**Delayed Discharges and Hospital Type:**

**Evidence from the English NHS**

James Gaughan1 Hugh Gravelle1 Luigi Siciliani 1,2

# (Revised version)

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# Abstract

Delayed discharges of patients from hospital, commonly known as bed-blocking, are a long standing policy concern. Delays can increase the overall cost of treatment and may worsen patient outcomes. We investigate how delayed discharges vary by hospital type (Acute, Specialist, Mental Health, Teaching), and the extent to which such differences can be explained by demography, case-mix, the availability of long-term care, and hospital governance as reflected in whether the hospital has Foundation Trust status which gives greater autonomy and flexibility in staffing and pay. We use a new panel database of delays in all English NHS hospital Trusts from 2011/12 to 2013/14. Employing count data models, we find that a greater local supply of long-term care (care home beds) is associated with fewer delays. Hospitals which are Foundation Trusts have fewer delayed discharges and might therefore be used as exemplars of good practice in managing delays. Mental Health Trusts have more delayed discharges than Acute Trusts but a smaller proportion of them are attributed to the NHS, possibly indicating a relatively greater lack of adequate community care for mental health patients.

1 Economics of Social and Health Care Research Unit, Centre for Health Economics, University of York

2 Department of Economics and Related Studies, University of York

*JEL*: I10, I18

# Policy Points

* Foundation Trusts have fewer delayed discharges and might therefore be used as exemplars of good practice in managing delays.
* Mental Health Trusts incur more delays with a higher proportion outside the control of the NHS. This may indicate unmet need for mental health patients, and possible lack of coordination over provision of social care.
* Greater local provision of long-term care beds in care homes reduces delayed discharges in hospitals, confirming the importance of coordinating health and social care.

# 1. Introduction

Over 1.2 million bed-days were lost in the National Health Service (NHS) in England in 2013/14 because patients remained in hospital after they were medically ready to be discharged. The annual cost of patients aged 65 and over occupying hospital beds but no longer in need of acute treatment has been estimated at £820m (NAO, 2016). Such delayed discharges, often referred to as bed-blocking, are a long standing policy concern. In the U.K. the issue is as old as the NHS. Lowe and McKeown (1949) noted that the creation of the NHS divided the responsibility for health and other forms of care and allocation of patients to appropriate care setting began to increase in importance.[[1]](#footnote-1)

Despite subsequent changes in the provision and organisation of health and long-term care (LTC) services, including attempts to improve integration between the sectors (Glasby et al. 2011), the problem of delayed discharges persists. As the King’s Fund reported, delayed discharges remain an important concern among NHS managers (Appleby et al. 2013). A recent report of the House of Commons Health Committee pointed to delayed discharges as one of the reasons for hospital accident and emergency departments missing their access targets (House of Commons Health Committee 2013).

Concern about delays is also not limited to the U.K. In many member countries of the Organisation for Economic Co-operation and Development (OECD), hospital and long-term care provision is frequently divided between different sets of institutions. The funding and organisation of these two sectors often differ, with each acting independently of the other. The separation of responsibilities can lead to delays due to lack of communication and coordination. The supply of long-term care is not controlled by the hospitals. But if a care home bed is not available when a hospital patient is ready to be transferred, the patient is forced to remain in hospital until a bed becomes free or they are sufficiently recovered to go home. Delays may be the result of poor hospital management and protocols. For example, a patient may have a delayed discharge because a consultant (senior doctor) is not on duty to authorise the discharge or because they are waiting for a transfer to non-acute NHS community care.

A growing elderly population, measured both absolutely and as a proportion of the total population (European Commission Economic Policy Committee 2009), suggests that the problem is likely to become worse because use of health and LTC services is concentrated among the elderly (de Maijer et al. 2011). Bardsley et al. (2012) found that 10% of people aged over 75 in 2005/6 used both hospital and LTC in the same year. This demand pressure increases the importance of allocating patients to the appropriate care setting (see Kuhn and Nuscheler 2011 for a theoretical analysis).

The cost of delays in discharging patients from hospital is financial and clinical. Since hospital care is more expensive than care in other settings, a patient who can be appropriately cared for in another setting, such as a LTC institution (residential home or nursing home) or with support in their own home (homecare) will be less costly to treat if discharged from hospital. There are also some greater clinical risks to the patient of being in hospital when medically ready to be discharged including hospital acquired infection and pressure sores (Health Foundation 2013).

Previous research suggests that provision of LTC affects the extent of bed blocking (Fernandez and Forder 2008, Gaughan et al. 2015). But hospitals can also reduce bed blocking through good discharge planning and communication with LTC providers. For example, an internal analysis of delays in the Sheffield Teaching Trust (Health Foundation 2013) resulted in changes in procedure which reduced delays without increasing readmissions, an indication that the more prompt discharges were appropriate.

## 1.1. Aims and hypotheses

We investigate how delayed discharges vary by type of NHS hospital. NHS hospitals are classified for administrative and regulatory purposes in two main ways. First, depending on their patient group and functions they are designated as Acute, Specialist, Teaching or Mental Health. Second, depending on their governance structure, they may have Foundation Trust (FT) status, which gives them greater autonomy.

We focus on hospital type since it is readily observed and many existing NHS policies are defined in terms of hospital type. For example, Specialist hospitals receive top-up payments over and above the standard payments for each patient treated.[[2]](#footnote-2) Mental Health providers have different payment rules from other providers with a greater proportion of their funding coming from block contracts with local healthcare budget holders and less varying with the number of patients treated. Teaching hospitals receive additional payments for teaching services. Hospitals with Foundation Trust status face a less constraining regulatory regime than other hospitals: they do not have to break even each year, can borrow to invest, and have greater freedom in paying their staff. Hospital types with fewer delays could be used as examples of good practice. Those with more delays could be targeted by specific policy interventions. Moreover, our data on delayed discharges is at hospital rather than individual patient level.

We compare differences in delays across types of provider before and after controlling for a range of factors such as patient demographics, case-mix, size and long-term care availability. Any remaining differences across hospital type after allowing for these factors may be due to the different type of organisation (due to specialisation or greater autonomy), different services (acute, mental health services) or additional responsibilities (such as teaching).

The *a priori* effect of hospital type on delays is unclear. Foundation Trust (FT) status requires that the hospital demonstrates quality of care and financial viability (Monitor 2007, Monitor 2013). FT status can be considered a label of good quality care. Higher quality, driven by more efficient management of patient pathways, may reduce delays of discharge but might also attract more severe and complex patients with a higher risk of suffering delay.

Specialist Trusts may obtain efficiency gains and provide higher quality by focussing on a narrower range of patients, such as those with cardiovascular or orthopaedics conditions. This may lead to fewer delays for these patients. But specialist hospitals may also attract more complex patients who may have more requirements for post treatment long-term care services which may take longer to arrange. Teaching Trusts also educate medical students as well as treating patients and this reduces the amount of attention that senior staff can devote to patient care once immediate medical needs are met. Teaching hospitals may also attract more complex patients who are more prone to delays.

