Volume-Outcome Effect in a NHS*

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Abstract

Evidence from previous literature reports a negative relation between volume of procedure and mortality rates or other proxies in the health sector. In general, high-volume hospitals appear to achieve smaller mortality rates for specific procedures, although the results are quite variable. The correlation is well known as volume-outcome effect and the main hypothesis addressed are "practice-makes-perfect" and "selective referral". However, most studies focus on US hospitals, which face different incentives than hospitals in a National Health Service (NHS). In order to fulfill such lack in the literature, this study aims to understand what happens in a NHS when using an 8 years database from 2001 to 2008 with records from Portugal. The results reveal a statistically significant negative correlation between volume of procedures and outcome for some medical procedures. Furthermore, the benefits are mainly caused by scale effects but some level of learning-by-doing was also recognized.

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Contents

List of Tables

1 Introduction

The analysis of the correlation between number of procedures and results are quite common in several markets - the volume-outcome effect. An application of this sort of comovement can also be found in the health care context. In general, the results point out that better health outcomes tend to come with larger number of procedures. However, the studies generally concentrate efforts in the US health market or other private markets, keeping the National Health Services (NHS) outside the discussion. And this is quite unexpected, because the European health systems are basically publicly provided and NHS exists in many countries (UK, Spain, Italy, etc).

The correlation is called volume-outcome effect and the main reasons are “practice makes perfect” and “selective referral”[1]. The first idea, caused by scale economies or learning-by-doing, says that greater volume of procedures lead to improved outcomes; whereas the last effect supports that high quality centers atract more patients, which turns to have more volume of procedures. Considering the important implications of the volume-outcome effect, such as causality relations and changes in efficiency due to centralization or decentralization in hospital or surgeon levels, this paper, in a context of NHS, tries to give answer to the question “do centralization of some medical procedures increase the quality of health indicators?”. Using data from an European NHS, from Portugal, the investigation relies on the existence or not of benefits in terms of better health outcomes considering both hospital, through mean mortality of a given procedure for each hospital per year, and patient level, by outcome, which assumes values of zero or one if the patient survived or died respectively, after the procedure. And without leaving unanswered diferences in results due to sort of management, we have also taken samples that capture such variation and others. Using fixed effect (FE), probit and weighted least square (WOLS) models, the results did demonstrated a significant negative relation between volume of procedure and mortality rate/outcome. The medical procedures that supported the hypothesis of practice-makes-perfect were DRGs 14, 113, 148, 202, 203, 274, 318 and 395. Moreover, the way under which volume affects the outcome variable is due to scale and learning-by-doing effects, results that are specially supported by FE and probit regressions.

The paper is organized into six sections. This section comprehends the introduction. Section 2 brings the review of the literature. In section 3 we have a breaf view of the Portuguese Health sector evolution. Section 4 explains the methodology used, whereas section 5 explains the results found and provides some extensions. Section 6 closes the paper with final remarks. And at the end, in the appendix, we have the omitted regressions.

2 Literature review

The literature reports a relation between hospital or surgeon volume (or other measure) and outcomes, as mortality rates or other proxies. In general, it seems to be a positive correlation between greater volume and better outcomes. However, the data and diseases categories used are quite variable. Halm (2002) had reviewed 135 papers about this topic from 1980 to 2000 and found exactly that, the variation on the results found are considerably large. In the next table we summarize the more remarkable works about the theme.

[1]For further details see Luft, Hunt and Maerki (1987).

Table 1: Literature review results

YEAR	AUTHORS	SAMPLE	METHOD	DEPENDENT VARIABLE	INDEPENDENT VARIABLES	RESULTS
2005	Gaynor, Martin; Seider, Harald and Vogt, William B.	California - 1983 to 1999 - CABG[a]	Probit model (bootstraping the standard errors and clustering at the hospital level)	mortality rate	risk adjusters, year dummies, hospital dummies and current and lags of volume	negative correlation between mortality and number of procedures performed; an increase in volume of one case reduces mortality by 0.003 percentage points; scale effects
2006	Ramanarayanan, Subramaniam	US - 1998 to 2003 - CABG[a]	IV[g] approach - Instrument: surgeon exit	physician volume and outcome	1° stage: exit volume; patient characteristics; surgeon fixed effects; hospital fixed effects; hospital characteristics and year dummies; 2° stage: physiscian volume(surgeon experience); patient characteristics; surgeon fixed effects; hospital fixed effects; hospital characteristics and year dummies	each additional procedure a year leads to a reduction of 0.05 percent in the probability of patient mortality; procedure experience adds to a general human capital of the surgeon
1992	Hannan et all	New York - 1985 to 1987 - AAA[b]	Logit model	outcome	hospital volume, surgeon volume, control variables relating to patient and hospital characteristics	inverse relation between hospital/surgeon volume and mortality rate; practice makes perfect hypothesis was not evident and weak selective referral effects were found
1998	Hamilton, Barton H. and Ho, Vivian	Quebec - 1990 to 1993 - hip fracture	OLS[h] and Logit models	outcome, mortality and lenght of stay	patient-specific and/or hospital- specific characteristics; volume	negative relation between surgical volume and both length of stay and in-hospital mortality; decomposing the volume-outcome effect and considering patient and hospital characteristics, there is not significant effect of volume on length of stay or mortality
1992	Farley, Dean E. and Ozminkowski, Ronald J.	US - 1980 to 1987	Multivariate regressions	mortality corrected for severity	volume, teaching status, nursing intensity, and fraction of physician who are board-certificated	practice-makes perfect for AMI[c], hernia repairs and RDS[d] in neonate; selective referral for CAGB[a]
1984	Flood et al.	US - 17 diagnostic categories	OLS and Multiple Logit model	outcome adjusted for severity	volume; initial patient condictions	negative correlation between volume and outcome
1984	Flood et al.	US - 9 diagnostic categories	The standardized regression coeficient, β and the variance ratio, F	outcome adjusted for severity	volume; hospital size, teaching status, expenditures	strong and consistent evidence for the negative relation between volume and outcome

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1987	Luft et al.	US - 1972 - 17 diseases	Simultaneous equation approach: one equation explains outcome and the second equation explains volume	volume and outcome	1) volume, geografic regions, medical school affiliation, transfer in/transfer out, medical staff on govern board; 2) death rate, neighbors, medical school affiliation, medical staff/beds, volume of appendectomies	practice-makes-perfect hypothesis was supported for 11 of the 17 procedures; selective referral hypothesis was supported for respiratory distress syndrome and subarachnoide hemorrhage
2002	Birkmeyer et al.	US - 1994 to 1999 - 14 diseases[e]	Multiple logistic regression model	mortality corrected for severity	volume	inverse relation for volume and mortality for all procedures
2000	Ho, Vivian	California - 1984 to 1996 - angioplasty	Logistic regression model	mortality rate	volume	inverse relation for volume and mortality
2002	Ho, Vivian	California - 1984 to 1996 - PTCA[f]	Probit model	outcome (mortality or CABG[a])	volume and year dummies	there was reduction in mortality rates or CABG[a] over time, for all hospitals, without take into account the volume; volume was associated with better outcomes, although the effect was small; there was no evidence of learning-by-doing; there was reduction on costs, for high-volume hospitals, evidencing economy of scale
2006	Gowrisankaran et al.	California and Florida - Whipple procedure, CABG[a], AAA[b]	Conditional logit model and maximum likelihood	mortality rate	volume, surgical experience of hospital, effect of experience on mortality, risk factors of the patient, hospital characteristics	practice-makes-perfect (and also learning-by-doing) for CABG[a] and AAA[b]; ambiguous results for Whipple procedure

[a]Coronary artery bypass graft.; [b]Abdominal aortic aneurysm.; [c]Acute myocardial infarction.; [d]Respiratory distress syndrom [e]Six types of cardiovascular procedures and eight types of cancer resections.; [f]Percutaneous translumial coronary angioplasty.; [g]Instrumental variable.; [h]Ordianry least square.

The widely used outcome measure is the mortality, many times adjusted for severity among other variations. For some specific diseases, more demanding measures can be also used as the outcome (e.g.,sometimes CABG was used as the outcome for the volume of PTCA). Several studies mainly apply logistic regressions which seems appropriate, according to the distribution of the data. Whether the specification consider that volume of procedures is an exogenous variable, then one should conclude in the direction of "practice-makes-perfect" hypothesis. Otherwise, "selective referral" must be the case. Furthermore, the practice-makes-perfect hypothesis seems to dominate the selective referral hypothesis in most of the results. In order to investigate such event in the Portuguese Health Market, some arguments from these previous papers will be used. However, our research had sometimes presented limitations due to data restrictions, which somehow constrained the analysis. In the CABG case, as an example, this is a widely studied procedure that were also considered here but in a small sample with only six hospitals.

3 The Portuguese Health System

In the beginning of 70s, Portugal had performed health indicators far from to be satisfatory, specially when comparing with other ocidental countries in Europe. On that time, the health system appeared to be quite fragmented and the spending in health represented only 2,8% of the gross domestic product(GDP). In 1971, a reformulation had created the primary care centers. After the democratic revolution in 1974, the Constitution of 1976 established health as a right for all people and created the national health service. Around 1985, considering the joining of Portugal into the actual European Union, the spending in health had increased and promoted enhancements.

In the 90s, important enouhg to be highlighted, they have started the incentives for the participation of the private sector (generally through administration tranference of public hospitals to the private sector) and the regionalization of the health system, sharing the country in five main areas - *Administrações Regionais de Saúde*. In this decade, also the payment system was changed becoming a more prospective one. And in the last decade, efforts to keep the more enterpreneurial-like management have been made together with new regulamentation in the pharmaceutical market and changings in the waiting lists.

Looking for better and better efficiency in the health sector, the motivation for this study goes towards the enhancement of quality in the market. Pursing such goal, if we could show that volume-outcome effect is indeed present in the data then health policy will matter and the centralization for some medical procedure will have real effects.

4 Methodology

4.1 Data

The data was obtained from *Administração Central do Sistema de Saúde*(ACSS). Additional data as hospitals' characteristics were also drawn from ACSS and available documents in hospitals' web pages. All Portuguese discharges in hospital (92 hospitals) from 2001 to 2008 were included (with some exceptions due to imcomplete observations for all years or even particular type of management).

The measure of volume is the number of occurrences for the selected DRG. On the other hand, the outcome variable was first the mortality rate, per diagnosis-related group(DRG), per hospital and per year. The variable is computed as the total number of deaths divided by the total number of occurrences:

$$(mort)_{i,h,t} = (number\_deaths)_{i,h,t}/(number\_occurrences)_{i,h,t}, \quad (1)$$

where i indexes for the DRG; h, for the hospital; and t indexes the year.

The DRGs studied had been selected according to the importance to the health market. As importance, one can understand it as being the volume of admissions in the whole sample. The next tables present the DRGs used in the investigation and a detailed description of the main variables used.

Table 2: Selected DRGs

DRG	Description
14	Intracranial hemorrhage or cerebral infarction
78	Pulmonary embolism
79	Respiratory infections & inflammations, age >17, with cc
82	Respiratory neoplasms
89	Simple pneumonia & pleurisy, age >17, with cc
113	Amputation for circ system disorders except upper limb & toe
127	Heart failure & shock
140	Angina pectoris
148	Major small & large bowel procedures, with cc
172	Digestive malignancy, with cc
202	Cirrhosis & alcoholic hepatitis
203	Malignancy of hepatobiliary system or pancreas
239	Pathological fractures & musculoskeletal & conn tiss malignancy
274	Malignant breast disorders, with cc
296	Nutritional & misc metabolic disorders, age >17, with cc
318	Kidney & urinary tract neoplasms, with cc
320	Kidney & urinary tract infections, age >17, with cc
331	Other kidney & urinary tract diagnoses, age >17, with cc
366	Female reproductive system malignancy, with cc
395	Red blood cell disorders, age >17
403	Lymphoma & non-acute leukemia, with cc
416	Septicemia, age >17

Table 3: DRG volume

DRG	2001	2002	2003	2004	2005	2006	2007	2008	Total
14	19868	20450	19737	21005	21728	21504	22546	19268	166106
78	1093	1110	1346	1468	1397	1356	1561	1449	10780
79	2202	2511	2933	3492	3260	3504	3959	3748	25609
82	3236	3735	3715	3765	3849	4163	4660	3756	30879
89	13282	15830	17507	17535	20972	18909	23564	19482	147081
113	1819	1797	1755	2135	1814	1799	2067	1852	15038
127	12034	12267	12089	13265	13569	13815	16386	14013	107438
140	1370	1502	1129	1413	1176	850	901	714	9055
148	2666	2973	3291	3432	3831	4121	4442	3929	28685
172	3356	3572	3582	3690	3883	4219	4346	3648	30296
202	5604	5608	5810	5741	5457	5311	5655	4370	43556
203	2451	2549	2689	2869	3119	3286	3549	3049	23561
239	354	326	379	437	343	577	669	497	3582
274	609	581	589	564	493	716	676	614	4842
296	1320	1373	1552	1601	1736	1919	1898	1765	13164
318	471	428	446	539	580	664	659	719	4506
320	2982	3607	4331	4848	5351	6288	6762	6749	40918
331	729	886	895	1188	1408	1495	2298	2199	11098
366	528	562	539	593	556	644	727	644	4793
395	2051	2154	2400	2210	2462	2750	2575	2292	18894
403	1366	1357	1417	1417	1494	1715	1877	1323	11966
416	1125	1203	1674	1879	2339	2621	2752	2852	16445

Table computed after FE regressions.

Table 4: Mortality mean

DRG	2001	2002	2003	2004	2005	2006	2007	2008	Mean
14	0.05771	0.03299	0.04087	0.04906	0.04318	0.06684	0.05005	0.05643	0.049643575
78	0.36726	0.36548	0.27802	0.28280	0.35017	0.28138	0.28999	0.30010	0.314398275
79	0.20109	0.19307	0.15888	0.16232	0.12780	0.16519	0.16366	0.11784	0.161229438
82	0.12667	0.11691	0.09474	0.15006	0.13597	0.11108	0.12037	0.09602	0.118974788
89	0.05440	0.05214	0.03969	0.04057	0.02992	0.03335	0.02469	0.04246	0.039652888
113	0.32713	0.30098	0.30225	0.34122	0.33004	0.28331	0.29684	0.26355	0.30566535
127	0.07021	0.06557	0.09314	0.09755	0.05708	0.07830	0.04624	0.06176	0.071231775
140	0.62240	0.62206	0.58822	0.56774	0.49278	0.57145	0.56388	0.49074	0.564907938
148	0.25324	0.17316	0.19163	0.14452	0.17193	0.12070	0.16364	0.13824	0.169631263
172	0.12104	0.10276	0.15638	0.09784	0.10198	0.11176	0.10714	0.13219	0.116385863
202	0.14750	0.15640	0.14814	0.14288	0.13736	0.14455	0.14428	0.12455	0.143206213
203	0.15325	0.19705	0.14724	0.17194	0.13343	0.12723	0.11899	0.12451	0.146705363
239	0.69691	0.61474	0.62998	0.42509	0.57174	0.45919	0.44658	0.52714	0.5464216
274	0.45149	0.48352	0.39356	0.47786	0.44809	0.41792	0.41027	0.45961	0.442790963
296	0.46965	0.35279	0.39155	0.41020	0.39208	0.38788	0.34504	0.35521	0.388049863
318	0.38491	0.45528	0.34508	0.36121	0.33715	0.32955	0.23562	0.28074	0.341192388
320	0.30696	0.27597	0.27540	0.30495	0.22289	0.22833	0.19152	0.17928	0.248162463
331	0.55714	0.52657	0.45846	0.42940	0.45549	0.45818	0.29536	0.31490	0.436939138
366	0.51582	0.48176	0.49758	0.48844	0.51543	0.39357	0.39308	0.42101	0.463334588
395	0.43465	0.39742	0.45894	0.45622	0.45561	0.52205	0.42772	0.45560	0.451026375
403	0.30303	0.25022	0.25234	0.19897	0.25015	0.28724	0.20931	0.29483	0.255759025
416	0.23568	0.21343	0.16609	0.14610	0.22585	0.16387	0.14031	0.13005	0.177670663

Table computed after FE regressions.
The values were transformed applying the exponential function.

Table 5: Specific hospital characteristics

variable	mean	sd	min	max
mean_age	70.35397	6.946467	0.7272727	99
frac_women	0.1194742	0.1866004	0.0015723	1
ds2	13.50543	9.86012	0.441	47.851
lotation	364.1154	292.3203	10	1497
icm	1.024096	0.2688495	0.47	2.5
dm	7.401138	1.309396	4.18	20.5
mc2	0.0049111	0.0025007	0	0.0304008

$ds2 = (patients\_gone)/(10^3)$.
$lotation = occupation\_beds\_mean$.
$icm = case\_mix\_index$.
$dm = waiting\_time$.
$mc2(patient\_cost) = [(total\_cost)_{h,y}/ds_{h,y}]/(10^6)$.

The sample has, after all selections, 92 hospitals, 23 DRGs and 8 years of observations. From the tables, it is quite clear the pattern of volume and mortality rates, taking hospitals mean. The volume of procedure was stable over the years with slight increases for some DRGs. On the other hand, mortality rates had increased for more than half of procedures considered. Furthermore, specific hospital characteristics were presented in order to give the reader an idea about the size, severity and level of costs.

4.2 Empirics

On this topic is of concern to discuss about causality relations between volume and outcome. It plays an important role for specification of the models. Whether we state that outcome is the dependent variable, so we are tending to accept the practices-makes-perfect hypothesis. Otherwise, the selective referral hypothesis should be the explanation. However, due to specific characteristics of the Portuguese NHS, the selective referral hypothesis does not take place and in principle there is no need for discussion about the relevant hypothesis. The patients cannot choose the hospital to be treated, they are directed to one or another hospital, according to the area where they live.

Taking such context into considerantion, we had applied first the FE regression, considering that there exist some unobservable effects in the hospital level, and then, we had set fixed effects on that level. Consequently, specifying the equation[2]:

$$(mort)_{i,h,t} = \alpha + \beta * (vol\_gdh)_{i,h,t} + \delta * (mean\_age)_{i,h,t} + \phi * (frac\_women)_{i,h,t} + \theta * (hospital\_characteristic)_{h,t} + \epsilon_{i,h,t} \quad (2)$$

Given the data and the above equation we had used the STATA 9 version to compute

[2]We had also used year dummies to control for time variations and the standard errors were bootstraped, clustered at the hospital level.

the fixed effect regression[3] in order to obtain a pattern about the behavior of volume and outcome. There we applied the xtreg command. Furthermore, considering the characteristics of the Portuguese market, we had divided the sample in two categories, according to the sort of management: EPE and SPA. The results are presented in the next section.

Afterwards, we changed the unit of analysis from hospital to individual levels. It was performed several probit models with outcome[4] as the dependent variable. On the side of the explanatory variables, we had used the volume of procedures, considering all procedures,excluding the transference cases (as we supposed that maybe the transfers could be the most complicated cases, which in turn could have changed the results), and using just the urgency and not transference cases. However, one weakness of this model, when applied to our sample, is that the computation assigns the same importance for all hospitals in the sample, without considering the size of the hospital in terms of volume of procedures. Taking into account this fact, we also performed the WOLS regression model for the same data. In both cases, the relevant specification[5] is:

$$\begin{aligned}(outcome)_{n,i,h,t} = \alpha + \beta * (vol\_gdh)_{i,h,t} + \delta * age_n + \phi * gender_n \\ +\theta * (hospital\_characteristics)_{h,t} + \epsilon_{n,i,h,t}\end{aligned} \tag{3}$$

where n indexes patients and the other indexes are the same as before.

