evidence (Browne et al 2008) and with the policy of directing routine cases to ISTCs[13].

Controlling for possible confounding factors correlated with ownership potentially biasing estimates has now been recognised for a number of years as a crucial issue in studies comparing public-, private- and non-profit sector organizations (see Estrin et al. 2009, and for healthcare, e.g., Norton 1994, Sloan et al. 2001). Our strategy is to combine two approaches to deal with this problem. The non-random selection of patients into the two types of hospital may affect patient satisfaction and our explanatory variables may not fully control for this. The ISTC surveys include both inpatients and admitted patients treated as day cases, whereas the NHS surveys do not include day cases. There is a wide variation among NHS trusts in patients' average length of stay and we control for individual patients' length of stay. Unfortunately we have very little explicit information in the data to control for the selection of patients into either of the two types of hospitals. For this reason we cannot fully model either the choice of hospital or the patient's experience as a function of observable patient characteristics, condition, location, etc. as a system of

[13] Or indeed to treatment centres generally—see Street et al (2009).

structural equations. We expect that unobservable characteristics entering the stochastic components of patients' experience and of the choice of hospital are correlated with each other and with hospital ownership. In order to estimate the effect of ownership (a binary variable) and allow for its endogeneity, we therefore estimate a two-stage switching regression model with endogenous switching. This approach provides a way of instrumenting the ownership variable while allowing the equations for public- and private-sector hospitals to differ. The method involves a two-stage estimation, in which the first stage is to estimate a probit model of the selection of patients into a public- or private-sector hospital. In the second stage, the estimated probability that the patient attends an ISTC replaces the ISTC dummy variable in the estimation of the patient experience equations. The method has an important robustness property since it does not require the first-stage probit model to be correctly specified (Wooldridge 2002). However, identification requires an instrument that has predictive power in the choice of hospital, but not in the patient's experience equations (an exclusion restriction).[14]

Our second approach is designed to control for other, unobserved aspects of individual hospitals that may also affect patient experience, such as the size of the hospital, its location, etc. Some of these characteristics may be correlated with ownership though not systematically so, such as the hospital's spare capacity, the age of the premises, etc, and need to be controlled for in order to avoid spuriously attributing to ownership differences in reported quality that are caused by other factors. For example, new hospitals may be easier to clean and look more pleasant to patients. There are new hospitals in both the public and private sectors, but there may be relatively more in the private sector, though not because of ownership but because of the recent entry of private providers into NHS care. An important issue here is the fact that private and public sector hospitals face different prices, which may impact on quality by affecting aspects of hospitals' management that may also be influenced by ownership. Thus, for example, if a second-wave ISTC receives a lower price per procedure than a public hospital, it may, all else being equal, have comparatively lower levels of staffing, qualifications and higher capacity utilization—all differences that could also come from a greater emphasis on cost minimization due to private ownership, and may result in lower quality. In order to avoid such confounding effects, we control for these factors with hospital Fixed Effects, which allow us to keep constant the unobserved characteristics of individual hospitals.[15] Hospital

[14] Theoretically, identification does not require an instrument or exclusion restriction since it can be achieved through the non-linearity of the predicted probability, but this type of identification is weak and produces less efficient estimations.

[15] These Fixed Effects will not capture differences due to ownership: any differences systematically associated with ownership are captured by the private ownership (ISTC) variable. The point of the Fixed Effects is simply to make sure

Fixed Effects also provide an additional control for unobserved patient characteristics (if certain types of patients are referred to certain hospitals).

4. The Empirical Model

We assume that patient i and her GP have a choice between private and public hospitals (j being the hospital subscript) and that this choice is informed by the observable characteristics of the patient and hospital, Z_{ij}, as well as unobservable tastes and characteristics of the patient and unobservable characteristics of the hospital captured by the random term ε_{Dij} with D = 0 for public hospitals and 1 for private ones. We model the binary choice of hospital as a classic index-function model where only a dummy variable D_i is observed:

(1) $D_i = 1\left(\delta' Z_{ij} \geq \xi_{Dij}\right)$

where the indicator function 1(A) takes the value 1 if the event A is true, denoting in our case the choice of an Independent Sector Treatment Centre, i.e., a private hospital, and 0 otherwise.

The outcome vectors Y_{1i} and Y_{0i} denote the scores of patients' experience in the different dimensions of quality in a private hospital and in a public hospital, respectively. By grouping the conditioning variables (observable hospital and patient characteristics) in the matrix X_{ij} and the model parameters in the vectors β_1 and β_0, we can write the basic equations as

(2) $Y_{1i} = X'_{ij}\,\beta_1 + \eta_j + \varepsilon_{1ij}$ if $D_i = 1$

(3) $Y_{0i} = X'_{ij}\,\beta_0 + \eta_j + \varepsilon_{0ij}$ if $D_i = 0$

where η_j captures unobserved hospital characteristics affecting experience. These unobserved hospital characteristics are assumed to follow the same distribution in public and private providers. The error terms ε_{1ij} and ε_{0ij} capture unobserved patient factors affecting the choice of hospital. Note that we allow the patients' unobservable heterogeneity to have different distributions for private and public providers. This assumption allows us to use provider fixed effects to control for unobservable provider characteristics –with the same distribution in the two sectors--and some

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that we do not attribute to ownership spurious effects due to other factors. Hausman tests confirm that unobserved hospital heterogeneity is correlated with the errors so that in the absence of hospital Fixed Effects the estimated coefficients would be biased in all cases except that of the "Prompt discharge" factor. Also note that because the ISTC variable is an estimated probability in the switching regression model, its value varies across patients of the same hospital.

unmeasured and common differences in the characteristics of patients who were treated by different providers. At the same time, we leave room for selection between public and private providers according to unobservable patient characteristics that vary across providers but are common to a given provider's patients. If instead we had assumed complete homogeneity of patients' unobservable characteristics across providers, we would be implicitly assuming random assignment between private and public providers. In formal terms, we assume that the unobservable patient heterogeneity is related to the choice of type of hospital so that $E\left(\xi_{ijD,}\varepsilon_{1i}\right)=\sigma_{1D}$ and $E\left(\xi_{ijD,}\varepsilon_{0i}\right)=\sigma_{0D}$ are not zero.

The importance of considering hospital fixed effects is twofold. On the one hand, it makes it possible to capture the unobserved hospital characteristics and any omitted variable at the hospital level. On the other hand, as Glick (2009) notes, hospital fixed effects offers an additional way of controlling for patient selection since the fixed effects estimation holds constant 'unmeasured aspects of providers or their patients that may be correlated both with regressors and outcomes'.

Given the allowance for selection, the identification of the model relies on a distributional assumption on the error of the choice equation ξ_{iD} which we assume has a Standard Normal distribution, and on an exclusion restriction in the vector Z_{ij}; that is, there is a variable in the equation describing the selection of patients into the two sectors that is excluded from the outcome equations.[16] In addition, this variable must have predictive power in the linear projection of the variable D_i on all the explanatory variables $\left(Z_{ij}\right)$.