Mental Health Trusts treat patients with serious mental illness rather than physical health problems. These patients are often managed partly by community facilities such as Crisis Resolution Teams and Home Treatment Teams. Thus they may have better links to community and long term care than other types of hospital but their patients may be more difficult to place in suitable facilities outside hospital. There is also concern that mental health services are relatively underfunded. Where this results in insufficient resources in the hospital or provision of community care for mental health conditions, this could increase delayed discharges.

## 1.2. Related Literature

Forder (2009) investigated the degree of substitution between hospital and LTC in 8000 English census ward areas and estimated that a £1 increase in spending on care homes was associated with a £0.35 fall in hospital costs. Fernandez and Forder (2008) and Gaughan et al. (2015) found that English patients living in Local Authorities with fewer care home and nursing home beds were more likely to have a delayed discharge. Hospital readmissions are also higher in Local Authorities with lower care home or home help supply (Fernandez and Forder 2008).

Our study contributes to the literature on the substitution of hospital and LTC. The analyses in Fernandez and Forder (2008) and Gaughan et al. (2015) were at Local Authority level and could not examine the impact of hospital characteristics on hospital delays since patients resident in a local authority are likely to be treated in several hospitals. We believe our study is the first which attempts to examine variations in delayed discharges across *hospitals.*  It is also relevant for the extensive empirical literature on quality and efficiency differences across hospital types (for-profit versus non-profit, specialised versus non-specialised etc) as surveyed in Eggleston (2008).

Section 2 details the data. Section 3 provides the methods. Section 4 reports descriptive statistics and regression results. Section 5 discusses potential mechanisms underlying the findings. Section 6 concludes.

# 2. Data

We employ a new database which measures delays at hospital Trust[[3]](#footnote-3) level and includes all NHS Hospital Trusts in three financial years: 2011-12, 2012-13 and 2013-14.

## 2.1. Dependent Variable

Information on hospital delays are reported at hospital, rather than individual patient, level. The “Acute and Non-Acute Delayed Transfers of Care” dataset (NHS England 2014a) contains monthly information submitted by Trusts to the Department of Health on the number of delayed transfers of patients as required by the Delayed Discharges (Community Care Etc) Act (2003).[[4]](#footnote-4) Since the Act only covers delays among adults specialist children’s hospitals are not included in the analysis. We also exclude hospitals specialising in maternity, gynaecology and neonatal care, sometimes referred to as ‘Women’s Hospitals’ as they serve relatively young patients who are unlikely to require long term care and who have a negligible number of delayed discharges. We have information on delays for all English Acute and Mental Health Trusts in three financial years.

A delay is defined as occurring when a clinical decision has been made that a patient is ready for discharge from hospital and a multidisciplinary team agrees with this decision. The multi-disciplinary team includes “nursing and other health and social care professionals caring for that patient in an acute setting” (DH 2010b). When a delayed discharge occurs, it is attributed to the NHS Trust where the patient was treated, to the Local Authority where the patient resides, or to both. There is a formal dispute procedure for cases where agreement over attribution is not reached between the institutions concerned.

We measure delayed discharges as the total number of bed-days lost per year due to delayed patients. We measure both the total number of delayed days (*Delays*), whether attributed to the NHS or not, and those attributed to the NHS only (*Delays attributed to the NHS*).

## 2.2. Types of Trust

Information on type of Trust is from the National Reporting and Learning System (NHS England 2013). There are four mutually exclusive types of Trust: Acute Trusts[[5]](#footnote-5), Acute Specialist Trusts, Acute Teaching Trusts and Mental Health Trusts (Manhaes et al. 2013).

Acute Trusts provide acute hospital care without a specific focus on teaching or a specific type of patient or condition. Acute Teaching Trusts are generally large providers with a wide range of departments, linked to a University, and providing training for medical students as well as treating a full range of patients. Acute Specialist Trusts are a regional or national centre for a particular field of medicine, such as cancer or orthopaedics. They treat the most complex cases in a field and are generally small compared to Acute Trusts. Mental Health Trusts provide hospital care to patients with mental health conditions. In this they are similar to Acute Specialists but they are similar in size to Acute Trusts and there are far more Mental Health Trusts than there are Acute Specialists in a specific field.

Trusts of all four types can also have Foundation Trust (FT) status (Monitor 2014) the requirements for which are the same for all Trust types. There were only small changes in the number of Trusts with FT status and in their distribution across the four Trust types over the study period.

## 2.3. Control Variables

We control for the number of beds in a Trust, taking data from “Quarterly bed availability and occupancy” submitted to the Department of Health and published by NHS England (NHS England 2014b). The average number of beds is given at Trust level (DH 2010a) for each quarter of a financial year. We use the average of the sum of the number of available and occupied beds reported for the four quarters of each financial year. To account for potential non-linearity in the relationship between beds and delays, beds are also measured as categorical variables: 200-399, 400-599, 600-799, 800-999, 1000-1499 and 1500+ beds. The base case is 0-199 beds.

We use three Trust level case-mix variables: the percentages of admissions which are emergencies, for males, patients aged 60-74 and aged 75+ (HSCIC 2013b). We include risk-adjusted emergency readmission rates within 28 days of discharge from hospital as a measure of hospital quality.[[6]](#footnote-6) The data are from the Indicator Portal of the HSCIC website (HSCIC 2014) and are indirectly standardised by age, gender, method of admission, diagnoses and procedures. The denominator for the emergency readmission rate is all patients discharged alive in the year, except those with a primary specialty of mental health or any diagnosis of cancer. The latter are excluded since their readmissions are much less likely to be a signal of poor care and are not used as a performance indicator (HSCIC 2013a).

A higher readmission rate might be associated with more delays if it reflects poorer quality of care in the hospital or a greater proportion of patients with unobserved greater morbidity. However, bed blocking may increase subsequent emergency readmissions if pressure on beds leads to premature discharge or worse care for other patients. We therefore use two year lags of the emergency readmission rate to reduce simultaneity bias.

If no bed is available in a care home, then a patient may have to remain in hospital despite being clinically ready to be discharged into long-term care. Most patients have to pay, at least in part, for long-term care and so it may take longer to find a LTC bed at a price they can afford if prices are higher. We therefore measure the accessibility of long-term care in the area served by a hospital Trust using data on care home beds and prices for June 2011 (Laing and Buisson 2010). We measure the number of care home beds and their average price within 10km[[7]](#footnote-7) from a hospital for care homes whose primary clients are people aged 65+ or with dementia. The primary client group of a care home is the group for which the largest number of beds is registered with the Care Quality Commission which regulates the sector.

There were eight mergers between Trusts during the study period. We compute annual values for dependent and explanatory variables for Trusts which merged at some point in a year as if they were a single Trust at the start of the year.