Asking more, given the negative correlation found that will be explained in a while, it would be important to understand what is behind, i.e., whether the practice-makes-perfect hypothesis is due to scale effects or to a learning-by-doing process. To address that question, we performed several probit models to investigate if the probability of death responds to the acumulated volume of procedures for the DRGs. In other words, we want to verify if today's outcome is being affected by accumulated volume of procedures in previous years. In the beginning we tended to follow what was done in Gaynor, Seider and Vogt (2005), where they highlighted the importance of including a set of lags of volume as explanatory variables for the outcome of a given year for some DRG to distinguish the differences among lags of volume for near and far years. However, our sample showed a very high correlation[6] among the acummulated volume variables (it will be defined below) and we ended up with just one of them, the accumulated volume of 2008, which comprehends the sum of volume of procedures from 2004 to 2007. On this step, the especification is:

$$\begin{aligned}(outcome)_{n,i,h,2008} = \alpha + \beta * (acumvol\_08)_{i,h} + \delta * age_n + \phi * gender_n \\ +\theta * (hospital\_characteristics)_{h,2008} + \epsilon_{n,i,h}\end{aligned} \tag{4}$$

[3]For each DRG.

[4]It is a binary variable that assumes values equal to zero or one if the individual survived or died after the medical prcedure, respectively.

[5]Year and hospital dummies were used.

[6]See appendix for more details.

where

$$(acumvol\_2008)_{i,h} = \sum_{t=2004}^{2007} (vol\_gdh)_{i,h,t} \tag{5}$$

5 Results

5.1 FE, probit and WOLS

The rule of thumb is that volume of procedures have an inverse relation with mortality rate. The starting point is a FE regression with only volume as the independent variable to explain mortality rates. From the 23 DRGs investigated only DRGs 140 and 239 failed to have such relation. The coefficients of volume of procedure for this regressions and the others that will be explained in a while can be seen in the next table. The complete results are presented in the appendix. When including mean age, percentage of women, hospital characteristic and year dummies as explanatory variables of the FE regressions, the number of DRGs that have such relation for the volume of procedures decreases to 12. The mean age had a mainly negative relation with mortality rate as well, although most of the coefficients were not significant, what is unexpected. But it should be carefully interpreted according with medical details not known from the authors at this moment. Greater percentage of women tend to increase the mortality rates and the hospital control variables have most not significative coefficients. Of course, it was a general exercise which will be filtered to capture details that could be altering the results. Before that, we splited the general sample in two subsamples: *Empresas Públicas Empresariais*(EPE) and *Setor Público Administrativo*(SPA) hospitals, according to management type and the results reduced the number of DRGs with significant coefficientes for volume of procedures: the FE regressions for the EPE sample had only 9 supporting volume-outcome effect, whereas the SPA sample had 7. The firts step in this direction of capturing small details of the sample was to draw a subsample that excludes the transference cases. The motivation for this relies on the fact that maybe the most complicated cases in the hospitals are suffering some level of selective referral and in order to avoid it such cases were excluded. The results point out that, comparing with the FE regressions for the general sample, 3 new DRGs are included among the ones with significant inverse relation for volume and outcome and DRG 403 has no inverse relation anymore. Such results suggest that some level of selective referral might be happening for the new significative DRGs (79, 127 and 203).

As discussed in the theoretical part, we immediatly excluded the selective referral hypothesis to explain the volume-outcome effect in the Portuguese case, due to specific rules of the country in the health market, but now is the time to reconsider the assumption mainly due to the evidence seen in the sample without transference cases. Although it is not formally possible, it might be the case that arrangements behind the scenes are happening. As an example, one could think of a patient that goes to the health center near to his residence and the physician realizes that there exists other health center that might be more adequate to take care of the patient's problem. Then, together with the patient, they agree that the doctor is going to tranfer the patient to that center. It somehow configurates a selective referral which was excluded by hypothesis and now will be considered as possible, given that we cannot control for this exemplified case and any other that might end up working in a way that characterizes selective referral. In order to avoid these possibilities and be sure that our sample has only cases that can be labeled as practice-makes-perfect, we designed a sample that contains only the discharges characterized in the sample as urgency and that were not transferences. It rules out potential cases of selective referral and keep consistency with the specification of the model[7]. The results list again 14 DRGs as the ones with negative coefficients for volume. Taking again the FE regression for the general sample as the benckmark, we have now 2 new DRGs, 148 and 203, which might be suffering the consequences of selective referral and due to this reason was not significant in the FE regressions for the general sample and now do so.

Keeping the pattern of refining the first FE result where all except two of DRGs presented a negative coefficient for volume when without other explanatory or control variables, we now change the level of observation from hospital to patient level. It somehow increases the amount of information once we substitute mean variables of hospitals for individual data of patients. Following the same logic to split the samples (except that we are not going to distinguish between management sort of hospitals anymore), the first probit regression models, which includes volume of procedure, age, gender and hospital characteristics as explanatory variables plus year dummies, show that 11 of the 23 DRGs investigated supported the volume-outcome effect, meaning that an increase in volume tends to decrease the probability of death after the medical procedure. The relevant DRGs are 14, 79, 113, 140, 148, 202, 203, 331, 366, 395 and 416 and only 5 of them appeared also in the general FE regressions. In the sample without transference cases, the number of DRGs supporting the effect is also 11, being 7 of them also present in the FE regression without transference cases list of DRGs that had significative inverse relation between volume and mortality rates. As a matter of fact, DRG 239 was added to the list of significant DRGs for the sample without transferences, but it surprisingly has a positive coefficient and an intuition for this is lacked at this moment. Furthermore, the sample that excludes the possibility of selective referral has also 12 DRGs that corroborates with volume-outcome effect, where 8 of them also appeared in FE regressions for the same subsample. Considering the other explanatory variables and given an overall perspective of all discussed subsamples, age has here an expected positive sign and gender has a negative effect for men, whereas the hospitals characteristics coefficients are a little different: patients gone, waiting time and cost mainly have a positive relation with probability of death; case-mix index (ICM) shows no pattern, and mean lotation appeared to

[7] Further details of simultaneous relationships between volume and mortality can be verified in Barker, Rosenthal and Cram (2010).

have a negative relation, which could also be interpreted as some volume-outcome effect level in the sense that the greater is the mean lotation, the greater should be the capacity of the hospital to receive patients and in turn the greater might be the volume of procedures.

As explained before, we turn the attention now to the WOLS regressions to verify whether the individual level regression results are or not similar to the ones found in the hospital level, taking into account the volume of procedures for each DRG, in each hospital, for each year as a weight to perform the WOLS regressions and control for heteroskedasticity. The regressions considering all observation had 9 DRGs (14, 79, 82, 89, 202, 203, 320, 403, 416) supporting volume-outcome effect, although only 4 of them (14, 82, 202 and 403) appeared also in the regressions for the hospital level and 5 of them coincide with the ones for the probit regressions on the general sample. Changing attention to the sample without transference cases, the DRGs with significant and negative coefficients for volume are the same of the general sample plus DRGs 127, 148, 318, 395 and minus DRG 320. And analyzing the sample that most excludes the possibility of selective referral, the list of the supportive DRGs is more reduced, composed by DRGs 14, 79, 82, 89, 127, 202, 318, 403 and 416. Furthermore , as expected, age has positive coefficients.

Summarizing the results, the "survival" DRGs (the ones where the coefficients of volume are statistically significant across all samples - general, without transference cases and urgency that are not transference cases) for FE regressions are 11 (14, 78, 82, 113, 172, 202, 274, 296, 318, 366 and 395), for probit regressions are 10 (14, 79, 113, 140, 148, 202, 203, 331, 395 and 416) and for WOLS regressions are 7 (14, 79, 82, 89, 202, 403 and 416). Taking the intersection of these samples, it is only DRGs 14 and 202. Furthermore, the intersection of the most reasonable sample (the one that excludes potential selective referral) increases the set also with DRGs 14 and 82. However, maybe it is not so strict as suggested at first glance. If we take only the intersection between FE and probit regressions (one considering analysis of hospital level and other of individial level) for the sample without potential selective referral, the "survival" DRGs are 14, 113, 148, 202, 203, 274, 318 and 395, whereas the intersection between FE and WOLS regressions are the set of DRGs 14, 82, 202, 318 and 403.

Just to make a comparison with the fiding results on the literature, it is presented some shared and sometimes contrary results to ours, although they are related to private health services. The DRG 148, labelled as major small & large bowel procedures, was also studied by Flood et al (1984) and they share with us the presence of volume-outcome effect, although they highlighted this event mainly for a group of patients in a low-risk category. Moreover, Birckmeyer et al (2002) studied pancreatic resection which is also included in our sample as DRG 203 and they found that high-volume hospitals tend to perform better outcomes what corroborates with our finding. From Luft, Hunt and Maerki (1987), the DRGs 14, 148, 202 appear as common diseases studied (and also DRG 121, which will be discussed separately). However, they found no volume-outcome effect for DRG 148, whereas our results show learning-by-doing effect. On the same sample, they found no effect for cirrhosis (DRG 202) and we found significant volume-outcome effect. DRG 14, which is related to intracranial hemorrage or cerebral infarction, show significant scale effect and some level of learning-by-doing in our models and they, using sub-arachnoid hemorrage and aneurism (these diseases seem to require similar medical interventions), recognized selective referral effects what is expected, given the specialized techniques required for the treatment. The similarities and differences recognized in the literature mean nothing in terms of right and wrong, specially because we and them dealed with different enviroments, but they indicate that we are trying to understand the same type of questions and that some medical procedures might behave in a near pattern, what cannot be answered at this point yet.

Table 6: Volume of procedure coefficients

	FE				Probit			WOLS		
	FERWV	FER	FERWOTC	FERWOSR	PR	PRWOTC	PRWOSR	WOLSR	WOLSRWOTC	WOLSWOSR
drg14	-0.00009*	-0.00005*	-0.00007*	-0.00007*	-0.00030**	-0.00040**	-0.00041**	-0.00011**	-0.00016**	-0.00017**
	(0.00004)	(0.00002)	(0.00003)	(0.00003)	(0.00007)	(0.00011)	(0.00011)	(0.00001)	(0.00001)	(0.00001)
drg78	-0.00447**	-0.00310**	-0.00338**	-0.00345**	0.00043	0.00057	0.00075	-0.00024	-0.00031	-0.00021
	(0.00110)	(0.00100)	(0.00105)	(0.00111)	(0.00193)	(0.00211)	(0.00221)	(0.00026)	(0.00030)	(0.00031)
drg79	-0.00095**	-0.00037+	-0.00053*	-0.00042+	-0.00119**	-0.00154**	-0.00154**	-0.00027**	-0.00034**	-0.00035**
	(0.00026)	(0.00021)	(0.00024)	(0.00023)	(0.00028)	(0.00036)	(0.00037)	(0.00006)	(0.00008)	(0.00008)
drg82	-0.00088**	-0.00084**	-0.00060**	-0.00073**	-0.00003	-0.00024	-0.00053	-0.00067**	-0.00069**	-0.00064**
	(0.00019)	(0.00022)	(0.00021)	(0.00025)	(0.00034)	(0.00041)	(0.00101)	(0.00014)	(0.00014)	(0.00019)
drg89	-0.00012**	0.00002	-0.00004	-0.00002	-0.00009	-0.00006	-0.00005	-0.00007**	-0.00007**	-0.00007**
	(0.00004)	(0.00002)	(0.00003)	(0.00003)	(0.00010)	(0.00011)	(0.00011)	(0.00001)	(0.00001)	(0.00001)
drg113	-0.00370**	-0.00423**	-0.00454**	-0.00622**	-0.00276**	-0.00262**	-0.00229*	-0.00019	-0.00049+	-0.00051
	(0.00076)	(0.00090)	(0.00133)	(0.00176)	(0.00071)	(0.00083)	(0.00098)	(0.00025)	(0.00029)	(0.00036)
drg127	-0.00038**	-0.00028+	-0.00044**	-0.00014	0.00001	0.00004	0.00008	-0.00001	-0.00007**	-0.00007**
	(0.00010)	(0.00015)	(0.00015)	(0.00013)	(0.00033)	(0.00035)	(0.00035)	(0.00002)	(0.00003)	(0.00003)
drg140	-0.00021	-0.00106	-0.00099	-0.00216	-0.00246**	-0.00274**	-0.00257**	-0.00007	-0.00002	0.00001
	(0.00093)	(0.00129)	(0.00173)	(0.00160)	(0.00059)	(0.00076)	(0.00072)	(0.00005)	(0.00009)	(0.00010)
drg148	-0.00123*	-0.00059+	-0.00045	-0.00211**	-0.00219**	-0.00257**	-0.00342**	-0.00020+	-0.00032**	-0.00031
	(0.00047)	(0.00031)	(0.00033)	(0.00073)	(0.00059)	(0.00057)	(0.00129)	(0.00011)	(0.00012)	(0.00028)
drg172	-0.00084**	-0.00051*	-0.00059*	-0.00104**	0.00004	-0.00002	-0.00086+	0.00005	0.00001	0.00017
	(0.00025)	(0.00020)	(0.00023)	(0.00035)	(0.00045)	(0.00045)	(0.00049)	(0.00011)	(0.00012)	(0.00019)
drg202	-0.00038**	-0.00028**	-0.00035**	-0.00048**	-0.00155**	-0.00168**	-0.00181**	-0.00012**	-0.00019**	-0.00020**
	(0.00011)	(0.00009)	(0.00011)	(0.00014)	(0.00031)	(0.00035)	(0.00035)	(0.00004)	(0.00005)	(0.00007)
drg203	-0.00102**	-0.00050+	-0.00069*	-0.00177**	-0.00209**	-0.00214**	-0.00234*	-0.00071**	-0.00082**	-0.00035
	(0.00038)	(0.00030)	(0.00032)	(0.00047)	(0.00048)	(0.00056)	(0.00094)	(0.00013)	(0.00014)	(0.00034)
drg239	-0.00623	-0.00318	-0.00543	-0.01812+	0.00109	0.00179*	0.00672	-0.00072	-0.00070	-0.00172
	(0.00443)	(0.00395)	(0.00444)	(0.00974)	(0.00094)	(0.00090)	(0.00636)	(0.00058)	(0.00063)	(0.00253)
drg274	-0.01175**	-0.00723*	-0.00550*	-0.00703*	-0.00190	-0.00223	-0.00334*	0.00041	0.00029	0.00004
	(0.00403)	(0.00279)	(0.00228)	(0.00333)	(0.00145)	(0.00146)	(0.00146)	(0.00065)	(0.00068)	(0.00102)
drg296	-0.00407**	-0.00330**	-0.00315**	-0.00382**	-0.00040	0.00006	0.00004	-0.00097	-0.00137	-0.00207
	(0.00090)	(0.00079)	(0.00085)	(0.00100)	(0.00143)	(0.00147)	(0.00156)	(0.00074)	(0.00094)	(0.00155)
drg318	-0.00851**	-0.00684*	-0.00921**	-0.01423**	-0.00295	-0.00298	-0.01010*	-0.00006+	-0.00011**	-0.00011*
	(0.00264)	(0.00269)	(0.00217)	(0.00348)	(0.00330)	(0.00325)	(0.00411)	(0.00004)	(0.00004)	(0.00004)
drg320	-0.00130**	-0.00054+	-0.00041	-0.00047	-0.00019	-0.00032	-0.00033	-0.00015*	-0.00014	-0.00014
	(0.00027)	(0.00030)	(0.00029)	(0.00030)	(0.00055)	(0.00058)	(0.00059)	(0.00007)	(0.00009)	(0.00013)
drg331	-0.00328*	-0.00168	-0.00228+	-0.00248+	-0.00135**	-0.00196**	-0.00216**	0.00005	-0.00036	-0.00027
	(0.00132)	(0.00102)	(0.00115)	(0.00138)	(0.00035)	(0.00049)	(0.00035)	(0.00086)	(0.00094)	(0.00158)

continued on next page

drg366	-0.01784**	-0.01175**	-0.01259**	-0.01874**	-0.00309**	-0.00321*	-0.00196	-0.00006	-0.00007	-0.00005
	(0.00495)	(0.00352)	(0.00401)	(0.00407)	(0.00119)	(0.00130)	(0.00275)	(0.00005)	(0.00005)	(0.00008)
drg395	-0.00208*	-0.00193*	-0.00251**	-0.00361**	-0.00155**	-0.00140**	-0.00155**	-0.00035	-0.00060*	-0.00035
	(0.00079)	(0.00085)	(0.00084)	(0.00113)	(0.00045)	(0.00044)	(0.00042)	(0.00026)	(0.00029)	(0.00045)
drg403	-0.00270**	-0.00136*	-0.00139+	-0.00272**	-0.00109	-0.00118	-0.00210	-0.00024*	-0.00036**	-0.00038**
	(0.00069)	(0.00064)	(0.00078)	(0.00094)	(0.00084)	(0.00095)	(0.00133)	(0.00010)	(0.00013)	(0.00013)
drg416	-0.00093*	-0.00020	-0.00037	-0.00038	-0.00118**	-0.00139**	-0.00162**	-0.00056**	-0.00057*	-0.00056*
	(0.00041)	(0.00021)	(0.00031)	(0.00032)	(0.00022)	(0.00032)	(0.00028)	(0.00020)	(0.00027)	(0.00028)

** p<0.01, * p<0.05, + p<0.1
Standard errors in parentheses
FE and probit have robust sandard errors clustered at hospital level
FERWV = FE regression with volume
FER = FE regression with volume
FERWOTC = FE regression without transference cases
FERWOSR = FE regression without (potential) selective referral
PR = Probit regression
PRWOTC = Probit regression without transference cases
PRWOSR = Probit regression without (potential) selective referral
WOLSR = WOLS regression
WOLSRWOTC = WOLS regression without transference cases
WOLSWOSR = WOLS without (potential) selective referral

5.2 Learning by doing

In the industrial organization is quite common to study the effects of raising the number of goods produced on costs or quality of them. We did the same question for the health market. Precisely, we are interested in understanding what is the effect on the probability of death for a given patient when the volume of medical procedure in previous years increases in a given hospital. As specified on the last section, the independent variables are the 2008 acummulated volume of procedures and the other normal explanatory variables, whereas outcome in 2008 is the dependent variable. It is important to note that learning by doing will explain the relation whenever the coefficient of accumulated volume for 2008 is significant and negative. Going through the results, we had an heterogenous set. The DRGs 14, 113, 148, 172, 202, 203 and 331 are supporting that the volume-outcome effect is due to some level of learning by doing for 2008. The complete regression results are shown in the appendix. These results somehow goes in the oposite direction of Gaynor, Seider and Vogt(2005) where they found that only contemporaneous effects were statistically significant when explaining probability of death in terms of accumulated volume of medical procedure for CABG (which is not in our sample now), but they are not perfectly comparable, since our model gives the same importance for past volume in differente years, whereas they distinguish among them.

