Explaining differences in hospital performance: Does the answer lie in the labour market?

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Abstract

This paper examines the relationship between performance of English public sector hospitals (NHS trusts) and the quality of their nursing staff. Performance ratings of NHS trusts published in 2001 and 2002 indicate a clear regional divide. This divide is not explained by lower medical need. The gap between wages in the private and public sector (the private sector premium) has a regional divide similar to that of the performance ratings. Utilising cross sectional variation in the private sector premium, we find that performance against several of the individual targets that are aggregated into the NHS performance ratings is negatively associated with the private sector premium.

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Introduction

There is wide variation in the performance of NHS trusts. To tackle this, the government introduced a performance rating system, which summarises the overall performance of trusts against a number of targets. The system places all non-specialist hospital trusts in England in one of four categories ranging from three to zero stars. On inspection of the variation in the performance rating across hospitals an interesting puzzle emerges. There is a clear regional pattern to the ratings whereby hospitals in the North of England, on average, perform better than hospitals in the South (see Table 1).

This paper focuses on the labour market as a possible explanation. Regional pay differences are considerable.[1] Further, the pay distribution in the public sector is more compressed that that of the private sector, both within and between educational groups, indicating that high quality individuals get higher returns in the private sector.[2] This means that in some areas public sector employers are at a considerable disadvantage, relative to both private sector employers and their public sector counterparts in other parts of the country in terms of hiring and retention of staff. Low relative pay leads to two possible shortages, a lack of staff and of quality. It can cause problems in hiring and retention. There is evidence for men that falling public sector relative wages have led to a decline in the quality of the public sector workforce.[3]

This paper investigates the hypothesis that the pattern in the performance ratings of NHS hospitals is driven by differences in relative earnings. Specifically, it examines the relationship between relative pay in the public and private sector for a key group of hospital staff - female nurses - and the star ratings and the individual components of those ratings.

Data and Methods

The first set of star ratings was published in September 2001.[4] These assessed hospitals on their performance over 2000/01. The overall ratings were based on 21 targets split into four groups: 9 key targets, 4 performance targets, 3 clinical targets, and 5 staff targets. The key targets are the most significant factors in determining the overall performance rating. Key targets include measures of hospital cleanliness, financial performance and key waiting time targets. Performance targets include other waiting time targets and resolution of written complaints. Clinical targets include mortality and readmission rates and a measure of clinical negligence. The staff targets include measures such as retention of staff and sickness/absence rates. The second set of performance ratings were published in July 2002 and assessed hospitals based on their performance over 2001/02.[5] There were 37 targets: an expanded set of performance and clinical targets and targets based on inpatient surveys.

Factors that may drive the ratings

This paper examines the hypothesis that the star ratings are a function of the relative pay of nursing staff. We examine not absolute pay, but nurses' pay relative to what an individual who is a nurse would get were she to take alternative employment in her area in the private sector. Absolute pay in both public and private sectors is highest in London and the South East.[6] But what matters to an individual living in an area choosing between different employers is the differential between them.. We hypothesise that the private-public pay ratio will exert a significant negative influence on trust performance. The higher the ratio, the more attractive the alternatives to working as a nurse, and the lower the quantity and quality of the staff available to the trust.

We control for other factors that may explain the star ratings. We allow for variation in need, the resources available to the trust, and for various fixed characteristics of the trust. If those admitted to hospital are sicker in a given area then the trusts in that area might be poorer performers (at least on some components of the star ratings). Hospitals with more resources should perform better, all other things being equal. The size and teaching status of the trust are included to allow for the fact that volume and case mix may affect outcomes.

We might not expect a clear relationship between the pay ratio and the overall star rating due to the nature of the calculation of the overall star rating. In both years the star rating is made up of a number of individual targets carrying differing weights and these were not necessarily known in advance. In this situation, managers are more likely to focus on individual targets rather than the overall rating, as they can affect the former more easily than the latter.[7,8,9] Further, some targets will have a closer relationship with nurses' pay and quality than others. We therefore also examine each target separately.