We can obtain estimates of β_1 and β_0 by following the two-stage estimation method for switching regression models (Maddala 1983). In this model and allowing for provider fixed effects, the predicted score for patient experience is obtained as:

$$(4)\ E\left(\hat{Y}_i\right)=\hat{\beta}_0^{'}X_{ij}+\hat{\Phi}_{ij}X_{ij}\left(\hat{\beta}_1^{'}-\hat{\beta}_0^{'}\right)+\hat{\eta}_j+\hat{\phi}_{ij}\left(\hat{\sigma}_{0D}-\hat{\sigma}_{1D}\right)$$

where $\hat{\phi}=\phi\left(\hat{\delta}^{'}Z_{ij}\right)$ and $\hat{\Phi}=\Phi\left(\hat{\delta}^{'}Z_{ij}\right)$ are, respectively, the density function and the cumulative distribution function of the Standard Normal distribution whose parameters are estimated in the

[16] Assuming the validity of the exclusion restriction, we do not need to assume any particular functional form for the distribution of the errors in the outcome equations.

probit model of the choice of type of hospital. The selection term $(\hat{\sigma}_{0D} - \hat{\sigma}_{1D})$ can be interpreted in terms of Roy's comparative advantage: if the level of quality of patient experience with private providers is greater in the case of selection than in the case of random assignment, this coefficient is positive.

The estimation of the model is done in two stages. In the first stage, we estimate a probit model of the choice between NHS hospitals and ISTCs, allowing for different variances for different hospitals. In the second stage, we estimate the switching regression model for each one of the eight dimensions of experience considered. We estimate this model both with and without hospital fixed effects[17].

In practice, the Fixed Effects specification largely controls for selection both on hospital unobservables and patient unobservables within the hospital. We introduce the patient selection equation in order to ensure that our estimates are robust to patient selection based on unobservables that vary across hospitals.[18] The number of specialties of the hospital is included in the probit equation as the exclusion restriction, in order to ensure identification. The validity of this instrument relies on it not being correlated with the errors in the patient experience equation. The number of specialties restricts the choice of hospital, but it is unlikely to affect random disturbances to non-clinical patient experience once we control for each hospital specialty and for the other characteristics of the individual hospital, as we do in the patient experience equations.[19] At the same time, the predictive power of the number of specialties in the choice equation is strong. The coefficient of the number of specialties is strongly significant in the probit equation, and the model has a pseudo-R-square of 0.74, which falls to 0.40 if we drop the number of specialties from the model. Part of the predictive power of this variable is due to the higher average number of

[17] We only present the estimates incorporating hospital fixed effects here. Results of estimations without hospital fixed effects are available from the authors.

[18] We have estimated an exogenous switching model for comparison (though without hospital Fixed Effects because the exogenous switching involves an ownership dummy variable) and find almost identical results as with endogenous switching (without hospital Fixed Effects) for the equations explaining the CQC Domain scores. However there are some significant differences in the average ownership effects obtained for the equations explaining the factor scores.

[19] In order to examine the validity of the number of specialties as an instrument in the absence of another suitable instrument that we could use to carry out an overidentification test, we included the variable as an explanatory variable in our model without hospital Fixed Effects, and found that it has no explanatory power for most of the domains or factors. Its coefficient is only significant at the 1% level for the domain "Coordination" (and for the "Prompt discharge" factor at the 5% level). The inclusion of this extra variable does not affect the estimated effects when switching is exogenous, suggesting that using this variable does not bias the coefficient estimates. That the number of specialties is exogenous to the main equations is not surprising because the equations concern *non-clinical* quality.

specialties in the public sector.[20] However, that predictive power is not spurious or entirely due to a difference in numbers of departments devoid of any substantive content. For example, ISTCs have a lower average number of specialties because they specialise in a small number of routine procedures aimed at lighter cases, for whom the availability of ISTC capacity improves access to elective care. This specialisation has raised concerns about clinical safety (Wallace 2006) and such concerns are likely to affect the choice of hospital. Thus the predictive power of the number of specialties is not spurious, even though the reduced-form probit equation does not model a structural relationship or estimate a causal effect.

The estimates of the choice equation appear in Appendix A3. The estimation successfully describes the selection of hospital. The negative coefficient of the instrument--the number of specialties of the hospital--shows the negative association between the number of specialties and the probability of being admitted in an ISTC.[21]

5. Findings

The estimates of model (4) are presented in Table 4a for the five quality domains defined by the CQC and in Table 4b for the three factors identified by our factor analysis. The first result is that for all dimensions of care quality, the equations estimated for the NHS hospitals and for the ISTCs are significantly different. In other words, the determinants of the quality experienced by patients in each dimension are not the same in the two types of hospital, or affect quality differently. The two types of hospital deliver quality differently, with each type offering better quality, all else being equal, in certain areas in certain specialties or to certain groups of patients. Being in an ISTC affects experienced quality, in each dimension, in a basic way (this is the ISTC fixed effect[22]) as well as in other ways that are specific to the hospital specialty, and/or to the patient's gender, age and state of health (the parameters corresponding to the variables entered in interaction with the ISTC dummy variable). The selection of patients into a particular type of provider does not affect reported quality levels in the CQC domains (except possibly in the Information one, but the effect is

[20] In our sample, the average number of specialties is 3.5 for ISTCs (minimum 1, maximum 7) and 11.3 for NHS hospitals (minimum 1, maximum 22).

[21] Here the number of specialties is defined over the whole range of specialties available in public and private hospitals and is not restricted to the nine specialties analyzed. The negative association does not imply causation but simply reflects the fact that ISTCs (for which the ownership dummy variable equals 1) have a smaller number of specialties than public hospitals.

[22] The fixed effect of being an ISTC is measured by the coefficient of $\hat{\Phi}$ capturing the difference between the intercepts of the models for ISTC and NHS hospitals.

only weakly significant)[23]. However, among the factors identified by data analysis patient selection does affect the reported quality of experience in the More Information / Less Comfort dimension, i.e., the patients that are directed to ISTCs will report a better experience, all else being equal, in this dimension. This could be because patients with less complex cases generally require less explanations and information about their care.

The top halves of Tables 4a and 4b give the effects of the different determinants on the scores for public hospitals, and the bottom half the difference between those effects and the effects for ISTCs (ISTC fixed effect and effects specific to patient characteristics and hospital specialties).

CQC Domains

If we look at the top half of Table 4a, we see that older patients generally report a better experience in the CQC quality domains than the reference group (men aged 16-35 in General Surgery) in public hospitals, all else being equal. Being a woman is associated with a less good reported experience in four of the five domains, and being in better health with a better one; experience in the Coordination and Information domains is better in some specialties, again all else being equal. These results are in line with recent international evidence, which shows age and being in better health to have positive effects on reported patient experience and conflicting findings regarding gender effects (Hekkert et al 2009, Säilä et al 2008, Quintana et al 2006, Veenstra and Hofoss 2003).