A natural question that comes after it is to ask what happens with our previous results for the FE, probit and WOLS when truncating the sample at year 2005. Basically, we want to exclude the hypothesis that the volume-outcome effect found in the data is due to observations that goes from 2001 and 2004 and be more precise about the alleged learning-by-doing effect. The results are also in the appendix. Approximately, half of the DRGs with significant volume of procedures coefficients in the general sample regressions also did so for the FE regressions on the truncated sample. The DRGs with negative significant coefficients for volume are 82, 113, 127(new), 296 and 366. For the truncated probit regressions, we had DRGs 14, 79, 113, 148, 202, 203, 239(+), 331, 366, 395 and 416; whereas, for the truncated WOLS regressions, the negative significant ones were 14, 79, 82, 148, 202, 203, and 416. And what can be concluded from there is that the learning-by-doing alleged evidence is somehow supported by the volume-outcome effect found mainly in the probit regressions considering the truncated sample for DRGs 14, 113, 148, 202, 203 and 331.

5.3 Extensions

5.3.1 Cardiac group experiment

As highlighted before, some important medical procedures were not included in the sample due to absence of observations for all hospitals of the sample. It is possivel to verify on table 2 that we have no DRGs for cardiac problems, although they are common procedures analysed in the literature, like the CABG procedure in Gaynor, Seider and Vogt(2005), Ramanarayanan(2006), Farley and Ozminkowski(1992) and Ho(2002). The reasons are mainly the amount of costs involved, the mortality rate associated and the frequency at which the procedures are used in the hospitals. Due to that, we decided to analyse a couple of DRGs related to cardiac problems, using only six hospitals, the ones that had occurences for the DRGs. The studied DRGs were: 107, CABG w/o PTCA w cardiac catheterization; and 109, CABG w/o PTCA w/o cardiac catheterization. The regressions on hospital level were dropped due to absense of positive observation means for all hospitals. But still, we proceeded the probit and WOLS regressions, where the sample without the eldest represents 97.63% of the general sample. However, the results show no volume-outcome effect at all for them, as can be verified on the next table.

Given the not significant results found in this later limited sample, we continued our investigation on the cardiac problems studing DRG 121, which is related to AMI and is possible to develop the analysis over hospital and patient level. The results can be seen on the next table and they support volume-outcome effect in a robust way, given the level of significance across the different econometric models, what was also verified in Luft, Hunt and Maerki (1987).

Table 7: CABG regression coefficients

	Probit		Probit wo transfer		Probit wo eldest		VWLS		VWLS wo transfer		VWLS wo eldest	
DRG	107	109	107	109	107	109	107	109	107	109	107	109
vol_gdh	-0.00174	-0.00023	-0.00082	0.00014	-0.00168	-0.00000	-0.00052	-0.00003	-0.00086	-0.00002	-0.00082	-0.00003
	(0.00148)	(0.00059)	(0.00121)	(0.00070)	(0.00135)	(0.00068)	(0.00064)	(0.00004)	(0.00075)	(0.00004)	(0.00062)	(0.00004)
age	0.03264**	0.02380**	0.03188**	0.02114**	0.02894**	0.02161**	0.00200**	0.00081**	0.00219**	0.00065**	0.00157**	0.00068**
	(0.00294)	(0.00377)	(0.00468)	(0.00326)	(0.00485)	(0.00477)	(0.00041)	(0.00013)	(0.00048)	(0.00014)	(0.00042)	(0.00014)
gender	0.10905	0.11714	0.18478+	0.18754**	0.18391*	0.10417	0.00850	0.00605+	0.01627	0.00871*	0.01367	0.00495
	(0.07917)	(0.12752)	(0.09530)	(0.07125)	(0.08800)	(0.10232)	(0.01019)	(0.00334)	(0.01193)	(0.00355)	(0.00988)	(0.00328)
ds2	0.06105**	0.05373**	0.05801**	0.07487**	0.06040**	0.05322**	-0.01777	0.00089	-0.02256	0.00428	-0.02152	0.00041
	(0.00645)	(0.00816)	(0.00894)	(0.01384)	(0.00798)	(0.00949)	(0.01407)	(0.00305)	(0.01577)	(0.00324)	(0.01351)	(0.00298)
lotation	-0.00028	-0.00070**	-0.00012	-0.00070**	-0.00014	-0.00064**	0.00005	-0.00002	0.00007	-0.00003+	0.00007	-0.00002
	(0.00058)	(0.00011)	(0.00063)	(0.00013)	(0.00065)	(0.00011)	(0.00007)	(0.00002)	(0.00008)	(0.00002)	(0.00007)	(0.00002)
icm	0.47877**	0.36197*	0.46992**	0.55376**	0.44022*	0.32584*	0.00338	-0.02422	0.07741	-0.04747	0.03214	-0.01407
	(0.17803)	(0.14086)	(0.18043)	(0.15827)	(0.20976)	(0.13045)	(0.18532)	(0.03854)	(0.20449)	(0.04002)	(0.17870)	(0.03767)
dm	-0.64405*	-0.48136**	-0.74008**	-0.74086**	-0.65218*	-0.52366**	-0.11813	-0.00301	-0.17321	0.00762	-0.16868+	-0.00265
	(0.25429)	(0.09743)	(0.21733)	(0.08934)	(0.27642)	(0.11414)	(0.09786)	(0.02061)	(0.11142)	(0.02245)	(0.09449)	(0.02012)
mc2	160.81581**	105.80358**	152.87285**	136.17054**	167.75650**	106.12247**	0.40433	3.70583	-5.74234	7.46047	-0.68275	2.67285
	(15.96326)	(10.78631)	(14.51507)	(17.78626)	(16.02756)	(12.71247)	(19.73426)	(5.39884)	(22.67334)	(6.01660)	(19.00823)	(5.30240)
Obs	1810	9595	1502	8024	1748	9401	1810	9595	1502	8024	1748	9401
R-squared							0.03173	0.01074	0.03503	0.01223	0.02599	0.00874

** $p<0.01$, * $p<0.05$, + $p<0.1$
Standard errors in parentheses
Robust standard errors adjusted for cluster in hosp_id2 for probit

Table 8: AMI regression coefficients

	FE			Probit			WOLS		
	General	wo transfer	wo eldest	General	wo transfer	wo eldest	General	wo transfer	wo eldest
vol_gdh	-0.00074**	-0.00070**	-0.00094**	-0.00113**	-0.00128**	-0.00119**	-0.00014**	-0.00013**	-0.00013**
	(0.00025)	(0.00021)	(0.00029)	(0.00031)	(0.00034)	(0.00032)	(0.00004)	(0.00005)	(0.00004)
mean_age	-0.00248	-0.00853	0.00058						
	(0.00836)	(0.00549)	(0.00383)						
frac_women	0.42666+	0.24965	0.11057						
	(0.21955)	(0.19043)	(0.17229)						
ds2	-0.00344	-0.00050	-0.00548	0.01518+	0.01787+	0.01701*	0.00251**	0.00162	0.00122
	(0.00292)	(0.00302)	(0.00330)	(0.00809)	(0.00938)	(0.00801)	(0.00090)	(0.00111)	(0.00092)
lotation	0.00003	0.00006	0.00002	-0.00042**	-0.00059**	-0.00045**	0.00002	-0.00008**	0.00002
	(0.00005)	(0.00006)	(0.00007)	(0.00015)	(0.00020)	(0.00015)	(0.00002)	(0.00003)	(0.00002)
icm	-0.03766	-0.02953	-0.00623	0.10196	0.02462	0.12281+	0.01037	0.00056	0.00251
	(0.04892)	(0.04342)	(0.02827)	(0.06522)	(0.08053)	(0.06941)	(0.01329)	(0.02150)	(0.01355)
dm	-0.02483	-0.01487	-0.03594+	0.03194+	0.06265*	0.03527+	0.02246**	0.03457**	0.02418**
	(0.02205)	(0.02405)	(0.01943)	(0.01778)	(0.03129)	(0.01922)	(0.00610)	(0.00730)	(0.00640)
mc2	-4.24048	-0.73301	-4.31439	45.98096**	53.65729**	51.70797**	0.01304	-0.47851	-2.55656
	(3.74642)	(4.03060)	(3.48821)	(15.33812)	(15.52487)	(17.46663)	(1.70145)	(2.18975)	(1.77584)
age				0.03010**	0.02830**	0.02798**	0.00545**	0.00567**	0.00412**
				(0.00099)	(0.00098)	(0.00124)	(0.00012)	(0.00014)	(0.00013)
gender				0.05723**	0.04401*	0.08966**	0.01370**	0.01102**	0.01685**
				(0.01853)	(0.01892)	(0.01988)	(0.00305)	(0.00368)	(0.00318)
Obs	393	380	358	57073	42858	43902	57073	42858	43902
R-squared	0.22588	0.16276	0.18337				0.06937	0.07901	0.05109

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

Standard errors in parentheses

Robust standard errors adjusted for cluster in hosp_id2 for probit

5.3.2 Economic impact

The real impact of volume-outcome effect depends on the volume of activity. Such volume could be leveraged with centralization of medical procedures. Here follows an exercise to verify what would happen with outcome when the volume of activity is increased, considering specific caracteristics of the portuguese health sector as a whole and after considering the centralization under the two highest-volume hospitals for each significant DRG in the FE regressions for the general sample. For the general exercise, we computed the change in mortality due to the observed volume and the volume plus 10%, taking the mean values for all hospitals for volume of procedure in 2008 (remember that the effects of the other explanatory variables and also the fixed effect cancel out when taking the differences to compute the changes), whereas in the second exercise we first selected the two highest-volume hospitals in the general sample and after computed the change in mortality promoted by the centralization effect (sum of volume for both hospitals and other independent variables taken as the highest-volume hospital value) compared with the change in mortality performed for each hospital alone, also for 2008.

Table 9: Economic Impact

DRG	β	vol	vol+10%	mort	$\beta * vol$	$\beta * (vol + 10\%)$	Change	
drg14	-0.00005	296.7727	326	0.0557675	-0.01484	-0.01632	-0.00148	-0.148%
drg78	-0.0031	27.77778	31	0.3156498	-0.08611	-0.09472	-0.00861	-0.861%
drg82	-0.00084	65.35	72	0.1206876	-0.05489	-0.06038	-0.00549	-0.549%
drg113	-0.00423	34.8	38	0.2650982	-0.14720	-0.16192	-0.01472	-1.472%
drg121	-0.00074	101.03	111	0.17184	-0.074765974	-0.082242571	-0.007476597	-0.748%
drg172	-0.00051	56.97015	63	0.1484734	-0.02905	-0.03196	-0.00291	-0.291%
drg202	-0.00028	79.16071	87	0.1427868	-0.02216	-0.02438	-0.00222	-0.222%
drg274	-0.00723	11.11667	12	0.4600916	-0.08037	-0.08841	-0.00804	-0.804%
drg296	-0.0033	33.64912	37	0.3561511	-0.11104	-0.12215	-0.01110	-1.110%
drg318	-0.00684	15.39216	17	0.3696677	-0.10528	-0.11581	-0.01053	-1.053%
drg366	-0.01175	13.12281	14	0.421546	-0.15419	-0.16961	-0.01542	-1.542%
drg395	-0.00193	50.9661	56	0.4673263	-0.09836	-0.10820	-0.00984	-0.984%
drg403	-0.00136	25.53572	28	0.2902989	-0.03473	-0.03820	-0.00347	-0.347%

Table 10: Economic Impact II

DRG	hosp	β	vol	mort	$\beta * vol$	$\beta * (vol + 10\%)$	Change	
14	HUCO	-0.00005	703	0.0077	-0.0352	-0.0708	-0.0357	-3.565%
	ALMA		713	0.0083	-0.0357			
78	HUCO	-0.0031	178	0.0476	-0.5518	-0.7161	-0.1643	-16.430%
	MARI		53	0.1667	-0.1643			
82	PULI	-0.00084	232	0.0119	-0.1949	-0.4301	-0.2352	-23.520%
	JOAO		280	0.0104	-0.2352			
113	ANTO	-0.00423	136	0.0909	-0.5753	-1.0406	-0.4653	-46.530%
	HUCO		110	0.1	-0.4653			
121	JOAO	-0.00074	312	0.02941	-0.23088	-0.48618	-0.2553	-25.530%
	MATO		345	0.02326	-0.2553			
172	HUCO	-0.00051	204	0.0154	-0.1040	-0.2117	-0.1076	-10.761%
	IPOP		211	0.0095	-0.1076			

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202	MARI	-0.00028	180	0.0625	-0.0504	-0.1333	-0.0829	-8.288%
	HUCO		296	0.0222	-0.0829			
274	IPOC	-0.00723	86	0.0333	-0.6218	-0.9688	-0.3470	-34.704%
	IPOP		48	0.0455	-0.3470			
296	MARI	-0.0033	151	0.3333	-0.4983	-0.8679	-0.3696	-36.960%
	SANT		112	0.0476	-0.3696			
318	IPOP	-0.00684	38	0.0769	-0.2599	-0.8345	-0.5746	-57.456%
	JOAO		84	0.0769	-0.5746			
366	IPOL	-0.01175	50	0.04	.	.	.	.
	HUCO		108	0.0667	-1.2690			
395	MARI	-0.00193	246	0.1429	-0.4748	-0.6716	-0.1969	-19.686%
	HUCO		102	0.2	-0.1969			
403	HUCO	-0.00136	127	0.0294	-0.1727	-0.3114	-0.1387	-13.872%
	MARI		102	0.0435	-0.1387			

In the next table, it is reported some previous findings in the literature. It could be noted the similarity in gains, which shows it in terms of reduction in mortality, around 1%. Comparing with the centralization effect gains, it was not found previous exercises and it is clear that the gains are quite large, however note that such centralization in most of times implies an increase in volume that sometimes goes beyond 100%.

Table 11: Economic Impact III (in the literature)

Reference	Period	Procedure	Δ volume	Mort reduction
Ho (2000)	1984-1987	PTCA	h90 to h600[a]	0.06%
	1988-1992	–	–	0.05%
	1993-1996	–	–	0.03%
Ho (2002)	1984-1996	PTCA	270 prcedures (hospital)	0.04%
Ramanarayanan (2006)	1998-2003	CABG	1 procedure (surgeon)	0.05%
Farley and Ozminkowski (1992)	1980-1987	AMI	10% (hospital)	2.20%
	–	RDS	–	1.20%
	–	hernia repair	–	6.80%
Gowrisankaran et al (2006)	1993-1997	AAA	50% (hospital)	0.50%
	1988-1999	CABG	–	0.50%
	1988-1999	Whipple procedure	–	2.10%
Gaynor, Seider and Vogt (2005)	no specific value reported			
Luft, Hunt and Maerki (1987)	no specific value reported			
Hannan et al (1992)	no specific value reported			
Hamilton and Ho (1998)	no specific value reported			
Birkmeyer et al (2002)	no specific value reported			
Flood et al (1984)	no specific value reported			

[a] h90 is low-volume hospital whereas h600 is high-volume;

6 Final remarks

In a work developed by Gaynor, Seider and Vogt (2005), they found a positive correlation between greater volume and better health outcomes for the US health market. A question that we can address is whether it might also occur in a national health system. It is an important issue, because several countries in Europe are nationally supported and so the incentives and behavior might be diffent from what is reported in the literature for the private markets. We had used data from a NHS, from Portugal, which has some particular features. Specially, people cannot choose the hospital where they are going to be treated. Patients are allocated according to the place of residence. In principle, this law rules out the selective referral hypothesis that might support the volume-outcome evidence found in some previous papers. Remaining only with the practice-makes-perfect hypothesis, we specified a model and used FE, probit and WOLS regressions to infer about such evidence.

The results were quite variable, according to the medical procedure we were dealing with. This variation was also referred on other works. The volume-outcome effect, characterized as the correlation between volume of procedures and outcomes, has indeed been identified for some medical procedures. Dealing with general sample with and without transference cases, it was realized that the beginning assumption of absense of selective referral in the data would be wrong and some level of that would be happening. Then it was designed a sample that excludes such possibility in order to be consistent with the econometric specification. The most important results, supported by FE and probit regressions, was that DRGs 14, 113, 148, 202, 203, 274, 318 and 395 show volume-outcome effect through at least scale gains. Furthermore, DRGs 14, 113, 148, 202, 203 and 331 showed the effect through learning-by-doing. Moreover, we noted that the more enterpreneurial-like management seems to get more benefits from volume-outcome effect. Some extensions were provided. Using a small subsample to look for the volume-outcome effect in DRGs related to cardiac problems, CABG procedures showed no evidence of such effect and AMI had a robust effect. Moreover, answering the centralization research question, the findings for the economic impact analysis were that an increase in 10% of volume of procedure has an impact of reducing around 1% in mortality rates as a mean. Greater changes would be obtained for centralization. As an example for DRG 14, it would be the case that a reduction around 3.5% could be achieved in hospitals HUCO and ALMA, if they the volume of procedure observed in the two hospitals were produced at the same place.

The current results are preliminary. They did demonstrated evidence of the volume-outcome effect and it might become a question that will matter for policy, specially for the DRGs where improvements were recognized in the economic impact extension. Further relevant discussions as transferences of costs from government to patients, such as transportation to the health center, were put apart and not covered in this work.

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Appendices

The complete regression coefficients are presented in this appendix. They have control dummies for year in all regressions and control dummies for hospitals in the VWLS regressions. These coefficients were supressed to save space. However, they are available by request.

