

Do Targets Matter? A comparison of English and Welsh national health priorities

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Paper presented at the Health Economics Study Group
Oxford, 5-7 January 2005

Abstract

Issues

National priorities and performance management regimes in the National Health Services of England and Wales diverged following devolution. For example, while the English NHS has long faced waiting time targets, in Wales targets were abandoned in the immediate post-devolution period. We expect that this had an impact on the behaviour and performance of Trusts in each of the two countries.

Methods

We analyse routine data collected over a seven-year period from two English and one Welsh Trust either side of the English-Welsh border to ascertain whether: (1) there is evidence of differential performance over time that relates to the country where the Trust is located; (2) within each Trust, there is evidence of discrimination among English and Welsh patients.

Results

Over the period the English trusts recorded increased levels of activity and undertook proportionately more day case and elective activity. Activity levels remained constant in Wales, the proportion of day case activity fell, proportionately more non-elective patients were admitted, and mortality rates rose. While not a general finding, pro-English discriminatory behaviour in respect to waiting times is evident in some specialties in both English and Welsh Trusts, with the temporal pattern of discrimination mirroring the divergence in national policies.

Conclusion

National targets appear to have had an impact on Trust behaviour in some specialties and for some procedures and – this is for discussion - may have had a spill-over effect on performance generally.

Status: work in progress

1. Introduction

The priorities laid out by government are intended to have an impact on organisational performance. The English and Welsh health systems have different national priorities and different performance management regimes and these may lead to differences in the behaviour of English and Welsh Trusts.

For example, waiting times are managed quite differently in the two countries. There are differences in terms of how performance is measured, what targets are to be achieved, and which organisations have ultimate responsibility for achieving the targets. While the English NHS has faced waiting time targets for at least the last decade, in 1998, following devolution, targets were abandoned in Wales, being re-established only in March 2001 (McClelland, 2002).

The difference in regulatory emphasis may well contribute to a difference in performance, and may help explain why Welsh patients face longer waiting times than in England. “NHS patients in Wales are waiting longer for routine treatment than people in England, according to a report by the Audit Commission. Some 85% of patients in Wales are admitted for routine surgical treatment within a year of being placed on a waiting list, while 96% of patients in England are seen within the same period.”¹

However attributing these differences to the different priorities of each country is complicated because many other factors contribute to observed levels of performance. The differences in waiting times may not be due to the target setting regimes in the two countries but to differences in such things as hospital management structures, funding levels, or the health needs of the populations.

One way to isolate the impact of different national priorities is by considering those NHS Trusts that serve both English and Welsh patients. In effect, such Trusts face two different “masters” and this may impact on the care delivered to patients from each country. This possibility was suggested by the (then) Commission for Health Improvement in its Clinical Governance review of Royal Shrewsbury Hospitals NHS Trust. CHI reports that “a Welsh patient with a non urgent routine condition may wait a shorter time to see a consultant for a first out-patient appointment but a longer time waiting for an operation than their English counterpart” (Commission for Health Improvement, 2002).

By concentrating on those organisations that serve both English and Welsh patients, it may be possible to discern whether the different national priorities in each country lead to differences in practice within the provider organisation. If it is true that national policy has a significant impact on institutional performance then we would expect the following behaviours to occur:

- Trusts will be more likely to focus their attention on the dimensions of performance against which they will be measured and judged nationally. This implies that overall achievement against these performance dimensions will be

¹ <http://news.bbc.co.uk/1/hi/wales/3001634.stm>

higher in countries that place greater emphasis on this type of performance management regime.

- Purchasers will be more assiduous in ensuring achievement against their own country's national policy requirements. This implies that, for a Trust that has dealings with purchasers from two countries, the Trust will have an incentive to discriminate among patients in order to satisfy the different requirements of its two sets of purchasers.

In this paper we analyse longitudinal data for three Trusts close to the English-Welsh border, two of which are located in England. We consider trends in levels and types of activity and we analyse waiting times for selected specialties and procedures to identify evidence of pro-English discriminatory behaviour within each Trust.

