Examining the variation across acute trusts in patient delayed discharge

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Abstract

Delayed transfers of care, or delayed discharges, adversely affect patient care and increase costs to England's National Health Service. The main objective of this paper is to explain variation in the probability of delayed discharge from an acute trust and patient perspective. A novel approach is employed in using the Adult Inpatient Survey over the period 2007-2014. We use a two stage regression model to assess the impact of various patient, acute hospital trust, and regional characteristics on the probability of delayed discharge. In the first stage we model the patient-level probability of delayed discharge and estimate hospital trust-specific fixed-effects. Stage two includes multiple linear regressions to explain acute trust fixed effects from stage one by using acute trust characteristics and regional observable characteristics as explanatory variables. Results indicate the probability of delayed discharge varies among acute trusts and patients. Patient-mix complexity, staff skill-mix, size and scope of acute trust are among those factors affecting the trust-specific discharge efficiency.

Keywords: Delayed discharge, acute trust, Adult Inpatient Survey

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1 Introduction

Patient case management, known in England as integrated care pathways, were already applied in the UK for over 45 conditions by 1998 [1]. The aim of integrated care pathways is to decrease hospital variations in clinical practice, by including a protocol with the details of routines of practice and discharge planning, which is communicated to patients. Discharge planning remains a key aspect of treatment pathway and a systematic review of international evidence suggests there is a beneficial effect of discharge planning on decreasing emergency readmission rates [2]. Discharge planning should reduce delayed discharges, but still remains a long-standing problem in England which has been specifically considered under various health policy reforms [3, 4]. Unnecessary delayed discharge may be detrimental for the patient's health, inhibit hospital trusts' ability to improve performance and results in sub-optimal clinical quality and efficiency across the local health economy [5].

A delayed discharge, or delayed transfer of care (DToC), occurs when the patient is medically fit to leave the hospital, either discharged home or transferred to another community care setting [6, 7]. Data on DToC is collected monthly at national level by NHS England, being the only official data related to delays in discharging patients aged 18 and above, and reports the number of patients and bed days lost due to delays. NHS England reports also the organisation responsible for the delay (NHS, social care or both), the type of care being provided (acute or non-acute), and the reason for the delay (among ten specified options). The National Audit Office (NAO) estimates that older patients represent a large majority of patients experiencing delays [8] with 2.2 million beds days lost due to delayed discharge in 1999 that increased to 2.7 million bed days in 2015 [8, 9]. Both internal (such as timing of consultant decisions) and external factors (such as waiting a package for home care and waiting for a nursing home) contributed to delayed discharges.

The literature has mainly examined the impact of external factors, specifically the supply of social care for this patient group, on the use of hospital services and performance of health care providers. In England, areas with larger social care supply not only had a lower hospital demand but also experienced lower rates of delayed discharge and readmission [10, 11]. Higher supply of care-home beds decreased both the number of patients experiencing delayed discharge and the number of delayed days [12, 13]. These results are also supported by the available international evidence [14, 15]. Hospital trusts that coordinate patients' discharge destination with a larger number of local authorities are also more likely to delay discharge [16].

The literature has also investigated the impact on delays of factors such as patient and provider characteristics. Patients of older age, with greater medical complexity, and admitted into hospital as an emergency case were associated with an increased probability of delayed discharge [17, 18, 19, 20, 16]. The evidence on the role of hospital characteristics on delayed discharge is relatively limited, despite the fact that the proportion of delayed days attributable to the NHS has been above those attributable to social care for a prolonged period of time [21]. Foundation trusts in England, which are hospitals with a higher degree of independence for decision-making, show better discharge systems in place than other hospital types and hospital size seems to be a good predictor of efficient discharge processes [13, 16].

This paper analyses variability in delayed discharge across acute hospitals trusts in England, one of the main factors behind unwarranted systemic variability in clinical practice [5]. Our contribution to the literature on delayed discharge is three-fold. First, we bring a new definition of delayed discharge based on patients' experience provided by the Adult Inpatient Survey (AIS), as opposed to other studies that used DToC or administrative data. The AIS is a survey of patient experience during hospital stay which includes, among other dimensions, questions related to the discharge process. We exploit information on whether the patient's discharge was delayed, with any delay defined according to patient's expectations from information received in discharge planning protocols. The question asks respondents whether they had a delay the day of leaving hospital. Our definition of delay is measured in hours, as opposed to days of delays reported by the DToC or administrative data. Secondly, the AIS questionnaire also includes information on the reasons for the delay. We use this information to identify any underlying difference across trusts by delay category. Although research has focused on the organisation responsible for the delay (NHS, social care or both), there has been less attention to the examination of the causes of the delay. Finally, we use a two-stage method to quantify provider variability in delayed discharge accounting for patient-mix and identifying those provider characteristics that explain trust-specific discharge efficiency, therefore contributing to the limited literature on hospital determinants of delayed discharge.

2 Methods

We utilised a two stage regression model in order to: first, isolate the effects of patient characteristics on patient probability of delayed discharge and estimate the unobserved trust-specific fixed effect affecting the likelihood of delayed discharge; secondly, investigate which trust characteristics explain the estimated trust-specific probability of delayed discharge. This two stage regression model increases the statistical efficiency of the model by lowering the variance of the overall model and of the estimated effects of individual variables. Similar models have been used in studies of patient experience surveys and demand for education [22, 23, 24].

The first stage is a logit model to assess the association of various observed patient demographic and admission-related characteristics upon the probability of reporting a delayed discharge. We observe whether the patient is discharged with delay via a latent regression:

$$Y^*_{pj} = \beta^{'} X_p + \phi_j + \epsilon_{pj} \tag{1}$$

Y_{pj} represents whether patient p admitted to acute trust j reported a delayed discharge and β are the coefficients of the patient-level variables X_p. Fixed effects for acute trust j are captured in ϕ_j to seize variation across trusts in the probability of delayed discharge. These acute trust fixed effects will also capture effects of being treated by trusts located across heterogeneous geographical locations. Finally, ϵ_{pj} is the error term. As the outcome of interest takes only two values, the underlying probability of a delayed discharge is expressed as follows:

$$P(Y_{pj} = 1 \mid X_p, \phi_j) = F(\beta^{'} X_p + \phi_j) \tag{2}$$

where *F(.)* is the logistic cumulative distribution function. We first estimate a pooled logit regression for all years and also run a logit for each survey year (from $t = 2007, ..., 2014$), and we estimate the trust-specific fixed effect $\widehat{\phi}$. In the pooled regression this fixed-effect is estimated over the 2007-2014 period, removing any time variation of the trust fixed effect, denoted as $\widehat{\phi_j}$. For each year t logit regression, the fixed effect captures the unobserved fixed-effect specific to each trust per year $\widehat{\phi_{jt}}$. These estimated coefficients reflect the intrinsic trust likelihood of delayed discharge, with some trusts being more likely than others to delay patient discharge, independently of patient characteristics considered in the first stage.