Table 12: FE regression coefficients for the general sample

	Model 1			Model 2								
DRG	vol_gdh	R-squared	Obs	R-squared	vol_gdh	mean_age	frac_women	ds2	lotation	icm	dm	mc2
drg14	-0.00009*	0.03291	507	0.67056	-0.00005*	0.00485+	1.30653**	0.00128+	-0.00005+	-0.01126	-0.00784+	5.52103*
	(0.00004)				(0.00002)	(0.00267)	(0.15822)	(0.00077)	(0.00003)	(0.01334)	(0.00469)	(2.76387)
drg78	-0.00447**	0.06881	362	0.21780	-0.00310**	-0.01209**	0.43959**	0.00874+	-0.00009	0.01813	-0.04131	10.02943
	(0.00110)				(0.00100)	(0.00341)	(0.11224)	(0.00469)	(0.00014)	(0.08180)	(0.03678)	(10.48342)
drg79	-0.00095**	0.05721	410	0.22250	-0.00037+	-0.00849*	0.26172**	0.00114	-0.00028	-0.00759	0.02779	17.64253
	(0.00026)				(0.00021)	(0.00348)	(0.09566)	(0.00498)	(0.00021)	(0.06115)	(0.03035)	(15.02407)
drg82	-0.00088**	0.02118	435	0.07166	-0.00084**	0.00357	0.15236	-0.00215	0.00006	-0.00622	-0.01882	-2.53618
	(0.00019)				(0.00022)	(0.00421)	(0.09687)	(0.00196)	(0.00004)	(0.03704)	(0.01643)	(5.03654)
drg89	-0.00012**	0.03165	512	0.59369	0.00002	-0.00335	1.98174**	0.00168	-0.00006	0.01194	0.00643	4.74917
	(0.00004)				(0.00002)	(0.00219)	(0.12166)	(0.00112)	(0.00004)	(0.01976)	(0.00785)	(3.45929)
drg113	-0.00370**	0.04850	366	0.13987	-0.00423**	-0.01768**	0.20631	-0.00437	0.00004	-0.02367	0.01790	5.55411
	(0.00076)				(0.00090)	(0.00607)	(0.13206)	(0.00364)	(0.00008)	(0.07458)	(0.03874)	(9.87326)
drg127	-0.00038**	0.07029	507	0.20238	-0.00028+	-0.00880	1.52483	0.00439*	-0.00011	-0.06178*	0.01086	16.72413+
	(0.00010)				(0.00015)	(0.00580)	(2.18299)	(0.00219)	(0.00009)	(0.02808)	(0.01325)	(8.69404)
drg140	-0.00021	0.00038	158	0.16358	-0.00106	-0.01707*	0.11742	-0.02998	0.00066**	0.35586	-0.04935	-17.32656
	(0.00093)				(0.00129)	(0.00811)	(0.18362)	(0.02228)	(0.00021)	(0.30663)	(0.05432)	(22.38085)
drg148	-0.00123*	0.04845	369	0.18789	-0.00059+	-0.00743*	0.99274**	0.00113	0.00000	-0.06112	0.00614	3.50688
	(0.00047)				(0.00031)	(0.00285)	(0.32817)	(0.00300)	(0.00009)	(0.07848)	(0.01369)	(5.38958)
drg172	-0.00084**	0.02507	491	0.16217	-0.00051*	0.00042	0.28372*	-0.00207	0.00004	-0.18584*	0.01879	-2.52867
	(0.00025)				(0.00020)	(0.00355)	(0.13285)	(0.00204)	(0.00006)	(0.07193)	(0.02483)	(5.48460)
drg202	-0.00038**	0.01466	411	0.06948	-0.00028**	-0.00379	0.10943	0.00003	-0.00009	-0.02687	-0.06076	6.94227
	(0.00011)				(0.00009)	(0.00292)	(0.09263)	(0.00268)	(0.00005)	(0.09880)	(0.04418)	(10.96159)
drg203	-0.00102**	0.02518	470	0.16327	-0.00050+	0.00101	0.33594**	0.00310	-0.00007	-0.02615	-0.00993	9.11080+
	(0.00038)				(0.00030)	(0.00227)	(0.12503)	(0.00200)	(0.00006)	(0.08677)	(0.01590)	(5.32636)
drg239	-0.00623	0.03174	202	0.17955	-0.00318	-0.00702*	0.35505**	-0.00060	-0.00001	0.02526	-0.04440	-6.99201
	(0.00443)				(0.00395)	(0.00296)	(0.12535)	(0.01232)	(0.00026)	(0.42300)	(0.07741)	(17.96187)
drg274	-0.01175**	0.10904	390	0.37622	-0.00723*	0.00100	0.74635**	-0.00205	0.00011	0.25607+	0.02264	-19.35635
	(0.00403)				(0.00279)	(0.00166)	(0.08032)	(0.00529)	(0.00013)	(0.13386)	(0.03242)	(12.07843)
drg296	-0.00407**	0.06219	377	0.15472	-0.00330**	-0.00990+	0.66179**	-0.00966*	0.00024*	-0.15386	0.04248	-16.85944
	(0.00090)				(0.00079)	(0.00521)	(0.18497)	(0.00420)	(0.00010)	(0.16040)	(0.03382)	(10.58316)
drg318	-0.00851**	0.09572	258	0.16011	-0.00684*	0.00020	0.03667	-0.01152	-0.00003	-0.02596	-0.04080	-30.89887
	(0.00264)				(0.00269)	(0.00389)	(0.10139)	(0.00956)	(0.00015)	(0.19212)	(0.03406)	(22.91680)
drg320	-0.00130**	0.08585	408	0.22581	-0.00054+	-0.00991*	1.71801**	-0.00595	-0.00013	-0.04116	-0.08278**	13.85119
	(0.00027)				(0.00030)	(0.00453)	(0.55740)	(0.00680)	(0.00017)	(0.05148)	(0.02853)	(16.48324)
drg331	-0.00328*	0.12280	225	0.32133	-0.00168	-0.00451	1.65016**	-0.01383	0.00009	0.05246	-0.06930	-29.34343
	(0.00132)				(0.00102)	(0.00672)	(0.32524)	(0.01451)	(0.00022)	(0.31986)	(0.09809)	(28.37674)

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drg366	-0.01784**	0.15070	406	0.30182	-0.01175**	-0.00167	0.61662**	-0.01008+	-0.00005	0.02454	-0.02948	-7.76361
	(0.00495)				(0.00352)	(0.00190)	(0.09525)	(0.00505)	(0.00010)	(0.14231)	(0.04589)	(9.19641)
drg395	-0.00208*	0.03298	292	0.09984	-0.00193*	-0.01208	0.96124	0.01312	-0.00031	0.17970	-0.00645	14.85861
	(0.00079)				(0.00085)	(0.00832)	(0.98738)	(0.01209)	(0.00019)	(0.35795)	(0.04233)	(30.63795)
drg403	-0.00270**	0.05183	366	0.14217	-0.00136*	0.00039	0.29536**	-0.00690	-0.00011	0.01636	-0.00889	-4.91049
	(0.00069)				(0.00064)	(0.00261)	(0.10392)	(0.00431)	(0.00013)	(0.17016)	(0.03415)	(10.38215)
drg416	-0.00093*	0.02802	434	0.27579	-0.00020	-0.00112	0.50061**	0.00274	0.00001	-0.09185+	-0.04016+	5.54035
	(0.00041)				(0.00021)	(0.00173)	(0.11848)	(0.00265)	(0.00007)	(0.04792)	(0.02088)	(5.81718)

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

Robust standard errors adjusted for cluster in hosp_id in parentheses

Table 13: FE regression coeficients for EPE sample

DRG	vol_gdh	mean_age	frac_women	ds2	lotation	icm	dm	mc2	Obs	R-squared
drg14	-0.00004*	0.01119*	1.70161**	-0.00004	-0.00001	-0.00358	0.00359	1.04063	287	0.60242
	(0.00002)	(0.00541)	(0.49675)	(0.00050)	(0.00002)	(0.01180)	(0.01014)	(1.22735)		
drg78	-0.00243**	-0.01658**	0.55088**	0.01040+	-0.00039*	0.15115+	-0.16185*	17.57001	219	0.35315
	(0.00086)	(0.00327)	(0.12911)	(0.00522)	(0.00017)	(0.08126)	(0.06586)	(11.02218)		
drg79	0.00003	-0.01352**	0.15733+	-0.00017	-0.00031*	-0.02381	0.08324*	8.14697	244	0.36458
	(0.00016)	(0.00387)	(0.08011)	(0.00298)	(0.00012)	(0.04610)	(0.03753)	(7.31603)		
drg82	-0.00023	-0.00182	0.38328	-0.00324+	0.00008+	-0.01631	-0.00150	-4.27765+	263	0.19355
	(0.00018)	(0.00465)	(0.31864)	(0.00164)	(0.00004)	(0.01794)	(0.01645)	(2.52667)		
drg89	-0.00001	-0.00123	1.86274**	0.00060	-0.00003	0.01448	0.00645+	1.77857	291	0.91465
	(0.00001)	(0.00222)	(0.14463)	(0.00054)	(0.00002)	(0.01104)	(0.00330)	(1.57179)		
drg113	-0.00314**	-0.00608	0.50263*	-0.00873+	0.00014	0.08160	-0.04706	-10.03150	225	0.18452
	(0.00091)	(0.00915)	(0.21239)	(0.00516)	(0.00012)	(0.08750)	(0.06330)	(9.76406)		
drg127	-0.00011	-0.00117	3.84206**	-0.00096	0.00007	-0.04200	0.03131	-2.46550	288	0.28767
	(0.00007)	(0.00193)	(1.18776)	(0.00093)	(0.00006)	(0.03182)	(0.02731)	(2.43286)		
drg140	0.00052	-0.01578	0.23626	-0.04924	0.00085	0.65147	-0.39177	-29.67085	104	0.24552
	(0.00197)	(0.01111)	(0.20073)	(0.03118)	(0.00061)	(0.49782)	(0.27659)	(36.73822)		
drg148	-0.00084+	-0.00753**	1.15105*	-0.00032	0.00006	-0.02094	-0.03136	-2.17023	250	0.18927
	(0.00048)	(0.00273)	(0.52288)	(0.00323)	(0.00013)	(0.12483)	(0.03651)	(6.01614)		
drg172	-0.00031	-0.00153	0.35360	-0.00114	0.00007	-0.22026*	0.02444	-2.56047	286	0.23910
	(0.00021)	(0.00338)	(0.24584)	(0.00283)	(0.00012)	(0.08689)	(0.01639)	(8.05673)		
drg202	-0.00024*	0.00276	0.09170	0.00056	-0.00007+	0.02683	-0.01841	0.38002	250	0.10917
	(0.00009)	(0.00359)	(0.09460)	(0.00153)	(0.00004)	(0.09061)	(0.01341)	(4.27098)		
drg203	-0.00096**	-0.00236	-0.25042	0.00402+	-0.00008	-0.00065	-0.03110	10.07728+	276	0.16367
	(0.00028)	(0.00219)	(0.21903)	(0.00233)	(0.00008)	(0.09833)	(0.02197)	(5.72879)		

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drg239	-0.00341	-0.00596	0.35469	0.01370	-0.00071	-0.15677	-0.05641	22.52453	130	0.17252
	(0.00594)	(0.00370)	(0.24771)	(0.01417)	(0.00047)	(0.53941)	(0.18535)	(24.64443)		
drg274	-0.00553+	-0.00040	1.13351**	-0.00176	0.00014	0.20065	-0.04317	-16.11795	238	0.40921
	(0.00289)	(0.00174)	(0.16962)	(0.00687)	(0.00028)	(0.17339)	(0.07026)	(15.39930)		
drg296	-0.00210**	-0.00919	0.65889*	-0.00581	-0.00004	-0.01744	-0.03083	-8.90685	228	0.17817
	(0.00075)	(0.00670)	(0.28956)	(0.00409)	(0.00020)	(0.14405)	(0.08708)	(9.49461)		
drg318	-0.00636*	0.00129	-0.08535	-0.01434	-0.00010	0.30437	-0.13506	-40.88295*	169	0.25602
	(0.00246)	(0.00536)	(0.12981)	(0.01021)	(0.00034)	(0.30787)	(0.09035)	(19.85003)		
drg320	-0.00050	-0.02242**	1.03161*	-0.01205*	-0.00005	-0.00744	-0.14216*	-10.55323	244	0.31182
	(0.00039)	(0.00736)	(0.48931)	(0.00468)	(0.00019)	(0.03788)	(0.06321)	(8.51427)		
drg331	0.00011	-0.00919	1.02537+	0.00717	-0.00193*	-0.77664	-0.17557*	67.06600	132	0.41512
	(0.00089)	(0.00714)	(0.52794)	(0.01498)	(0.00075)	(0.48766)	(0.08400)	(40.67295)		
drg366	-0.01394**	-0.00537*	0.55460**	-0.01172	-0.00000	0.16431	-0.10431	-13.13223	239	0.31972
	(0.00391)	(0.00242)	(0.18665)	(0.00749)	(0.00029)	(0.20475)	(0.06868)	(17.15152)		
drg395	-0.00157	-0.01942*	-0.87354	0.01079	-0.00102+	0.58624	0.04011	-51.06959	167	0.19792
	(0.00115)	(0.00918)	(1.77077)	(0.01596)	(0.00051)	(0.48507)	(0.17202)	(40.24598)		
drg403	-0.00104	0.00214	0.17018	-0.00349	-0.00021	0.05461	-0.05428	-5.33510	240	0.12038
	(0.00084)	(0.00373)	(0.11430)	(0.00560)	(0.00021)	(0.19446)	(0.05709)	(12.57413)		
drg416	0.00002	-0.00036	0.47578*	0.00346	0.00001	-0.08987*	-0.03419	5.07790	271	0.28993
	(0.00015)	(0.00163)	(0.18157)	(0.00270)	(0.00010)	(0.03774)	(0.02890)	(5.24621)		

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

Robust standard errors adjusted for cluster in hosp_id in parentheses

Table 14: FE regression coeficients for SPA sample

DRG	vol_gdh	mean_age	frac_women	ds2	lotation	icm	dm	mc2	Obs	R-squared
drg14	-0.00012*	0.00118	1.21757**	0.00234	-0.00003*	-0.03616	-0.01299**	10.60406**	220	0.79933
	(0.00005)	(0.00154)	(0.04039)	(0.00269)	(0.00001)	(0.02565)	(0.00461)	(1.93040)		
drg78	-0.00479+	-0.00368	0.31082	0.05470	0.00014	0.10711	-0.02577	5.17283	143	0.24570
	(0.00264)	(0.00687)	(0.22735)	(0.04242)	(0.00018)	(0.36473)	(0.04308)	(37.51847)		
drg79	-0.00188**	-0.00046	0.36206+	0.02338	-0.00011	-0.08694	-0.00107	77.91308*	166	0.32098
	(0.00059)	(0.00526)	(0.18095)	(0.01941)	(0.00012)	(0.26334)	(0.04067)	(34.12519)		
drg82	-0.00245*	0.00492	0.07825	-0.00587	0.00006	-0.14278	-0.00875	4.53528	172	0.10031
	(0.00098)	(0.00516)	(0.08352)	(0.01444)	(0.00007)	(0.32478)	(0.02734)	(19.34300)		
drg89	0.00004	-0.00570+	2.60746**	0.00790	-0.00006	0.06548	0.00916	6.66388	221	0.33832
	(0.00005)	(0.00333)	(0.55746)	(0.00702)	(0.00006)	(0.18330)	(0.01292)	(4.13794)		
drg113	-0.00569*	-0.02718**	0.19957	0.03553	-0.00024+	-0.40949	0.00209	107.43194*	141	0.24071
	(0.00221)	(0.00836)	(0.17941)	(0.03223)	(0.00014)	(0.64004)	(0.05872)	(47.82896)		

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drg127	-0.00057**	-0.01016	0.70973	0.02751**	-0.00016*	-0.37068**	0.00999	44.33479**	219	0.34436
	(0.00020)	(0.00887)	(1.91507)	(0.00914)	(0.00006)	(0.13417)	(0.01611)	(11.61135)		
drg140	-0.00246	-0.01855	0.36701	-0.02163	0.00085	0.52135	0.02606	-171.20293	54	0.24103
	(0.00194)	(0.01502)	(0.63374)	(0.11573)	(0.00070)	(1.06545)	(0.08458)	(227.65243)		
drg148	-0.00035	-0.00573	0.77091+	0.02776+	-0.00012	-0.19596	0.01289	51.20308*	119	0.32654
	(0.00037)	(0.00972)	(0.43484)	(0.01404)	(0.00008)	(0.39298)	(0.00954)	(21.81404)		
drg172	-0.00129+	0.00164	0.23872	-0.01782	0.00000	-0.39821	0.02451	-4.92608	205	0.17456
	(0.00071)	(0.00581)	(0.16581)	(0.01628)	(0.00008)	(0.27942)	(0.02767)	(11.37074)		
drg202	-0.00063+	-0.01119**	0.09711	-0.04187*	-0.00005	-0.46919	-0.09161	8.99830	161	0.14495
	(0.00035)	(0.00399)	(0.11163)	(0.01928)	(0.00017)	(0.49041)	(0.06699)	(42.14099)		
drg203	-0.00035	0.00269	0.38897**	-0.00236	-0.00007	-0.18506	-0.00867	5.31404	194	0.23274
	(0.00045)	(0.00465)	(0.13525)	(0.01323)	(0.00012)	(0.23255)	(0.01873)	(28.22031)		
drg239	-0.00153	-0.00947+	0.32111**	-0.09418	0.00083**	0.99256	-0.00540	-113.63278+	72	0.55157
	(0.00373)	(0.00465)	(0.11440)	(0.06746)	(0.00028)	(0.73578)	(0.06733)	(61.77363)		
drg274	-0.00933+	0.00341	0.57326**	0.00989	0.00007	0.18940	0.06466	-43.37513	152	0.41722
	(0.00530)	(0.00294)	(0.09435)	(0.03653)	(0.00013)	(0.39962)	(0.04522)	(27.48597)		
drg296	-0.00795**	-0.00712	0.62200*	-0.01344	0.00022	-0.76512+	0.04035	8.85368	149	0.24749
	(0.00280)	(0.00781)	(0.29906)	(0.03864)	(0.00019)	(0.43488)	(0.04836)	(62.76828)		
drg318	-0.01482+	-0.00170	0.19837	0.08480	-0.00024	-0.79923	-0.01254	32.71451	89	0.23992
	(0.00775)	(0.00644)	(0.12680)	(0.05755)	(0.00018)	(0.74384)	(0.05295)	(54.36176)		
drg320	-0.00114	0.00237	2.07659+	0.04828+	-0.00017+	-0.09975	-0.07246+	64.45903**	164	0.28920
	(0.00076)	(0.00480)	(1.18719)	(0.02665)	(0.00009)	(0.22964)	(0.03812)	(13.76312)		
drg331	-0.00284*	-0.00112	1.81109**	-0.08786+	0.00053**	-0.29527	-0.06273	-75.20287*	93	0.47385
	(0.00118)	(0.01069)	(0.33882)	(0.04430)	(0.00019)	(0.92183)	(0.10827)	(32.55928)		
drg366	-0.00896	0.00192	0.67367**	0.01099	-0.00014	0.32355	-0.02625	-3.91427	167	0.33715
	(0.00605)	(0.00223)	(0.08593)	(0.03216)	(0.00011)	(0.38090)	(0.05565)	(15.31606)		
drg395	-0.00124	0.00233	1.39503	0.04406	-0.00031	0.08924	-0.01263	62.36414+	125	0.09673
	(0.00154)	(0.01433)	(0.90979)	(0.05037)	(0.00021)	(1.03655)	(0.05693)	(31.33897)		
drg403	-0.00282	-0.00012	0.46773**	-0.03451	-0.00010	-0.49710	0.01264	19.39926	126	0.39547
	(0.00191)	(0.00247)	(0.10687)	(0.02472)	(0.00015)	(0.37415)	(0.03978)	(36.17889)		
drg416	-0.00287+	-0.00337	0.46560**	0.02041	-0.00004	-0.55366	-0.02426	16.08807	163	0.31116
	(0.00164)	(0.00397)	(0.13748)	(0.02625)	(0.00009)	(0.39686)	(0.03204)	(16.30953)		

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

Robust standard errors adjusted for cluster in hosp_id in parentheses

Table 15: FE regression coeficients for the general sample without transferences

DRG	vol_gdh	mean_age	frac_women	ds2	lotation	icm	dm	mc2	Obs	R-squared
drg14	-0.00007*	-0.00013	0.96110*	-0.00050	-0.00001	-0.02534	-0.00497	1.21677	472	0.35593