2. Institutional set-up

We analyse a set-up in which a single provider contracts with two purchasers, E and W , who purchase care on behalf of English and Welsh patients according to national policy guidelines. The purchasers aim to maximise social welfare, and judge benefits to derive from the number of patients treated x , waiting times for treatment r , and other dimensions of quality q , with benefits increasing in the number treated and quality $b_x(\cdot)$, $b_q(\cdot) > 0$ and decreasing by waiting time $b_r(\cdot) < 0$. x and r are assumed to be observable and contractible, whereas q is much less precisely verifiable. The social welfare function for both purchasers consists of these benefits, the payoff to the provider u , and the payment P each makes to the provider. Hence, total social welfare is:

$$\sum_{j=1}^2 b^j(x^j, r^j, q^j) + u^j - (1 - \alpha)P^j \\ = b^E(x^E, r^E, q^E) + u^E - (1 - \alpha)P^E + [b^W(x^W, r^W, q^W) + u^W - (1 - \alpha)P^W]$$

where j indexes the purchasers and α reflects the shadow cost of public funds, assumed common to the two purchasers.

Like the national governments they represent, the purchasers attach different weights, γ^j , to each type of benefit, with:

$$b^E = \gamma_1^E x + \gamma_2^E r + \gamma_3^E q, \quad \gamma_1^E + \gamma_2^E + \gamma_3^E = 1 \\ b^W = \gamma_1^W x + \gamma_2^W r + \gamma_3^W q, \quad \gamma_1^W + \gamma_2^W + \gamma_3^W = 1$$

Compared to the Welsh purchaser, the English purchaser attaches greater importance to waiting times, hence $\gamma_2^E > \gamma_2^W$. By implication this entails that relatively less importance is attached to the other dimensions of quality, with $\gamma_3^E < \gamma_3^W$.

The contract with each purchaser differs. The Welsh purchaser pays no special attention in the contract to waiting time (or quality, which is assumed non-

contractible) and payment is made according to the number of patients treated, with $P^W = P^W(x)$.

The contract with the English purchaser includes a target waiting time, \bar{r} . While it is possible to contract directly on waiting times in a variety of ways this is not usual practice in the NHS. Rather the incentive for a provider to pay attention to waiting times comes from the threat that there will be some form of sanction if satisfactory standards are not reached. This sanction might take the form of the chief executive being removed from post or the contract being placed elsewhere if the target is not met. This type of arrangement can be implemented in a context where the parties contract over repeated periods, with the incentive to meet the target operating through the payoff rather than payment function.

In these circumstances, the provider will be concerned about the payoff in the current period and in subsequent periods (Chalkley and Malcomson 2000). The present discounted value of the provider's payoff from any date τ is given by:

$$\sum_{t=\tau}^{\infty} \delta^{t-\tau} u^E(x_t^E, r_t^E, q_t^E, P_t^E)$$

where t denotes the time period and δ is the provider's discount factor, $0 \leq \delta \leq 1$. As long as $\delta > 0$, the provider will care about future payoffs.

Faced with these two contractual arrangements, the provider will pay greater attention to its contract with the English purchaser and, in particular, to the waiting times faced by English patients rather those by Welsh patients.

3. Research questions, methods and data

In order to ascertain whether national policy had an impact on provider behaviour, we analyse routine data from each of the three Trusts to answer two questions:

1. Is there evidence of differential performance over time among the three Trusts and are these differentials associated with the country in which the Trust is located?
2. Within each Trust, is there evidence of discrimination among patients according to where their purchasing authority is located?

The former question is considered by examining trends at each Trust across a number of dimensions, including levels and types of activity, waiting times, and mortality rates.

With respect to the second question, the conjecture is that, given the incorporation of the performance management regime in England, patients that are the responsibility of English purchasers are more likely to experience shorter waiting times compared to those who are the responsibility of Welsh purchasers. Given that national policy in the two countries has changed over time, we expect to observe the following pattern:

- Phase 1 – baseline: similar experiences, irrespective of whether patients are English or Welsh, because there was a common policy in the two countries. Up until 1998, England and Wales had a common set of performance indicators and performance targets as part of the Patients’ Charter programme.
- Phase 2 – divergence: where the relaxing of targets and less stringent performance management regime in Wales leads to Trusts placing greater emphasis on meeting English targets, resulting in pro-English discrimination.
- Phase 3 – convergence: following the re-introduction of targets and strengthening of the performance management regime in Wales.