Stage Two investigates which factors explain variability in the acute trust fixed effects using as our dependent variable $\widehat{\phi_{jt}}$, the fixed effect of acute trust j in year t as estimated in Stage One, and explore a regression model with a number of observable trust characteristics as explanatory variables:

$$\hat{\phi}_{jt} = \alpha + \beta' Z_{jt} + \epsilon_{jt} \tag{3}$$

where α is the constant term, β the regression coefficient of acute trust characteristics Z_{jt}, and ϵ_{jt} the residual error term. When using the fixed effect estimated from the pooled regression $\widehat{\phi_j}$, and given the effect is computed as a single figure across all survey years, the explanatory variables are averaged over the study period. When using the fixed effect estimated from the first stage for each year $\widehat{\phi_{jt}}$, the second stage includes year dummies as controls.

3 Data

3.1 Stage One Variables

We use patient responses to the AIS who were treated at 171 acute trusts during the years 2007 to 2014. The AIS is conducted annually by the Care Quality Commission (CQC) to assess patient experience of admitted patient care within England. AIS participants are requested to answer questions pertaining to various aspects of their presentation, admission, treatment, and discharge. The AIS predominantly assesses patient experience during the summer months, and we do not consider seasonal variation by assuming that these monthly variations across trusts are minimised when averaging over different years. Only patients 16 years and older who spent at least one night as an inpatient at an acute trust in England were eligible to receive the survey.

Patients surveyed are selected by taking each trust's last 850 discharges in sequential order during June, July, or August. The survey is mailed to patients after discharge and respondents fill in the survey at home, therefore AIS is unlikely to be affected by courtesy bias. However, questionnaire responses might be susceptible to recall bias, although recall periods of less than six months tend to show a high percentage of accurate reporting (slightly above 98%) [25, 26].

Statistics on the number of patients receiving the AIS and reporting delays by survey year are presented in Table A1 in the Online Supplementary Material. It is not possible to know whether non-response is due to a change in patient's address or whether there exist systematic differences between respondents and non-respondents, although younger patients and men present larger non-response rate than older patients and women. This could represent a potential threat to the estimates if we were to use the AIS to assess clinical aspects of quality of care [22, 27]. However, delay experienced at discharge relates to an objective measure of health care service provision, as opposed to subjective quality measures [22], and therefore we do not anticipate non-response to affect the validity of the discharge information captured in AIS.

A subset of AIS questions are directed towards patient's experience of the hospital discharge process. The main question of interest is *"On the day you left the hospital, was your discharge delayed for any reason?"*. If patients experience a delay they are asked *"What was the main reason for the delay?"* where the respondent indicates whether she had to wait for medicines, to see the doctor, for an ambulance or for other reasons. Patients are also asked *"How long was the delay?"* and this is reported in hours. We first use the question on whether the patient had a delayed discharge to estimate the overall trust fixed effect and subsequently exploit the information on the causes of delay to identify if there are systematic differences across trusts for each delay category. Table A1 in the Online Supplementary Material reports the breakdown of respondents by delay type per year.

In the Stage One logit regression, we use patient-level AIS data on gender and age group to control for variation in patient demographics. In order to capture medical complexity of a patient's admission, the specification includes the following patient controls: type of admission (emergency or other), whether the patient stayed in critical care area, the number of ward transfers (0, 1, $\geq$2), and whether the patient underwent a procedure or operation. Descriptive statistics for these variables per each survey year are summarised in Table A2 in the Online Supplementary Material.

3.2 Stage Two Variables

Using AIS data averaged at trust-level, some second stage variables that represent average admission medical complexity are included to explain the trust-specific likelihood of delay among acute trusts. We included the percentage of patients who stayed in a critical care area and the percentage of patients who underwent an operation or procedure. To allow for unplanned admissions to affect patient discharge management, we also included the acute trust's percentage of emergency admissions to total admissions.

We used Hospital Episode Statistics (HES) to obtain the average patient age and percentage of male admissions per trust and year, and some additional trust characteristics to represent size (total annual admissions), and the number of unique consultant main specialties. To reflect capacity constraints in equipment and staff, we also considered bed occupancy rates, the ratio of annual admissions to medical staff full-time equivalent (FTE) and non-medical staff FTEs. A summary of sample statistics for the patient and hospital level characteristics is provided in Table A3 in the Online Supplementary Material.

Lastly, we control for health and social care needs at regional level. We include population density to capture the effect of transportation from hospitals, especially in rural areas, which has been associated with delayed discharges [28]. Health status and deprivation inequalities were captured by the percentage of individuals with incomes below 60% of the median household income, percentage of population reporting a disability, and the mean values for female Life Expectancy (LE) at birth. Regional inequalities in social care are captured through a ratio of social care expenditures which measures average funding per adult aged 18 and above, measured at 2015 prices according to the Consumer Price Index. Social care expenditures were calculated by summing the following two items: (1) gross total cost for residential and nursing care and home help/care for all adult client groups and older people; and (2) gross total cost for day care or day services to all adults and older people. Regional adult social care expenditures were obtained from the Personal Social Services: Expenditure and Unit Costs data publication (PSS-EX1), which was reported annually in coordination with England's fiscal year.

4 Results

4.1 Stage One: Logit Regression

Column (1) in Table A6 shows the average marginal effects of each patient observable characteristic on the probability of the patient being discharged with delay (within any trust). The estimates are obtained from the pooled sample of the 8 annual surveys. In columns (2) to (9) we report the results from for each survey year data. Overall, results are similar in significance and sign to the estimates in column (1). The results show gender and age are both statistically significant predictors of delayed discharge. Compared to women, men are between 1.4 and 2.2 percentage points (pp) more likely to report a delayed discharge between 2007-2010 but generally this effect is not precisely estimated from 2011 onwards. For the age variable, patients aged 65 and above are less likely to be discharged late compared to younger patients but the effect decreases over time from being 7.4pp less likely in 2007 to 3.2pp in 2014.