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	(0.00003)	(0.00482)	(0.38015)	(0.00130)	(0.00003)	(0.02028)	(0.00763)	(3.61325)		
drg78	-0.00338**	-0.00820*	0.37331**	0.01007*	-0.00007	-0.06117	-0.03194	16.70372+	340	0.17455
	(0.00105)	(0.00329)	(0.09771)	(0.00467)	(0.00012)	(0.10834)	(0.03059)	(9.95582)		
drg79	-0.00053*	-0.00390	0.28997*	0.00087	-0.00025	-0.02990	0.03027	17.78767	386	0.20754
	(0.00024)	(0.00358)	(0.13504)	(0.00505)	(0.00020)	(0.06094)	(0.04014)	(14.98669)		
drg82	-0.00060**	-0.00286	0.20381**	-0.00257	0.00008	-0.04661	-0.02746	-3.10980	410	0.10828
	(0.00021)	(0.00352)	(0.07049)	(0.00284)	(0.00006)	(0.04599)	(0.01845)	(5.45413)		
drg89	-0.00004	0.00037	1.11610**	0.00126	-0.00002	-0.01530	-0.00200	2.98433	503	0.37017
	(0.00003)	(0.00248)	(0.41554)	(0.00121)	(0.00004)	(0.04910)	(0.00803)	(4.29977)		
drg113	-0.00454**	-0.00694	0.14345	-0.00344	0.00004	-0.10523	0.00018	4.44103	337	0.09588
	(0.00133)	(0.00566)	(0.15840)	(0.00416)	(0.00011)	(0.12949)	(0.04081)	(10.02806)		
drg127	-0.00044**	-0.00697	0.94825	0.00375	-0.00002	-0.02128	-0.01303	14.15737	501	0.16548
	(0.00015)	(0.00781)	(0.63717)	(0.00239)	(0.00011)	(0.05464)	(0.03560)	(9.23935)		
drg140	-0.00099	-0.01266	0.59237**	-0.02088	0.00065**	0.22362	-0.08887	-4.24053	150	0.21825
	(0.00173)	(0.00874)	(0.10955)	(0.02284)	(0.00022)	(0.31536)	(0.05747)	(26.06715)		
drg148	-0.00045	-0.00887*	0.94961**	-0.00016	0.00001	-0.05005	0.00675	1.49817	363	0.21058
	(0.00033)	(0.00422)	(0.27424)	(0.00244)	(0.00008)	(0.09196)	(0.01333)	(4.86191)		
drg172	-0.00059*	0.00043	0.26275*	-0.00102	-0.00001	-0.04013	0.01952	0.18857	477	0.15095
	(0.00023)	(0.00315)	(0.11144)	(0.00162)	(0.00005)	(0.03910)	(0.01938)	(3.35848)		
drg202	-0.00035**	-0.00255	0.10844	-0.00129	-0.00006	-0.01107	-0.04322	1.29833	384	0.07391
	(0.00011)	(0.00348)	(0.10134)	(0.00232)	(0.00005)	(0.11573)	(0.04684)	(10.83328)		
drg203	-0.00069*	0.00018	0.08794	0.00200	-0.00003	-0.01446	-0.01308	6.79378	455	0.07845
	(0.00032)	(0.00187)	(0.08395)	(0.00204)	(0.00006)	(0.06680)	(0.01331)	(5.39541)		
drg239	-0.00543	-0.00521+	0.25766+	-0.00163	-0.00004	0.10438	-0.13164	-19.34972	184	0.18290
	(0.00444)	(0.00310)	(0.13939)	(0.01119)	(0.00029)	(0.41972)	(0.13842)	(19.17250)		
drg274	-0.00550*	0.00100	0.71116**	-0.00159	0.00014	0.26260+	0.03874+	-21.58894+	371	0.35054
	(0.00228)	(0.00169)	(0.07016)	(0.00503)	(0.00013)	(0.13272)	(0.02255)	(10.90304)		
drg296	-0.00315**	-0.01045+	0.32210	-0.00723	0.00030*	-0.34218+	0.01513	-5.11641	364	0.10820
	(0.00085)	(0.00528)	(0.20737)	(0.00443)	(0.00013)	(0.17837)	(0.03583)	(10.68202)		
drg318	-0.00921**	0.00169	-0.04114	-0.00279	-0.00014	0.30670	-0.05286	23.92855	240	0.16985
	(0.00217)	(0.00337)	(0.09182)	(0.01155)	(0.00014)	(0.20673)	(0.04039)	(30.36598)		
drg320	-0.00041	-0.01395**	1.38828**	-0.00942	-0.00002	-0.16467	-0.06212**	6.51267	385	0.25718
	(0.00029)	(0.00443)	(0.48700)	(0.00710)	(0.00017)	(0.11685)	(0.02009)	(18.39092)		
drg331	-0.00228+	-0.00309	0.89506**	-0.00289	0.00020	0.27168	-0.05958	-19.13790	211	0.24960
	(0.00115)	(0.00742)	(0.32949)	(0.01702)	(0.00022)	(0.30759)	(0.11980)	(31.88043)		
drg366	-0.01259**	-0.00250	0.63573**	-0.00885+	-0.00011	-0.06509	-0.01401	7.41818	381	0.29704
	(0.00401)	(0.00181)	(0.09864)	(0.00523)	(0.00012)	(0.15007)	(0.05236)	(11.94908)		
drg395	-0.00251**	-0.01417+	0.10295	0.01155	-0.00034	0.36351	-0.03306	13.39037	271	0.13593
	(0.00084)	(0.00821)	(0.65155)	(0.01356)	(0.00022)	(0.39132)	(0.05230)	(41.06136)		
drg403	-0.00139+	-0.00041	0.30155**	-0.00854	-0.00014	-0.04667	-0.02935	-4.04677	352	0.17058

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	(0.00078)	(0.00240)	(0.11256)	(0.00623)	(0.00016)	(0.18814)	(0.03852)	(9.42489)		
drg416	-0.00037	-0.00200	0.58141**	0.00250	0.00004	-0.12257+	-0.03611	1.44922	422	0.32441
	(0.00031)	(0.00185)	(0.11472)	(0.00284)	(0.00007)	(0.06454)	(0.02358)	(5.30800)		

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

Robust standard errors adjusted for cluster in hosp_id in parentheses

Table 16: FE regression coefficients for the urgency and not transference sample

DRG	vol_gdh	mean_age	frac_women	ds2	lotation	icm	dm	mc2	Obs	R-squared
drg14	-0.00007*	0.00358	1.04841**	-0.00035	-0.00001	-0.05748+	-0.00310	2.34290	469	0.38780
	(0.00003)	(0.00407)	(0.36461)	(0.00120)	(0.00003)	(0.02913)	(0.00802)	(3.13060)		
drg78	-0.00345**	-0.00804*	0.39354**	0.01032*	-0.00005	-0.08929	-0.02955	14.35128	340	0.19392
	(0.00111)	(0.00325)	(0.09830)	(0.00455)	(0.00011)	(0.12846)	(0.03007)	(9.77316)		
drg79	-0.00042+	-0.00570+	0.26569*	0.00179	-0.00028	-0.15430	0.05299+	20.02333	382	0.25258
	(0.00023)	(0.00334)	(0.12953)	(0.00505)	(0.00021)	(0.14273)	(0.03015)	(15.63687)		
drg82	-0.00073**	-0.00279	0.21597**	-0.00373	0.00009	-0.06510	-0.02119	-4.16603	406	0.11893
	(0.00025)	(0.00291)	(0.07668)	(0.00289)	(0.00007)	(0.08268)	(0.01771)	(5.30606)		
drg89	-0.00002	0.00070	1.35662**	0.00097	-0.00001	0.02182	-0.00141	1.54044	501	0.50416
	(0.00003)	(0.00229)	(0.31264)	(0.00107)	(0.00003)	(0.04483)	(0.00638)	(3.56590)		
drg113	-0.00622**	0.00164	0.02703	-0.00346	0.00011	-0.30923+	0.00162	0.82932	321	0.13466
	(0.00176)	(0.00526)	(0.10579)	(0.00524)	(0.00011)	(0.17095)	(0.04575)	(8.67327)		
drg127	-0.00014	0.00580	4.71612**	0.00236	0.00002	-0.00934	-0.00123	7.91345	498	0.36479
	(0.00013)	(0.00467)	(1.22500)	(0.00191)	(0.00008)	(0.05822)	(0.02520)	(6.26762)		
drg140	-0.00216	-0.01101	0.52920**	-0.02982	0.00069**	0.17224	-0.07194	-23.26034	150	0.22767
	(0.00160)	(0.00823)	(0.11802)	(0.01930)	(0.00020)	(0.31959)	(0.06036)	(20.34098)		
drg148	-0.00211**	-0.00668+	0.49730+	-0.00416	0.00010	-0.07995	0.01953	0.18211	343	0.18169
	(0.00073)	(0.00352)	(0.26310)	(0.00381)	(0.00010)	(0.12305)	(0.02395)	(6.59678)		
drg172	-0.00104**	-0.00081	0.26929**	-0.00054	0.00001	-0.13649	0.01313	1.65465	469	0.19780
	(0.00035)	(0.00311)	(0.08347)	(0.00163)	(0.00005)	(0.11628)	(0.01734)	(3.76484)		
drg202	-0.00048**	-0.00406	0.12770	-0.00164	-0.00003	0.02163	-0.03989	0.81005	383	0.10501
	(0.00014)	(0.00295)	(0.13307)	(0.00231)	(0.00005)	(0.11458)	(0.04912)	(10.45039)		
drg203	-0.00177**	0.00054	0.16529+	0.00211	0.00003	-0.11863	-0.02210	5.13977	442	0.12801
	(0.00047)	(0.00168)	(0.08744)	(0.00217)	(0.00006)	(0.09006)	(0.01381)	(5.45282)		
drg239	-0.01812+	0.00031	0.06272	-0.00355	0.00007	0.35300	-0.07479	-25.90920	174	0.17653
	(0.00974)	(0.00309)	(0.11174)	(0.00966)	(0.00027)	(0.40451)	(0.13044)	(17.66287)		
drg274	-0.00703*	0.00173	0.70086**	-0.00234	0.00014	0.14458	-0.01272	-19.66458	365	0.41295
	(0.00333)	(0.00170)	(0.06911)	(0.00478)	(0.00013)	(0.13335)	(0.02655)	(12.10199)		
drg296	-0.00382**	-0.00791	0.25136	-0.00668	0.00030*	-0.28987	0.02616	-6.76301	359	0.10881
	(0.00100)	(0.00544)	(0.15724)	(0.00430)	(0.00015)	(0.19690)	(0.03614)	(11.17642)		

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drg318	-0.01423**	-0.00169	-0.03318	-0.00341	-0.00001	0.38155+	-0.05349	21.78729	229	0.18566
	(0.00348)	(0.00313)	(0.09453)	(0.01431)	(0.00027)	(0.22198)	(0.04438)	(32.70885)		
drg320	-0.00047	-0.01208**	1.39706**	-0.00909	-0.00003	-0.18106	-0.06866**	7.53753	382	0.25994
	(0.00030)	(0.00423)	(0.48864)	(0.00736)	(0.00017)	(0.13437)	(0.02232)	(18.60937)		
drg331	-0.00248+	-0.01025	0.78706*	-0.01015	0.00025	0.16089	-0.02167	-10.76018	205	0.27643
	(0.00138)	(0.00694)	(0.38739)	(0.01517)	(0.00020)	(0.36726)	(0.12314)	(33.06761)		
drg366	-0.01874**	-0.00197	0.56630**	-0.00513	-0.00012	-0.06262	-0.01228	9.75173	372	0.35352
	(0.00407)	(0.00215)	(0.07756)	(0.00497)	(0.00012)	(0.16072)	(0.03867)	(11.63412)		
drg395	-0.00361**	-0.01503+	-0.70761	0.00111	-0.00007	0.25755	0.00059	-6.08349	262	0.12657
	(0.00113)	(0.00779)	(0.62847)	(0.01427)	(0.00021)	(0.41708)	(0.06492)	(34.55242)		
drg403	-0.00272**	-0.00164	0.29528*	-0.00899	-0.00009	0.03887	-0.02617	-7.86811	341	0.19319
	(0.00094)	(0.00258)	(0.12327)	(0.00617)	(0.00013)	(0.18376)	(0.03986)	(9.32578)		
drg416	-0.00038	-0.00207	0.56190**	0.00243	0.00004	-0.11964+	-0.03496	2.30064	418	0.31448
	(0.00032)	(0.00188)	(0.11698)	(0.00273)	(0.00007)	(0.06453)	(0.02307)	(5.29586)		

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

Robust standard errors adjusted for cluster in hosp_id in parentheses

Table 17: FE regression coefficients for the truncated general sample

DRG	vol_gdh	mean_age	frac_women	ds2	lotation	icm	dm	mc2	Obs	R-squared
drg14	-0.00009	0.00499	1.22585**	-0.00358	0.00004	0.03479	-0.01231+	-1.62810	252	0.73582
	(0.00007)	(0.00411)	(0.11713)	(0.00242)	(0.00008)	(0.02821)	(0.00641)	(3.32224)		
drg78	-0.00138	-0.01174*	0.60854*	-0.00406	-0.00028	-0.11039	-0.08511	9.88038	177	0.15349
	(0.00096)	(0.00560)	(0.25026)	(0.02594)	(0.00065)	(0.23867)	(0.08307)	(29.65410)		
drg79	-0.00024	-0.00324	0.66460**	0.00253	-0.00025	0.17546+	-0.02353	27.35519	213	0.23109
	(0.00017)	(0.00365)	(0.24776)	(0.02971)	(0.00043)	(0.09189)	(0.10199)	(27.70058)		
drg82	-0.00082**	0.00323	0.09989	-0.00550	-0.00024	0.01807	-0.00711	4.78051	221	0.05562
	(0.00028)	(0.00652)	(0.07668)	(0.00714)	(0.00020)	(0.14363)	(0.02238)	(8.77412)		
drg89	-0.00001	-0.00115	1.92195**	0.00092	0.00003	-0.04203**	-0.00181	-0.30753	252	0.92759
	(0.00002)	(0.00245)	(0.09685)	(0.00135)	(0.00003)	(0.01290)	(0.00328)	(1.18462)		
drg113	-0.00342*	-0.01334	0.29602	0.00032	-0.00037	-0.30593	0.04517	31.92708	179	0.11958
	(0.00131)	(0.01211)	(0.22297)	(0.03521)	(0.00068)	(0.38088)	(0.10401)	(32.60411)		
drg127	-0.00033**	-0.00482	-1.83976**	-0.00140	0.00006	-0.00126	-0.00158	1.41788	247	0.31305
	(0.00008)	(0.00351)	(0.68443)	(0.00538)	(0.00011)	(0.03146)	(0.01010)	(4.71425)		
drg140	-0.00194	-0.02288*	0.22579	0.03071	0.00402**	0.43225	-0.44442*	-43.58699	80	0.36110
	(0.00237)	(0.01067)	(1.00318)	(0.06859)	(0.00128)	(0.53544)	(0.21809)	(63.45825)		
drg148	-0.00018	-0.00731+	1.10782*	0.00417	0.00062	0.12858	0.00097	-15.68643	188	0.21655
	(0.00033)	(0.00423)	(0.46751)	(0.01104)	(0.00044)	(0.10729)	(0.01327)	(12.42073)		

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drg172	-0.00014	0.00537	0.45235*	-0.00751	-0.00013	0.08315*	0.01528	3.55699	246	0.36147
	(0.00017)	(0.00437)	(0.17893)	(0.01124)	(0.00009)	(0.03405)	(0.01761)	(4.59636)		
drg202	-0.00017	-0.01687**	0.07745	-0.01164	-0.00002	-0.03934	-0.07056	2.22846	204	0.16636
	(0.00011)	(0.00597)	(0.12432)	(0.01260)	(0.00028)	(0.12553)	(0.06036)	(9.67648)		
drg203	-0.00046+	-0.00076	0.37661+	-0.00264	0.00006	0.02103	-0.01410	-0.26968	235	0.19430
	(0.00025)	(0.00293)	(0.21533)	(0.00520)	(0.00012)	(0.06928)	(0.02099)	(6.62526)		
drg239	-0.00044	-0.00753	0.62951*	-0.16800*	0.00869**	0.88205+	-0.19478+	75.43186	111	0.31711
	(0.00516)	(0.00459)	(0.26052)	(0.06983)	(0.00287)	(0.47477)	(0.10226)	(61.31336)		
drg274	-0.00525	0.00242	0.80409**	0.06610	-0.00188	0.28316	0.04598	35.01504	187	0.36838
	(0.00345)	(0.00255)	(0.12978)	(0.05427)	(0.00227)	(0.26208)	(0.06654)	(36.90692)		
drg296	-0.00250**	-0.00964+	-0.18127	0.03976*	0.00116+	-0.40355	0.01465	6.05798	180	0.11112
	(0.00089)	(0.00566)	(0.31271)	(0.01926)	(0.00059)	(0.24233)	(0.05271)	(14.39161)		
drg318	-0.00231	0.00084	0.07809	-0.01052	0.00073	-0.07428	-0.13249	-2.62389	140	0.09136
	(0.00141)	(0.00383)	(0.24263)	(0.04306)	(0.00107)	(0.27844)	(0.12201)	(55.49447)		
drg320	-0.00036	0.00581	1.42008	-0.03140	0.00091+	0.18563	-0.13310**	-45.44405	207	0.17817
	(0.00026)	(0.00695)	(1.82595)	(0.02273)	(0.00049)	(0.19127)	(0.04269)	(28.18583)		
drg331	-0.00191+	0.01379	1.46652**	-0.08885	-0.00366**	-0.31907	-0.08225	10.41462	130	0.44573
	(0.00099)	(0.01222)	(0.43076)	(0.08297)	(0.00096)	(0.32977)	(0.09633)	(57.40865)		
drg366	-0.00587*	-0.00256	0.57347**	-0.00220	0.00116	-0.40344	-0.08609*	-29.68948	204	0.23641
	(0.00238)	(0.00249)	(0.17142)	(0.02166)	(0.00109)	(0.25577)	(0.03416)	(30.65890)		
drg395	-0.00148	-0.02026	-0.00260	0.01681	-0.00121	0.25818	0.05575	58.06488	144	0.08674
	(0.00111)	(0.01454)	(2.52773)	(0.04990)	(0.00327)	(0.67997)	(0.13436)	(96.77202)		
drg403	-0.00109	0.00301	0.09599	0.01613	0.00019	0.08337	-0.02012	-1.63716	186	0.07253
	(0.00073)	(0.00318)	(0.12025)	(0.03248)	(0.00049)	(0.23118)	(0.06528)	(15.90589)		
drg416	-0.00038	0.00119	0.41216+	-0.01075	-0.00002	-0.25524*	-0.04994	1.39624	224	0.27088
	(0.00026)	(0.00255)	(0.22978)	(0.01429)	(0.00036)	(0.11105)	(0.03555)	(12.32071)		