For each Trust we analyse specialities and procedures with average waiting times over 50 days and where there are more than 50 episodes per year purchased by both Welsh and English purchasers, those fulfilling the criteria listed in table 1. In order to estimate the differential in waiting times associated with the country in which purchasers are based we control for a number of patient characteristics that may explain waiting times, including age, gender and various measures of casemix complexity. Casemix complexity is measured by the number of diagnoses that are coded, by the number of operations performed, and using an index constructed on the basis of the version 3.1 Healthcare Resource Group (HRG) to which each patient is assigned. Relative weights for each HRG were calculated using the 2003 National Reference Cost Schedule for English NHS Trusts.² The index is centred around 1, this value corresponding to the average Reference Cost reported for elective, non-elective and day case HRGs.

The set of variables is conditional on the specialty or procedure being analysed. A brief description of the variables is provided in table 2 while table 3 provides specification details.

We analyse the Hospital Episode Statistics (HES), compiled by all English hospital Trusts, and the equivalent for Welsh trusts, the Patient Episode Database for Wales (PEDW) for three Trusts:

- Robert Jones and Agnes Hunt Orthopaedic Hospital & District NHS Trust
- Royal Shrewsbury Hospitals NHS Trust
- North East Wales NHS Trust

Each HES or PEDW record comprises a Finished Consultant Episode (FCE), defined as the period when the patient is under the care of a specific consultant. An episode ends when the patient is discharged from hospital or into the care of another consultant. HES and PEDW contain a wealth of information about patients, including their purchasing authority, the reason for admission, diagnoses, procedures undertaken, discharge arrangements, and waiting times. Most, but not all, of these variables are common across HES and PEDW. For the English Trusts seven years’ worth of HES data are analysed, covering the financial years from 1996/97 to 2002/03. PEDW data for the North East Wales Trust were available from 1997/98 to 2002/03.

²http://www.dh.gov.uk/PublicationsAndStatistics/Publications/PublicationsPolicyAndGuidance/PublicationsPolicyAndGuidanceArticle/fs/en?CONTENT_ID=4070195&chk=UzhHA3

4. Results

General Trends

Annual descriptive data for Robert Jones and Agnes Hunt Orthopaedic & District Hospital NHS Trust, Royal Shrewsbury Hospitals NHS Trust, and North East Wales NHS Trust are presented in tables 4, 5 and 6 respectively.

With respect to activity, there are similar patterns at the two English Trusts but clear differences at the North East Wales Trust. Over the period, activity increased substantially at the English Trusts but remained constant at the Welsh Trust. The English Trusts undertook proportionately more elective activity over time, while proportionately more non-elective work was undertaken in Wales. The proportion of day case activity rose steadily at the English Trusts but fell in Wales.

Casemix complexity appears to have increased at Robert Jones, as indicated by the HRG index and by a declining proportion of patients recorded as having no operation. That said, average length of stay fell over the period. There is no clear evidence that casemix complexity changed over time at the other two Trusts.

Mortality rates at the two English Trusts are below the English national average (of 2.3% in 2002/03). Over the period the rate averaged 1.5% at Royal Shrewsbury and 0.8% at Robert Jones, where a declining trend is evident. Mortality rates were highest at the Welsh Trust and increased steadily from 2.9% in 1997/98 to 4.3% in 2002/03.

Waiting Times

Waiting times for each of the specialties and procedures listed in Table 1 were estimated according to the model specifications detailed in Table 3 on each year's worth of data. Although not intended as explanatory models, the majority of models estimating the waiting time for specific procedures pass the RESET test (83% - 52/63). The models estimating specialty-level waiting times appear misspecified, with only 12% (7/59) passing the RESET test.

Estimation results for the full set of variables are not reported. Rather, table 7 presents the coefficient estimates and their standard errors for the regressors WELSH (for the two English Trusts) and ENGLISH (for the Welsh Trust) for all models. For the English Trusts, the coefficient shows the average difference in days that Welsh patients wait compared to their English counterparts after controlling for other patient characteristics. A positive coefficient implies that the Welsh wait longer, on average, than English patients. For the North East Wales Trust, the English patients are compared to the Welsh, so a positive coefficient implies that the English face longer waiting times.

For each of the specialties and procedures, two graphs are shown. The first shows trends in activity for the two sets of patients, the second the difference in the mean waiting times (with 95% confidence interval) for Welsh patients compared to the

English (for North East Wales Trust, the average wait for Welsh patients forms the baseline).

The results of the analysis can be summarised as follows:

Robert Jones and Agnes Hunt Orthopaedic Hospital & District NHS Trust

- From 2001/02, waiting times for Welsh patients for all Trauma & Orthopaedics procedures were on average 37 days longer.
- From 2000/01, Welsh patients faced a longer waiting time of 60 days for hip and knee replacements on average. Prior to 1997/98 the average waiting time for Welsh patients was less than that for the English.
- In 2002/03 Welsh patients waited around 49 days longer for removals of fixation devices from bones.