# 3. Methods

Since days of delay are non-negative, integer valued and have a right skewed distribution we estimate Negative Binomial count data models in which the mean number of days of delay is

(1)

is a vector of dummy variables for hospital types (Specialist, Teaching, Mental Health) with Acute as the baseline type. is a dummy variable for the hospital having Foundation Trust status. No hospital changed its type over the period but three became Foundation Trusts so that does vary over time. is a vector of covariates. are year dummies. The coefficients *β* are the proportionate changes in the number of days of delay from a one unit change in the explanatory variable if it is continuous or from a change from 0 to 1 for a dummy variable such as hospital type. We enter the logarithms of LTC beds and prices in the models so that their coefficients are the % change in delays associated with a 1% increase in beds or prices.

is the number of beds in the hospital. We estimate (1) with beds as an exposure term i.e. with *β*3 = 1. This is equivalent to standardising the dependent variable for the hospital size. We could have used the number of patients (rather than beds) as the exposure term but this raises concerns about simultaneity if hospitals with more delayed discharges admit fewer patients because no beds are available. We therefore, as in Propper et al. (2004) and Kolstad and Kowalski (2012), use beds to measure hospital size.

To allow for the possibility that the number of delays is not proportional to hospital size, with larger hospitals being better or worse at managing delays, we also include a vector of bed size categories (200-399, 400-599,…,1000-1499, 1500 and over) in with unconstrained coefficients.

We use the NB2 Negative Binomial model (Cameron and Trivedi 1986) in which the variance is a quadratic function of the mean. The main alternative count model, the Poisson, assumes that the variance is equal to the mean and we find that this strong assumption does not hold in our data.

We estimate five versions of (1) for all delays and then for delays due to the NHS. The first version includes only the hospital type categories. We then allow for hospital size by adding beds as an exposure term and the bed size categories. Next we add the number and price of local care home beds and then the case-mix variables. These models are estimated with robust standard errors clustered at Trust level.

Our fifth model includes time invariant random hospital effects. Finally, we estimate three models as robustness checks for our main findings. The first of these includes interactions of FT status and hospital type. The second includes only Acute Trusts in the sample. Both of these models investigate if the effect of FT status is consistent across Trust types. The third robustness check includes a variable for Trusts with another Trust in the same Local Authority and an interaction of this variable with FT status. This model is included to consider if LTC providers prefer caring for patients discharged from a Foundation Trust and so effect the number of delays from FTs.

# 4. Results

## 4.1 Descriptive Statistics

The average Trust has around 6000 bed-days lost due to delays of which 4000 are attributed to the NHS. Delays increased by 2.5% per year, from 5742 days in 2011-12 to 6182 days in 2013-14. Delays due solely to the NHS increased more quickly than delays due to other institutions and rose from 64% to 69% of all delays over the period.

Figure 1 shows the distribution of the number of days of delay across Trusts in 2013-14. The distribution is right skewed, with a small proportion of providers having a large number of delays. The distribution is similar for the other years.

[Figure 1]

Without accounting for size, total delays are largest in Teaching Trusts and smallest in Specialist Trusts. Acute and Mental Health Trusts have similar numbers of days of delay. However, Teaching Trusts are larger hospitals while Acute Specialist and Mental Health providers tend to be smaller. Figure 2 shows days of delay per 100 beds for the different types of Trust and by FT status. Mental Health Trusts have the highest number of days of delay per bed, around 50% more than Acute and Teaching Trusts. Specialist Trusts have the smallest number of days of delay per bed. Mental Health Trusts have a much smaller proportion of delays which are attributed to the NHS (44% versus over 70% across other types of Trust).

[Figure 2]

Figure 2 also indicates that there are fewer days of delay per 100 beds in Trusts with FT status compared to non-FT Trusts, particularly for delays attributed to the NHS. Overall, delays per 100 beds are 8-9% smaller in Foundation Trusts and delays attributed to the NHS are 18-19% smaller.

As Table 1 shows, 57% of Trusts are Acute (i.e. non-teaching, non-specialist hospitals), 13% are Teaching Acute Trusts, and 25% are Mental Health Trusts. Only 6% are Specialist Trusts. 63% have Foundation Status. Trusts have on average 643 beds. 22% of patients admitted to hospital are older than 75 years and around 40% are admitted as emergencies. The standardised readmission rate is 9% on average. The average Trust has about 3100 care home beds within 10 kilometres from the Trust Headquarters. Within the same radius, the average price for a week stay in a care home is £550.

[Table 1]

Table 2 presents the number of Trusts with and without FT status. The highest proportion of Foundation Trusts is amongst Acute Specialist Trusts: 11 out of the 12 Specialist Trusts have FT status. Mental Health Trusts and Acute Teaching Trusts also have high FT rates of 72% and 60% respectively. Acute Trusts with no additional responsibilities (e.g. non-teaching) have the lowest FT rate of 56%.

[Table 2]

## 4.2 Regression results

Table 3 reports results for models of total bed days lost as the dependent variable. Model 1 includes only year and Trust type dummy variables, with 2011/12 and Acute Trusts as the baseline categories. In Model 2 we add a hospital beds exposure term with a coefficient equal to one, which standardises delays by beds, and also add bed size categories. Model 3 adds measures of LTC availability (beds and prices) and model 4 also has case-mix and emergency readmissions. Model 5 includes the same explanatory variables as model 4 but allows for unobserved random hospital effects.

[Table 3]

In all models we find that there is over dispersion, rejecting the Poisson specification relative to the Negative Binomial. The goodness of fit measures (AIC and BIC) broadly indicate that additional variables improve the explanatory power of the models, though the AIC indicates that the improvement from adding all the case-mix controls (model 4 versus model 3) is small. The BIC, which has a stronger penalty for additional explanatory variables, suggests a deterioration in model performance when the case mix variables are added, even though two of them are statistically significant.

*Foundation Trust* status is associated with 15-16% fewer bed-days lost after standardising for beds and controlling for long-term care and case-mix (Models 3 and 4). After controlling for unobserved heterogeneity (Model 5), the difference is even larger (33%).

Once bed numbers are allowed for, *Teaching Trusts* have similar delays to Acute Trusts. *Specialist Trusts* have around 60% fewer delays per bed than Acute Trusts (model 3) but the difference is not statistically significant, even at 10%, once long-term care availability and patients’ case-mix have been controlled for (model 4).

*Mental Health Trusts* are associated with 46-62% more delayed days after accounting for size (models 2 to 4). However, this effect is smaller and insignificant after controlling for unobserved heterogeneity (model 5).

The availability of long-term care beds is consistently associated with fewer delays. We use the logarithms of LTC beds and prices in the models so that their coefficients are the % change in delays associated with a 1% increase in beds or prices. Thus the results in models 3 to 5 suggest that a 1% increase in long-term care beds is associated with 0.27-0.29% fewer delays. Higher prices for long-term care beds are positively associated with delays but the coefficient is at most weakly significant (model 5).

Trusts with a higher percentage of patients aged 75 years or over have more delays (models 4 and 5). Treating 1% more patients in this age category is associated with 0.01-0.02% more delays. A higher proportion of male patients is also positively associated with more delays, though the association is statistically significant only in the random effects model (5). Given the models condition on age and men have shorter disability-free life expectancy, this variable may capture a greater likelihood of non-acute health problems which make it more difficult to discharge male patients.