Compared with this, being in an ISTC (bottom half of the table) has a positive basic effect in four of the five CQC domains (all except "access"). The magnitudes of these effects are substantial--of around 1 standard deviation for the "relationships" and "comfort" domains[24]. In addition, there are more complex ISTC effects specific to patient characteristics and to six of the hospital specialties. Being older tends to have a less positive effect on reported experience in ISTCs than in NHS hospitals. In one case, that of 36-50 year-olds, being in that age category even has a negative net effect on quality in the "comfort" domain in ISTCs. This is quite unusual. It is possible that the generally lesser positive effect associated with age in ISTCs reflects a bias in favour of the public sector in older age groups. Being female may have a less negative effect on reported quality in the "coordination" and "information" domains in ISTCs, but the difference is only weakly significant

[23] But selection effects will also be captured by hospital fixed effects.
[24] The standard deviation is compared to that of the distribution of the scores.

and the net effect of being female remains negative in ISTCs as in NHS hospitals. Rating oneself as being in better health has a much less favourable effect on quality in all domains except for "access" in ISTCs, though the net effect remains positive in all domains. If there was a bias to this estimated effect due to reverse causality (better quality care causing a better state of health) this finding would suggest quality defined in this particular way is less good in ISTCs (and is overestimated). Length of stay has the same effect in ISTCs and NHS hospitals (the ISTC effect is not significantly different from zero). Specialty-specific ISTC effects concern the "coordination" domain (the ISTC effect is positive in Urology and negative in Orthopaedics, ENT and Plastic surgery); "relationships" (negative ISTC effects in Orthopaedics, ENT, Plastic surgery and Gynaecology); "comfort" (positive ISTC effect in Ophthalmology and negative effect in Oral surgery and Gynaecology); and "access", on which there is a positive ISTC effect in Orthopaedics.

Factors

Once again, the picture is slightly different if we look at the determinants of quality along the three dimensions coming out of the factor analysis of all survey questions (Table 4b). In public hospitals (top half of the table) older age still has a positive effect on reported quality all-round (ages over 50) and along the "more information but less comfort" dimension. However, being female does not affect experience quality, and a better state of health only affects the factor "all-round quality" positively. Ophthalmology is associated with a positive effect on all-round quality, as are Orthopaedics, ENT and Gynaecology for the prompt discharge factor. However, Orthopaedics also has a negative effect on the score for "more information but less comfort", as has Urology.

There is a positive basic ISTC effect on all-round quality of experience, but a negative one on the provision of more information and less comfort. Both effects are quite large. There remains a negative ISTC effect specific to the over-50 age groups on all-round quality, so much so that the net coefficient even becomes negative in ISTCs. The unusual finding of a negative age effect on quality in ISTCs is thus confirmed, which may reflect a lesser consideration for older patients in ISTCs due perhaps to a less intrinsically-motivated workforce, as we had hypothesised, and/or a bias in favour of the NHS among older age groups that would lead those patients to rate NHS organisations systematically better than private-sector ones. A better state of health has a less positive effect on all-round reported quality in ISTCs than in NHS hospitals, but the effect still is a positive one. However, it affects experience positively in the "more information but less comfort" area (as opposed to no effect in NHS hospitals). If there was a bias due to reverse causality in the

estimated effect of patients' state of health, this would suggest that by this definition quality may be less good in ISTCs along one dimension, better along another and the same as in NHS in the third dimension. Length of stay has the same effect in ISTCs as in NHS organisations, except possibly in the Prompt Discharge dimension where the net effect may be positive in ISTCs—but both the (negative) effect for NHS hospitals and the positive one for ISTCs are only weakly significant. Specialty-specific ISTC effects are positive and large enough in the more information / less comfort area in Urology and Orthopaedics to give those two specialties a net advantage (towards information and away from comfort) in this dimension of quality, where they were associated with less good scores in NHS hospitals. Oral surgery is associated with very large ISTC effects—a negative one in all-round satisfaction but a positive one along the Prompt Discharge factor. A positive ISTC effect is also observed for this factor in plastic surgery. Gynaecology is associated with less good all-round reported quality in ISTCs (but not in NHS hospitals).

Total ISTC effects

In order to find out whether hospital ownership has a statistically significant effect overall on the quality of patients' reported experience, we have to evaluate the sum of the basic and specific ISTC effects at the sample means. The resulting effects are presented in Table 5 for each of the five CQC domains and each of the three factors. For comparison, we present the same total estimated effect for a model in which we do not control for unobserved individual hospital characteristics (model without provider fixed effects) in the bottom half of the table. The total estimated ISTC effect is not significantly different from zero in any of the domains or factors considered. The only possible exception is the CQC's "information" dimension along which the ISTC effect is weakly significant (at the 10% level) and negative. The differences in quality levels reported on average by patients in the two sectors, which we looked at earlier, are therefore entirely attributable to factors other than ownership, including hospital choice and unobserved patient and hospital characteristics specific to individual hospitals[25].

The bottom half of Table 5 shows that for the CQC domains, the estimated ISTC effect would be positive in the absence of hospital fixed effects, i.e., if we did not control for confounding effects associated with unobserved characteristics specific of individual hospitals. These characteristics could concern each hospital's resources, its age, etc. This suggests that there are "good" and "bad"

[25] We verified that the result was the same with the next three factors accounting for an additional 14% of the variance (i.e., for more than 99% together with the first three factors).

hospitals, from the point of view of these characteristics that improve the quality of patient experience, in both sectors, but there are relatively more "good" ones among ISTCs than among NHS hospitals for reasons other than ownership (ownership effects being captured by the ISTC variable). It is interesting to note that this effect is not observed for the equations explaining the three main factors identified by the data analysis among all the survey questions. This suggests that the positive ISTC effect estimated when confounding effects associated with individual hospital characteristics are not taken into account could be an artefact of the selection of the questions included in the CQC's domains and the way these domains are defined[26].

Patient Sorting

Given the role of patient selection into each type of hospital in explaining certain aspects of the average level of quality of patients' reported experience it is of interest to examine whether the process sorts patients in such a way that patients that would be happier in a particular sector are sent there. It could simply be that patients that would have a better experience anyway, for example because they suffer from only one, straightforward condition, are sent to ISTCs; and/or it could be that patients better suited to a given sector are sent to that sector.

In order to investigate this issue, we have computed, for each group of patients (i.e., those treated in NHS hospitals and those treated in ISTCs) the quality scores the estimated models would predict for each type of hospital. We take the values of explanatory variables for all the patients that were treated in NHS organisations and combine them with the coefficients estimated for each type of hospital to calculate and test whether these patients would give a higher score to NHS hospitals or to ISTCs in each CQC domain and each of our three factors. In other words, we test whether patients treated in NHS hospital would report a better experience, as predicted by our estimated model, if they had been treated in ISTCs. We then repeat the exercise with patients treated in ISTCs. The compared scores and corresponding tests are presented in Table 6.

The top half of Table 6 presents the scores predicted for patients treated in NHS hospitals, first as predicted by the model estimated on NHS hospitals and then below as predicted by the model estimated on ISTCs. The significance of the difference between the two scores is tested for each dimension with a *t*-test, presented below the two scores and their standard deviations. The bottom

[26] Among the next three factors, only the fourth one shows a significant and positive ISTC effect in the model without hospital fixed effects.

half of the table presents the same values computed for those patients that were treated in ISTCs. None of the differences are significantly different from zero in the top half of the table: patients that were treated in NHS hospitals would have been no happier and no less happy in ISTCs. Patients treated in ISTCs would also have been just as happy in NHS organisations in all dimensions except for the CQC Access domain, in which they would give NHS organisations a significantly lower score. Two of the three questions in this domain concern change of admission date and time on a waiting list. This result is consistent with the fact that the introduction of ISTCs aimed at creating capacity for routine elective surgery for which there were long waiting lists. There does seem to be successful sorting into ISTCs of patients that would have risked having their date of admission changed and/or been unhappy with the time spent on a waiting list. The Coordination domain shows ISTC patients might have been happier in NHS hospitals, but the difference in scores is only weakly significant (at the 10% level).