Royal Shrewsbury Hospitals NHS Trust

- In 2000/01 Welsh patients waited an average of 12 days longer for admission to General Surgery & Urology.
- For hernia repairs Welsh patients waited an average of 39 days longer in 1999/2000 and in 2002/03, but the higher waiting times in the intervening years were not statistically significant.
- For varicose veins procedures Welsh patients waited an average of 68 days from 2000/01 onwards.
- In 2000/01 and 2001/02, Welsh patients waited an average of 42 days longer for admissions to ophthalmology.
- For cataract removals, on average Welsh patients waited 16 days longer in 1997/98, around 72 days longer between 1999/2000 and 2001/02, and 22 days longer in 2002/03. They also waited 41 days longer in 1996/97 and 1997/98, prior to the divergence in policy.
- In 2000/02 the Welsh waited an average of 38 days longer for admission to ENT.
- For tonsil removals, Welsh patients waited 50 and 85 days longer in 1999/2000 and 2000/01.

North East Wales NHS Trust

- Over the period, the Welsh waited longer for admission to Trauma & Orthopaedics, with the difference in waiting times being significant in 1997/98 (64 days), 2000/01 (80 days) and 2002/03 (57 days).

5. Discussion

We have analysed routine data collected from three Trusts close to the English-Welsh border to ascertain whether:

- There is evidence of differential performance over time that relates to the country where the Trust is located.
- There is evidence within each Trust of discrimination between English and Welsh patients.

When comparing trends across Trusts, there are similarities between the two located in England and differences to North East Wales Trust. The two English Trusts

recorded increased levels of activity for all selected specialities and nearly all selected procedures, and undertook proportionately more day case and elective activity, over the time period. Activity levels remained constant or fell in Wales, the proportion of day case activity fell, and proportionately more non-elective patients were admitted.

Mortality rates at the English trusts remained low or declined further over the period, but the high and rising hospital mortality rates at the North East Wales Trust are cause for concern. It may be that higher mortality rates at the North East Wales Trust are due partly to the proportionate increase in emergencies admitted to the Trust. It is not apparent from the analysis of PEDW data that any other characteristics of patients admitted to the Trust have changed over time. It would be interesting to know what steps the Trust is taking to identify the cause of its high and rising mortality rate, whether or not it has isolated an institutional effect from other causal factors, and what plans are in place to improve the situation.

The differences observed between the English and Welsh Trusts may be due in part to national policy, with the more demanding performance management regime that operated in England over most of the period having a more discernible impact on organisational culture and behaviour. However, there may be other reasons that might explain differences in performance. These include differences in contracting policies, local health needs, local health priorities and funding levels. Research to ascertain what differences exist and the extent to which they are thought to be influential would be worth considering.

The problem of controlling for institutional and contextual heterogeneity can be avoided by examining behaviour in each Trust. In order to ascertain whether waiting time targets have a specific – rather than general – effect we have attempted to find evidence of pro-English discrimination with respect to waiting times that follows a similar pattern to the early relaxation and later strengthening of the target-setting regime in Wales.

Our analysis might be interpreted as lending some support to the hypothesis that targets have a specific effect. Pro-English discrimination that matches the expected temporal pattern is most evident for hip replacements, knee replacements, cataract removals, and varicose vein procedures, with weaker evidence for removal of fixation devices, hernia repairs and tonsil removals. There is no evidence of discrimination with respect to examinations of the upper digestive system or bladder examinations. As, unlike the latter set of procedures, the former set have been the focus of specific political attention with respect to waiting time policy, it might be concluded that the stricter targets embodied in the contracts with English purchasers have influenced internal Trust behaviour.

But consideration of the longer-term trends complicates matters. The hypothesis was that, because of the consistency in policy between the two countries prior to devolution, no discriminatory behaviour should have been evident prior to 1998. For the three procedures that most closely match the expected temporal pattern of discrimination between 1997/98 and 2002/03, there is evidence of prior discrimination. The Welsh waited significantly longer for cataract removals at the Royal Shrewsbury in 1996/97 and 1997/98. In contrast, at the Robert Jones, discriminatory behaviour was pro-Welsh in the period prior to the divergence in

policy. Clearly, then, some reason other than the target-setting regime must be advanced to explain the differentials observed prior to 1997/98. By extension it would be inappropriate to disregard the possibility that this unidentified cause still had influence.