To capture economies or diseconomies of scale, we include hospital bed number categories with the omitted category less than 200 beds. Since we also include beds as an exposure term with a coefficient of unity, the generally negative coefficients on the bed number categories imply that delays increase less than proportionately with beds. However, the coefficients are only statistically significant in the random effects specification (5) and only for the largest size category (more than 1500).

### 4.3 NHS delays

Table 4 provides the results for delays attributed to the NHS. Unlike the Table 3 results for all delays, Mental Health Trusts do not differ significantly from Acute Trusts after accounting for size, long-term care and case-mix variables. As in Table 3 for all delays, there are no significant differences between other Trust types and Acute Trusts after controlling for beds. A 1% increase in long-term care beds is associated with 0.23-0.27% fewer NHS delays, a similar result to that for all delays.

[Table 4]

The effect of Foundation Trust status is again negative, statistically significant, and large in magnitude. Foundation Trusts incur 19-23% fewer delays after accounting for size, long-term care and case-mix in models 3 and 4. Allowing for unobserved heterogeneity (Model 5) again increases the size of the effect (39%).

## 4.4. Interaction of FT status and Trust Type

Models 1 to 5 assume that having Foundation Trust status has the same implications for all types of Trust. We also estimated specifications similar to models 4 and 5 but with the addition of interactions between FT status and Trust type. The results are reported in Table A in the Appendix. They are broadly in line with those in Tables 3 and 4 and do not suggest that the association between FT status and delays varies by type of Trust. There is a large positive and highly significant coefficient on the interaction of Specialist Trust and Foundation Trust for NHS days of delay, but this is driven by the only Specialist Trust which does not have FT status and which had a very small number of delays attributed to the NHS in the study period. All other interactions between Foundation Trust status and Trust type are statistically insignificant at the 5% level.

## 4.5. Models for Acute Trusts

The patients in Mental Health Trusts are very different from those in the three types of Acute Trust in being younger, requiring different types of treatment and in having much longer lengths of stay. Mental Health Trusts also have a smaller proportion of their revenue from prospective prices per patient treated, relying more on funding from block contracts negotiated with local health budget holders and so may have a smaller financial incentive to discharge patients. Clinical readiness for discharge is also less easy to define than for acute patients with physical conditions.

We therefore re-estimate models 4 and 5 after excluding Mental Health Trusts. The results are in Table B in the Appendix. We find that the effects associated to being a Foundation Trust and to being located in an area with more Care Home Beds have even larger negative coefficients than in the models including Mental Health Trusts.

## 4.6. Relationship between LTC and FT Status

Another potential explanation for the lower rate of delays in Foundation Trusts is that providers of long-term care may be more willing to accept patients discharged from Trusts with FT status. Care homes may believe that FTs provide better care so that patients discharged by an FT are healthier and so less costly to manage. If FT patients have a lower risk of readmissions or death this will also reduce the transaction costs associated with refilling places in the care home. This effect on delays arising from decisions by care homes will be stronger when care homes operate in markets with more than one hospital. We therefore add to model 5 an indicator for the hospital being located in a Local Authority with at least one other hospital and its interaction with FT status. The results are reported in Table C in the Appendix. Neither variable is significant though the interaction of the competition indicator and FT status is indeed negative.

# 5. Discussion

The size of Trust is a key determinant of bed days lost due to delayed discharge and Trust type is strongly correlated with size. Specialist Trusts, and to a lesser extent Mental Health Trusts, tend to be smaller than Acute Trusts and Teaching Trusts to be larger. When we do not standardise for beds, Specialist hospitals have about half the delays of Acute Trusts, and Teaching hospitals have 50% more delays.

We generally do not find evidence of scale economies or of a non-linear relationship between delays and size, as captured by categories of number of beds. Hospitals with a large number of beds tend to have proportionally fewer overall delays (and higher NHS delays) but the differences are not statistically significant.

Hospital Trusts which have Foundation Trust status have 15% to 30% fewer bed-days lost due to delayed discharge of patients. Our finding that FTs have better performance than Trusts without FT status is in line with other studies. For example, Verzulli et al. (2011) found that FTs have lower hospital infection rates. All NHS hospital Trusts are not-for-profit public sector organisations but those which have Foundation Trust status have greater freedom from central control. In particular, they do not have to break even each year, can borrow to finance investment, have fewer limits on the amount of income they can generate from treating private patients, and are not constrained by national agreements on pay and conditions. Their ability to retain more easily financial surpluses implies that they have stronger incentives to contain costs and possibly to compete more aggressively to attract demand. The greater autonomy also implies that if FTs end up with a surplus they can reinvest it in better systems, including IT systems, for handling discharges (i.e. better management which can keep costs down) and use it to hire more trained and qualified staff to improve quality. NHS hospital Trusts of all types (Acute, Specialist, Teaching, Mental Health) can apply to become Foundation Trusts but must demonstrate that they meet quality, management, and financial requirements.[[8]](#footnote-8) Thus our finding of fewer delays in Foundation Trusts may be because Trusts which are successful in applying for Foundation Trust status are inherently higher quality or because their governance structure allows them greater autonomy which permits them to achieve higher quality and thus fewer delays. Because only three hospital Trusts became Foundation Trusts in the three years covered by our data, we cannot distinguish between these explanations.

Despite this, policymakers may be able to use Foundation Trusts as examples of good practice which can be identified by on site investigations of FTs which have a lower than expected number of delays. The fact that the association between FT status and delays was similar across all hospital types suggests that lessons from further investigation of FTs may hold for all types of Trust.

After accounting for size, patient characteristics and long-term care availability, we find that although Mental Health Trusts have similar delays attributed to the NHS as Acute Trusts, they incur more delays in total. This suggests that delays in Mental Health Trusts are more likely to be due to non-NHS social care factors. Patients in Mental Health Trusts are more likely to require more complex post discharge social and community care, which may take longer to organise. An increase in available long-term and community care resources, appropriate for patients with mental health conditions, may therefore have a bigger impact on delayed discharge from Mental Health Trusts than other types of Trust.

Specialist hospitals tend to have far fewer delays, after controlling for beds. Differences can be large (about 60% fewer delays after controlling for case-mix and long-term care) but are not statistically significant. The shorter delays may be due to the concentration of expertise and experience in the relevant field of medicine, the ability to adopt approaches best suited to care of a particular patient group and perhaps better funding and resources availability.

Teaching Trusts have similar delays to Acute Trusts after controlling for size. Teaching Status is generally considered a marker of higher quality. Teaching Trusts offer also a wider range of specialised services, attracting more severe patients. The higher quality may therefore raise demand and more complex case-mix can put an upward pressure on delays. In addition, the responsibilities of training medical students might increase the time it would otherwise have taken to discharge a patient. The higher perceived quality of teaching hospitals may also imply they have better management and more dedicated staff, which in turn may reduce delays.