Construction of the measures of the factors

To construct the pay ratio for each local labour market, we used data from a large national sample (the quarterly and annual Labour Force Surveys (LFS)[10]) on the pay of nurses and the pay of individuals with similar qualifications to nurses in the private sector for the year 1999. The pay of nurses varies only regionally (there is one value for London and one for outside London). The pay of individuals in the private sector varies at local level: we aggregated private pay to county/unitary authority level. From these data we formed the ratio of private sector to nurses pay. This varies by country/unitary authority. The pay ratio was matched to each trust in the sample by means of postcode. Details of the construction methodology for the pay variable are given in the Appendix.

As a measure of population need we use standardised mortality ratios (SMRs) at health authority level for the years 1999 (Office of National Statistics). We report results using female over- and under-75 SMRs. (These are highly correlated with male SMRs). As a robustness check, we also used 1998 SMRs and 1991 ward-level census data on the percentage of people with long-term limiting illness and the

proportion of households that are owner occupiers (Office of National Statistics 1991 Census). The results were very similar.

To control for the possible impact on the ratings of the resources of the hospital, its size and teaching status we use data on all hospital admissions from Hospital Epis ode Statistics, data on hospital staffing (Department of Health census of medical and dental workforce), income (from TAC05 returns, Department of Health), average daily numbers of available beds (occupied and unoccupied; from KH03 returns) and whether the hospital was a teaching (university) hospital according to a classification from the Department of Health. All these variables are for 1999. We divide total resources by admissions to give a measure of resources per patient, which is independent of size. (We also controlled for the pressure a hospital is under, using the number of hospital admissions per doctor but this was never significant and was omitted from the analysis). We measure hospital size by number of beds, though this could be measured in a number of other ways including the total number of admissions to hospital and the number of doctors. Our analyses using these alternative measures yielded very similar results.

Statistical analysis

We explain differences in overall star ratings for both 2000/1 (the September 2001 ratings) and 2001/2 (the July 2002 star ratings). The dependent variable is an ordinal variable (the star rating) that takes the values 0, 1, 2 or 3, 3 being the best possible outcome. We then run regressions of performance against each individual target. For each target hospitals are recorded as having either achieved, under-achieved or significantly underachieved. These are coded as 3, 2 and 1 respectively so that large values correspond to better outcomes. For some of these targets there is limited variation in outcomes across trusts and in these cases the dependent variable was collapsed into two and probit analysis was used. For a small number of the targets the amount of variation was so limited (at least 95 percent of hospitals hit the target) that analyses were not undertaken using these measures. Those omitted are 2 of the 21 September 2001 targets and 2 of the 37 July 2002 targets).

The independent variables are the pay ratio, under- and over-75 female SMRs, total hospital income from activities divided by total admissions, whether the trust is a teaching hospital, and the number of available beds.

173 acute trusts were performance rated in Sept 2001. After elimination of observations due to missing data our sample for the 2001 ratings is 148. The comparable figures for 2002 are 166 (20 specialist trusts were also rated) and 151.

Results

Table 1 presents the average star rating by local government region. There is a North-South divide, but the performance of the South West suggests that there is more than a North South split. Graph 1 shows the female all-age standardised mortality ratio (SMR). Broadly, this falls from north to south. Thus the regional pattern in star ratings cannot be a function of population ill health as areas with worst health have better star ratings. Graph 2 presents the 1999 pay ratio by region. The graph is ordered by lowest to highest region. The "private sector premium" is clearly highest in London and the South East, and lowest in the North of England. Graphs 3a and 3b plot the pay ratio against the star ratios for 2001 and 2002. Broadly, star ratings are higher in areas with lower private sector premia and lower in areas with higher premia.

Table 2 presents the regression results for the overall star rating. The dependent variable is the 2001 rating in column (1) and the 2002 rating in column (2). The table shows no clear association between either the pay gap and the ratings or any of the other possible explanatory factors. Overall, these factors explain little of the variation in the star ratings.