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

Robust standard errors adjusted for cluster in hosp_id in parentheses

Table 18: Probit regression coefficients for the general sample

DRG	vol_gdh	age	gender	ds2	lotation	icm	dm	mc2	Obs
drg14	-0.00030**	0.01764**	-0.02299*	0.00742*	-0.00012	0.05551	0.02621	1.16896	166319
	(0.00007)	(0.00114)	(0.01135)	(0.00302)	(0.00008)	(0.06013)	(0.01671)	(2.07738)	
drg78	0.00043	0.02798**	-0.14241**	-0.01356+	-0.00016	0.01955	0.05984+	15.15631	11954
	(0.00193)	(0.00170)	(0.02952)	(0.00758)	(0.00023)	(0.12978)	(0.03385)	(14.96849)	
drg79	-0.00119**	0.02601**	-0.10339**	-0.00144	0.00004	0.03273	0.01115	-7.85037	26931
	(0.00028)	(0.00090)	(0.02054)	(0.00513)	(0.00015)	(0.08467)	(0.01739)	(8.93896)	

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drg82	-0.00003	0.00625**	-0.14479**	-0.00251	-0.00005	0.05146	-0.03061	29.37391+	32245
	(0.00034)	(0.00069)	(0.01999)	(0.00987)	(0.00032)	(0.14688)	(0.03346)	(16.98326)	
drg89	-0.00009	0.02695**	-0.11775**	0.01048*	-0.00039*	-0.02647	-0.01284	14.32637	147228
	(0.00010)	(0.00070)	(0.01225)	(0.00486)	(0.00018)	(0.07841)	(0.01939)	(12.48726)	
drg113	-0.00276**	0.02020**	0.08833**	0.00531	-0.00016	0.02099	0.07121**	20.44873	16871
	(0.00071)	(0.00138)	(0.02984)	(0.00768)	(0.00022)	(0.08684)	(0.02410)	(13.79493)	
drg127	0.00001	0.02558**	-0.04079**	0.00029	0.00001	-0.05704	-0.04202+	-19.75401	107634
	(0.00033)	(0.00118)	(0.01345)	(0.00535)	(0.00021)	(0.09583)	(0.02357)	(12.72085)	
drg140	-0.00246**	0.02322**	0.04672	0.02565*	-0.00066+	0.33058	-0.04227	37.71957	16677
	(0.00059)	(0.00116)	(0.03783)	(0.01055)	(0.00037)	(0.24648)	(0.06163)	(33.14469)	
drg148	-0.00219**	0.02493**	-0.03580*	0.00709+	0.00015	-0.29098**	0.05984**	17.60530*	29690
	(0.00059)	(0.00086)	(0.01632)	(0.00422)	(0.00012)	(0.07159)	(0.02269)	(8.54132)	
drg172	0.00004	0.00052	-0.02378	-0.00464	-0.00020	-0.14483	0.03147	30.07946**	30588
	(0.00045)	(0.00071)	(0.01483)	(0.00414)	(0.00014)	(0.09094)	(0.02077)	(9.58806)	
drg202	-0.00155**	0.01199**	-0.04154*	0.01018+	-0.00003	-0.09546	0.00589	1.27349	47022
	(0.00031)	(0.00088)	(0.01811)	(0.00522)	(0.00014)	(0.12310)	(0.02303)	(12.43163)	
drg203	-0.00209**	0.00674**	-0.02194	0.00359	-0.00006	-0.18073+	0.08296**	9.65087	23930
	(0.00048)	(0.00104)	(0.01699)	(0.00548)	(0.00017)	(0.10598)	(0.02596)	(12.02714)	
drg239	0.00109	0.01107**	-0.12226**	0.00013	-0.00050*	0.36702*	-0.07976*	-0.55618	4973
	(0.00094)	(0.00121)	(0.03589)	(0.00690)	(0.00021)	(0.14806)	(0.03420)	(14.43752)	
drg274	-0.00190	0.00228*	0.28034*	-0.00180	-0.00035	-0.21248	0.04098	55.61787**	4957
	(0.00145)	(0.00101)	(0.11704)	(0.00963)	(0.00031)	(0.17810)	(0.03300)	(19.74722)	
drg296	-0.00040	0.01389**	-0.06260*	0.01136	-0.00069*	-0.02073	0.03753	-17.24862	14942
	(0.00143)	(0.00179)	(0.03016)	(0.00898)	(0.00032)	(0.19173)	(0.03482)	(20.95019)	
drg318	-0.00295	0.00402**	0.00089	-0.01119	0.00011	-0.03494	0.01538	16.21213	6006
	(0.00330)	(0.00154)	(0.03809)	(0.00998)	(0.00032)	(0.10334)	(0.02687)	(16.82493)	
drg320	-0.00019	0.02088**	-0.06174**	0.00867	-0.00043	-0.07997	0.02999	-7.85122	43398
	(0.00055)	(0.00104)	(0.01832)	(0.00678)	(0.00032)	(0.13386)	(0.03092)	(16.74290)	
drg331	-0.00135**	0.02647**	0.00257	0.00980	-0.00029	0.22727+	-0.03102	6.21111	14475
	(0.00035)	(0.00132)	(0.03318)	(0.00596)	(0.00019)	(0.12020)	(0.02760)	(17.35579)	
drg366	-0.00309**	0.00750**	.	-0.00144	-0.00044*	-0.10327	0.08346**	37.75082**	4996
	(0.00119)	(0.00140)	.	(0.00623)	(0.00019)	(0.10658)	(0.02650)	(12.85578)	
drg395	-0.00155**	0.01282**	-0.21475**	0.00545	-0.00004	0.05280	0.00974	-8.77169	26854
	(0.00045)	(0.00110)	(0.02235)	(0.00476)	(0.00016)	(0.17027)	(0.02873)	(15.61294)	
drg403	-0.00109	0.01007**	-0.07423**	0.00514	-0.00013	-0.07011	-0.00997	21.46986+	12641
	(0.00084)	(0.00127)	(0.02281)	(0.00811)	(0.00022)	(0.12119)	(0.02682)	(11.69591)	
drg416	-0.00118**	0.02063**	-0.01092	0.01304*	-0.00041*	-0.14346	0.04395*	37.41420**	16647
	(0.00022)	(0.00097)	(0.02489)	(0.00538)	(0.00017)	(0.08905)	(0.02216)	(9.77452)	

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** p<0.01, * p<0.05, + p<0.1
Robust standard errors adjusted for cluster in hosp_id in parentheses

Table 19: Probit regression coefficients for the general sample without transferences

DRG	vol_gdh	age	gender	ds2	lotation	icm	dm	mc2	Obs
drg14	-0.00040**	0.01916**	-0.02309+	0.00841*	-0.00019	0.01741	0.04445*	-0.19994	123117
	(0.00011)	(0.00089)	(0.01208)	(0.00409)	(0.00016)	(0.06769)	(0.01739)	(9.83262)	
drg78	0.00057	0.02889**	-0.15491**	-0.01780*	-0.00011	-0.11199	0.08949*	11.10204	10029
	(0.00211)	(0.00192)	(0.03211)	(0.00844)	(0.00024)	(0.16675)	(0.03598)	(17.91178)	
drg79	-0.00154**	0.02571**	-0.10953**	-0.00283	0.00009	0.03734	0.01349	-8.67127	22889
	(0.00036)	(0.00089)	(0.01961)	(0.00540)	(0.00015)	(0.10351)	(0.02121)	(10.57079)	
drg82	-0.00024	0.00529**	-0.14151**	-0.00271	-0.00004	0.04422	-0.02488	29.07836	28852
	(0.00041)	(0.00073)	(0.01926)	(0.01009)	(0.00033)	(0.15330)	(0.03518)	(17.82262)	
drg89	-0.00006	0.02713**	-0.12122**	0.00997*	-0.00040*	-0.05803	-0.00756	19.13779	132754
	(0.00011)	(0.00071)	(0.01286)	(0.00491)	(0.00018)	(0.07781)	(0.02095)	(12.90479)	
drg113	-0.00262**	0.02124**	0.07390*	0.00532	-0.00017	0.00846	0.06867**	21.89664	14159
	(0.00083)	(0.00166)	(0.03301)	(0.00754)	(0.00023)	(0.09733)	(0.02565)	(15.07063)	
drg127	0.00004	0.02648**	-0.04064**	0.00091	-0.00007	-0.06932	-0.02626	-14.69552	96798
	(0.00035)	(0.00104)	(0.01427)	(0.00540)	(0.00023)	(0.09704)	(0.02393)	(13.38873)	
drg140	-0.00274**	0.02270**	0.02298	0.02608*	-0.00076*	0.33388	-0.02293	46.10990	13467
	(0.00076)	(0.00113)	(0.04124)	(0.01016)	(0.00035)	(0.25104)	(0.05979)	(35.55063)	
drg148	-0.00257**	0.02565**	-0.04210*	0.00549	0.00020	-0.30226**	0.07313**	10.43821	27378
	(0.00057)	(0.00095)	(0.01799)	(0.00417)	(0.00013)	(0.07156)	(0.01747)	(8.37384)	
drg172	-0.00002	0.00020	-0.02387	-0.00567	-0.00019	-0.14040	0.03673+	28.41811**	28097
	(0.00045)	(0.00078)	(0.01614)	(0.00411)	(0.00013)	(0.09061)	(0.02132)	(9.11650)	
drg202	-0.00168**	0.01211**	-0.05514**	0.00980+	-0.00004	-0.08590	0.00696	-2.74657	42041
	(0.00035)	(0.00091)	(0.01999)	(0.00537)	(0.00013)	(0.12873)	(0.02465)	(12.56372)	
drg203	-0.00214**	0.00653**	-0.02443	0.00248	-0.00005	-0.20938+	0.08717**	10.27772	22220
	(0.00056)	(0.00123)	(0.01737)	(0.00559)	(0.00017)	(0.11389)	(0.02740)	(13.48342)	
drg239	0.00179*	0.01130**	-0.15466**	-0.00293	-0.00050**	0.22584+	-0.06396+	-1.01591	4202
	(0.00090)	(0.00138)	(0.03825)	(0.00674)	(0.00019)	(0.13692)	(0.03473)	(13.12445)	
drg274	-0.00223	0.00213*	0.28188*	-0.00425	-0.00025	-0.17859	0.03881	52.79582**	4593
	(0.00146)	(0.00108)	(0.12727)	(0.00952)	(0.00030)	(0.18246)	(0.03551)	(19.22331)	
drg296	0.00006	0.01416**	-0.07132*	0.01321	-0.00083**	0.02682	0.06042+	-17.12310	13558
	(0.00147)	(0.00174)	(0.03159)	(0.00835)	(0.00031)	(0.19124)	(0.03515)	(20.68311)	
drg318	-0.00298	0.00436*	0.01183	-0.01075	0.00005	-0.08774	0.03695	23.13710	5053
	(0.00325)	(0.00189)	(0.04405)	(0.01093)	(0.00035)	(0.10982)	(0.03245)	(19.96379)	
drg320	-0.00032	0.02115**	-0.07122**	0.00941	-0.00045	-0.08365	0.03683	-5.27261	39502
	(0.00058)	(0.00104)	(0.01955)	(0.00679)	(0.00032)	(0.13442)	(0.03154)	(17.00200)	

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drg331	-0.00196**	0.02875**	-0.00169	0.00728	-0.00021	0.16733	-0.02283	4.67137	12047
	(0.00049)	(0.00152)	(0.03821)	(0.00703)	(0.00022)	(0.11559)	(0.03092)	(16.90215)	
drg366	-0.00321*	0.00668**	.	-0.00013	-0.00050**	-0.13086	0.08294**	40.79324**	4464
	(0.00130)	(0.00150)	.	(0.00643)	(0.00019)	(0.11515)	(0.02979)	(12.27295)	
drg395	-0.00140**	0.01348**	-0.22748**	0.00766	-0.00019	0.03905	0.01672	-1.73413	24108
	(0.00044)	(0.00108)	(0.02412)	(0.00473)	(0.00014)	(0.15549)	(0.02794)	(14.55990)	
drg403	-0.00118	0.00997**	-0.07907**	0.00518	-0.00016	-0.08666	-0.00398	21.30017	11209
	(0.00095)	(0.00143)	(0.02481)	(0.00895)	(0.00026)	(0.13044)	(0.03211)	(13.06801)	
drg416	-0.00139**	0.02077**	-0.00637	0.01015+	-0.00037+	-0.22785*	0.06225*	39.63189**	14228
	(0.00032)	(0.00094)	(0.02649)	(0.00573)	(0.00019)	(0.10632)	(0.02666)	(11.85596)	

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

Robust standard errors adjusted for cluster in hosp_id in parentheses

Table 20: Probit regression coefficients for the urgency and not transference sample

DRG	vol_gdh	age	gender	ds2	lotation	icm	dm	mc2	Obs
drg14	-0.00041**	0.01845**	-0.02131+	0.00876*	-0.00019	0.02790	0.04382*	-0.36726	120746
	(0.00011)	(0.00099)	(0.01241)	(0.00406)	(0.00016)	(0.06808)	(0.01770)	(10.20168)	
drg78	0.00075	0.02867**	-0.14984**	-0.01891*	-0.00010	-0.08763	0.08599*	11.11569	9701
	(0.00221)	(0.00198)	(0.03198)	(0.00850)	(0.00024)	(0.16823)	(0.03594)	(17.85629)	
drg79	-0.00154**	0.02562**	-0.10958**	-0.00230	0.00007	0.05318	0.01131	-8.65043	22058
	(0.00037)	(0.00093)	(0.01957)	(0.00557)	(0.00016)	(0.10669)	(0.02226)	(11.08793)	
drg82	-0.00053	0.00393**	-0.13562**	-0.00088	0.00002	0.04464	-0.01523	23.01500	21635
	(0.00101)	(0.00081)	(0.02218)	(0.00912)	(0.00030)	(0.15915)	(0.03211)	(16.51107)	
drg89	-0.00005	0.02702**	-0.12148**	0.01024*	-0.00042*	-0.05321	-0.00737	19.78917	131351
	(0.00011)	(0.00070)	(0.01307)	(0.00495)	(0.00018)	(0.07800)	(0.02113)	(13.02050)	
drg113	-0.00229*	0.02097**	0.07375*	0.00461	-0.00018	-0.01654	0.07194**	22.30191	11965
	(0.00098)	(0.00173)	(0.03245)	(0.00819)	(0.00025)	(0.12677)	(0.02693)	(16.96271)	
drg127	0.00008	0.02654**	-0.04207**	0.00012	-0.00005	-0.06356	-0.02781	-15.67579	94283
	(0.00035)	(0.00102)	(0.01423)	(0.00542)	(0.00024)	(0.09789)	(0.02442)	(13.75822)	
drg140	-0.00257**	0.02182**	0.02318	0.02547**	-0.00079*	0.39412	-0.02703	43.78973	12695
	(0.00072)	(0.00115)	(0.04251)	(0.00965)	(0.00033)	(0.26308)	(0.06021)	(35.00776)	
drg148	-0.00342**	0.02454**	-0.04762*	0.00644	0.00005	-0.24798**	0.05797**	16.95922+	16555
	(0.00129)	(0.00089)	(0.02084)	(0.00427)	(0.00013)	(0.07826)	(0.01907)	(9.81826)	
drg172	-0.00086+	-0.00130	-0.05815**	-0.00190	-0.00011	-0.09827	0.04360+	23.31161*	22368
	(0.00049)	(0.00090)	(0.01787)	(0.00484)	(0.00013)	(0.10233)	(0.02401)	(10.75972)	
drg202	-0.00181**	0.01204**	-0.05189*	0.01073*	-0.00010	-0.04598	-0.00298	0.78189	36876
	(0.00035)	(0.00095)	(0.02085)	(0.00454)	(0.00013)	(0.11258)	(0.02456)	(12.79142)	

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drg203	-0.00234*	0.00301**	-0.06027**	0.01010+	-0.00036+	-0.05726	0.06284*	21.87064	15823
	(0.00094)	(0.00109)	(0.01862)	(0.00606)	(0.00019)	(0.11547)	(0.02541)	(15.38324)	
drg239	0.00672	0.01107**	-0.13108*	0.01318+	-0.00083**	0.40558*	-0.07148*	11.70041	2227
	(0.00636)	(0.00163)	(0.05245)	(0.00764)	(0.00028)	(0.18085)	(0.03277)	(20.00684)	
drg274	-0.00334*	0.00346**	0.21031	-0.00357	-0.00015	-0.13728	0.02199	44.17300*	3468
	(0.00146)	(0.00133)	(0.15212)	(0.01110)	(0.00034)	(0.20260)	(0.03659)	(17.90054)	
drg296	0.00004	0.01290**	-0.06487+	0.01290	-0.00082*	0.11164	0.05244	-22.99652	12826
	(0.00156)	(0.00174)	(0.03317)	(0.00862)	(0.00034)	(0.21990)	(0.03666)	(22.73252)	
drg318	-0.01010*	0.00189	-0.02058	-0.00784	0.00008	-0.05637	0.02564	35.35111+	3834
	(0.00411)	(0.00212)	(0.05260)	(0.01173)	(0.00038)	(0.11630)	(0.03501)	(20.64306)	
drg320	-0.00033	0.02081**	-0.07192**	0.00924	-0.00044	-0.09146	0.03867	-5.45708	38485
	(0.00059)	(0.00103)	(0.01942)	(0.00696)	(0.00033)	(0.13528)	(0.03214)	(17.40999)	
drg331	-0.00216**	0.02730**	-0.00801	0.00787	-0.00023	0.23015	-0.03836	5.49863	9745
	(0.00035)	(0.00147)	(0.04062)	(0.00675)	(0.00022)	(0.15205)	(0.03583)	(16.56703)	
drg366	-0.00196	0.00615**	.	0.00137	-0.00053*	-0.16487	0.08352*	44.67488**	3410
	(0.00275)	(0.00178)	.	(0.00726)	(0.00021)	(0.13370)	(0.03474)	(13.77813)	
drg395	-0.00155**	0.01343**	-0.24092**	0.00865+	-0.00027	0.12521	0.01979	-4.81720	20491
	(0.00042)	(0.00121)	(0.02495)	(0.00474)	(0.00016)	(0.14142)	(0.02927)	(14.54295)	
drg403	-0.00210	0.00895**	-0.09293**	0.00367	-0.00005	-0.07740	-0.00957	31.88102*	8577
	(0.00133)	(0.00127)	(0.03075)	(0.00915)	(0.00026)	(0.16514)	(0.03503)	(14.27619)	
drg416	-0.00162**	0.02036**	-0.00293	0.01501**	-0.00056**	-0.17580	0.06397*	46.65290**	13833
	(0.00028)	(0.00093)	(0.02662)	(0.00565)	(0.00018)	(0.10869)	(0.02725)	(12.00338)	