Increases in the supply of long-term care are associated with fewer delays, as in previous studies (Fernandez and Forder 2008; Gaughan et al. 2015). As a patient can only be discharged to institutional long-term care when a bed is available, an increased supply of such beds would be expected to reduce delayed discharges from hospital. However, such institutional care might not always be the most appropriate setting for care immediately after discharge. Especially for less severe patients, alternatives such as support in a patient’s own home, if available, may be preferred by the patient. Local care homes prices did not have a statistically significant impact on delays. This may reflect the overriding importance of providing appropriate care in a timely manner, rather than searching for the lowest price.

Trusts with a higher percentage of patients aged 75+ have more delays. Older patients are more intensive users of hospital and LTC services (Bardsley et al. 2012, Forder 2009), are likely to have more comorbidities and disabilities (Kasteridis et al. 2015, di Maijer 2011) and therefore require a more complex care package. This finding suggests that an aging population might lead to more delays in the future.

# 6. Conclusions

Reducing delays in discharge from hospital is a long standing policy concern. This study has investigated differences in delays by type of hospital. Hospital types are easily observable to the regulator and policy interventions can easily be targeted at a particular hospital type.

We find that Foundation Trusts have fewer delays. Foundation Trusts might therefore be used as exemplars of good practice in managing delays. Policy makers could investigate how such reductions have been achieved and provide insights to ensure that good practice is spread throughout the NHS. There is particular value in using Foundation Trusts as exemplars as all types of Trust (Acute, Specialist, Teaching, Mental Health) have become Foundation Trusts.

Mental Health Trusts have more delayed discharges due to non-NHS factors including social care. This may indicate unmet social care needs for mental health patients requiring more sophisticated care packages which take longer to organise and suggest that better coordination of hospital, community and social care would be particularly beneficial in reducing delayed discharges for mental health patients.

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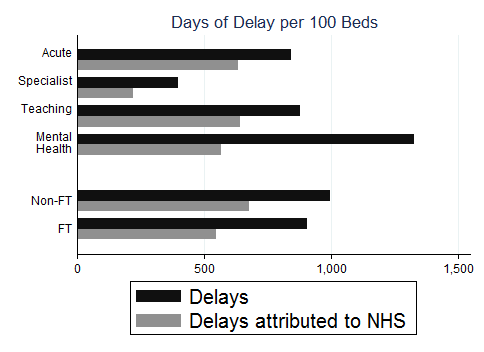
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# Figures

### Figure 1: Days of Delay

# 

## Figure 2: Days of Delay per 100 Beds by Trust Type



# Tables

## Table 1: Descriptive Statistics

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | *Mean* | *Standard deviation* | *Observations* | *Minimum* | *Maximum* |
| *Days of Delay* |  |  |  |  |  |
| All Trusts | 5997 | 5294 | 614 | 0 | 43899 |
| Acute Trust | 5654 | 4050 | 349 | 97 | 18363 |
| Acute Specialist Trust | 613 | 632 | 36 | 0 | 2427 |
| Acute Teaching Trust | 9820 | 9067 | 78 | 291 | 43899 |
| Mental Health Trust | 6096 | 4396 | 151 | 228 | 23641 |
| Foundation Trust | 5488 | 4737 | 385 | 0 | 23641 |
| *Days of Delay Attributed to NHS* |  |  |  |  |  |
| All Trusts | 4002 | 3869 | 614 | 0 | 25494 |
| Acute Trust | 4262 | 3415 | 349 | 33 | 17297 |
| Acute Specialist Trust | 348 | 491 | 36 | 0 | 2115 |
| Acute Teaching Trust | 7071 | 6034 | 78 | 161 | 25494 |
| Mental Health Trust | 2688 | 2321 | 151 | 23 | 12528 |
| Foundation Trust | 3494 | 3526 | 385 | 0 | 17297 |
| *Trust type* |  |  |  |  |  |
| Acute Trust | 0.568 | 0.496 | 614 | 0 | 1 |
| Acute Specialist Trust | 0.059 | 0.235 | 614 | 0 | 1 |
| Acute Teaching Trust | 0.127 | 0.333 | 614 | 0 | 1 |
| Mental Health Trust | 0.246 | 0.431 | 614 | 0 | 1 |
| Foundation Trust | 0.627 | 0.484 | 614 | 0 | 1 |
| *Covariates* |  |  |  |  |  |
| Hospital Beds | 642.8 | 352.3 | 614 | 7.532 | 2165 |
| Care Home Beds | 3129 | 2182 | 614 | 118 | 7496 |
| Care Home Price/Week | 550.3 | 90.79 | 614 | 414.4 | 722.1 |
| % patients 60-74 | 20.60 | 6.319 | 614 | 0.977 | 47.00 |
| % patients 75+ | 21.96 | 8.833 | 614 | 0 | 60.36 |
| % male patients | 45.73 | 5.843 | 614 | 1.554 | 77.35 |
| % Emergency Admissions | 39.78 | 14.75 | 614 | 0 | 97.73 |
| % Standardised Readmissions | 8.622 | 4.832 | 614 | 0 | 17.1 |

Sample: 614 (208, 203 and 203) Trusts in 2011/12-2013/14. Mean, Standard deviation, Observations, Minimum and Maximum are over three years. Days of Delay: total days of delay experienced by all delayed patients during a year. NHS Days of Delay: total days of delay experienced by delayed patients during a year attributed to the NHS. Hospital Beds: annual average daily number of available or occupied beds. Care Home Beds: number of beds in care homes within 10km of the Trust’s headquarters in 2011 whose primary clients are patients aged 65+ or with dementia. Care Home Price/Week: average weekly price in care homes within 10km of the Trust’s headquarters in 2011 whose primary clients are patients aged 65+ or with dementia. Standardised readmissions: annual indirectly standardised emergency readmission within 28 days, lagged by two years.

## Table 2: Number of Foundation Trusts by Type and Year

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 2011-12 | | 2012-13 | | 2013-14 | |
|  | Non-FT | FT | Non-FT | FT | Non-FT | FT |
| Acute Trust | 54 | 65 | 50 | 65 | 48 | 67 |
| Acute Specialist Trust | 1 | 11 | 1 | 11 | 1 | 11 |
| Acute Teaching Trust | 11 | 15 | 10 | 16 | 10 | 16 |
| Mental Health Trust | 15 | 36 | 14 | 36 | 14 | 36 |
| Total | 81 | 127 | 75 | 128 | 73 | 130 |

FT: Foundation Trust Status.