Table 3 presents the results of the same regression for each 2001 target separately. The table presents only the coefficient on the pay variable. Table 4 is the comparable results for the 2002 targets. For the 2001 targets, the pay variable is significantly associated in the expected negative direction with 7 of the 21 targets. Four are key targets - the total number of patients waiting for an inpatient appointment, reduction in outpatient waiting, trolley waiting and hospital cleanliness; one is a clinical target - level of compliance achieved against CNST risk management; one is a performance target - percentage of patients waiting less than 6 months for an inpatient appointment; one is a staff target – vacancy rate for qualified nursing, midwifery and health visiting staff (3 month vacancy rate). The pay variable is significantly positively associated with only one target - compliance with the new deal on junior doctors hours.

For the 2002 targets, the pay variable is negatively and significantly associated with 11 out of the 37 targets. 10 of these are performance targets, 6 of which are based on inpatient surveys. There are 2 targets that have a significant positive association with the pay ratio. Both are staffing targets: the amount of time lost through absences as a percentage of staff time available for directly employed NHS staff; and responses from NHS-employed staff opinion survey on satisfaction with employer. In summary, across the 2 years, over one third of the analysed targets (18 out of 53) are negatively associated with the pay ratio. Only 3 are positively associated. The results are robust to the data checks noted above and to omission of three trusts in the London/South East area that had private sector premia more than one standard error below the mean).

None of the other controls used in the analysis had as strong and consistent association with achieving the targets as the pay ratio. (These results are available from the authors.) Financial resources per head (income/admission) are negatively associated with three 2001 targets, positively associated with five 2002 targets and negatively associated with four 2002 targets. Our prior would be a positive or zero association while the bulk of the significant associations were negative: more money per head appears associated with less likelihood of scoring well on target. The ill health of the population (female SMR under- and over-75) is not associated in a clear direction with the targets. The bulk of the associations change sign between the two years. In 2001 there is a significant positive association with three targets and a significant negative association with 6, while the comparable figures for the 2002 targets are 11 and 4. Across targets and years, the bulk of the significant associations for the marker of need are positive and of the *a priori* incorrect sign: trusts which have populations in poorer health do better in terms of meeting targets.

The teaching status of the trust appears to have little association with hitting targets. Across the two years two targets were positively associated and five negatively. There appears to be more of a relationship with size: across the two years there were 8 negative associations and only 2 positive associations with targets. It appears smaller trusts are more likely to hit targets.

Discussion

Despite the considerable media attention given to the star ratings, there has been little attempt to explain them. A recent commentary by the Commission for Health Improvement, which noted but did not investigate the reasons for these differences in depth, stated that "there may be reasons for this variation associated with difficulties in recruiting staff and difference in culture and attitude".[11]

We have examined whether there is evidence that pay accounts for some of the differences in performance between trusts. We find that the pay relativity, between what the average nurse is paid and what she might get in the private sector, is negatively associated with achieving over one quarter of the individual targets in the star ratings and the specific patterns of association across targets broadly supports our hypothesis. There is a negative relationship with the 2001 target for nursing vacancies and the Qualified Allied Health Professionals target. Staff targets for which nurses' relative pay is less likely to be important (e.g. consultancy vacancies and compliance with junior doctors hours) were either not significantly associated, or were positively associated with the pay variable. There is a surprising positive association between the staff absences target in 2002 and the private sector premium, though this may reflect the use of agency staff in hospitals short of permanent staff. Many of the targets based on patient surveys are negatively related to the pay premium. Patient experiences are likely to depend, to a large extent, on their contact with nursing staff.[12] The fact that these outcomes are rated as better where staff are paid relatively more points to a link between the ratings and pay.

In contrast, other than a weak association with size, none of the other characteristics of hospitals or measures of population need appeared to be systematically related to the ratings. This echoes recent work, which found little association at trust level between prolonged waiting and markers of capacity or need.[13]

Low pay may lead to problems with both staff quantity and quality. In an attempt to disentangle quantity and quality we re-ran the regressions on each individual target including an extra control variable, the number of nurses (the head count of qualified nurses on 30th September 1999). The results were very similar to those reported above, suggesting that the effect on performance may not be from numbers of nursing staff but from the knock-on effect of low quality staff, which could include low retention, low quality and low morale and the greater use of agency staff. In support of this, two recent studies have found a higher proportion of agency nurses is associated with lower patient satisfaction and lower star ratings.[14,15]