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

Robust standard errors adjusted for cluster in hosp_id in parentheses

Table 21: Probit regression coefficients for the truncated general sample

DRG	vol_gdh	age	gender	ds2	lotation	icm	dm	mc2	Obs
drg14	-0.00036**	0.01867**	-0.01735	0.01091**	-0.00021*	0.02061	0.03096+	0.71516	85138
	(0.00009)	(0.00093)	(0.01294)	(0.00255)	(0.00010)	(0.06641)	(0.01856)	(1.86494)	
drg78	0.00024	0.02829**	-0.14883**	-0.01143	-0.00030	-0.03168	0.10260**	24.85720+	6600
	(0.00224)	(0.00230)	(0.03980)	(0.01015)	(0.00033)	(0.15269)	(0.03922)	(15.09440)	
drg79	-0.00103**	0.02648**	-0.09312**	-0.00283	0.00007	-0.02884	0.01296	-4.22979	14981
	(0.00022)	(0.00115)	(0.02433)	(0.00704)	(0.00021)	(0.09402)	(0.02292)	(9.79181)	
drg82	-0.00020	0.00617**	-0.15349**	0.00642	-0.00035	0.05696	-0.01810	35.20547+	16919
	(0.00042)	(0.00091)	(0.02289)	(0.01410)	(0.00046)	(0.19383)	(0.04269)	(20.71519)	
drg89	-0.00002	0.02643**	-0.12466**	0.01311**	-0.00053**	-0.06843	0.00523	19.92735	83005
	(0.00011)	(0.00081)	(0.01144)	(0.00480)	(0.00018)	(0.08292)	(0.02109)	(13.23510)	

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drg113	-0.00362**	0.02045**	0.07053*	0.01360+	-0.00045+	-0.02246	0.09216**	34.15447*	8497
	(0.00098)	(0.00196)	(0.03499)	(0.00823)	(0.00026)	(0.12637)	(0.03333)	(14.74389)	
drg127	0.00009	0.02609**	-0.02391	0.00385	-0.00016	-0.05952	-0.02794	-14.92675	57909
	(0.00032)	(0.00118)	(0.01837)	(0.00520)	(0.00022)	(0.09469)	(0.02600)	(11.92787)	
drg140	-0.00180	0.03911**	0.02743	0.03391	-0.00099	0.57926*	-0.09370	31.06308	6859
	(0.00151)	(0.00424)	(0.04882)	(0.02386)	(0.00077)	(0.28769)	(0.07940)	(44.68230)	
drg148	-0.00289**	0.02465**	-0.05467*	0.00717	0.00026+	-0.22226*	0.05581+	12.72240	16828
	(0.00062)	(0.00139)	(0.02314)	(0.00573)	(0.00016)	(0.09597)	(0.03383)	(8.60652)	
drg172	0.00054	0.00022	-0.03594+	-0.00055	-0.00042*	-0.19907*	0.04503+	38.72447**	16197
	(0.00038)	(0.00080)	(0.01942)	(0.00667)	(0.00021)	(0.08466)	(0.02493)	(10.65227)	
drg202	-0.00198**	0.01285**	-0.04094+	0.01222+	-0.00008	-0.03987	-0.00442	-0.67447	22317
	(0.00045)	(0.00114)	(0.02174)	(0.00672)	(0.00021)	(0.13280)	(0.02884)	(11.64922)	
drg203	-0.00231**	0.00548**	-0.01398	0.00191	-0.00000	-0.26968+	0.12326**	10.85399	13144
	(0.00055)	(0.00114)	(0.02658)	(0.00814)	(0.00026)	(0.13847)	(0.03058)	(13.90560)	
drg239	0.00330*	0.01008**	-0.09821*	0.01068	-0.00106**	0.13945	-0.02272	9.60948	2757
	(0.00130)	(0.00195)	(0.04957)	(0.00949)	(0.00024)	(0.18035)	(0.04435)	(15.02905)	
drg274	-0.00139	0.00241	0.22974+	-0.00209	-0.00045	-0.31274	0.13623*	52.30246*	2566
	(0.00224)	(0.00147)	(0.13853)	(0.01610)	(0.00055)	(0.24667)	(0.05649)	(25.73191)	
drg296	-0.00021	0.01331**	-0.05458	0.01865+	-0.00101**	-0.04728	0.07137	-6.94074	8374
	(0.00162)	(0.00177)	(0.03564)	(0.00989)	(0.00038)	(0.24320)	(0.04528)	(23.54567)	
drg318	-0.00025	0.00545**	0.01615	-0.00951	-0.00021	-0.16109	0.04506	22.47241	3180
	(0.00260)	(0.00174)	(0.05100)	(0.01018)	(0.00032)	(0.12784)	(0.04009)	(17.55274)	
drg320	-0.00039	0.02216**	-0.07249**	0.01575*	-0.00064+	-0.15098	0.05577	-1.33765	26224
	(0.00054)	(0.00142)	(0.02155)	(0.00657)	(0.00033)	(0.13372)	(0.03473)	(16.68316)	
drg331	-0.00095**	0.02634**	-0.03153	0.01230	-0.00052	0.24670+	-0.02827	0.42059	9293
	(0.00035)	(0.00196)	(0.03964)	(0.01011)	(0.00035)	(0.12677)	(0.04069)	(18.38057)	
drg366	-0.00398*	0.00762**	.	0.00756	-0.00083**	-0.08993	0.13583**	48.60501**	2639
	(0.00178)	(0.00202)	.	(0.00910)	(0.00031)	(0.13632)	(0.03943)	(15.22278)	
drg395	-0.00160**	0.01238**	-0.18172**	0.01365*	-0.00028	0.03870	-0.02318	3.89102	14315
	(0.00043)	(0.00142)	(0.03328)	(0.00696)	(0.00025)	(0.14878)	(0.03463)	(16.28840)	
drg403	-0.00108	0.01077**	-0.07481*	0.01224	-0.00042	-0.09746	0.01966	23.97786+	6710
	(0.00106)	(0.00120)	(0.03426)	(0.00978)	(0.00031)	(0.16492)	(0.03433)	(14.44875)	
drg416	-0.00115**	0.02037**	-0.02888	0.01899**	-0.00061**	-0.26926*	0.07111*	48.83910**	10669
	(0.00027)	(0.00120)	(0.02572)	(0.00665)	(0.00020)	(0.12144)	(0.03155)	(10.72340)	

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

Robust standard errors adjusted for cluster in hosp_id in parentheses

Table 22: WOLS regression coefficients for the general sample

DRG	vol_gdh	age	gender	ds2	lotation	icm	dm	mc2	Obs	R-squared
drg14	-0.00011**	0.00388**	-0.00264	0.00134**	-0.00000	0.02767*	0.01900**	-0.16547	166319	0.02781
	(0.00001)	(0.00007)	(0.00182)	(0.00048)	(0.00001)	(0.01400)	(0.00372)	(0.38154)		
drg78	-0.00024	0.00525**	-0.02326**	-0.00540*	0.00002	0.02989	0.03619*	-2.53536	11954	0.10754
	(0.00026)	(0.00022)	(0.00692)	(0.00228)	(0.00004)	(0.03854)	(0.01456)	(3.67300)		
drg79	-0.00027**	0.00601**	-0.02001**	-0.00057	0.00004	-0.02579	0.01129	-2.99687	26931	0.08313
	(0.00006)	(0.00014)	(0.00527)	(0.00208)	(0.00005)	(0.03168)	(0.00767)	(3.49266)		
drg82	-0.00067**	0.00223**	-0.04623**	0.00225	0.00001	-0.00099	0.03529**	2.95279	32245	0.04632
	(0.00014)	(0.00021)	(0.00593)	(0.00167)	(0.00004)	(0.02769)	(0.00871)	(3.36980)		
drg89	-0.00007**	0.00590**	-0.02686**	0.00300**	-0.00002	0.00276	0.01358**	2.64208+	147228	0.05787
	(0.00001)	(0.00007)	(0.00210)	(0.00066)	(0.00002)	(0.01482)	(0.00390)	(1.36241)		
drg113	-0.00019	0.00410**	0.02351**	0.00288+	0.00001	0.03411	-0.04267**	-3.07138	16871	0.03956
	(0.00025)	(0.00025)	(0.00559)	(0.00171)	(0.00004)	(0.02257)	(0.01083)	(3.72356)		
drg127	-0.00001	0.00474**	-0.00665**	-0.00090	0.00006**	0.02408+	-0.00175	-1.70139	107634	0.04045
	(0.00002)	(0.00010)	(0.00214)	(0.00070)	(0.00002)	(0.01303)	(0.00420)	(1.23744)		
drg140	-0.00007	0.00164**	0.00254	0.00062	-0.00003+	-0.02893*	0.00205	-0.10414	16677	0.04907
	(0.00005)	(0.00011)	(0.00279)	(0.00088)	(0.00002)	(0.01404)	(0.00548)	(1.26202)		
drg148	-0.00020+	0.00470**	-0.00443	-0.00001	0.00000	-0.03665	-0.01933*	1.68590	29690	0.05354
	(0.00011)	(0.00014)	(0.00418)	(0.00127)	(0.00003)	(0.03517)	(0.00900)	(2.60644)		
drg172	0.00005	0.00022	-0.00844	-0.00166	-0.00000	-0.07947+	0.02775*	0.96457	30588	0.02901
	(0.00011)	(0.00021)	(0.00557)	(0.00177)	(0.00003)	(0.04323)	(0.01168)	(3.52354)		
drg202	-0.00012**	0.00261**	-0.01040**	0.00099	-0.00000	0.02398	0.01997**	3.28887	47022	0.02853
	(0.00004)	(0.00012)	(0.00358)	(0.00104)	(0.00002)	(0.02418)	(0.00733)	(2.21469)		
drg203	-0.00071**	0.00215**	-0.00834	0.00181	0.00005	0.02693	0.02569*	-5.58658	23930	0.03495
	(0.00013)	(0.00023)	(0.00597)	(0.00176)	(0.00004)	(0.04665)	(0.01220)	(3.54883)		
drg239	-0.00072	0.00216**	-0.02928**	0.00146	-0.00005	0.00907	-0.01914	9.04376	4973	0.06744
	(0.00058)	(0.00027)	(0.01046)	(0.00329)	(0.00005)	(0.08462)	(0.02434)	(6.47982)		
drg274	0.00041	0.00065	0.09303+	0.00247	-0.00008	-0.11245	-0.00583	14.37908+	4957	0.06605
	(0.00065)	(0.00050)	(0.04783)	(0.00474)	(0.00008)	(0.12592)	(0.03065)	(7.73799)		
drg296	0.00005	0.00218**	-0.00733	0.00346*	-0.00003	0.04705	0.00154	-0.22383	14942	0.05241
	(0.00017)	(0.00019)	(0.00544)	(0.00135)	(0.00003)	(0.03892)	(0.01105)	(0.37102)		
drg318	-0.00097	0.00141**	0.00014	0.00209	0.00017*	-0.13535	-0.00630	8.37026	6006	0.04390
	(0.00074)	(0.00043)	(0.01293)	(0.00424)	(0.00009)	(0.09039)	(0.02571)	(7.66933)		
drg320	-0.00006+	0.00209**	-0.00612*	0.00363**	-0.00002	0.01979	0.02626**	1.92953	43398	0.03075
	(0.00004)	(0.00008)	(0.00264)	(0.00109)	(0.00002)	(0.01725)	(0.00519)	(1.62274)		
drg331	-0.00015*	0.00255**	0.00050	0.00212	-0.00004	0.07017*	-0.00404	4.43788	14475	0.04740
	(0.00007)	(0.00013)	(0.00433)	(0.00186)	(0.00003)	(0.03424)	(0.00973)	(3.15887)		
drg366	0.00005	0.00251**	0.00000	0.00893*	-0.00006	0.00920	0.02050	10.19389	4996	0.07450

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	(0.00086)	(0.00046)	(0.00000)	(0.00443)	(0.00007)	(0.11270)	(0.02855)	(7.75594)		
drg395	-0.00006	0.00096**	-0.01950**	0.00082	0.00002	-0.00207	0.00349	0.26346	26854	0.02151
	(0.00005)	(0.00007)	(0.00255)	(0.00081)	(0.00002)	(0.01663)	(0.00516)	(1.40317)		
drg403	-0.00035	0.00315**	-0.02307**	0.00121	0.00009*	0.06391	0.04537**	-0.67353	12641	0.03940
	(0.00026)	(0.00026)	(0.00791)	(0.00283)	(0.00004)	(0.06474)	(0.01739)	(5.40954)		
drg416	-0.00024*	0.00753**	-0.00175	0.00387	-0.00003	-0.02104	0.02294	4.40094	16647	0.07896
	(0.00010)	(0.00025)	(0.00753)	(0.00293)	(0.00006)	(0.05035)	(0.01577)	(4.65375)		

** p<0.01, * p<0.05, + p<0.1
Standard errors in parentheses
fweight = year & hosp_id2 & gdh_hcfa16

Table 23: WOLS regression coefficients for the general sample without transferences

DRG	vol_gdh	age	gender	ds2	lotation	icm	dm	mc2	Obs	R-squared
drg14	-0.00016**	0.00437**	-0.00260	0.00093	-0.00002	0.02634	0.02088**	-2.93076*	123117	0.03317
	(0.00001)	(0.00009)	(0.00217)	(0.00065)	(0.00002)	(0.01782)	(0.00443)	(1.34635)		
drg78	-0.00031	0.00550**	-0.02764**	-0.00847**	-0.00001	-0.00449	0.03821*	-13.62593**	10029	0.12591
	(0.00030)	(0.00025)	(0.00776)	(0.00255)	(0.00005)	(0.04921)	(0.01622)	(4.58110)		
drg79	-0.00034**	0.00614**	-0.02450**	-0.00187	0.00001	-0.05628	0.01297	-6.58542	22889	0.08134
	(0.00008)	(0.00016)	(0.00580)	(0.00238)	(0.00005)	(0.03969)	(0.00920)	(4.07355)		
drg82	-0.00069**	0.00192**	-0.04731**	0.00045	-0.00002	-0.01157	0.03491**	-2.41482	28852	0.04828
	(0.00014)	(0.00022)	(0.00632)	(0.00179)	(0.00004)	(0.03201)	(0.00936)	(3.80668)		
drg89	-0.00007**	0.00611**	-0.02847**	0.00192**	-0.00006**	-0.02473	0.01326**	-0.99510	132754	0.05885
	(0.00001)	(0.00008)	(0.00224)	(0.00071)	(0.00002)	(0.01739)	(0.00425)	(1.60574)		
drg113	-0.00049+	0.00431**	0.01971**	0.00185	0.00001	0.03821	-0.04617**	-4.05854	14159	0.04107
	(0.00029)	(0.00028)	(0.00614)	(0.00187)	(0.00005)	(0.02788)	(0.01173)	(4.05474)		
drg127	-0.00007**	0.00504**	-0.00722**	-0.00168*	0.00002	0.01759	0.00017	-2.45119+	96798	0.04155
	(0.00003)	(0.00010)	(0.00229)	(0.00076)	(0.00002)	(0.01496)	(0.00454)	(1.46947)		
drg140	-0.00002	0.00174**	0.00062	-0.00007	-0.00005*	-0.04738**	0.00137	0.80946	13467	0.05528
	(0.00009)	(0.00012)	(0.00328)	(0.00115)	(0.00002)	(0.01775)	(0.00648)	(1.64213)		
drg148	-0.00032**	0.00479**	-0.00524	-0.00047	0.00000	-0.03599	-0.01940*	0.18115	27378	0.05471
	(0.00012)	(0.00014)	(0.00433)	(0.00133)	(0.00003)	(0.03638)	(0.00923)	(2.79000)		
drg172	0.00001	0.00011	-0.00902	-0.00304	-0.00001	-0.06659	0.03246**	-3.02678	28097	0.03051
	(0.00012)	(0.00022)	(0.00585)	(0.00185)	(0.00004)	(0.04730)	(0.01237)	(3.87309)		
drg202	-0.00019**	0.00267**	-0.01353**	0.00030	-0.00001	0.02833	0.02129**	1.03745	42041	0.03037
	(0.00005)	(0.00013)	(0.00382)	(0.00112)	(0.00002)	(0.02716)	(0.00792)	(2.67927)		
drg203	-0.00082**	0.00214**	-0.00928	0.00108	0.00004	0.00433	0.02429+	-6.64447+	22220	0.03750
	(0.00014)	(0.00025)	(0.00623)	(0.00185)	(0.00004)	(0.04928)	(0.01293)	(3.77634)		
drg239	-0.00070	0.00218**	-0.03887**	0.00080	-0.00006	0.05498	-0.01507	9.53172	4202	0.07890

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	(0.00063)	(0.00030)	(0.01168)	(0.00392)	(0.00006)	(0.10005)	(0.02841)	(8.84132)		
drg274	0.00029	0.00055	0.09206+	0.00075	-0.00005	-0.11309	-0.00300	11.43346	4593	0.06964
	(0.00068)	(0.00052)	(0.04971)	(0.00494)	(0.00009)	(0.13203)	(0.03213)	(8.15052)		
drg296	-0.00018	0.00225**	-0.01008+	0.00370*	-0.00012**	0.04438	0.00649	-0.31000	13558	0.05340
	(0.00019)	(0.00020)	(0.00587)	(0.00156)	(0.00004)	(0.04609)	(0.01198)	(0.38487)		
drg318	-0.00137	0.00170**	0.00199	0.00159	0.00010	-0.19933+	-0.01902	1.12126	5053	0.05186
	(0.00094)	(0.00049)	(0.01446)	(0.00505)	(0.00010)	(0.10566)	(0.02896)	(10.70201)		
drg320	-0.00011**	0.00214**	-0.00754**	0.00378**	-0.00002	0.03280	0.02785**	1.32002	39502	0.03164
	(0.00004)	(0.00009)	(0.00281)	(0.00118)	(0.00002)	(0.02005)	(0.00561)	(1.87987)		
drg331	-0.00014	0.00272**	0.00040	0.00041	-0.00005	0.04570	0.00009	3.14266	12047	0.05621
	(0.00009)	(0.00015)	(0.00481)	(0.00219)	(0.00003)	(0.04094)	(0.01087)	(3.87310)		
drg366	-0.00036	0.00219**	0.00000	0.00628	-0.00008	0.04733	0.03424	4.62705	4464	0.07416
	(0.00094)	(0.00049)	(0.00000)	(0.00471)	(0.00007)	(0.12095)	(0.03102)	(8.52489)		
drg395	-0.00007	0.00101**	-0.02103**	0.00090	0.00001	0.00324	0.00603	0.76888	24108	0.02319
	(0.00005)	(0.00007)	(0.00272)	(0.00089)	(0.00002)	(0.01841)	(0.00555)	(1.73754)		
drg403	-0.00060*	0.00311**	-0.02480**	0.00193	0.00007	0.03340	0.04473*	-0.62233	11209	0.04289
	(0.00029)	(0.00028)	(0.00850)	(0.00309)	(0.00005)	(0.07087)	(0.01895)	(6.25449)		
drg416	-0.00036**	0.00761**	-0.00119	0.00075	-0.00001	-0.07900	0.01888	-2.11380	14228	0.08257
	(0.00013)	(0.00028)	(0.00815)	(0.00329)	(0.00006)	(0.05984)	(0.01708)	(5.25872)		

** p<0.01, * p<0.05, + p<0.1
Standard errors in parentheses
fweight = year & hosp_id2 & gdh_hcfa16

Table 24: WOLS regression coefficients for the urgency and not transference sample