6. Conclusions

This paper set out to investigate whether hospital ownership affected the level of quality reported by National Health Service patients in patient experience surveys in England. Looked at question by question, the surveys we analysed—2007 data for NHS hospitals and 2007/08 data for ISTCs—almost entirely gave a statistically significant advantage to ISTCs. Average scores obtained by NHS and private-sector providers on the five domains defined by the CQC over 20 of the 39 questions showed the same pattern. Interestingly, the picture was a little different when we considered the average scores obtained by the two types of hospitals along three dimensions identified with factor analysis among the 39 survey questions. ISTCs scored better on the All-round Quality and Prompt Discharge factors, but the analysis revealed a pattern in the data in which some hospitals score higher on a series of questions regarding the information provided to patients and relatively lower on questions regarding comfort—cleanliness, noise, etc.—while others scored more highly on questions regarding comfort and relatively less on information questions. Along that dimension, which we called More Information/ Less Comfort, public sector hospitals were closer to the "more information" end and private sector ones to the "comfort" one.

Our empirical approach aimed at separating out, in the observed differences, ownership effects from what could be attributed to patient characteristics that may affect patient experience, to the selection of patients into one of the two types of hospital and to other factors that might affect patient-observed quality, such as the characteristics of individual hospitals other than ownership. For this

purpose, we estimated a series of switching-equations models explaining scores obtained at the patient level in several areas of quality, including five domains defined by the Care Quality Commission and the three factors identified by our data analysis. In the estimations, we endogenized the selection of patients into the private or public sector and used hospital fixed effects in order to keep constant the unobserved characteristics of individual hospitals that are not systematically related to ownership. The hospital fixed effects allowed us to avoid estimating spurious effects that might stem from circumstances that happen to have resulted in public and private hospitals often differing in some ways not actually due to ownership.

Our findings indicate that patients' experiences in the two types of hospital are different: the two series of estimated equations are different. Hospital ownership affects experience both generally and in ways that are specific to groups of patients and hospital specialties, with certain aspects being better in one type of hospital or the other for certain groups of patients in certain specialties. All else being equal, women report a rather less good experience in both types of hospital, but a little less so for two of the CQC domains in ISTCs. NHS hospitals are associated, all else equal, with a better experience for older patients than ISTCs. Certain areas of quality are reported by patients to be better in some specialties in NHS hospitals, others in ISTCs.

Overall, however, the total effect of hospital ownership on the quality of experience reported by patients is not statistically different from zero in any of the eight dimensions of quality of experience we consider. In all dimensions, the average differences in the scores of hospitals in the two sectors can be entirely attributed to differences in the types of patients attending the two hospitals, to the selection of patients into hospitals of one sector or the other, and/or to the characteristics of individual hospitals.

Our results indicate a degree of successful sorting of patients that would benefit from faster access to care by being treated in an ISTC into that sector. However, in most of the quality dimensions we considered, our findings suggest that, once individual hospitals' characteristics are controlled for, patients of either sector would report a similar level of experience if they had been treated in the other sector.

When we analyse the scores obtained on the five CQC domains, we can attribute some differences in experience to observed patient characteristics and specialties, and to the choice of hospital and individual hospitals' characteristics as captured by hospital fixed effects (the selection term does not

have a significant effect on those scores). However, we do not know which hospital-specific characteristics are involved in determining the higher level of quality reported on average by patients in ISTCs. These factors could include those aspects of hospital resources, staffing levels and spare capacity, staff qualifications, the age of the premises, etc., that are not systematically related to hospital ownership. It would be interesting now to find out precisely which hospital characteristics are involved and how.

Interestingly, when we analyse the scores on the three main factors identified by the data analysis we performed on the 39 survey questions, we find the characteristics of individual hospitals have no significant effect (whereas the selection of patients into one or the other type of hospital significantly affects the score on the More information / Less Comfort factor). It seems that factor analysis teases out patterns in these data that are mostly independent from individual hospital characteristics. This finding also suggests that the aggregation method used to summarise multiple survey questions may be more important than has been thought until now.

References

Allen, Pauline. Restructuring the NHS again: Supply side reform in recent English Healthcare policy. *Financial Accountability and Management* 2009; 25 (4); 343- 389.

Bénabou, Roland and Jean Tirole. Incentives and pro-social behaviour. *American Economic Review* 2006; 96 (5); 1652-1678.

Besley, Timothy and Maitreesh Ghatak. Incentives, choice and accountability in the provision of public services. *Oxford Review of Economic Policy* 2003; 19 (2); 235-248.

Bloom, Nicholas, Carol Propper, Stephan Seiler and John Van Reenen. Management practices in hospitals. Mimeo, Stanford University, Imperial College and London School of Economics, 2009.

Browne, John, Liz Jamieson, Jim Lewsey, Jan van der Meulen, Lynn Copley and Nick Black. Case-mix & patients' reports of outcome in Independent Sector Treatment Centres: Comparison with NHS providers. *BMC Health Services Research* 2008; **8:**78doi:10.1186/1472-6963-8-78 available on http://www.biomedcentral.com/1472-6963/8/78 accessed on 11 June 2010.

Coase, Ronald. The nature of the firm. *Economica* 1937; 4; 386-405.

Crilly, Tessa and Julian Le Grand. The motivation and behaviour of hospital trusts. *Social Science & Medicine* 2004; 58; 1809-1823.

Department of Health. ISTC Phase 1 Contractual Information (as at 30 September 2008). Available at:www.dh.gov.uk/en/Healthcare/Primarycare/Treatmentcentres/index.htm?IdcService=GET_FILE&dID=178489&Rendition=Web, accessed on 9 August 2011, 2008a.

Department of Health. "ISTC Phase 2 Contractual Information (as at 30 September 2008). Available at:www.dh.gov.uk/en/Healthcare/Primarycare/Treatmentcentres/index.htm?IdcService=GET_FILE&dID=178488&Rendition=Web, accessed on 9 August 2011, 2008b.

Department of Health. *Independent Health Care. National Minimum Standards Regulations.* The Stationery Office: London; 2002 .

Eggleston, Karen, Yu-Chu Shen, Joseph Lau, Christopher Schmid and Jia Chan. Hospital ownership and quality of care: What explains the different results in the literature? *Health Economics* 2008; 17(12); 1345-1362.

Ellingsen, Tore and Magnus Johannesson. Paying respect. *Journal of Economic Perspectives* 2007; 21(4); 135-149.

Estrin, Saul, Jan Hanousek, Evžen Kočenda, and Jan Svejnar. The effects of privatization and ownership in transition economies. *Journal of Economic Literature* 2009; 47(3): 699–728.

Frey, B S and R Jegen. Motivation crowding theory. *Journal of Economic Surveys*, 15 (5): 589-611, 2005.

Francis, Robert. *Independent Inquiry into Care Provided by Mid Staffordshire NHS Foundation Trust January 2005 – March 2009*, Vol. I. The Stationery Office: London; 2010.

Georgellis, Yannis, Elisabetta Iossa and Vurain Tabvuma. Crowding out intrinsic motivation in the public sector. *Journal of Public Administration Research and Theory*, 2011; 21; 473-493.