All performance measures tend to be subject to controversy over their possible accuracy.[16, 17] Is this likely to bias our results? Smith has catalogued an extensive set of responses of health professionals to performance targets, some of which weaken the relationship between true and reported performance and some of which distort actual performance.[18] It is possible that the NHS star ratings are distorted by actions at more than one level: firstly by managers or clinicians seeking to do well and secondly to achieve political aims. Managers will focus on those targets they know they can achieve. The weighting of individual targets in the calculation of a single star rating may (and has) changed over time. Such manipulation may reduce the value of the overall ratings as an indicator of performance. This will mean analysis of the overall ratings is less likely to show any systematic relationship to a factor such as pay relativity which is beyond an individual manager's control. However, we would expect it to weaken less the relationship between an individual target and the pay variable: a manager who has good staffing conditions may well focus on achieving the targets where her pay advantage can be used to its fullest.

In conclusion, the implications of these results is that some of the performance of NHS trusts may be less related to managerial ability than to the labour market in which the trust is located. This, in turn, suggests that greater flexibility of pay at regional level may be one way to improve the performance of the NHS.

Data Appendix

To construct the pay relativities for each local labour market, data on pay in different geographical labour markets was taken from the Labour Force Survey (LFS)[19]. The LFS is a continuous, household survey, conducted by the Office for National Statistics (ONS). The LFS has been running since spring 1992 in its present form although a LFS has been carried out in the UK since 1973. Until 2000 there was both an annual local area LFS and a quarterly LFS. We use both. The annual local area LFS has data at a very detailed local area: data is available by 354 local authorities. However, the annual local area LFS has no detailed breakdown for occupation, containing only data by the broad categories of industry sector. The quarterly LFS, on the other hand, has an occupation variable but is more aggregated on a geographical basis: the geographical unit of observation is government office region.

For our measure of private pay, we used the annual local area LFS for 1999 (the latest year available). From this we extracted data on private sector pay, at the county/unitary authority level (of which there are 149), for females with comparable qualifications and part time/full time status to nurses. From the quarterly LFS 43% of nurses have some (as distinct from none) educational qualifications that are below NVQ4 and work full time (defined as over 30 hours per week). We restricted the group of private sector occupations to those that considered a reasonable alternative for an individual who had been working or might have wished to work as a nurse. The occupations we included in this restricted definition of the private sector were managers, administrators, professional occupations, associated professional and technical occupations, clerical and secretarial occupations (we excluded those workers in public administration, health and education as these are predominantly public sector). Using the annual local area LFS, we constructed average gross hourly private sector pay at county/unitary authority level across the individuals with the same qualifications (some below NVQ4) and hours (full time and part time) as nurses. (45% of nurses have the same set of qualifications but work part time. Analysis of the private sector pay of this group from the LFS indicated that the within region variation was greater than the between region variation. We therefore considered this variable to be unreliable.)

To calculate nurses' pay we considered female nurses only (1172 observations) and took data for those with highest qualification less than NVQ4 and who worked full time. This data is from the quarterly LFS, which has detailed occupational information so that nurses can be identified in the sample. However, the quarterly LFS is at regional level, so our measure of nurses' pay is at regional level. This is the appropriate level. There is no within-region variation in nurses' wages as nurses' pay is set nationally and is based on scales with certain grades. There is little scope for differences in nurses' pay across regions (except for nurses working in London regions who were entitled to London allowance). (As we use data from 1999, the South East uplift is not relevant as it was not introduced until April 2002.) We computed the average gross hourly pay both for female nurses residing in London and for those living outside London i.e. 2 unique values of nurses' average pay.

From these two sources of data we constructed the pay ratio: the ratio of average private sector pay (at county/unitary authority level) to average nurses' pay (at regional level). This varies across county/unitary authority. We linked the relevant pay variable to each acute trust in England by postcode (mapping by ArcView GIS 3.2). Each trust is assigned a value (not necessarily unique as two or more trusts may be located in the same county/unitary authority) for the relative pay ratio for nurses in their area.