## Table 3: Days of Delay

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Model (1):  Hospital type only | | Model (2):  (1) plus exposure and size categories | | Model (3):  (2) plus care home beds, prices | | Model (4):  (3) plus covariates | | Model (5):  (4) with random hospital effects | |
|  | Coef | p-value | Coef | p-value | Coef | p-value | Coef | p-value | Coef | p-value |
| Acute Specialist Trust | -2.177\*\*\* | (0.000) | -0.727\*\* | (0.045) | -0.625 | (0.138) | -0.620 | (0.187) | 0.0397 | (0.886) |
| Acute Teaching Trust | 0.540\*\*\* | (0.002) | 0.0967 | (0.602) | 0.122 | (0.430) | 0.121 | (0.430) | -0.138 | (0.344) |
| Mental Health Trust | 0.0981 | (0.394) | 0.481\*\*\* | (0.000) | 0.615\*\*\* | (0.000) | 0.457\*\* | (0.015) | 0.205 | (0.218) |
| Foundation Trust | -0.128 | (0.196) | -0.125 | (0.118) | -0.163\*\* | (0.039) | -0.147\* | (0.065) | -0.329\*\*\* | (0.000) |
| 2012-13 | 0.0523\* | (0.084) | 0.0438 | (0.154) | 0.0351 | (0.273) | 0.0256 | (0.434) | 0.0210 | (0.539) |
| 2013-14 | 0.0545 | (0.174) | 0.0563 | (0.175) | 0.0492 | (0.243) | 0.0418 | (0.344) | 0.0428 | (0.224) |
| Hospital Beds 200-399 |  |  | -0.0266 | (0.931) | -0.234 | (0.534) | -0.353 | (0.350) | -0.255 | (0.239) |
| Hospital Beds 400-599 |  |  | -0.0601 | (0.850) | -0.181 | (0.636) | -0.335 | (0.377) | -0.319 | (0.152) |
| Hospital Beds 600-799 |  |  | -0.0106 | (0.974) | -0.0819 | (0.833) | -0.215 | (0.580) | -0.274 | (0.232) |
| Hospital Beds 800-999 |  |  | -0.0246 | (0.940) | -0.0430 | (0.912) | -0.172 | (0.663) | -0.175 | (0.447) |
| Hospital Beds 1000-1499 |  |  | 0.0428 | (0.897) | 0.0119 | (0.976) | -0.121 | (0.756) | -0.159 | (0.501) |
| Hospital Beds 1500+ |  |  | -0.426 | (0.259) | -0.306 | (0.465) | -0.407 | (0.323) | -0.687\*\* | (0.029) |
| Ln Care Home Beds |  |  |  |  | -0.270\*\*\* | (0.000) | -0.266\*\*\* | (0.000) | -0.288\*\*\* | (0.000) |
| Ln Care Home Price/Week |  |  |  |  | 0.166 | (0.530) | 0.214 | (0.438) | 0.417\* | (0.081) |
| % patients 60-74 |  |  |  |  |  |  | -0.0126 | (0.495) | -0.0405\*\*\* | (0.000) |
| % patients 75+ |  |  |  |  |  |  | 0.0127\*\* | (0.026) | 0.0221\*\*\* | (0.000) |
| % of male patients |  |  |  |  |  |  | 0.0150 | (0.105) | 0.0146\*\* | (0.021) |
| % of emergency admissions |  |  |  |  |  |  | 0.00136 | (0.685) | 0.00254 | (0.352) |
| % standardised readmissions |  |  |  |  |  |  | -0.000471 | (0.973) | -0.00121 | (0.872) |
| Constant | 8.676\*\*\* | (0.000) | 2.192\*\*\* | (0.000) | 3.298\*\* | (0.047) | 2.359 | (0.254) | -4.782\*\*\* | (0.007) |
| Ln alpha | -0.401\*\*\* | (0.000) | -0.712\*\*\* | (0.000) | -0.790\*\*\* | (0.000) | -0.806\*\*\* | (0.000) |  |  |
| Ln r |  |  |  |  |  |  |  |  | 1.150\*\*\* | (0.000) |
| Ln s |  |  |  |  |  |  |  |  | 7.406\*\*\* | (0.000) |
| Exposure |  |  | Ln Beds in Trust | | Ln Beds in Trust | | Ln Beds in Trust | | Ln Beds in Trust | |
| AIC | 11747.9 | | 11539.1 | | 11489.4 | | 11488.3 | | 11183.7 | |
| BIC | 11783.2 | | 11601.0 | | 11560.1 | | 11581.1 | | 11280.9 | |
| s.e. | Cluster | | Cluster | | Cluster | | Cluster | | OIM | |

Negative binomial models: (1) to (4) pooled, (5) random effects. Dependent variable: total days of delay experienced by all delayed patients during a year. Coefficients are proportionate change in days of delay from one unit increase in explanatory variable. Standardised readmissions are lagged by two years. Exposure term has a coefficient of 1. Ln alpha: log of overdispersion. Ln r and Ln s: shape parameters of the beta (r, s) distribution of random effects. AIC: Akaike Information Criterion. BIC: Bayesian Information Criterion. s.e.: standard errors. Cluster: robust standard errors clustered at Trust level. OIM: observed information matrix standard errors. Observations: 614 = 208, 203 and 203 for 2011-12, 2012-13 and 2013-14. \*p < 0.1, \*\*p < 0.05, \*\*\*p < 0.01