Glick, Peter. How reliable are surveys of client satisfaction with healthcare services? Evidence from matched facility and household data in Madagascar. *Social Science &Medicine* 2009; 68; 368-379.

Gregg, Paul, Paul Grout, Anita Ratcliffe, Sarah Smith and Frank Windmeijer. How important is pro-social behaviour in the delivery of public services? *Journal of Public Economics* 2011; 95; 758-766.

Grout, Paul and Margaret Stevens. The assessment: Financing and managing public services. *Oxford Review of Economic Policy* 2003; 19(2); 215-234.

Hall, Judith A and Michael C Dornan. Patient sociodemographic characteristics as predictors of satisfaction with medical care: A meta analysis. *Social Science & Medicine* 1990; 30 (7); 811-818.

Hart, Oliver, Andrei Shleifer and Robert W Vishny. "The proper scope of government: Theory and an application to prisons. *Quarterly Journal of Economics* 1997; 112 (4); 1127-1161.

Hekkert, Karin Dorieke, Sezgin Cihangir, Sophia Martine Kleefstra, Bernard van den Berg and Rudolph Bertijn Kool. Patient satisfaction revisited: A multilevel approach. *Social Science & Medicine* 2009; 69; 68-75.

Kane, Robert L, Matthew Maciejewski and Michael Finch. The relationship of patient satisfaction with care and clinical outcomes. *Medical Care* 1997; 35 (7); 714-730.

Kendall, Jeremy, Tihana Matosevic, Julien Forder, Martin Knapp, Brian Hardy and Patricia Ware. The motivations of domiciliary care providers in England: New concepts, new findings. *Journal of Social Policy* 2003; 32(4); 489 - 511.

King's Fund. *Independent Sector Treatment Centres. Briefing.* Available at http://www.kingsfund.org.uk, accessed on 9 August 2011. The King's Fund, October 2009.

Leonard, Kenneth L. Is patient satisfaction sensitive to changes in the quality of care? An exploitation of the Hawthorne effect. *Journal of Health Economics* 2008; 27; 444-459.

Lewis, Gregory B and Sue A Frank. Who wants to work for the government? *Public Administration Review* 2002; 62(4); 395-404.

Lien, Hsien-Ming, Shin-Yi Chou and Jin-Tan Liu. Hospital ownership and performance: Evidence from stroke and cardiac treatment in Taiwan. *Journal of Health Economics* 2008; 27; 1208-1223.

Lyons, Sean T, Linda E Duxbury and Christopher A Higgins. A Comparison of the Values and Commitment of Private Sector, Public Sector, and ParapublicSector Employees. *Public Administration Review* 2006; 66(4); 605-618.

Mannion, Russell, Maria Goddard and Angela Bate. Aligning incentives and motivations in health care: The case of earned autonomy. *Financial Accountability & Management* 2007; 23(4); 401-420.

Nguyen Thi, Phi Linh, S Briançon, F Empereur and F Guillemin. Factors determining inpatient satisfaction with care. *Social Science & Medicine* 2002; 54,;493-504.

Norton, Edward C, and Douglas 0. Staiger**.** How hospital ownership affects access to care for the uninsured**.** RAND Journal of Economics 1994; 25 (1); 171-185.

Quintana, José M, Nerea González, Amaia Bilbao, Felipe Aizpuru, Antonio Escobar, Cristóbal Esteban, José Antonio San Sebastián, Emilio de-la-Sierra and Andrew Thompson. Predictors of patient satisfaction with hospital healthcare. *BMC Health Services Research* 2006; 6; 102; doi: 10.1186/1472-6963-6-102.

Säilä Tiina, Elina Mattila, Minna Kaila, Pirjo Aalto and Marja Kaunonen. Measuring patient assessments of the quality of outpatient care: A systematic review. *Journal of Evaluation in Clinical Practice* 2008; 14; 148-154.

Shen, Yu-Chu and Karen Eggleston. The effect of soft budget constraints on access and quality in hospital care. *International Journal of Health Care Finance and Economics* 2009; 9(2); 211-232.

Sloan, Frank A, Gabriel A Picone, Donald H Taylor Jr and Shin-Yi Chou. Hospital ownership and cost and quality of care: Is there a dime's worth of difference? *Journal of Health Economics* 2001; 20; 1-21.

Street, Andrew, Peter Sivey, Anne Mason, Marisa Miraldo and Luigi Siciliani. Are English treatment centres treating less complex patients? *Health Policy* 2009; doi: 10.1016/j.healthpol.2009.09.013.

Sussex, Jon. How fair? Competition between independent and NHS providers to supply non-emergency hospital care to NHS patients in England. *OHE Briefing* No 50. Office of Health Economics: London; September 2009.

Veenstra, Marijke and Dag Hofoss. Patient experiences with information in a hospital setting: A multilevel approach. *Medical Care* 2003; 41 (4), 490-499.

Wallace, W.A. Independent sector treatment centres: how the NHS is left to pick up the pieces. *British Medical Journal* 2006; 332(7541); 614

Westaway, Margaret S, Paul Rheeder, Danie G Van Zyl and John RSeager. Interpersonal and organizational dimensions of patient satisfaction: The moderating effect of health status. *International Journal for Quality in Health Care* 2003; 15 (4); 337-344.

Wooldridge, J.M. Estimating Average Treatment Effects. Chapter 18. *Econometric Analysis of Cross Section and Panel Data*. The MIT Press. London 2002.

Table 1. Score Comparisons, Acute NHS Trusts and ISTCs--Elective cases (exc. London) 9 specialties°

	Acute NHS Trusts 2007	**ISTCs Pooled 2007/8**	***t*-ratio***
Admission to Hospital			
Choice of hospital	28.8	92.4	-120.00
Choice of admission date	28.6	60.6	-60.20
Waiting time to admission	48.8	61.7	-31.78
Feeling about waiting time	80.3	88.7	-22.95
Admission date changed by hospital	91.5	95.1	-18.98
The Hospital and Ward			
Shared room with opposite sex	89.3	85.3	10.71
Wait for bed since admission	89.2	98.1	-20.03
Noise from other patients	70.2	93.2	-29.98
Noise from staff	83.0	95.7	-20.15
Food rating	53.9	75.2	-38.45
Room cleanliness	84.4	97.1	-60.24
Toilet cleanliness	80.4	96.5	-65.77
Doctors			
Answers from doctors	86.9	93.8	-24.84
Trust in doctors	93.6	96.9	-17.07
Doctors talk in front of you	89.7	96.1	-25.41
Doctors clean hands	82.4	94.3	-26.97
Nurses			
Answers from nurses	84.7	94.0	-32.27
Trust in nurses	87.9	95.8	-31.41
Nurses talk in front of you	90.3	95.5	-20.94
Enough nurses	76.4	95.3	-55.90
Nurses clean hands	84.7	94.4	-26.57
Care and Treatment & Pain			
Contradictions between staff	84.2	94.0	-33.75
Patient involvement	76.7	88.0	-33.84
Family involvement	66.9	84.6	-34.45
Privacy	94.5	98.3	-20.68
Time since call button	67.7	78.0	-24.40
Help to control pain	86.2	91.6	-12.95
Operations and Procedures			
Explanation risks operation or procedure	91.9	94.5	-10.92
Explanation before operation or procedure	86.7	90.4	-12.40
Explanation after operation or procedure	77.8	84.9	-18.60
Leaving Hospital			
Reasons for delayed discharge	73.7	92.7	-40.56
Waiting time discharge	84.1	96.9	-41.97
Explanation purpose medication	88.6	95.7	-22.48
Explanation side effects medication	53.9	73.2	-30.43
Explanation danger signals	58.1	77.4	-36.11
Explanation contacts	82.1	93.6	-27.90
Copies letters between hospital and GP	40.2	53.8	-22.98
Overall			
Respect and Dignity	91.1	97.6	-29.90
Overall rating of care	81.6	92.3	-45.48
Maximum Number of Observations	21,680	16.767	