As a robustness check we also calculated the same pay ratio using 1998 data. The correlation between the two years of data is high (0.85), as we would expect as regional pay relativities change slowly. We use 1999 data here, but results using 1998 data are very similar. We also computed a pay gap variable: average gross hourly private sector pay minus average gross hourly nurses' pay. Results using this measure were similar to those reported here.

Graph 1: All cause Female SMR by Government Region 1999

T & Wear
GrManch
MerseyS
RofNEast
RofNWest
WMidlmet
SYorksh
RofWMidl
WYorksh
EMidl
RofY&H
Eastern
SEast
OuterLon
SouthW
InnerLon

0   20   40   60   80   100   120
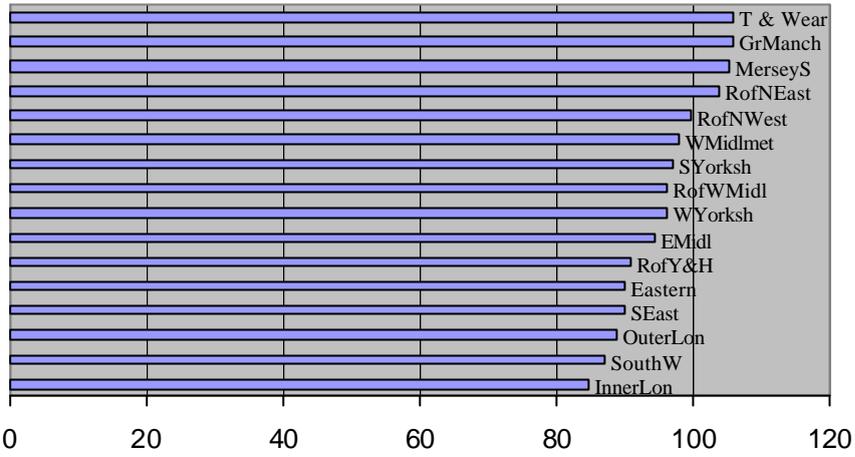
Graph 2: Pay ratio (private premium) for full time employees with less than NVQ4 by Government Region 1999

InnerLon
OuterLon
SEast
Eastern
MerseyS
RofWMidl
GrManch
WYorksh
SouthW
EMidl
T & Wear
WMidlmet
RofNWest
SYorksh
RofY&H
RofNEast

0   0.2   0.4   0.6   0.8   1   1.2
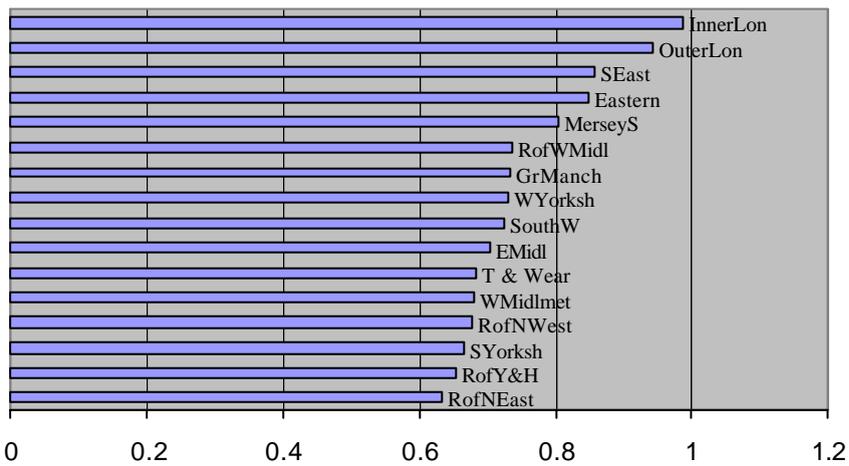
Graph 3a. Regional pay ratio and stars 2001