## Table 4: Days of Delay Attributed to NHS

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Model (1):  Hospital type only | | Model (2):  (1) plus exposure and size categories | | Model (3):  (2) plus care home beds, prices | | Model (4):  (3) plus covariates | | Model (5):  (4) with random hospital effects | |
|  | Coef | p-value | Coef | p-value | Coef | p-value | Coef | p-value | Coef | p-value |
| Acute Specialist Trust | -2.429\*\*\* | (0.000) | -0.717 | (0.104) | -0.503 | (0.364) | -0.723 | (0.241) | -0.172 | (0.599) |
| Acute Teaching Trust | 0.491\*\*\* | (0.003) | 0.0524 | (0.784) | 0.106 | (0.520) | 0.0694 | (0.689) | -0.0250 | (0.874) |
| Mental Health Trust | -0.433\*\*\* | (0.001) | -0.0493 | (0.626) | 0.0868 | (0.432) | -0.326 | (0.174) | -0.200 | (0.312) |
| Foundation Trust | -0.171 | (0.125) | -0.171\* | (0.064) | -0.229\*\* | (0.013) | -0.190\*\* | (0.040) | -0.393\*\*\* | (0.000) |
| 2012-13 | 0.0967\*\*\* | (0.004) | 0.109\*\*\* | (0.002) | 0.0984\*\*\* | (0.007) | 0.0856\*\* | (0.021) | 0.0535 | (0.169) |
| 2013-14 | 0.122\*\* | (0.011) | 0.151\*\*\* | (0.002) | 0.148\*\*\* | (0.003) | 0.145\*\*\* | (0.005) | 0.0976\*\* | (0.014) |
| Hospital Beds 200-399 |  |  | 0.253 | (0.483) | 0.128 | (0.774) | -0.0183 | (0.966) | 0.253 | (0.344) |
| Hospital Beds 400-599 |  |  | 0.213 | (0.559) | 0.190 | (0.678) | 0.0184 | (0.967) | 0.0581 | (0.831) |
| Hospital Beds 600-799 |  |  | 0.371 | (0.321) | 0.372 | (0.421) | 0.216 | (0.632) | 0.198 | (0.477) |
| Hospital Beds 800-999 |  |  | 0.266 | (0.480) | 0.304 | (0.512) | 0.152 | (0.738) | 0.204 | (0.469) |
| Hospital Beds 1000-1499 |  |  | 0.325 | (0.391) | 0.342 | (0.456) | 0.203 | (0.653) | 0.220 | (0.439) |
| Hospital Beds 1500+ |  |  | -0.0256 | (0.953) | 0.0914 | (0.852) | 0.00967 | (0.984) | -0.418 | (0.257) |
| Ln Care Home Beds |  |  |  |  | -0.256\*\*\* | (0.000) | -0.230\*\*\* | (0.004) | -0.272\*\*\* | (0.000) |
| Ln Care Home Price/Week |  |  |  |  | -0.141 | (0.667) | 0.00136 | (0.997) | -0.0180 | (0.944) |
| % patients 60-74 |  |  |  |  |  |  | -0.0152 | (0.495) | -0.0379\*\*\* | (0.002) |
| % patients 75+ |  |  |  |  |  |  | 0.0187\*\*\* | (0.001) | 0.0287\*\*\* | (0.000) |
| % of male patients |  |  |  |  |  |  | 0.0331\*\* | (0.023) | 0.0156\*\* | (0.031) |
| % of emergency admissions |  |  |  |  |  |  | 0.00164 | (0.715) | 0.00362 | (0.250) |
| % standardised readmissions |  |  |  |  |  |  | -0.0127 | (0.425) | -0.00231 | (0.803) |
| Constant | 8.378\*\*\* | (0.000) | 1.569\*\*\* | (0.000) | 4.431\*\* | (0.028) | 1.997 | (0.471) | -3.033 | (0.114) |
| Ln alpha | -0.162\* | (0.100) | -0.416\*\*\* | (0.000) | -0.460\*\*\* | (0.000) | -0.492\*\*\* | (0.000) |  |  |
| Ln r |  |  |  |  |  |  |  |  | 0.892\*\*\* | (0.000) |
| Ln s |  |  |  |  |  |  |  |  | 6.906\*\*\* | (0.000) |
| Exposure |  |  | Ln Beds in Trust | | Ln Beds in Trust | | Ln Beds in Trust | | Ln Beds in Trust | |
| AIC | 11251.8 | | 11079.9 | | 11052.7 | | 11040.6 | | 10692.7 | |
| BIC | 11287.2 | | 11141.7 | | 11123.5 | | 11133.4 | | 10790.0 | |
| s.e. | Cluster | | Cluster | | Cluster | | Cluster | | OIM | |

Negative binomial models: (1) to (4) pooled, (5) random effects. Dependent variable: total days of delay in year attributed to NHS. Coefficients are proportionate change in days of delay from one unit increase in explanatory variable. Standardised readmissions are lagged by two years. Exposure term has a coefficient of 1. Ln alpha: log of overdispersion. Ln r and Ln s: shape parameters of the beta (r, s) distribution of random effects. AIC: Akaike Information Criterion. BIC: Bayesian Information Criterion. s.e.: standard errors. Cluster: robust standard errors clustered at Trust level. OIM: observed information matrix standard errors. Observations: 614 = 208, 203 and 203 for 2011-12, 2012-13 and 2013-14. \*p < 0.1, \*\*p < 0.05, \*\*\*p < 0.01

# Appendix

## Table A: Days of Delay with Interaction of FT status and Trust Type

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Days of Delay | | | | Days of Delay Attributed to NHS | | | |
|  | Pooled Model | | Random Trust Effects | | Pooled Model | | Random Trust Effects | |
| Acute Specialist Trust | -0.685 | (0.144) | 0.137 | (0.816) | -2.833\*\*\* | (0.000) | -2.815\*\*\* | (0.007) |
| Acute Teaching Trust | 0.193 | (0.420) | 0.0606 | (0.738) | 0.108 | (0.657) | 0.114 | (0.566) |
| Mental Health Trust | 0.501\*\* | (0.028) | 0.193 | (0.361) | -0.222 | (0.453) | -0.400\* | (0.095) |
| Foundation Trust | -0.120 | (0.228) | -0.276\*\*\* | (0.003) | -0.163 | (0.155) | -0.460\*\*\* | (0.000) |
| Teaching Trust-  FT Interaction | -0.111 | (0.683) | -0.366\* | (0.090) | -0.0610 | (0.832) | -0.318 | (0.181) |
| Specialist-  FT Interaction | 0.0605 | (0.846) | -0.130 | (0.823) | 2.241\*\*\* | (0.000) | 2.972\*\*\* | (0.004) |
| Mental Health-  FT Interaction | -0.0660 | (0.701) | -0.00124 | (0.995) | -0.163 | (0.412) | 0.269 | (0.204) |
| Ln Care Home Beds | -0.263\*\*\* | (0.000) | -0.287\*\*\* | (0.000) | -0.239\*\*\* | (0.004) | -0.258\*\*\* | (0.000) |
| Ln Care Home Price/Week | 0.221 | (0.433) | 0.418\* | (0.081) | 0.0340 | (0.923) | -0.0206 | (0.935) |
| Ln alpha | -0.807\*\*\* | (0.000) |  |  | -0.511\*\*\* | (0.000) |  |  |
| Ln r |  |  | 1.147\*\*\* | (0.000) |  |  | 0.866\*\*\* | (0.000) |
| Ln s |  |  | 7.393\*\*\* | (0.000) |  |  | 6.831\*\*\* | (0.000) |
| Exposure | Ln Beds in Trust | | Ln Beds in Trust | | Ln Beds in Trust | | Ln Beds in Trust | |
| AIC | 11491.8 | | 11186.7 | | 11031.0 | | 10676.3 | |
| BIC | 11593.4 | | 11297.2 | | 11132.6 | | 10786.8 | |
| s.e. | cluster | | OIM | | cluster | | OIM | |

Negative binomial models. Days of Delay: total days of delay in year. Days of Delay Attributed to NHS: total days of delay in year attributed to NHS. Coefficients are proportionate change in days of delay from one unit increase in explanatory variable. These coefficients are also conditional on year dummies, hospital beds, age, gender, emergency and readmission variables as in Tables 3 and 4. Exposure term has a coefficient of 1. Ln alpha: log of overdispersion. Ln r and Ln s: shape parameters of the beta (r, s) distribution of random effects. AIC: Akaike Information Criterion. BIC: Bayesian Information Criterion. s.e.: standard errors. Cluster: robust standard errors clustered at Trust level. OIM: observed information matrix standard errors. Observations: 614 = 208, 203 and 203 for 2011-12, 2012-13 and 2013-14. \*p < 0.1, \*\*p < 0.05, \*\*\*p < 0.01.