Patients with emergency admission are roughly 9.3pp more likely to experience a delayed discharge in 2007 and this effect decreases over time. Compared to an admission with no ward transfers, patients with one ward transfer have higher probability of delayed discharge and this probability is even higher when patients experience two or more ward transfers. In 2012, if a patient was transferred two or more times he was 14.2pp more likely to report a delayed discharge. Patients spending part of their admission in critical care are also more likely to experience a delayed discharge, although the effect is not statistically significant in 2009 and 2011. Patients who have a procedure or operation are less likely to experience a delayed discharge in 2007-2010, but the effect changes sign to positive and significant in 2014. Overall, the individual results suggest that patient severity increasingly became a leading factor for discharge delays.

Table 1: Stage One: Logit model results

Variables	(1) Pooled	(2) 2007	(3) 2008	(4) 2009	(5) 2010	(6) 2011	(7) 2012	(8) 2013	(9) 2014
Male	0.01095***	0.01382***	0.0165***	0.0212***	0.0141***	0.0035	0.0058	0.0088**	0.0011
	(0.0015)	(0.0038)	(0.0040)	(0.0040)	(0.0042)	(0.0042)	(0.0042)	(0.0043)	(0.0044)
Age 51-65	-0.02245***	-0.0324***	-0.0131**	-0.0256***	-0.0240***	-0.0130**	-0.0189***	-0.0328***	-0.0131*
	(0.0020)	(0.0051)	(0.0053)	(0.0055)	(0.0057)	(0.0057)	(0.0061)	(0.0063)	(0.0068)
Age > 65	-0.05324***	-0.0738***	-0.0519***	-0.0621***	-0.0610***	-0.0485***	-0.0422***	-0.0435***	-0.0319***
	(0.0018)	(0.0047)	(0.0049)	(0.0050)	(0.0052)	(0.0051)	(0.0054)	(0.0057)	(0.0059)
Emergency	0.08822***	0.0929***	0.0920***	0.0875***	0.0930***	0.0948***	0.0743***	0.0802***	0.0833***
	(0.0017)	(0.0045)	(0.0047)	(0.0047)	(0.0049)	(0.0049)	(0.0050)	(0.0052)	(0.0053)
1 Ward transfer	0.08106***	0.0738***	0.0842***	0.07581***	0.0813***	0.7951***	0.0865***	0.0831***	0.0840***
	(0.0016)	(0.0044)	(0.0046)	(0.0046)	(0.0047)	(0.0046)	(0.0047)	(0.0048)	(0.0050)
$\geq$ 2 Ward transfers	0.12220***	0.1085***	0.1166***	0.1295***	0.1189***	0.1145***	0.1424***	0.1252***	0.1224***
	(0 .0028)	(0.0075)	(0.0077)	(0.0076)	(0.0079)	(0.0077)	(0.0079)	(0.0080)	(0.0083)
Critical	0.01582***	0.0221***	0.0198***	-0.0003	0.0113**	0.0069	0.0158***	0.0176***	0.0304***
	(0.0019)	(0.0050)	(0.0051)	(0.0052)	(0.0053)	(0.0051)	(0.0053)	(0.0054)	(0.0055)
Procedure	-0.00356**	-0.0189***	-0.0013	-0.0093*	-0.0084*	-0.0018	-0.0071	0.0061	0.0129**
	(0.0017)	(0.0047)	(0.0048)	(0.0048)	(0.0050)	(0.0048)	(0.0050)	(0.0050)	(0.0052)
N	457,973	64,584	61,146	59,042	55,644	59,519	54,909	53,023	50,106
Acute Trust FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	No	No	No	No	No	No	No

Notes: Reported estimates are for the average marginal effects of the explanatory variables. Standard errors in parentheses. Specification in Column (1) includes year fixed effects. Reference category for age is 16-50 years old. Reference category for ward transfer is No transfer. Fixed Effects not reported for parsimony. N is the number of observations. *** p<0.01, ** p<0.05, * p<0.1

4.2 Stage Two: Trust Fixed Effects Linear Regression

4.2.1 Basecase Results

In the second stage we use the estimated coefficients in Stage One for both the trust-average (from the pooled regression) and trust-year specific fixed effects as dependent variable. The variability in trust-specific discharge efficiency is shown in Table A4 of the Online Supplementary Material. Overall, the mean of the fixed effect is negative, indicating that the unobserved or intrinsic hospital factors lower the probability of patient-delayed discharge. Between variation in discharge efficiency is higher than the within variation. This suggests that trusts may have a managerial approach that aims to discharge patients timely.

Table A5 shows the results of the second stage. Columns (1) and (2) show the results when the fixed effect is averaged over the 2007-14 period (corresponding to Column (1) in Table A6). Column (1) in Table A5 shows the results for the empirical specification that controls only for trust-specific characteristics. Column (2) adds observable regional characteristics and yields very similar estimates to those in Column (1). Results presented in Columns (3) and (4) show the pooled OLS estimates (corresponding to Columns (2) to (9) in first stage Table A6), considering variation over time. The last two columns in Table A5 show the results of the estimated coefficients using a random effect panel data model. Although the data has a panel structure, the fact that all trust-specific unobserved variability is measured in the first stage and used in the second stage as dependent variable, removes the need to account for unobservables in the context of a random effects model.

The variables that capture severity and patient complexity in each trust show very similar estimates, highlighting there is no within variation in the case-mix effect over the years as opposed to the between variation across trusts that may exist. Results show the positive effect of higher complexity (percentage of emergency and critical care admissions) on the trust-specific likelihood of delay. Higher proportion of male admissions leads to lower trust-specific likelihood of delay. Trust with higher number of specialties, and high bed occupancy rates experience more delay in discharge, whereas higher volume of admissions reduces the probability of delayed discharge. The estimates for the indicators of staff capacity, ratios of admissions to medical and non-medical staff, show opposed effects. Whereas the ratio to medical staff reduces delay in discharge, the ratio to non-medical staff increases it. All regional variables, except income deprivation, have a significant negative effect in the pooled