° Averages over all respondents across establishments and specialties. All differences are statistically significant at the 1% level*
Sources*: NHS trust Inpatient Survey ISTC Inpatient and day case patient surveys.*

Table 2. Factor Loadings (sorted according to Factor 1)

Question	Factor1 (All-round Quality)	Factor2 (Prompt Discharge & Organization)	Factor3 (+Inform/ Comfort
Overall rating of care	0.09993	-0.04854	-0.07138
Answers from doctors	0.06729	-0.07323	0.15448
Respect and Dignity	0.06649	-0.02903	-0.06682
Answers from nurses	0.06461	-0.05183	-0.07394
Explanation danger signals	0.0618	-0.05345	0.21432
Toilet cleanliness	0.05991	0.05749	-0.30196
Family involvement	0.05978	-0.04852	0.07408
Trust in nurses	0.05926	-0.05405	-0.16834
Doctors clean hands	0.05794	-0.02481	-0.06818
Nurses clean hands	0.05591	-0.04251	-0.17177
Explanation side effects medication.	0.05439	-0.03528	0.206
Enough nurses	0.05373	0.05254	-0.13621
Explanation after operation or procedure	0.05315	-0.10532	0.25958
Help to control pain	0.05292	-0.01679	-0.02657
Explanations risks of the operation or procedure	0.04859	-0.08704	0.22392
Room cleanliness	0.04802	0.03164	-0.29932
Explanation before the operation or procedure	0.04683	-0.11496	0.29687
Privacy	0.04643	0.00694	-0.04558
Explanation purpose medication	0.04627	-0.056	0.12018
Contradictions between staff	0.04577	0.01497	-0.05905
Noise from staff	0.04564	0.0603	-0.16944
Doctors talk in front of you	0.04512	0.00857	0.04097
Patient involvement	0.04489	-0.06344	0.0816
Time since call button	0.0447	0.04403	-0.13588
How long was the delay in discharge	0.04052	0.53943	0.18934
Nurses talk in front of you	0.03799	0.01292	-0.09191
Trust in doctors	0.0375	-0.061	0.14032
Noise from other patients	0.03741	0.06896	-0.18438
Feeling waiting time	0.03373	0.00465	0.07153
Food rating	0.03113	0.03849	-0.11884
Explanation contacts	0.0307	-0.05857	0.13135
Choice of hospital	0.02765	0.02942	0.01325
Wait for bed since admission	0.02694	0.0265	-0.03194
Main reason for delayed discharge (1)	0.02484	0.504	0.16123
Choice of admission date	0.02376	0.02162	0.04816
Waiting time	0.01548	-0.01038	0.09074
Change date admission	0.01401	0.01067	0.01078
Share room opposite sex	0.01038	0.01874	-0.0596
Copies letters	0.00916	0.00536	0.06198

(1) In the question about the main reason for delayed discharge, the highest score is given when the discharge is not delayed and the score is zero when the discharge is due to medical or hospital reasons.

Table 3a. Dependent Variables: Sample Means

	CQC Quality Domains						Factors Prompt Discharge Factor	+Inform./-Comfort Factor
	Access	Coordination	Inform.	Relation.	Comfort	All-round Factor		
Mean of dep. variable	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(1.1084)	(1.1721)	(1.3205)	(1.4059)	(1.6275)	(1.0214)	(1.0677)	(1.1915)
NHS hospitals	-0.0566	-0.2538	-0.2204	-0.2012	-0.1778	-0.1803	-0.0775	0.0363
	(1.1366)	(1.2251)	(1.3939)	(1.5239)	(1.6632)	(1.0483)	(1.1371)	(1.2752)
ISTCs	0.3278	0.5054	0.4284	0.3876	1.0213	0.7065	0.3038	-0.1422
	(0.8580)	(0.8586)	(1.0385)	(1.0408)	(0.8653)	(0.4467)	(0.6529)	(0.7665)
Mean difference: *t*-ratio	-19.3***	-48.6***	-32.1***	-32.7***	-34.3***	-15.2***	-5.9***	2.5**

*** Significant difference at the 1 percent level

Table 3b. Explanatory Variables: Sample Means

	NHS hospitals		ISTCs		Mean Diff.
Variable	Mean	Std. Dev.	Mean	Std. Dev.	t-ratio
General Surgery	0.26342	(0.44050)	0.20111	(0.40084)	14.3***
Urology	0.11481	(0.31880)	0.03644	(0.18739)	28.3***
Orthopaedics	0.34700	(0.47603)	0.57953	(0.49365)	-46.7***
Ent	0.06522	(0.24692)	0.02046	(0.14156)	20.9***
Ophthalmology	0.01688	(0.12883)	0.05266	(0.22337)	-19.7***
Oral surgery	0.01024	(0.10068)	0.00907	(0.09478)	1.2
Plastic surgery	0.03021	(0.17117)	0.00626	(0.07889)	16.8***
Gastroent	0.00752	(0.08638)	0.04425	(0.20566)	-23.7***
Gynaecology	0.14470	(0.35180)	0.05022	(0.21840)	30.5***
Length of stay	3.86854	(4.76067)	0.89867	(1.95284)	75.9***
Female	0.60424	(0.48902)	0.54190	(0.49826)	12.3***
Age 16 to 35	0.08044	(0.27198)	0.13735	(0.34423)	-18.1***
Age 36 to 50	0.16933	(0.37505)	0.23838	(0.42611)	-16.8***
Age 51 to 65	0.30604	(0.46086)	0.30518	(0.46050)	0.2
Age more than 65	0.44419	(0.49689)	0.31902	(0.46611)	25.2***
Self-rated state of health(1)	4.02540	(1.14352)	4.46114	(1.11750)	-32.0***
Number of obs.	21,680		16,767		

(1) Maximum = 6, minimum = 1.

*** Significant difference at the 1 percent level

Table 4a. Determinants of Patients' Experience in Care Quality Commission Domains. Provider Fixed Effects.