## Table B: Days of Delay without Mental Health Trusts

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Days of Delay | | | | Days of Delay Attributed to NHS | | | |
|  | Pooled Model | | Random Trust Effects | | Pooled Model | | Random Trust Effects | |
| Acute Specialist Trust | -0.796 | (0.256) | -0.674 | (0.232) | -1.318 | (0.106) | -0.359 | (0.536) |
| Acute Teaching Trust | 0.146 | (0.367) | -0.0678 | (0.744) | 0.100 | (0.603) | 0.144 | (0.510) |
| Foundation Trust | -0.185\* | (0.063) | -0.393\*\*\* | (0.000) | -0.191\* | (0.091) | -0.457\*\*\* | (0.000) |
| Ln Care Home Beds | -0.382\*\*\* | (0.000) | -0.455\*\*\* | (0.000) | -0.337\*\*\* | (0.002) | -0.455\*\*\* | (0.000) |
| Ln Care Home Price/Week | -0.250 | (0.554) | 0.344 | (0.305) | -0.223 | (0.653) | -0.172 | (0.631) |
| Ln alpha | -0.768\*\*\* | (0.000) |  |  | -0.456\*\*\* | (0.000) |  |  |
| Ln r |  |  | 1.021\*\*\* | (0.000) |  |  | 0.781\*\*\* | (0.000) |
| Ln s |  |  | 7.123\*\*\* | (0.000) |  |  | 6.720\*\*\* | (0.000) |
| exposure | Ln Beds in Trust | | Ln Beds in Trust | | Ln Beds in Trust | | Ln Beds in Trust | |
| AIC | 8635.8 | | 8379.9 | | 8421.2 | | 8110.5 | |
| BIC | 8718.5 | | 8466.8 | | 8504.0 | | 8197.4 | |
| s.e. | cluster | | OIM | | cluster | | OIM | |

Negative binomial models. Days of Delay: total days of delay in year. Days of Delay Attributed to NHS: total days of delay in year attributed to NHS. Coefficients are proportionate change in days of delay from one unit increase in explanatory variable. These coefficients are also conditional on year dummies, Hospital beds, age, gender emergency and readmission variables as in Tables 3 and 4. Exposure term has a coefficient of 1. Ln alpha: log of overdispersion. Ln r and Ln s: shape parameters of the beta (r, s) distribution of random effects. AIC: Akaike Information Criterion. BIC: Bayesian Information Criterion. s.e.: standard errors. Cluster: robust standard errors clustered at Trust level. OIM: observed information matrix standard errors. Observations: 614 = 208, 203 and 203 for 2011-12, 2012-13 and 2013-14. \*p < 0.1, \*\*p < 0.05, \*\*\*p < 0.01.

**Table C: Model 5 with competing Trusts indicator**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | All Days of Delay | | Days of Delay Due to NHS | |
|  | coef | p | coef | p |
| Acute Specialist Trust | 0.0713 | (0.798) | -0.132 | (0.688) |
| Acute Teaching Trust | -0.137 | (0.363) | -0.0399 | (0.809) |
| Mental Health Trust | 0.208 | (0.220) | -0.215 | (0.283) |
| Foundation Trust | -0.211\* | (0.084) | -0.271\*\* | (0.042) |
| Ln Care Home Beds | -0.296\*\*\* | (0.000) | -0.274\*\*\* | (0.000) |
| Ln Care Home Price/Week | 0.448\* | (0.062) | 0.00965 | (0.970) |
| Other Trusts in the same Local Authority | 0.0909 | (0.469) | 0.128 | (0.352) |
| Interaction of FT \* Other Trusts in LA | -0.186 | (0.223) | -0.193 | (0.352) |
| ln r | 1.174\*\*\* | (0.000) | 0.910\*\*\* | (0.000) |
| ln s | 7.442\*\*\* | (0.000) | 6.934\*\*\* | (0.000) |
| exposure | Ln Beds in Trust | | Ln Beds in Trust | |
| AIC | 11186.1 | | 10695.4 | |
| BIC | 11292.2 | | 10801.5 | |
| s.e. | OIM | | OIM | |

Negative binomial models with Trust level random effects. All Days of Delay: total days of delay in year. Days of Delay Attributed to NHS: days of delay in year attributed to NHS. Coefficients are proportionate change in days of delay from one unit increase in explanatory variable. These coefficients are also conditional on year dummies, Hospital beds, age, gender emergency and readmission variables as in Tables 3 and 4. Exposure term has a coefficient of 1. Ln r and Ln s: shape parameters of the beta (r, s) distribution of random effects. AIC: Akaike Information Criterion. BIC: Bayesian Information Criterion. s.e.: standard errors. OIM: observed information matrix standard errors. Observations: 614 = 208, 203 and 203 for 2011-12, 2012-13 and 2013-14. \*p < 0.1, \*\*p < 0.05, \*\*\*p < 0.01

1. Before the creation of the NHS, Poor Law Authorities were responsible for the social (long-term care) and medical (hospital) needs of people in their area. The difference in cost between caring for an elderly person in hospital and elsewhere may have been small, due to the limited differences between settings in terms of equipment and staff at the time. The National Health Service Act in 1946 specifically set the remit of the new hospital boards created to be providers of hospital care, creating a division of responsibility for the different services. [↑](#footnote-ref-1)
2. Acute NHS hospitals are paid by a prospective payment system with price per patient treated varying with the patient’s Health Resource Group (HRG) which is defined by diagnosis and procedure. Similar grouping with tariff systems, referred to as Diagnosis Related Group (DRG) payment systems, are used in many other European and OECD countries. [↑](#footnote-ref-2)
3. Our unit of analysis is the Trust though many Trusts operate on more than one site. [↑](#footnote-ref-3)
4. The Act allows NHS Trusts to claim reimbursement from Local Authorities in charge of care home and community care provision in their area, if necessary services are not provided in time for the discharge of an acute patient and this is solely the responsibility of the Local Authority. A Trust can only claim such reimbursement if it gives at least three days notice that a patient is likely to require LTC on discharge and at least 24 hours notice of the discharge (DH 2003, DH 2010b). Trusts must report all delays which occur, irrespective of whether they are entitled to reimbursement for them. [↑](#footnote-ref-4)
5. Within the set of Acute Trusts which are not categorised as Acute Specialist or Acute Teaching, there are three subsets: Small Acute, Medium Acute and Large Acute. Size in this instance is defined by income (HSCIC 2013c). We ignore these subsets so that size is measured by beds for all Trust types (Acute, Acute Teaching, Acute Specialist and Mental Health Trusts). [↑](#footnote-ref-5)
6. Other measures of clinical quality such as case mix adjusted mortality are not available for all types of Trust. [↑](#footnote-ref-6)
7. The location of Trusts is defined by the postcode of headquarters. The postcode of the care home provider defines the location of LTC. Postcodes are mapped to lower super output area (LSOA) which have a mean population of 1500. The straight line distance between the centroids of LSOAs is used to determine which care homes are within 10km of each Trust. [↑](#footnote-ref-7)
8. Requirements for obtaining FT status are set out in Monitor (2007), Monitor (2013). [↑](#footnote-ref-8)