Table 2: Stage Two: Trust-Specific Probability of Delayed Discharge

Variables	(1) Pooled first stage	(2) Pooled first stage	(3) Pooled OLS	(4) Pooled OLS	(5) Random effects	(6) Random effects
% Emergency Adm.	0.0052**	0.0062***	0.0054***	0.0062***	0.0038***	0.0044***
	(0.0021)	(0.0022)	(0.0009)	(0.0009)	(0.0012)	(0.0012)
% Critical Care Adm.	0.0078***	0.0082***	0.0081***	0.0082***	0.0065***	0.0065***
	(0.0026)	(0.0027)	(0.0011)	(0.0011)	(0.0013)	(0.0013)
% Procedures/Operations	0.0011	0.0013	0.0007	0.0010	0.0005	0.0005
	(0.0018)	(0.0018)	(0.0007)	(0.0007)	(0.0008)	(0.0008)
% Male Admissions	-0.0149***	-0.0150***	-0.0104***	-0.0112***	-0.0054**	-0.0059**
	(0.0054)	(0.0054)	(0.0022)	(0.0021)	(0.0026)	(0.0026)
Mean Age (Trust-level)	0.0039	0.0058	0.0001	0.0024	-0.0034	-0.0013
	(0.0043)	(0.0043)	(0.0018)	(0.0019)	(0.0027)	(0.0028)
Total Consultant Specialties	0.0093***	0.0091***	0.0099***	0.0095***	0.0087***	0.0078***
	(0.0030)	(0.0030)	(0.0013)	(0.0013)	(0.0018)	(0.0018)
Admits/Med-staff FTEs	-0.0023***	-0.0018**	-0.0018***	-0.0013***	-0.0007**	-0.0005
	(0.0006)	(0.0007)	(0.0002)	(0.0003)	(0.0003)	(0.0003)
Admits/Nonmed-staff FTEs	0.0150***	0.0118**	0.0125***	0.0094***	0.0062***	0.0051***
	(0.0041)	(0.0049)	(0.0016)	(0.0018)	(0.0019)	(0.0019)
Bed Occupancy Rate	0.0068**	0.0037	0.0050***	0.0035***	0.0036***	0.0033***
	(0.0031)	(0.0032)	(0.0010)	(0.0010)	(0.0009)	(0.0009)
Total Admissions (1000s)	-0.0010**	-0.0007	-0.0010***	-0.0008***	-0.0007**	-0.0006*
	(0.0005)	(0.0005)	(0.0002)	(0.0002)	(0.0003)	(0.0003)
Population Density		-0.0052		-0.0023*		0.0014
		(0.0036)		(0.0013)		(0.0017)
Social Care Exp.(pc)		-0.0009*		-0.0009***		-0.0006**
		(0.0005)		(0.0002)		(0.0002)
Regional Female LE		-0.0706*		-0.0460***		0.0016
		(0.0380)		(0.0172)		(0.0234)
Disability Rate		-0.0526***		-0.0352***		-0.0115*
		(0.0182)		(0.0070)		(0.0062)
%Pop. Inc<60% Median		0.0130		0.0050		-0.0023
		(0.0145)		(0.0056)		(0.0071)
Intercept	-1.3428***	5.5266	-1.0721***	3.4411**	-0.9592***	-0.7733
	(0.3175)	(3.5082)	(0.1288)	(1.5473)	(0.1808)	(2.0664)
R-Square	0.4140	0.4417	0.3222	0.3510		
N	169	169	1277	1277	1277	1277
Year Dummies	No	No	Yes	Yes	Yes	Yes

Notes: Standard errors in parentheses. In Columns (1) and (2) the dependent variable $\widehat{\phi_j}$ is the FE estimated from pooled fist stage logit. In Columns (3) and (4) the dependent variable $\widehat{\phi_{jt}}$ is the FE estimated for each trust-year pair, estimated from the logit model for each survey year. In Columns (5) and (6), the dependent variable is as in Columns (3) and (4) and show the estimates resulting from a random effects panel data model. Geographical variables available for 9 regions. Regional variables are averaged over the 2007-2014 period for the pooled first stage in Column (2). We exploit geographical and temporal variability of these regional variables in the models presented in Columns (4) and (6). N is the number of observations. *** p<0.01, ** p<0.05, * p<0.1.

OLS model. We find that higher population density, female LE, social care expenditure and disability rate decrease trust-specific likelihood of delayed discharge.

We also examined differences across the distribution of estimated trust-specific fixed effects by splitting the sample above and below the mean of the estimated fixed effect. Estimates are reported in Table A5 in the Online Supplementary Material. Delays in trusts above the mean fixed effect (less efficient) seem to be driven by patient and regional characteristics, whereas those below the mean are driven mainly by trust characteristics.

4.2.2 Differences in trust-specific probability of delayed discharge by cause of delay

In this section we present the results of examining whether there exist differences in the estimated trust-specific probability of delayed discharge by each one of the four reported reasons of delay: the patient had to wait (1) for medicines, (2) to see a doctor, (3) for an ambulance, or (4) for other reasons. The trust-specific probability of delay is obtained by reason of delay as the fixed effect from a logit model in the first stage. The dependent variable indicator compares each delay category with having no delay. Results from stage one are available in Table A6 in the Online Supplementary Material for the pooled first stage (first stage results for other models are available upon request). Overall results are in line with those in Table A6 except two remarkable differences: a positive effect of older age on delay caused by waiting for an ambulance, and a negative effect of critical stay patients who experience less delay due to waiting for a doctor and to the category "other reasons".

Table 3 presents second stage results by cause of delay. Overall, results are in line with those presented in Table A5 in sign and significance, with some differences across delay type. According to the pooled OLS specification (columns (5) to (8)), we notice that older age has a positive and significant effect only when the main cause of delay is waiting for an ambulance, which is consistent with the positive effect found in stage one. The differential effect of staff skill-mix by reason of delay is remarkable. Whereas shortage in medical staff (shown by admissions to medical staff) has a negative effect on delays caused by medicines or ambulances, it presents a positive effect on delays caused by waiting a doctor. Yet, admissions to non-medical staff ratio increase the trust-specific probability of delay for any reason. Bed occupancy rate only has a significant and positive effect on trust-specific delay when the delay is mainly due to waiting for medicines or to see a doctor, and trust size measured by total admissions has a negative effect for delays due to waiting medicines or the category "other reasons". Regional variables present similar effects as in Table A5.