Furthermore, it may be inappropriate to attribute observed differences solely to target-setting policy because, despite holding many institutional and contextual features constant, it cannot be assumed the English and Welsh purchasers have similar arrangements for paying for the number of patients treated. If the formulation of $P^w(x)$ differs between the two purchasers, it may be this, not the targets, that drives discriminatory behaviour. Unfortunately it would be impossible to ascertain every actual specification of $P^w(x)$ given the diversity of purchasers that had dealings with each of the three Trusts and the continuous re-organisation of these purchasing organisations over the period. But there is some recent evidence that inadequate funding from Powys Local Health Board might be the cause of longer waiting times for Welsh patients at the Royal Shrewsbury Hospital.³ If this is indicative of a more general difference in funding arrangements this would undermine the contention that targets matter most in explaining discriminatory behaviour.

Finally, it might be that longer waiting times are acceptable to the Welsh – if they get something else in return. Within each Trust, the utility loss associated with longer waiting times may have been offset by improvements in other dimensions of quality, q . This seems unlikely, though. The only measure we have of q is mortality rate, but we found no evidence that the rate differed for English and Welsh patients within each Trust. “Compensation” may instead have come from other sources. For instance, commentators have suggested that in the immediate post-devolution period the Welsh Minister for Health and Social Services reduced attention to waiting time targets in Wales and instead “emphasised what has been termed ‘joined up working’ focusing on partnerships between health, local government and the voluntary sector” (Burnett, 2001, McClelland, 2002). It is unclear whether sufficient off-setting benefits were generated to justify the shift in policy focus, but the subsequent re-introduction of targets in Wales suggests not. Politically then, at least, perhaps targets do matter.

References

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³ http://news.bbc.co.uk/2/hi/uk_news/wales/mid_/2981761.stm

Table 1: Specialties and procedures selected for analysis

Hospital, specialty, procedure	OPCS codes
Robert Jones and Agnes Hunt Orthopaedic Trust	
Trauma & Orthopaedics	
<i>Hip replacements</i>	<i>W37-W39, W46-W48</i>
<i>Knee replacements</i>	<i>W40-W42</i>
<i>Removal of internal fixation device from a bone</i>	<i>W283</i>
Royal Shrewsbury Hospital	
General Surgery & Urology	
<i>Hernia repairs</i>	<i>T19-T27</i>
<i>Varicose veins procedures</i>	<i>L832, L85-L87</i>
<i>Examinations of the upper digestive system</i>	<i>G451, G458, G459</i>
<i>Examinations of the bladder</i>	<i>M459</i>
Ophthalmology	
<i>Cataract removals</i>	<i>C71-C72, C74-C75</i>
Ear, Nose & Throat	
<i>Tonsil removals</i>	<i>F34</i>
Gynaecology	
North East Wales NHS Trust	
General Surgery & Urology	
Trauma & Orthopaedics	
Ophthalmology	
Gynaecology	

Table 2: Variable descriptions

Variable name	Description	HES data field	PEDW data field
ELECDUR	Waiting time in days	elecdu	'episode start date' minus 'date decided to admit'
ENGLISH	Purchaser is an English Health Authority, English GP fundholder, Primary Care Group, or Primary Care Trust	purcode	registered lhb
WELSH	Purchaser is a Welsh Health Authority, Welsh GP fundholder, or Local Health Board	purcode	registered lhb
OTHERPUR	Purchaser is private, Scottish or Irish NHS purchaser, Special Health Authority or Care Trust	purcode	registered lhb
DAYCASE	Taking a value of 1 if patient was treated as a daycase, 0 otherwise	classpat	patient class
AGE	Age in whole years at episode start date	age	age
AGE2	AGE ²	age	age
AGE3	AGE ³	age	age
FEMALE	Taking a value of 1 if patient is female, 0 otherwise	sex	sex
HRGW	Casemix complexity – hrg weights	hrglate	hrg drg submitted
NUMBERDIAG	Casemix complexity – number of diagnoses	diag_1–diag_3	diag1–diag6
NUMBEROP	Casemix complexity – number of operations	oper_1, oper_2	oper1–oper4
EXTRACAP	Type of procedure used in removal of cataract: extracapsular extraction	oper_1	oper1
PROSTHRE	Type of procedure used in removal of cataract: phacoemulsification	oper_1	oper1