	Access		Coordination		Information		Relationships		Comfort	
Urology	-0.0572	(0.0395)	-0.0149	(0.0407)	-0.136**	(0.0558)	-0.0930**	(0.0465)	-0.0753	(0.0760)
Orthopaedics	-0.191***	(0.0289)	0.0852**	(0.0350)	-0.0226	(0.0371)	0.0606	(0.0388)	0.137***	(0.0439)
Ent	0.00579	(0.0428)	0.329***	(0.0547)	0.00619	(0.0563)	0.0688	(0.0621)	0.100	(0.0758)
Ophthalmology	0.0220	(0.0804)	0.199**	(0.0904)	0.194*	(0.108)	0.000977	(0.105)	-0.0143	(0.166)
Oral surgery	-0.0684	(0.0872)	0.0123	(0.0902)	0.193*	(0.107)	0.137	(0.148)	-0.0580	(0.187)
Plastic surgery	0.00606	(0.0653)	0.144*	(0.0731)	0.182*	(0.0925)	0.0493	(0.0692)	0.310**	(0.131)
Gastroent	0.0602	(0.0896)	-0.00474	(0.163)	-0.113	(0.140)	-0.221	(0.137)	-0.220	(0.231)
Gynaecology	0.120***	(0.0330)	0.175***	(0.0416)	0.0400	(0.0537)	0.188***	(0.0480)	0.164***	(0.0618)
Log(length of stay)	0.0292*	(0.0170)	-0.17***	(0.0187)	-0.0718**	(0.0292)	-0.0841***	(0.0222)	-0.068**	(0.0295)
Female	0.0782***	(0.0185)	-0.15***	(0.0194)	-0.204***	(0.0282)	-0.00372	(0.0240)	-0.14***	(0.0326)
Age 36 to 50	0.126***	(0.0445)	0.311***	(0.0411)	0.225***	(0.0512)	0.541***	(0.0559)	0.249***	(0.0728)
Age 51 to 65	0.225***	(0.0407)	0.539***	(0.0394)	0.501***	(0.0479)	0.828***	(0.0499)	0.670***	(0.0610)
Age more 65	0.279***	(0.0409)	0.684***	(0.0382)	0.443***	(0.0498)	0.899***	(0.0548)	1.097***	(0.0633)
Self-rated state of health	0.113***	(0.00820)	0.247***	(0.00962)	0.293***	(0.0112)	0.330***	(0.0115)	0.320***	(0.0137)
ISTC fixed effect	-0.0326	(0.210)	0.767***	(0.138)	0.371*	(0.192)	1.366***	(0.150)	1.307***	(0.268)
ISTC*Urology	-0.0264	(0.275)	0.170*	(0.0933)	0.264	(0.176)	0.0425	(0.156)	0.172	(0.595)
ISTC*Orthopaedics	0.310***	(0.113)	-0.19***	(0.0618)	0.0985	(0.0672)	-0.115*	(0.0614)	-0.0307	(0.169)
ISTC*Ent	0.150	(0.152)	-0.62***	(0.200)	0.00365	(0.140)	-0.257*	(0.149)	-0.0528	(0.338)
ISTC*Ophthalmology	-0.206	(0.215)	0.00951	(0.103)	0.130	(0.137)	-0.0104	(0.156)	0.675**	(0.311)
ISTC*Oral surgery	-0.579	(0.644)	0.0717	(0.205)	-0.0872	(0.245)	-0.537*	(0.291)	-2.344*	(1.329)
ISTC*Plastic surgery	0.0318	(0.344)	-0.598**	(0.265)	-0.455	(0.339)	-0.697***	(0.245)	-0.666	(0.637)
ISTC*Gastroent	0.105	(0.591)	0.110	(0.190)	0.253	(0.239)	0.319	(0.196)	0.422	(1.103)
ISTC*Gynaecology	-0.0673	(0.115)	-0.294	(0.184)	0.0259	(0.154)	-0.530***	(0.112)	-0.68***	(0.227)
ISTC*Log(length of stay)	0.0272	(0.0571)	0.0957	(0.0647)	-0.0736	(0.0540)	0.0765	(0.0488)	0.154	(0.117)
ISTC*Female	-0.0103	(0.0470)	0.0582*	(0.0335)	0.0677*	(0.0384)	0.0477	(0.0353)	0.00163	(0.0598)
ISTC*Age 36 to 50	0.0431	(0.111)	-0.143**	(0.0655)	-0.0270	(0.0893)	-0.459***	(0.0816)	-0.287*	(0.173)
ISTC*Age 51 to 65	0.0747	(0.121)	-0.30***	(0.0667)	-0.177**	(0.0814)	-0.629***	(0.0740)	-0.56***	(0.155)
ISTC*Age more 65	0.00179	(0.130)	-0.41***	(0.0703)	-0.0338	(0.0847)	-0.643***	(0.0787)	-0.84***	(0.148)
ISTC*Self-rated state of health	-0.0168	(0.0263)	-0.13***	(0.0166)	-0.124***	(0.0255)	-0.191***	(0.0189)	-0.19***	(0.0311)
Selection term	0.0355	(0.132)	-0.176	(0.140)	0.339*	(0.183)	0.170	(0.146)	-0.0854	(0.231)
Constant	-0.729***	(0.0610)	-1.278**	(0.0658)	-1.361***	(0.0845)	-2.052***	(0.0928)	-1.89***	(0.106)
Observations		23840		22552		17693		25521		15772
Number of hospitals		160		164		164		164		159

Robust standard errors in parentheses, clustered at hospital level

*** p<0.01, ** p<0.05, * p<0.1

Table 4b. Determinants of Patients' Experience along 3 Factors.

Provider Fixed Effects

	All-round Quality Factor		Prompt Discharge Factor		+Information/-Comfort Factor	
Urology	-0.128	(0.144)	0.208	(0.184)	-0.386**	(0.186)
Orthopaedics	-0.0186	(0.0751)	0.182*	(0.0936)	-0.252***	(0.0950)
Ent	-0.196	(0.163)	0.392**	(0.165)	-0.0363	(0.194)
Ophthalmology	0.553**	(0.215)	0.307	(0.240)	-0.266	(0.589)
Oral surgery	-0.0731	(0.475)	-0.480	(0.606)	-0.000142	(0.352)
Plastic surgery	0.154	(0.221)	0.199	(0.277)	0.117	(0.332)
Gastroent	-0.00756	(0.365)	-0.806	(1.394)	1.380	(1.358)
Gynaecology	-0.143	(0.119)	0.346***	(0.121)	0.137	(0.150)
log(length of stay)	-0.00748	(0.0625)	-0.127*	(0.0651)	0.112	(0.0746)
Female	-0.0416	(0.0618)	-0.0172	(0.0836)	0.0801	(0.0886)
Age 36 to 50	0.172	(0.118)	-0.189	(0.123)	0.309**	(0.150)
Age 51 to 65	0.479***	(0.0890)	-0.174	(0.128)	0.341**	(0.139)
Age more 65	0.662***	(0.104)	0.00477	(0.114)	0.202	(0.149)
Self-rate of health	0.271***	(0.0275)	-0.0348	(0.0365)	-0.0159	(0.0311)
ISTC fixed effect	1.229***	(0.425)	-0.0957	(0.655)	-1.561**	(0.735)
ISTC*Urology	-0.159	(0.732)	-0.240	(0.934)	2.287***	(0.872)
ISTC*Orthopaedics	-0.0644	(0.369)	-0.400	(0.460)	1.174**	(0.460)
ISTC*Ent	0.416	(0.570)	-0.320	(0.696)	0.298	(0.822)
ISTC*Ophthalmology	-8.399	(8.331)	-21.11*	(11.25)	11.08	(13.86)
ISTC*Oral surgery	-9.28***	(2.982)	8.759***	(3.248)	1.260	(3.118)
ISTC*Plastic surgery	-0.0930	(0.570)	1.977***	(0.737)	-0.475	(0.810)
ISTC*Gastroent	0.388	(1.007)	-4.497	(3.581)	-2.765	(3.472)
ISTC*Gynaecology	-1.54***	(0.505)	0.156	(1.015)	0.764	(1.201)
ISTC*log(length of stay)	0.150	(0.138)	0.308*	(0.175)	-0.232	(0.169)
ISTC*Female	0.0554	(0.110)	0.0180	(0.142)	-0.152	(0.141)
ISTC*Age 36 to 50	-0.222	(0.425)	0.960	(0.588)	-0.485	(0.472)
ISTC*Age 51 to 65	-0.660*	(0.334)	0.475	(0.543)	-0.149	(0.574)
ISTC*Age more 65	-0.782**	(0.326)	0.347	(0.518)	-0.0378	(0.553)
ISTC*Self-rated state of health	-0.15***	(0.0569)	-0.0185	(0.0787)	0.245***	(0.0714)
Selection term	-0.289	(0.426)	-0.150	(0.516)	1.095**	(0.489)
Constant	-1.42***	(0.182)	0.206	(0.216)	-0.379	(0.249)
Observations	1649		1649		1649	
Number of hospitals	157		157		157	