Table 3: Stage Two: Trust-Specific Probability of Delayed Discharge by Delay Type

	Pooled First Stage				Pooled OLS			
Variables	(1) Medicines	(2) Doctor	(3) Ambulance	(4) Other	(5) Medicines	(6) Doctor	(7) Ambulance	(8) Other
% Emergency Adm.	0.0086***	0.0067**	-0.0029	0.0082***	0.0071***	0.0064***	-0.0024	0.0058***
	(0.0030)	(0.0029)	(0.0041)	(0.0024)	(0.0012)	(0.0014)	(0.0019)	(0.0012)
% Critical Care Adm.	0.0088**	0.0068*	0.0097*	0.0050*	0.0089***	0.0064***	0.0089***	0.0045***
	(0.0036)	(0.0035)	(0.0050)	(0.0029)	(0.0014)	(0.0016)	(0.0022)	(0.0014)
% Procedures/Operations	0.0028	-0.0011	-0.0073**	0.0042**	0.0003	-0.0011	-0.0027*	0.0023**
	(0.0025)	(0.0024)	(0.0035)	(0.0020)	(0.0009)	(0.0011)	(0.0015)	(0.0010)
% Male Admissions	-0.0190***	-0.0071	0.0030	-0.0095	-0.0144***	-0.0076**	-0.0072	-0.0083***
	(0.0072)	(0.0070)	(0.0101)	(0.0059)	(0.0028)	(0.0032)	(0.0045)	(0.0028)
Mean Age (Trust-level)	0.0080	0.0008	0.0150*	0.0017	0.0033	0.0015	0.0077*	0.0008
	(0.0058)	(0.0056)	(0.0082)	(0.0048)	(0.0024)	(0.0028)	(0.0040)	(0.0025)
Total Consultant Specialties	0.0106**	0.0113***	0.0038	0.0091***	0.0111***	0.0104***	0.0025	0.0091***
	(0.0041)	(0.0039)	(0.0057)	(0.0033)	(0.0017)	(0.0020)	(0.0027)	(0.0017)
Admits/Med-staff FTEs	-0.0023**	0.0006	-0.0051***	-0.0013	-0.0019***	0.0007*	-0.0033***	-0.0005
	(0.0010)	(0.0009)	(0.0014)	(0.0008)	(0.0004)	(0.0004)	(0.0006)	(0.0004)
Admits/Nonmed-staff FTEs	0.0113*	0.0069	0.0276***	0.0151***	0.0096***	0.0046*	0.0129***	0.0102***
	(0.0065)	(0.0063)	(0.0091)	(0.0054)	(0.0024)	(0.0028)	(0.0038)	(0.0024)
Bed Occupancy Rate	0.0048	0.0089**	0.0012	-0.0028	0.0035***	0.0080***	0.0007	0.0005
	(0.0043)	(0.0042)	(0.0061)	(0.0036)	(0.0013)	(0.0016)	(0.0022)	(0.0014)
Total Admissions (1000s)	-0.0009	-0.0007	0.0002	-0.0011**	-0.0009***	-0.0005	0.0000	-0.0010***
	(0.0007)	(0.0006)	(0.0009)	(0.0005)	(0.0003)	(0.0003)	(0.0005)	(0.0003)
Population Density	-0.0068	0.0008	0.0004	-0.0059	-0.0039**	0.0030	0.0018	-0.0015
	(0.0048)	(0.0046)	(0.0067)	(0.0040)	(0.0017)	(0.0020)	(0.0028)	(0.0018)
Social Care Exp.(pc)	-0.0012*	-0.0006	-0.0006	-0.0004	-0.0011***	-0.0007**	-0.0008*	-0.0003
	(0.0007)	(0.0007)	(0.0010)	(0.0006)	(0.0003)	(0.0003)	(0.0004)	(0.0003)
Regional Female LE	-0.1232**	0.0397	-0.1570**	0.0211	-0.0923***	0.0690***	-0.1207***	0.0275
	(0.0511)	(0.0493)	(0.0716)	(0.0420)	(0.0222)	(0.0259)	(0.0359)	(0.0228)
Disability Rate	-0.0569**	-0.0382	-0.0641*	-0.0450**	-0.0365***	-0.0226**	-0.0567***	-0.0324***
	(0.0245)	(0.0236)	(0.0343)	(0.0201)	(0.0091)	(0.0106)	(0.0146)	(0.0094)
%Pop. Inc<60% Median	0.0181	-0.0147	0.0057	0.0199	0.0097	-0.0210**	0.0051	0.0043
	(0.0194)	(0.0187)	(0.0272)	(0.0159)	(0.0072)	(0.0084)	(0.0116)	(0.0074)
Intercept	9.1950*	-5.5734	9.0481	-3.8841	6.8124***	-7.8245***	6.5929**	-4.3804**
	(4.7144)	(4.5493)	(6.6021)	(3.8709)	(1.9957)	(2.3351)	(3.2227)	(2.0542)
R-Square	0.3171	0.5095	0.3902	0.4229	0.2682	0.3714	0.2046	0.2538
Number of Ob	169	169	169	169	1,275	1,275	1,268	1,275
N	169	169	169	169	1,275	1,275	1,268	1,275

Notes: Standard errors in parentheses. Stage Two results presented. The dependent variable in Columns (1) to (4) is the FE obtained in Stage One from the pooled logit over the 2007-2014 period for each delay category. The dependent variable in Columns (5) to (8) is the estimated FE from the first stage for each trust-year. The dependent variable in Stage One is a dummy equal 1 if delayed due to category s ($s = medicines, doctor, ambulance, other$) and 0 if no delay. N is the number of observations. *** p<0.01, ** p<0.05, * p<0.1.

5 Discussion

The aim of this paper is to examine the long-standing problem of hospital delayed discharges in England from the patient experience perspective as reported in AIS data. The AIS questionnaire includes information on the discharge process and we exploit information on whether the patient experienced a delay the day of leaving hospital and, for those patients that report a delay, the main reason for the delay. In this paper we introduce a novel approach in the analysis of delayed discharge, in that we are using data from the AIS, a patient experience survey, as opposed to the literature that has used DToC or administrative data. The main question of interest asks respondents whether they experienced a delay the day the left the hospital and, if so, they are prompted to report the delay in hours bands (0-1, 1-2, 2-4 and 4 plus hours of wait). Although the question is intended to capture any delay on the day of leaving hospital, it is not possible to ascertain whether the question captures multiday delay, although there is a significant and positive relationship between LOS and experience of delayed discharge which is robust to controlling for patient characteristics.