DRG	vol_gdh	age	gender	ds2	lotation	icm	dm	mc2	Obs	R-squared
drg14	-0.00017**	0.00431**	-0.00269	0.00105	-0.00002	0.02793	0.02079**	-2.79596*	120746	0.03192
	(0.00001)	(0.00009)	(0.00221)	(0.00066)	(0.00002)	(0.01840)	(0.00448)	(1.37309)		
drg78	-0.00021	0.00547**	-0.02578**	-0.00849**	-0.00001	-0.02985	0.03754*	-13.45470**	9701	0.12795
	(0.00031)	(0.00025)	(0.00792)	(0.00260)	(0.00005)	(0.05463)	(0.01663)	(4.67861)		
drg79	-0.00035**	0.00621**	-0.02527**	-0.00219	-0.00000	-0.05026	0.01267	-7.01042+	22058	0.07983
	(0.00008)	(0.00017)	(0.00596)	(0.00246)	(0.00006)	(0.04354)	(0.00987)	(4.20811)		
drg82	-0.00064**	0.00148**	-0.04857**	0.00120	-0.00006	-0.01905	0.03544**	0.43550	21635	0.04192
	(0.00019)	(0.00027)	(0.00762)	(0.00208)	(0.00005)	(0.04433)	(0.01092)	(4.46570)		
drg89	-0.00007**	0.00613**	-0.02876**	0.00213**	-0.00006**	-0.02601	0.01323**	-0.82390	131351	0.05834
	(0.00001)	(0.00008)	(0.00226)	(0.00072)	(0.00002)	(0.01785)	(0.00432)	(1.61905)		
drg113	-0.00051	0.00448**	0.02044**	0.00209	0.00001	0.08635*	-0.04665**	-5.76056	11965	0.04199
	(0.00036)	(0.00032)	(0.00683)	(0.00206)	(0.00005)	(0.03804)	(0.01300)	(4.55223)		
drg127	-0.00007**	0.00513**	-0.00779**	-0.00173*	0.00002	0.02023	0.00072	-2.49038+	94283	0.04162

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	(0.00003)	(0.00011)	(0.00234)	(0.00078)	(0.00002)	(0.01606)	(0.00465)	(1.49754)		
drg140	0.00001	0.00177**	0.00062	0.00014	-0.00005*	-0.05452**	0.00178	1.36603	12695	0.05588
	(0.00010)	(0.00013)	(0.00346)	(0.00122)	(0.00002)	(0.02017)	(0.00690)	(1.73084)		
drg148	-0.00031	0.00567**	-0.01010	0.00030	-0.00003	-0.02219	-0.01755	0.84272	16555	0.06273
	(0.00028)	(0.00020)	(0.00628)	(0.00187)	(0.00004)	(0.05345)	(0.01325)	(4.00848)		
drg172	0.00017	-0.00043+	-0.02260**	-0.00354	-0.00002	-0.02039	0.03316*	-2.74884	22368	0.02747
	(0.00019)	(0.00026)	(0.00670)	(0.00218)	(0.00005)	(0.05387)	(0.01390)	(4.38293)		
drg202	-0.00020**	0.00284**	-0.01361**	0.00021	-0.00002	0.02093	0.01496+	1.58818	36876	0.02814
	(0.00007)	(0.00015)	(0.00429)	(0.00128)	(0.00003)	(0.03026)	(0.00892)	(2.92069)		
drg203	-0.00035	0.00114**	-0.02325**	0.00176	-0.00006	0.01958	0.02133	-3.59714	15823	0.02903
	(0.00034)	(0.00031)	(0.00788)	(0.00241)	(0.00006)	(0.06252)	(0.01531)	(4.73829)		
drg239	-0.00172	0.00263**	-0.03575+	0.00463	-0.00029*	0.04240	-0.01614	24.89475*	2227	0.07683
	(0.00253)	(0.00052)	(0.01851)	(0.00618)	(0.00014)	(0.16006)	(0.04008)	(12.60780)		
drg274	0.00004	0.00127*	0.07076	0.00125	-0.00002	-0.14444	0.01950	7.39300	3468	0.06856
	(0.00102)	(0.00061)	(0.06265)	(0.00601)	(0.00012)	(0.15006)	(0.03690)	(9.55089)		
drg296	-0.00024	0.00226**	-0.01033+	0.00407*	-0.00014**	0.05478	0.00705	-0.30046	12826	0.05170
	(0.00022)	(0.00023)	(0.00616)	(0.00162)	(0.00004)	(0.04917)	(0.01252)	(0.39211)		
drg318	-0.00207	0.00109+	-0.00554	0.00171	0.00011	-0.21783+	-0.01911	6.54269	3834	0.05607
	(0.00155)	(0.00061)	(0.01702)	(0.00589)	(0.00012)	(0.12348)	(0.03288)	(11.94057)		
drg320	-0.00011*	0.00216**	-0.00797**	0.00364**	-0.00002	0.03339	0.02801**	1.13737	38485	0.03109
	(0.00004)	(0.00009)	(0.00287)	(0.00121)	(0.00002)	(0.02088)	(0.00575)	(1.92665)		
drg331	-0.00014	0.00302**	-0.00140	0.00115	-0.00005	0.05452	-0.00157	4.85770	9745	0.05296
	(0.00013)	(0.00018)	(0.00580)	(0.00267)	(0.00005)	(0.05024)	(0.01284)	(4.58647)		
drg366	-0.00027	0.00211**	0.00000	0.00534	-0.00012	0.09866	0.03438	5.80939	3410	0.06584
	(0.00158)	(0.00058)	(0.00000)	(0.00533)	(0.00009)	(0.13969)	(0.03428)	(9.78555)		
drg395	-0.00005	0.00109**	-0.02403**	0.00050	0.00002	0.00088	0.00545	0.17673	20491	0.02405
	(0.00008)	(0.00008)	(0.00310)	(0.00107)	(0.00002)	(0.02165)	(0.00637)	(1.95613)		
drg403	-0.00035	0.00306**	-0.03191**	0.00215	0.00007	0.06555	0.04223*	5.74382	8577	0.04019
	(0.00045)	(0.00036)	(0.01004)	(0.00352)	(0.00006)	(0.08143)	(0.02146)	(6.95910)		
drg416	-0.00038**	0.00751**	0.00053	0.00283	-0.00011	-0.10362+	0.01663	2.15070	13833	0.07978
	(0.00013)	(0.00029)	(0.00828)	(0.00334)	(0.00007)	(0.06149)	(0.01741)	(5.44337)		

** p<0.01, * p<0.05, + p<0.1
Standard errors in parentheses
fweight = year & hosp_id2 & gdh_hcfa16

Table 25: WOLS regression coefficients for the truncated general sample

DRG	vol_gdh	age	gender	ds2	lotation	icm	dm	mc2	Obs	R-squared
drg14	-0.00005**	0.00396**	-0.00089	0.00346	-0.00015*	0.02813	0.03149**	0.12166	85138	0.03198

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	(0.00002)	(0.00010)	(0.00251)	(0.00309)	(0.00008)	(0.02538)	(0.00695)	(0.40522)		
drg78	0.00035	0.00489**	-0.02370**	0.00579	0.00076*	-0.03630	0.02018	-20.46597+	6600	0.11608
	(0.00035)	(0.00028)	(0.00905)	(0.01299)	(0.00034)	(0.07251)	(0.02532)	(12.12256)		
drg79	-0.00030**	0.00635**	-0.02031**	0.01034	0.00010	0.04359	0.01122	-8.70979	14981	0.08376
	(0.00009)	(0.00021)	(0.00724)	(0.01091)	(0.00024)	(0.05962)	(0.01267)	(10.59391)		
drg82	-0.00064**	0.00232**	-0.05078**	0.00866	-0.00003	-0.01910	0.03219*	-0.63672	16919	0.05232
	(0.00019)	(0.00029)	(0.00820)	(0.00924)	(0.00024)	(0.05200)	(0.01503)	(9.52373)		
drg89	-0.00002	0.00601**	-0.03001**	-0.00010	-0.00028**	0.03963	0.01565*	8.19470*	83005	0.05754
	(0.00002)	(0.00010)	(0.00283)	(0.00348)	(0.00009)	(0.02674)	(0.00665)	(3.64552)		
drg113	-0.00025	0.00404**	0.02234**	0.00190	-0.00014	0.06702	-0.06427**	-0.21268	8497	0.04992
	(0.00039)	(0.00035)	(0.00777)	(0.00975)	(0.00025)	(0.04293)	(0.01989)	(9.40601)		
drg127	-0.00002	0.00484**	-0.00427	-0.00197	0.00011	0.04779*	0.00048	-4.16071	57909	0.04115
	(0.00004)	(0.00013)	(0.00293)	(0.00421)	(0.00011)	(0.02353)	(0.00770)	(3.92355)		
drg140	-0.00015	0.00235**	0.00562	-0.02120**	-0.00012	-0.07790*	-0.02482+	-12.92290+	6859	0.07820
	(0.00015)	(0.00020)	(0.00502)	(0.00756)	(0.00018)	(0.03104)	(0.01290)	(6.62403)		
drg148	-0.00039*	0.00467**	-0.00721	0.00902	-0.00007	-0.02397	-0.00677	-0.81450	16828	0.05816
	(0.00016)	(0.00018)	(0.00553)	(0.00748)	(0.00019)	(0.05700)	(0.01662)	(7.12671)		
drg172	-0.00020	0.00014	-0.01238	0.00162	0.00003	-0.00637	0.02273	-15.48413	16197	0.02958
	(0.00018)	(0.00029)	(0.00780)	(0.01106)	(0.00027)	(0.07638)	(0.02096)	(10.78104)		
drg202	-0.00019*	0.00285**	-0.01060*	-0.00693	-0.00015	0.01679	0.01906	-6.76736	22317	0.03188
	(0.00009)	(0.00018)	(0.00524)	(0.00634)	(0.00016)	(0.04513)	(0.01291)	(6.30725)		
drg203	-0.00066**	0.00176**	-0.00672	0.00142	-0.00031	0.01471	0.01828	-5.64621	13144	0.04150
	(0.00019)	(0.00032)	(0.00818)	(0.01072)	(0.00030)	(0.08259)	(0.02001)	(10.99949)		
drg239	-0.00136	0.00206**	-0.02574+	0.04292+	0.00024	-0.14865	-0.01683	26.26520	2757	0.08539
	(0.00099)	(0.00038)	(0.01456)	(0.02401)	(0.00053)	(0.15187)	(0.04676)	(20.40835)		
drg274	-0.00011	0.00062	0.06572	-0.05366+	0.00001	0.02064	-0.07545	38.34783	2566	0.08974
	(0.00099)	(0.00071)	(0.06664)	(0.03256)	(0.00085)	(0.21752)	(0.05942)	(30.22789)		
drg296	0.00002	0.00181**	-0.00591	-0.00513	-0.00030	-0.03102	0.01960	0.09058	8374	0.06042
	(0.00021)	(0.00024)	(0.00692)	(0.00866)	(0.00022)	(0.06731)	(0.01821)	(0.41810)		
drg318	-0.00053	0.00185**	0.00303	-0.02174	-0.00038	-0.33079+	-0.06860	-20.79702	3180	0.06345
	(0.00112)	(0.00058)	(0.01791)	(0.02482)	(0.00055)	(0.16937)	(0.05037)	(22.93169)		
drg320	0.00001	0.00222**	-0.00718*	0.00193	-0.00011	-0.00191	0.03511**	3.61202	26224	0.03499
	(0.00006)	(0.00011)	(0.00345)	(0.00526)	(0.00012)	(0.03117)	(0.00890)	(4.67424)		
drg331	-0.00014	0.00247**	-0.00462	0.00898	-0.00006	0.09400	-0.00017	11.07523	9293	0.05296
	(0.00011)	(0.00017)	(0.00544)	(0.00913)	(0.00020)	(0.05990)	(0.01563)	(9.16812)		
drg366	-0.00081	0.00264**	0.00000	-0.02117	-0.00044	0.16214	-0.00008	-5.25836	2639	0.08964
	(0.00114)	(0.00065)	(0.00000)	(0.02728)	(0.00084)	(0.20014)	(0.05123)	(28.06734)		
drg395	-0.00011	0.00086**	-0.01547**	-0.00651	0.00016	-0.00998	-0.01305	-4.30286	14315	0.02329
	(0.00008)	(0.00009)	(0.00338)	(0.00476)	(0.00011)	(0.02862)	(0.00836)	(4.22976)		
drg403	-0.00028	0.00328**	-0.02331*	-0.01496	0.00012	0.12225	0.01899	-30.35674*	6710	0.05251

continued on next page

	(0.00031)	(0.00035)	(0.01080)	(0.01662)	(0.00039)	(0.10954)	(0.03252)	(15.43455)		
drg416	-0.00053**	0.00746**	-0.00862	0.00246	0.00053	-0.08502	0.03172	-20.18132	10669	0.08238
	(0.00018)	(0.00032)	(0.00942)	(0.01426)	(0.00039)	(0.08418)	(0.02998)	(13.51036)		

** p<0.01, * p<0.05, + p<0.1
Standard errors in parentheses
fweight = year & hosp_id2 & gdh_hcfa16 & vol_gdh

Table 26: Correlation matrix

	acumvol_05	acumvol_06	acumvol_07	acumvol_08
acumvol_05	1.000			
acumvol_06	0.9820	1.000		
acumvol_07	0.9472	0.9883	1.000	
acumvol_08	0.9217	0.9718	0.9874	1.000

Table 27: Probit regression coefficients for the sample with acumvol_08

DRG	acumvol_08	age	gender	ds2	lotation	icm	dm	mc2	Obs
drg14	-0.00007*	0.01889**	-0.02974	0.00924	-0.00012	0.00215	0.01137	-2.47201	19328
	(0.00004)	(0.00134)	(0.02369)	(0.00638)	(0.00026)	(0.07559)	(0.02076)	(12.92610)	
drg78	-0.00060	0.02813**	-0.13430	-0.01073	-0.00028	0.01937	0.18611**	21.57606	1650
	(0.00074)	(0.00386)	(0.09762)	(0.01962)	(0.00059)	(0.29366)	(0.06033)	(32.74245)	
drg79	-0.00022	0.02790**	-0.12562**	-0.00309	0.00003	0.19842	-0.01461	-1.86751	3840
	(0.00028)	(0.00196)	(0.04452)	(0.01347)	(0.00039)	(0.16717)	(0.05435)	(20.26397)	
drg82	0.00004	0.00411**	-0.16526**	0.00011	-0.00013	0.08271	-0.08464	36.17462	3901
	(0.00013)	(0.00158)	(0.03995)	(0.01941)	(0.00064)	(0.24794)	(0.06751)	(28.76897)	
drg89	-0.00002	0.02684**	-0.11007**	0.01781*	-0.00065*	-0.07525	0.00716	22.01870	19515
	(0.00004)	(0.00124)	(0.02225)	(0.00814)	(0.00029)	(0.11836)	(0.03357)	(18.47649)	
drg113	-0.00083*	0.01638**	0.11492	0.01298	-0.00045	-0.26863	0.11136+	50.66270*	2018
	(0.00041)	(0.00404)	(0.09149)	(0.01413)	(0.00041)	(0.29701)	(0.06394)	(20.85473)	
drg127	0.00000	0.02491**	-0.02099	0.00897	-0.00035	-0.02141	-0.01227	-6.02474	14071
	(0.00010)	(0.00201)	(0.02598)	(0.00899)	(0.00034)	(0.12475)	(0.03718)	(17.03681)	
drg140	0.00047	0.04777**	-0.07852	0.05501	-0.00181	1.01178+	-0.19227	24.76172	1459
	(0.00061)	(0.00706)	(0.12640)	(0.03811)	(0.00127)	(0.56210)	(0.14947)	(73.74657)	
drg148	-0.00100**	0.02547**	-0.00864	0.02209**	-0.00008	-0.00443	0.08151*	20.63677	4058
	(0.00017)	(0.00264)	(0.04957)	(0.00853)	(0.00025)	(0.11809)	(0.03409)	(14.21631)	
drg172	0.00023*	0.00123	-0.04667	-0.00938	-0.00003	-0.23914*	0.02677	27.63053+	3660
	(0.00010)	(0.00160)	(0.04175)	(0.01027)	(0.00031)	(0.11693)	(0.03111)	(15.19741)	
drg202	-0.00036*	0.01347**	0.00166	0.01800	-0.00030	-0.21578	0.06762	-0.41761	4678
	(0.00017)	(0.00207)	(0.04796)	(0.01105)	(0.00038)	(0.17949)	(0.05278)	(18.34345)	
drg203	-0.00059**	0.00482*	0.03197	0.00048	0.00012	-0.53605*	0.15859**	14.41663	3079
	(0.00023)	(0.00227)	(0.06655)	(0.01478)	(0.00050)	(0.21846)	(0.04754)	(26.05368)	
drg239	0.00121*	0.01095**	-0.06186	-0.00470	-0.00083	0.21198	-0.04926	-2.62211	661
	(0.00053)	(0.00292)	(0.11542)	(0.01989)	(0.00051)	(0.33052)	(0.09936)	(32.76751)	
drg274	-0.00124+	0.00291	0.41226	0.00230	-0.00034	0.06584	-0.03681	101.54367*	622
	(0.00073)	(0.00341)	(0.42763)	(0.02485)	(0.00087)	(0.45410)	(0.09262)	(41.80824)	
drg296	0.00035	0.01127**	-0.21087**	0.03329+	-0.00177**	-0.12341	0.17663*	-10.20601	2004
	(0.00055)	(0.00391)	(0.07836)	(0.01729)	(0.00065)	(0.43402)	(0.08118)	(34.08707)	
drg318	0.00042	0.00852**	0.14580	0.00460	-0.00083	-0.37136	0.16159*	36.40620	829
	(0.00103)	(0.00306)	(0.10700)	(0.02341)	(0.00071)	(0.23192)	(0.06581)	(35.09028)	
drg320	-0.00007	0.02102**	0.02563	0.02087*	-0.00076+	-0.16835	0.04250	-5.50483	6998
	(0.00014)	(0.00224)	(0.04746)	(0.01051)	(0.00041)	(0.16857)	(0.03977)	(20.50895)	
drg331	-0.00060**	0.02616**	-0.03271	-0.00922	0.00055	0.55545*	-0.15549*	-47.51156+	2675
	(0.00023)	(0.00391)	(0.08200)	(0.01633)	(0.00051)	(0.21663)	(0.07322)	(28.26433)	
drg366	0.00065	0.00751*		0.01368	-0.00153**	-1.02726**	0.39269**	69.76918**	655

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	(0.00068)	(0.00347)		(0.01850)	(0.00056)	(0.35109)	(0.06080)	(25.96245)	
drg395	-0.00030	0.01421**	-0.06912	0.01685	-0.00015	0.05649	-0.12968+	-10.30773	3394
	(0.00028)	(0.00270)	(0.06960)	(0.01810)	(0.00054)	(0.25509)	(0.06640)	(31.05426)	
drg403	-0.00028	0.01202**	0.03173	0.00557	-0.00020	-0.15582	0.03755	34.65612	1394
	(0.00044)	(0.00262)	(0.07005)	(0.02117)	(0.00063)	(0.28590)	(0.07853)	(29.45486)	
drg416	-0.00024	0.02015**	-0.07711	0.02741	-0.00098+	-0.33028+	0.11630*	52.81277+	2869
	(0.00017)	(0.00171)	(0.05064)	(0.01778)	(0.00052)	(0.18541)	(0.05330)	(27.31665)	

** $p<0.01$, * $p<0.05$, + $p<0.1$

Robust standard errors adjusted for cluster in hosp_id in parentheses