Stars 2001 (y-axis, 0 to 3)
Pay ratio 1999 (x-axis, 0 to 1.2)
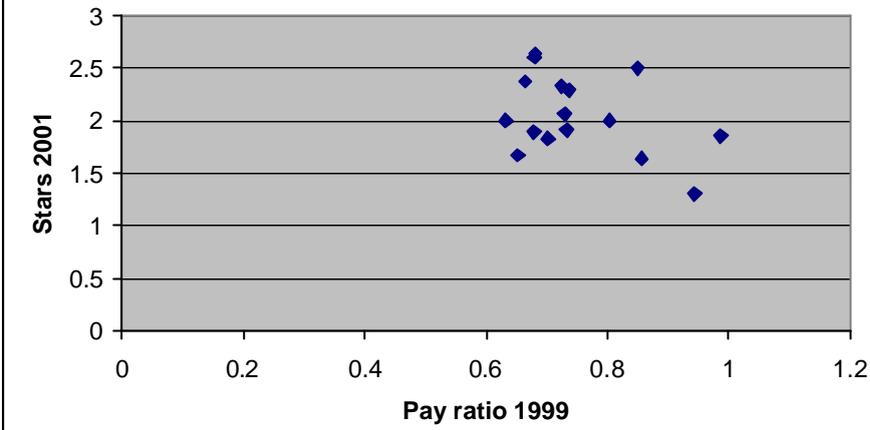
Graph 3b. Regional pay ratio and stars 2002

Stars 2002 (y-axis, 0 to 3)
Pay ratio 1999 (x-axis, 0 to 1.2)
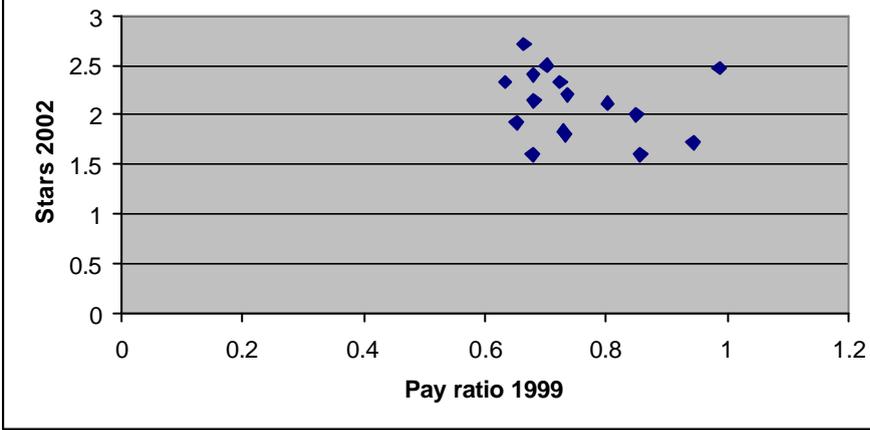
Table 1 Average 2001 and 2002 star ratings by government office region

Government office region	Average star rating Sept 01	Average star rating July 02
Tyne & Wear	2.60	2.40
Rest of North East	2.33	2.33
Greater Manchester	1.91	1.80
Merseyside	2.00	2.11
Rest of North West	2.37	2.71
South Yorkshire	2.00	2.33
West Yorkshire	2.29	2.20
Rest of Yorkshire & Humberside	1.83	2.50
East Midlands	2.63	2.14
West Midlands Metropolitan	1.67	1.92
Rest of West Midlands	1.89	1.60
Eastern	2.50	2.00
Inner London	1.85	2.47
Outer London	1.64	1.60
South East	1.30	1.72
South West	2.06	1.83

Table 2. Ordered probit analysis of star ratings

	(1) Star01	(2) Star02
Pay ratio (private/public)	-0.5285	0.0869
	(0.7724)	(0.7795)
Hospital income/ total admissions	-0.2974	0.1667
	(0.1837)	(0.7795)
Female SMR (under 75's)	-0.0017	0.0020
	(0.0067)	(0.0058)
Female SMR (75+)	0.0084	-0.0022
	(0.0125)	(0.0117)
Trust is a teaching hospital	-0.0055	-0.0604
	(0.3454)	(0.3565)
Number of available beds	0.0001	0.0004
	(0.0004)	(0.0003)
Sample size (number of trusts)	148	151
Pseudo R^2	0.03	0.01