By using the definition of delay in the AIS (measured in hours) we are capturing any inefficiency occurring the day of leaving hospital. This inefficiency would add to the inefficiency related to any additional days the patient spent unnecessarily in hospital prior to the day they are discharged. These extra days of delay would be reflected in the type of DToC data commonly used in the literature examining the link between hospital health care provision and supply of social care. In any case, the policy implications of looking at delayed discharge, whether measured in hours on the day of discharge or in number of days as in DToC data, are in both cases related to the management in patient flow of health care providers.

In the first stage of our empirical specification we use AIS patient level data to estimate the impact of patient characteristics on the probability of delayed discharge. Our results suggest that male patients, patients with greater clinical complexity and emergency admissions have an increased probability of delayed discharge, in line with existing evidence [18, 19, 20]. The estimates for age suggest that older patients are less likely to experience delayed discharge. However, the analysis by cause of delay shows a distinct positive effect of age for delays due to waiting an ambulance. The finding of a negative effect of older age on delay in first stage results could be due to the under-representation of younger patients in the AIS [29] which can bias to report larger delays by young respondents.

In the second stage we analyse the likelihood of delayed discharge specific for each trust. The factors associated with this trust-specific probability of delayed discharge capture the average case-mix of patients, some observable trust characteristics, and a number of regional variables to control for regional inequalities. We are able to identify those internal NHS factors that influence delayed discharge, controlling for external factors potentially conditioning trust ability to manage patient discharge efficiently. In line with the first stage results, higher complexity of patient-mix lead to an increased trust-specific delayed discharge.

The most relevant association between hospital characteristics and delayed discharge has been found in the variables capturing medical and non-medical staff capacity. The fact that the admission to medical staff ratio reduces trust-specific probability of delayed discharge (except if delay is due to waiting to see a doctor) whereas the admission to non-clinical staff ratio increases this probability suggests there could be adjustments in the mix of non-medical staff to improve patient flow and discharge efficiency. It is not possible to assess from our results which staff group among the non-medical cluster has a higher impact on delayed discharge. This group includes nurses, midwives, ambulance staff, technical and support staff and managers, among others. Nurses (together with midwives and health visitors) and support to clinical staff account for two thirds of the NHS clinical workforce [30]. Cost-containment polices to meet efficiency targets in the NHS have also led to a reduction in administrative staff [31]. Ensuring adequate staffing levels in these groups seems an appropriate target, especially given nurse shortages [30], and the likely impact this would have on patient management.

Trusts with higher number of medical specialties have a larger trust-specific probability of delayed discharge, possibly reflecting higher complexity in the coordination of processes. Large trusts with high number of admissions manage discharges more efficiently. However, patient flows that result in higher bed occupancy are associated to higher probability of delay discharge. We argue there may be some internal factors related to processes that make the discharge process less efficient when occupancy rates are higher, at the same time that delayed discharge contributes to bed blockage. In other words, delay discharge and bed occupancy rate are intertwined so that bed occupancy rate could in principle be considered endogenous. This would not invalidate our model, which is a reduced form, and coefficients should be interpreted as the association between trust-specific probability of delayed discharge and the set of patient, hospital and geographical variables that we employ.

From our analysis we are unable to link specifically the likelihood of delayed discharge for patients that are transferred to a care home as a function of regional social care supply, but our results are in line with findings in the literature in that social care funding has a knock-on effect on hospital efficiency in discharge practices [10, 12, 13].

6 Conclusion

This research provides insight into those internal aspects of hospital service provision that would benefit from the allocation of additional resources or the transfer of existing resources to reduce delayed discharges. Results showed the probability of delayed discharge increases with increasing admission medical complexity, both at patient and trust levels, including for trusts with larger number of medical specialties. Therefore, actions and resources directed to account for medical complexity in the discharge process could have an effect in reducing delay. Discharge practices from high volume providers could also be adopted by lower volume hospital trusts to improve discharge efficiency. An additional area of potential improvement is on workforce planning of medical and non-medical staff, defining the appropriate levels of workforce mix that facilitate a speedy discharge once patients are medically fit to leave hospital. The results from the analysis also reinforce the role of social care funding as an external factor that conditions trust ability to reduce delayed discharge.

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Appendix A Supplementary Material

Table A1: AIS Main Reason for Delay

	Patients		Delay Type				
Year	No Delay	Delay (†)	Medicines	Doctor	Ambulance	Other	Missing
2007	45,463	28,879	16,649	4,536	2,347	3,686	1,661
2008	42,610	28,321	16,188	4,481	2,306	3,728	1,618
2009	40,848	27,061	15,441	4,159	2,210	3,571	1,680
2010	38,493	26,285	15,087	3,938	2,187	3,422	1,651
2011	40,991	28,487	15,987	4,110	2,613	3,821	1,956
2012	37,570	26,016	15,185	3,491	2,299	3,379	1,662
2013	36,228	25,118	14,560	3,359	2,339	3,378	1,482
2014	33,329	24,745	14,323	3,291	2,419	3,265	1,447
Total	315,532	214,912	123,420	31,365	18,720	28,250	13,157

Source: Adult Inpatient Survey 2007-2014, Care Quality Commission.
†Includes 4,948 missing responses (between 509 to 839 per year) to question *"What was the main reason for the delay?"* for those respondents answering yes to question *"On the day you left the hospital, was your discharge delayed for any reason?"*.