Table 3: Model specifications and explanatory variables

+: included in model
 -: excluded from model

	Explanatory variables											number diag	number op	daycase
	welsh	english	otherpur	female	age	age2	age3	hrgw	extracap	prosthre				
Robert Jones and Agnes Hunt Orthopaedic Hospital NHS Trust														
Trauma & Ortho	+	-	+	+	+	+	+	+	-	-	+	+	+	
Hip replacements	+	-	+	+	+	+	+	-	-	-	+	+	-	
Knee replacements	+	-	+	+	+	+	+	-	-	-	+	+	-	
Fixation removal	+	-	+	+	+	+	+	-	-	-	+	+	+	
Royal Shrewsbury Hospital														
General Surgery	+	-	+	+	+	+	+	+	-	-	+	+	+	
Hernia repairs	+	-	+	+	+	+	+	-	-	-	+	+	+	
Varicose veins procedures	+	-	+	+	+	+	+	-	-	-	+	+	+	
Digestive system exams	+	-	+	+	+	+	+	-	-	-	+	+	+	
Bladder exams	+	-	+	+	+	+	+	-	-	-	+	+	+	
Ophthalmology	+	-	+	+	+	+	+	+	-	-	+	+	+	
Cataract removals	+	-	+	+	+	+	+	-	+	+	+	+	+	
Gynaecology	+	-	+	-	+	+	+	+	-	-	+	+	+	
Ear, nose & throat	+	-	+	+	+	+	+	+	-	-	+	+	+	
Tonsil removals	+	-	+	+	+	+	+	-	-	-	+	+	+	
North East Wales NHS Trust														
General Surgery	-	+	+	+	+	+	+	+	-	-	+	+	+	
Trauma & Ortho	-	+	+	+	+	+	+	+	-	-	+	+	+	
Ophthalmology	-	+	+	+	+	+	+	+	-	-	+	+	+	
Gynaecology	-	+	+	-	+	+	+	+	-	-	+	+	+	

excluded in some years due to insufficient number of observations

Table 4: Descriptive statistics for Robert Jones and Agnes Hunt Orthopaedic & District Hospital NHS Trust

	1996	1997	1998	1999	2000	2001	2002
Episodes	6,871	7,423	8,742	9,098	9,535	8,984	9,430
Episodes with waiting time	4,775	5,184	6,253	6,240	6,792	6,641	7,411
Mean waiting time (days)	124.7386	135.2313	141.9432	142.0059	150.8238	155.9605	156.3952
Average Length of Stay	8.6	8.0	6.9	6.4	5.9	6.3	6.0
Mortality Rates	1.4%	1.0%	1.1%	0.7%	0.5%	0.4%	0.3%
% Daycases	15%	17%	18%	19%	21%	21%	22%
% Elective Episodes	71%	74%	79%	79%	83%	85%	88%
Nationality of purchaser							
English	3,926	4,073	5,032	5,493	5,608	5,038	5,404
Welsh	2,007	2,226	2,576	2,688	2,891	2,828	3,052
Specialties							
Trauma & Orthopaedics	75%	77%	79%	80%	66%	79%	81%
Personal characteristics							
Mean age (years)	47.19	46.89	47.12	46.90	47.29	48.66	48.99
% Female	15%	17%	18%	19%	21%	21%	22%
Casemix complexity							
HRG weights	0.88	0.89	0.87	0.85	0.86	0.91	0.95
Single diagnosis	2,258	2,347	3,046	3,261	3,722	3,349	3,404
Two diagnoses	557	1,802	2,317	2,321	2,497	2,391	2,494
Three diagnoses	4,056	3,274	3,379	3,516	3,316	3,244	3,532
No operation	1,896	1,907	2,021	2,086	1,783	1,684	1,602
One operation	2,821	2,981	3,807	4,241	4,557	4,387	4,317
Two operations	2,154	2,535	2,914	2,771	3,195	2,913	3,506