Standard errors in parentheses

~significant at 10%; * significant at 5%, ** significant at 1%

Table 3. Coefficient on 1999 pay ratio for 2001 targets

	Coeff. on pay ratio	standard error	R^2	n
Key Targets:				
Total no. of patients waiting for an inpatient appointment	-3.24~	1.80	0.13	148
Reduction in outpatient waiting (% of planned target achieved)	-2.0739~	1.0937	0.11	148
% of patients waiting less than 2 weeks from urgent GP referral to outpatient appointment for suspected breast cancer	0.8628	0.9445	0.01	148
No. of patients waiting on trolleys for more than 12 hrs	-1.6520~	0.9689	0.08	148
Operations cancelled on the day as a percentage of elective admissions	-0.2682	0.8258	0.01	148
Commitment to improving Working Lives	All hospitals hit target			
Hospital cleanliness (patient environment team inspection score)	-2.276~	1.2312	0.20	148
Performance Targets:				
Percentage of patients waiting less than 6 months for an inpatient appointment at the end of Q4	-2.5188*	1.0395	0.08	148
Patients seen within 13 weeks of GP written referral for 1st outpatient appointment	-0.2182	0.9942	0.12	148
Trolley waits greater then 4 hours as a percentage of all non-elective admissions	-1.2566	0.8581	0.12	148
Resolution of written complaints (% completed within 4 weeks)	-0.9438	0.9209	0.07	148
Clinical Targets:				
Clinical negligence: level of compliance achieved against Clinical negligence scheme for Trusts risk management standards	-2.4411*	1.2322	0.10	148
Emergency readmission rates within 28 days of discharge (age and sex standardised)	2.0147	1.8046	0.29	148
Deaths in hospital within 30 days of surgery (non-elective admissions) (age and sex standardised)	0.5112	1.1983	0.13	148
Staff Targets:				
Sickness/absence rate for directly employed NHS staff	0.5469	0.9292	0.13	148
Consultancy vacancy (3 month vacancy rate)	0.5661	0.9511	0.08	148
Qualified nursing, midwifery and health visiting staff vacancy (3 mth vacancy rate)	-3.680**	0.9146	0.14	148
Qualified Allied Health Professionals (3 mth vacancy rate)	-0.6190	0.9205	0.04	148
Compliance with the new deal on junior doctor's hrs	1.7169~	0.9514	0.11	148

Other independent variables included in each regression are those in Table 2

Targets not analysed: no. of patients waiting more than 18 months for an inpatient appointment (99% of trusts hit target); financial performance against plan based on the provisional 2000/01 audited accounts (97% of trusts) hit target