Robust standard errors in parentheses, clustered at hospital level

*** p<0.01, ** p<0.05, * p<0.1

Table 5. Total Hospital Ownership Effect: ISTC Effect at Sample Means

	CQC Domains					Factors		
	Access	Coordination	Information	Relationships	Comfort	All-round Quality Factor	Prompt Discharge Factor	+Information -Comfort Factor
Model with provider fixed effects								
Average effect	.0758393	-.0661617	-.1770*	.0049757	.0411297	-.3304203	-.2744006	.1061137
Standard error	(0.09630)	(0.09727)	(0.09692)	(0.07932)	(0.15723)	(0.35354)	(0.47018)	(0.53526)
Model without provider fixed effects								
Average effect	0.3988***	0.6641***	0.5183***	0.4961***	0.9129***	0.35802	-0.00851	-0.19627
Standard error	(0.10548)	(0.07215)	(0.08492)	(0.06041)	(0.11914)	(0.28315)	(0.36151)	(0.37428)

*** Statistically significant at the 1 % level

Table 6. Compared Predicted Scores for Treatment in the Two Types of Hospitals

	Access	Coordin.	Inform.	Relation.	Comfort	All-round Factor	Prompt Discharge Factor	+Inform./- Comfort Factor
Patients Treated in NHS Hospitals								
Predicted scores in NHS hospitals (B0X0)	-0.0181	-0.0430	-0.0391	-0.0588	-0.0458	-0.0617	-0.0376	-0.0286
	(0.1767)	(0.3496)	(0.3827)	(0.4308)	(0.5041)	(0.4178)	(0.2335)	(0.2357)
Predicted scores in ISTCs (B1X0)	0.0309	-0.0297	-0.2205	-0.0314	0.0818	-0.1508	0.2756	-0.2602
	(0.1033)	(0.1037)	(0.0921)	(0.0700)	(0.1852)	(0.2902)	(0.4081)	(0.3817)
t-ratio for H_0: B1X0-B0X0 = 0	0.44	0.11	-1.70	0.32	0.64	-0.29	0.75	-0.57
Patients Treated in ISTCs								
Predicted scores in ISTCs (B1X1)	0.1011	0.0851	0.0788	0.1188	0.2399	0.2188	0.1478	0.1180
	(0.1559)	(0.2183)	(0.2547)	(0.2203)	(0.3352)	(0.2174)	(0.1356)	(0.2394)
Predicted scores in NHS hospitals (B0X1)	-0.0861	0.2164	0.1504	0.0921	0.1276	0.1637	0.0152	-0.2307
	(0.0695)	(0.0523)	(0.0563)	(0.0463)	(0.1037)	(0.4538)	(0.6226)	(0.7387)
t-ratio for H_0: B1X1-B0X1 = 0	2.17***	-1.65*	-0.76	0.34	0.85	0.12	0.21	0.44

Predicted scores from Provider's Fixed Effects Model.

t-tests run with the standard deviation measured at the mean of X.

Standard deviations in parentheses

*** Difference is statistically significant at the 1 percent level * Difference is statistically significant at the 10 percent level

Appendices

A1 Questionnaires

Both survey questionnaires are attached. The questions used for the ISTC survey are a subset of those of the NHS inpatient survey. The coding of individual answers is indicated in the NHS questionnaire (scoring has been done by Bartlett's method, which produces unbiased estimates).

Questionnaire_for_the_2008_Inpatients_survey.pdf

istc survey
questionnairedh_083

A2 Questions Included in Care Quality Commission's Domains:

- ***Access and waiting***

  Was your admission date changed by the hospital?

  How do you feel about the length of time you were on the waiting list before your admission to hospital?

  From the time you arrived at the hospital, did you feel that you had to wait a long time to get to a bed on a ward?

- ***Safe, high quality, coordinated care***

  Sometimes, a member of staff will say one thing and another will say something quite different. Did this happen to you?

  On the day you left hospital, was your discharge delayed for any reason?

  Did a member of staff tell you about any danger signals you should watch for after you went home?

- ***Better information, more choice***

  Were you involved as much as you wanted to be in decisions made about your care and treatment?

  Did a member of staff explain the purpose of the medications you were to take at home in a way you could understand?

  Did a member of staff tell you about medication side effects to watch for when you went home?

- ***Building relationships***

  When you had important questions to ask the doctor, did you get answers that you could understand?

  Did doctors talk in front of you as if you weren't there?

  When you had important questions to ask a nurse, did you get answers that you could understand?

  Did nurses talk in front of you as if you weren't there?

- ***Clean, comfortable, friendly place to be***

  Were you ever bothered by noise at night from other patients?

  Were you ever bothered by noise at night from hospital staff?

In your opinion, how clean was the hospital room or ward that you were in?

How would you rate the hospital food?

Were you given enough privacy when being examined or treated?

Overall, did you feel you were treated with respect and dignity while you were in the hospital?

Do you think the hospital staff did everything they could to help control your pain?

A3 Selection Equation

Table A3.1 Probit Estimation, Hospital Choice

	Marginal Probabilities
Hospital number of specialties	-0.0529***
	(0.0125)
Urology	-0.0244
	(0.0200)
Orthopaedic	0.0288
	(0.0359)
Ent	-0.0137
	(0.0206)
Ophthalmology	0.0499
	(0.0540)
Oral surgery	0.0902*
	(0.0524)
Plastic surgery	-0.0475
	(0.0337)
Gastroent	0.140**
	(0.0688)
Gynaecology	-0.0878***
	(0.0274)
log(length of stay)	-0.191***
	(0.0523)
Female	-0.000984
	(0.00443)
Age 36 to 50	0.0577***
	(0.0166)
Age 51 to 65	0.0695***
	(0.0199)
Age more 65	0.113***
	(0.0289)
Self-rated state of health	0.0238***
	(0.00652)
Observations	31529
Pseudo R2	0.7419

Notes

Robust standard errors in parentheses, clustered at hospital level

*** p<0.01, ** p<0.05, * p<0.1

Hospital choice is not affected by the specialty except in the case of Gastroenterology which favours the choice of an ISTC and in the case of Gynaecology with a 9 percent lower probability of ISTC choice. The higher the length of stay, the lower the probability of being treated in an ISTC. With regard to patient's characteristics, patients older than 35 are more likely to go to an ISTC.