Table A2: Sample Statistics Stage One Variables

Variables	2007	2008	2009	2010	2011	2012	2013	2014
Male	0.4558	0.4618	0.4631	0.4585	0.4661	0.4675	0.4655	0.4709
	(0.4981)	(0.4985)	(0.4986)	(0.4983)	(0.4989)	(0.4989)	(0.4988)	(0.4992)
Age 16-50	0.2608	0.2562	0.2457	0.2355	0.2225	0.2074	0.1997	0.1811
	(0.4391)	(0.4365)	(0.4305)	(0.4243)	(0.4159)	(0.4055)	(0.3998)	(0.3851)
Age 51-65	0.2812	0.2823	0.2799	0.2749	0.2673	0.2649	0.2555	0.2465
	(0.4496)	(0.4501)	(0.4489)	(0.4464)	(0.4426)	(0.4413)	(0.4362)	(0.4310)
Age $>$ 65	0.4580	0.4615	0.4744	0.4897	0.5102	0.5277	0.5447	0.5724
	(0.4982)	(0.4985)	(0.4993)	(0.4999)	(0.4999)	(0.4992)	(0.4980)	(0.4947)
Emergency	0.5136	0.5237	0.5252	0.5351	0.5547	0.5717	0.5842	0.5828
	(0.4998)	(0.4994)	(0.4994)	(0.4988)	(0.4970)	(0.4948)	(0.4929)	(0.4931)
0 Ward transfers	0.6605	0.6573	0.6489	0.6452	0.6452	0.6364	0.6336	0.6275
	(0.4736)	(0.4747)	(0.4773)	(0.4785)	(0.4784)	(0.4810)	(0.4818)	(0.4835)
1 Ward transfer	0.2676	0.2688	0.2740	0.2770	0.2778	0.2849	0.2885	0.2922
	(0.4427)	(0.4433)	(0.4460)	(0.4475)	(0.4479)	(0.4514)	(0.4531)	(0.4548)
$\geq$ 2 Ward transfers	0.0720	0.0740	0.0772	0.0778	0.0770	0.0788	0.0779	0.0803
	(0.2584)	(0.2618)	(0.2669)	(0.2679)	(0.2665)	(0.2694)	(0.2680)	(0.2718)
Critical care	0.1984	0.2026	0.2065	0.2088	0.2125	0.2102	0.2163	0.2230
	(0.3988)	(0.4020)	(0.4048)	(0.4065)	(0.4091)	(0.4075)	(0.4117)	(0.4163)
Procedure/operation	0.6965	0.6862	0.6843	0.6760	0.6538	0.6383	0.6331	0.6368
	(0.4598)	(0.4640)	(0.4648)	(0.4680)	(0.4758)	(0.4805)	(0.4820)	(0.4809)
N	64,584	61,146	59,042	55,644	59,519	54,909	53,023	50,106

Source: Adult Inpatient Survey years 2007-2014.
Notes: N are the number of Observations

Table A3: Sample Statistics Stage Two Trust Variables

Variables	2007	2008	2009	2010	2011	2012	2013	2014
% Emergency Admissions	34.3412	34.8136	35.2755	35.3268	34.7696	35.4120	35.3591	35.8601
	(10.1892)	(9.7022)	(9.5590)	(9.5318)	(9.2269)	(10.0704)	(10.1263)	(10.3414)
% Critical Care Admissions	20.1461	20.8262	20.9744	21.3044	21.6509	21.2654	21.8963	22.1282
	(8.1992)	(7.9723)	(7.8065)	(7.5206)	(7.4086)	(7.2200)	(7.3370)	(7.4077)
% Procedures/Operations	68.0025	66.9662	66.7224	65.6800	63.8153	62.1837	61.7703	61.9618
	(11.9203)	(11.0867)	(10.9355)	(10.8972)	(11.4394)	(10.7546)	(10.9691)	(10.6293)
% Male Admissions (Trust)	49.3883	43.1527	43.2538	43.2655	43.5136	43.7763	43.7980	43.7976
	(6.3671)	(5.2273)	(5.1644)	(5.0421)	(4.9764)	(5.1084)	(5.1976)	(5.1935)
Mean Age (Trust)	50.0250	50.6319	50.9451	51.2256	51.6707	52.0602	52.5361	53.0361
	(5.1955)	(5.2245)	(5.2499)	(5.3092)	(5.3733)	(5.4592)	(5.4380)	(5.4047)
Total Admissions (1000s)	77.5253	81.8736	83.9638	85.5417	86.4992	88.0814	90.3328	92.6743
	(42.6068)	(43.9329)	(45.1382)	(46.3222)	(46.4072)	(48.2309)	(49.7603)	(51.4808)
Total Consultant Specialties	25.6938	25.6933	25.7988	26.7683	26.5915	26.8795	24.9277	25.2289
	(8.3831)	(8.5211)	(8.4062)	(8.6362)	(8.5234)	(8.9995)	(8.3220)	(8.6295)
Bed Occupancy Rate	84.1333	85.0065	84.8571	83.9729	83.5568	84.6239	84.0466	84.7398
	(6.6562)	(6.0961)	(6.3685)	(7.0359)	(7.1626)	(7.1823)	(7.7183)	(7.5710)
Admits/Med-staff FTEs	186.9382	186.0573	182.2685	178.2331	176.1820	173.4761	173.0350	173.3986
	(46.2379)	(46.8330)	(46.4820)	(45.9308)	(42.6393)	(42.7550)	(42.7520)	(46.1104)
Admits/Nonmed-staff FTEs	25.2562	25.1752	25.9181	25.8256	25.5143	24.6345	24.5831	24.4198
	(5.5924)	(5.6316)	(5.8808)	(5.8198)	(6.1515)	(6.5646)	(6.5557)	(6.6924)
N (non-missing)	160	163	164	164	164	166	166	166

Notes: N is the number of Observations. Patient level variables on emergency, critical care and procedures were obtained from averaged AIS data per trust and year. Averaged age and proportion of males per trust and year were computed from HES data.

Table A4: Discharge efficiency: Estimated fixed effects

Year	N	Mean	Std. Dev.	Min	Max
Average	171	-0.685	0.237	-1.704	-.203
2007	165	-0.606	0.271	-1.791	0.038
2008	165	-0.711	0.259	-1.607	-0.164
2009	162	-0.623	0.277	-1.330	0.072
2010	161	-0.611	0.291	-1.736	0.086
2011	161	-0.623	0.284	-1.686	0.034
2012	156	-0.622	0.292	-1.866	-0.045
2013	156	-0.650	0.281	-2.089	-0.025
2014	154	-0.634	0.275	-1.682	-0.072
Overall	1280	-0.635	0.280	-2.089	0.086
Between	171		0.239	-1.694	-0.176
Within			0.144	-1.126	-0.183