~significant at 10%; * significant at 5%, ** significant at 1%

Table 4. Coefficient on 1999 pay ratio for 2002 targets

	Coeff. on pay ratio	standard error	R^2	N
Key Targets:				
Number of patients waiting more than 12 hours for admission via A&E	-0.1251	0.1631	0.04	131
Percentage of elective admissions cancelled at the last minute for non-clinical reasons	-0.0626	0.9080	0.01	149
Number of patients reported across the year as waiting more than 18 months for inpatient treatment	1.28	1.39	0.08	151
Whole hospital score for cleanliness, formulated against Patient Environment Action Team (PEAT) visits	All hospitals hit target			
Progress towards achievement of Improving Working Lives (IWL) Standard 'practice status'	All hospitals hit target			
Percentage of patients seen within two weeks of urgent GP referral for suspected cancer to outpatient appointment with specialist	0.0938	0.9458	0.02	139
Achievement of financial balance in 2001/2 without unplanned financial support	-0397	1.1789	0.16	151
Performance Targets:				
Total time spent in A&E from arrival to admission, transfer or discharge	-4.173**	0.8573	0.10	131
Wait from diagnosis to treatment for patients newly diagnosed with breast cancer	-1.0317	0.9239	0.04	128
Percentage of patients not admitted within one month of last minute cancellation	-0.435	0.7824	0.01	149
Percentage of patients whose discharge from hospital was delayed	-1.791*	0.7717	0.09	142
Inpatient Survey – Coordination of care: Combined score of questions around organisation of emergency care, organisation of admissions process, staff giving conflicting information and members of staff taking overall charge of care.	-2.786**	0.799	0.06	142
Inpatient Survey – Environment and facilities: Combined score of questions around cleanliness and quality and amount of food provided.	-3.455**	0.8205	0.10	142
Inpatient Survey – Information and education: Combined score of questions around staff's responses to questions, explanations of medication and information about possible problems following transfer of care.	-1.878*	0.7910	0.06	142
Inpatient Survey – Physical and emotional needs: Combined score of questions around noise, adequate control of pain, assistance during mealtimes and discussions with staff about anxieties.	-3.002**	0.8047	0.08	142
Inpatient Survey – Prompt Access: Combined score of questions around length of waiting list, notice given of admission, change to admission date and waiting time to get to a ward through admission or A&E.	-3.572**	0.8156	0.07	142
Inpatient survey – Respect and dignity: Combined score of questions around privacy for discussion, examination and treatment, mixed sex facilities and whether patient was treated with dignity and respect	-2.539**	0.7989	0.05	142
Percentage of patients waiting less than 6 months for an inpatient admission	-1.6194*	0.7618	0.04	150
Percentage of patients seen within 13 weeks of GP written referral for first outpatient Appointment	-1.5739*	0.7529	0.02	146
Total number of patients waiting for an inpatient appointment (% of planned target achieved)	-0.2259	0.7533	0.02	151
Clinical Targets				
Level of compliance against Clinical Negligence Scheme for Trusts risk Management standards	-0.9597	0.9604	0.03	151
Deaths within 30 days of a CABG, per 100,000patients (age, sex and method of admission standardised, includes deaths in hospital and after discharge)	-4.9923	4.3062	0.40	24
Deaths within 30 days of surgery for non-elective admissions to hospital, per 100,000 patients (age and sex standardised, includes deaths in hospital and after discharge)	-0.7349	0.8644	0.03	132
Emergency readmissions to hospital within 28 days of discharge (all ages), as a percentage of live discharges (age and sex standardised)	1.2055	0.9277	0.08	132

Emergency readmissions of children to hospital within 7 days of discharge following medical treatment (ages 0-15), as a percentage of live discharges (age and sex standardised)	1.3349	0.8662	0.04	128
Emergency readmissions to hospital within 28 days of discharge following treatment for a fractured hip, as a percentage of live hip fracture discharges (age and sex standardised)	-1.8422	1.2628	0.10	131
Emergency readmissions to hospital within 28 days of discharge following a stroke, as a percentage of live stroke discharges (age and sex standardised)	-2.6546*	1.2802	0.10	130
Percentage of patients discharged back to usual place of residence within 56 days of emergency admission to hospital with a stroke, all ages (age and sex standardised)	-0.1747	1.1362	0.16	130
Percentage of patients discharged back to usual place of residence within 28 days of emergency admission to hospital with a hip fracture, all ages (age and sex standardised)	0.1451	0.9120	0.03	130
Staff Targets				
Summary measure of HES data quality for NHS trusts with inpatient activity	-0.3330	0.7591	0.06	151
Percentage of Junior Doctors complying in full with the New Deal on Junior Doctors Hours	-0.7218	0.7475	0.04	151
Amount of time lost through absences as a percentage of staff time available for directly employed NHS staff (highest coded as poorest outcome)	2.0913*	0.8206	0.09	140
Responses from NHS-employed staff opinion survey on satisfaction with employer	1.3914~	0.7771	0.02	142
Achievement of information governance targets (Values range from 0 to 36)	0.0813	0.7533	0.01	151

Other independent variables included in each regression are those in Table 2.

Targets not analysed: Number of patients waiting more than 15 months for an inpatient admission (96% of trusts reached target); number of patients waiting more than 6 months (26 weeks) for an outpatient appointment (99% of trusts) reached target; Number of patients waiting more than 12 months for a coronary artery bypass graft (CABG) and percutaneous transluminal coronary angioplasty (PTCA).

~significant at 10%; * significant at 5%, ** significant at 1%

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