Table A5: Second Stage Results: Trust Fixed Effects

Variables	(1) Pooled first stage	(2) Pooled first stage	(3) Pooled OLS	(4) Pooled OLS	(5) Random effects	(6) Random effects
% Emergency Adm.	0.0079***	0.0038	0.0064***	0.0020**	0.0051***	0.0017
	(0.0023)	(0.0027)	(0.0009)	(0.0010)	(0.0011)	(0.0011)
% Critical Care Adm.	0.0062**	-0.0004	0.0047***	0.0016	0.0042***	0.0023**
	(0.0027)	(0.0032)	(0.0011)	(0.0011)	(0.0013)	(0.0012)
% Procedures/Operations	0.0065***	0.0015	0.0038***	-0.0007	0.0015*	-0.0005
	(0.0020)	(0.0020)	(0.0007)	(0.0007)	(0.0008)	(0.0008)
% Male Admissions	-0.0119*	-0.0084	-0.0047**	-0.0063***	-0.0005	-0.0069***
	(0.0065)	(0.0053)	(0.0022)	(0.0022)	(0.0025)	(0.0025)
Mean Age (Trust-level)	0.0131**	-0.0024	0.0061***	-0.0033*	0.0017	-0.0035
	(0.0056)	(0.0037)	(0.0020)	(0.0017)	(0.0025)	(0.0021)
Total Consultant Specialties	0.0041	0.0021	0.0049***	0.0016	0.0048**	0.0020
	(0.0038)	(0.0038)	(0.0015)	(0.0012)	(0.0019)	(0.0014)
Admits/Med-staff FTEs	-0.0004	-0.0011	-0.0001	-0.0007***	0.0002	-0.0006**
	(0.0009)	(0.0007)	(0.0003)	(0.0002)	(0.0003)	(0.0003)
Admits/Nonmed-staff FTEs	-0.0001	0.0042	0.0004	0.0039**	-0.0012	0.0041**
	(0.0062)	(0.0043)	(0.0021)	(0.0015)	(0.0022)	(0.0017)
Bed Occupancy Rate	-0.0034	0.0031	-0.0003	0.0022**	0.0016*	0.0023**
	(0.0036)	(0.0029)	(0.0010)	(0.0010)	(0.0010)	(0.0010)
Total Admissions (1000s)	0.0005	-0.0005	-0.0000	-0.0004*	-0.0002	-0.0004*
	(0.0006)	(0.0004)	(0.0003)	(0.0002)	(0.0003)	(0.0002)
Population Density	-0.0022	0.0024	-0.0016	-0.0004	-0.0012	-0.0007
	(0.0043)	(0.0033)	(0.0015)	(0.0012)	(0.0017)	(0.0013)
Social Care Exp.(pc)	-0.0013**	0.0002	-0.0006***	-0.0001	-0.0004*	-0.0001
	(0.0006)	(0.0006)	(0.0002)	(0.0002)	(0.0002)	(0.0003)
Regional Female LE	-0.0472	0.0436	-0.0443**	-0.0071	-0.0087	-0.0150
	(0.0433)	(0.0350)	(0.0176)	(0.0159)	(0.0216)	(0.0182)
Disability Rate	-0.0347	0.0203	-0.0281***	-0.0073	-0.0152**	-0.0114*
	(0.0210)	(0.0176)	(0.0074)	(0.0065)	(0.0070)	(0.0067)
%Pop. Inc<60% Median	0.0130	-0.0076	0.0116*	-0.0009	0.0115	-0.0007
	(0.0167)	(0.0131)	(0.0061)	(0.0048)	(0.0071)	(0.0056)
Intercept	2.9991	-4.3205	2.5124	0.5736	-0.5971	1.2825
	(3.9591)	(3.2270)	(1.5928)	(1.4318)	(1.9280)	(1.6301)
R-Square	0.3975	0.1392	0.3151	0.1772		
N	80	89	617	660	617	660

Notes: Standard errors in parentheses. See *Notes* in Table 4. Each pair of columns show the estimates when the sample is split below and above the mean of the fixed effect (FE). The average FE is negative, meaning that trusts below average FE have lower trust-specific probability of delayed discharge and trust above mean FE present larger specific probabilities of delay. All estimates include patient, trust and regional variables. Columns (1) and (2) show the estimates for the Pooled estimates corresponding to Column (2) in Table 4 for below and above the mean of the FE, respectively. Similarly, Columns (3) and (4) correspond to the Column (4) and Columns (5) and (6) to Column (6) in Table 4. N is the number of observations. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table A6: Stage One: Pooled First Stage results by cause of delay

Variables	(1) Medicines	(2) Doctors	(3) Ambulance	(4) Other
Male	0.0264***	0.2062***	-0.0786***	0.0252**
	(0.0075)	(0.0131)	(0.0173)	(0.0116)
Age 51-65	-0.0362***	-0.4040***	0.5947***	-0.1159***
	(0.0104)	(0.0168)	(0.0370)	(0.0160)
Age $>$ 65	-0.2470***	-0.7430***	1.4246***	-0.2116***
	(0.0095)	(0.0155)	(0.0322)	(0.0144)
Emergency	0.4417***	0.2653***	0.6801***	0.1696***
	(0.0090)	(0.0156)	(0.0222)	(0.0138)
1 Ward transfer	0.3734***	0.2448***	0.4574***	0.3032***
	(0.0085)	(0.0150)	(0.0195)	(0.0133)
$\geq$ 2 Ward transfers	0.4985***	0.2562***	0.9420***	0.5889***
	(0.0140)	(0.0264)	(0.0270)	(0.0211)
Critical	0.1652***	-0.1536***	-0.0036	-0.0416***
	(0.0094)	(0.0177)	(0.0209)	(0.0150)
Procedure	-0.0400***	-0.0077	-0.1066***	0.0778***
	(0.0088)	(0.0153)	(0.0196)	(0.0139)
year 2008	0.0265*	0.0345	0.0149	0.0693***
	(0.0142)	(0.0239)	(0.0340)	(0.0222)
year 2009	0.0295**	0.0286	-0.0034	0.0866***
	(0.0144)	(0.0243)	(0.0345)	(0.0224)
year 2010	0.0762***	0.0337	0.0480	0.1100***
	(0.0146)	(0.0248)	(0.0346)	(0.0227)
year 2011	0.0612***	0.0426*	0.1187***	0.1897***
	(0.0144)	(0.0245)	(0.0334)	(0.0220)
year 2012	0.0800***	-0.0444*	0.0341	0.1141***
	(0.0146)	(0.0256)	(0.0345)	(0.0229)
year 2013	0.0780***	-0.0462*	0.0717**	0.1212***
	(0.0148)	(0.0260)	(0.0343)	(0.0231)
year 2014	0.1631***	0.0377	0.1691***	0.2643***
	(0.0149)	(0.0262)	(0.0341)	(0.0229)
N	382023	301597	289086	309906
Acute Trust FE	Yes	Yes	Yes	Yes

Notes: Reported estimates are for the coefficients of the logit models for the pooled first stage. Standard errors in parentheses. Reference category for age is 16-50 years old and for ward transfer is No transfer. N is the number of observations. *** p<0.01, ** p<0.05, * p<0.1