Table 5: Descriptive statistics for Royal Shrewsbury Hospitals NHS Trust

	1996	1997	1998	1999	2000	2001	2002
Episodes	54,224	56,973	59,686	60,525	61,042	63,720	66,441
Episodes with waiting time	21,523	21,699	23,929	23,931	21,264	20,086	19,750
Mean waiting time (days)	79	81	93	75	88	110	106
Average Length of Stay	3.3	3.8	3.6	3.6	3.7	3.7	3.0
Mortality Rates	1.7%	1.4%	1.6%	1.5%	1.6%	1.4%	1.6%
% Daycases	23%	23%	26%	27%	29%	30%	31%
% Elective episodes	40%	38%	40%	40%	41%	43%	43%
Nationality of purchaser							
English	46,890	49,613	52,293	53,700	53,802	55,069	56,725
Welsh	6,170	6,885	6,864	6,280	6,712	7,805	9,023
Specialties							
General Surgery & Urology	16%	15%	15%	16%	16%	15%	14%
Trauma & Orthopaedics	4%	4%	4%	4%	4%	4%	3%
Ear, Nose & Throat	6%	5%	6%	5%	6%	6%	6%
Ophthalmology	6%	5%	6%	6%	7%	7%	7%
Gynaecology	8%	7%	7%	8%	7%	7%	7%
Personal characteristics							
Mean age (years)	41.45	41.37	42.71	43.85	44.84	45.61	47.06
% Female	61%	59%	60%	59%	59%	59%	58%
Casemix complexity							
HRG weight	0.46	0.45	0.46	0.45	0.45	0.45	0.45
Single diagnosis	33,587	32,651	34,571	33,152	32,903	33,176	32,133
Two diagnoses	4,304	16,507	16,861	18,053	18,532	19,411	20,376
Three diagnoses	16,333	7,815	8,254	9,320	9,607	11,133	13,932
No operation	30,094	32,006	30,408	30,745	29,585	28,154	29,288
One operation	12,537	14,117	15,697	15,714	17,045	20,487	20,682
Two operations	11,558	10,816	13,531	14,014	14,363	15,053	16,380

Table 6: Descriptive statistics for North East Wales NHS Trust

	1997	1998	1999	2000	2001	2002
Episodes	46,947	46,898	46,463	47,937	49,137	47,563
Episodes with waiting time	17,734	17,670	16,191	15,423	16,282	12,869
Mean wait (days)	70.79	92.53	84.81	114.52	89.20	96.96
Average Length of Stay	5.7	5.5	5.2	5.6	5.6	5.4
Mortality Rates	2.9%	3.1%	3.1%	3.4%	3.6%	4.3%
% Daycases	22%	22%	20%	20%	20%	13%
% Elective episodes	41%	41%	39%	37%	38%	30%
Nationality of purchaser						
English	1,924	2,070	1,998	2,242	2,482	2,636
Welsh	44,634	44,752	44,408	45,654	46,584	44,865
Specialties						
General Surgery & Urology	22%	22%	21%	22%	22%	22%
Trauma & Orthopaedics	7%	6%	7%	6%	6%	6%
Ophthalmology	5%	5%	4%	5%	4%	3%
Gynaecology	7%	16%	16%	16%	15%	13%
Personal characteristics						
Mean age (years)	49.87	50.85	51.35	51.83	52.02	52.82
% Female	57%	57%	58%	58%	57%	55%
Casemix-complexity						
HRG weights	0.54	0.53	0.53	0.55	0.55	0.57
Single diagnosis	16,873	15,607	16,548	16,397	16,551	14,707
Two diagnoses	12,266	12,405	12,293	12,380	12,953	11,927
Three or more diagnoses	17,808	18,886	17,621	19,160	19,422	20,660
No operation	22,190	22,032	23,351	24,009	25,332	27,669
One operation	16,442	17,060	15,962	16,882	16,308	13,763
Two or more operations	8,315	7,806	7,150	7,046	7,497	6,131

Table 7: Estimated beta coefficients on Welsh/English (for English/Welsh trust)

note: Coefficients in **bold** are significant at 5% confidence level

	1996		1997		1998		1999		2000		2001		2002	
	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE
<i>Robert Jones and Agnes Hunt Orthopaedic Hospital NHS Trust</i>														
Trauma & Ortho	-1.30	5.02	-37.21	5.17	-19.15	4.87	-17.83	4.46	8.66	4.63	35.97	4.23	39.56	3.73
Hip repl.	0.29	13.84	-65.96	14.15	-43.22	15.91	-15.02	18.83	49.35	17.52	102.66	16.27	90.25	13.31
Knee repl.	9.44	18.19	-43.73	17.67	-7.39	22.03	-13.64	21.86	44.73	20.27	60.10	19.09	85.47	14.91
Fixation removal	-12.47	15.68	-38.71	20.66	-13.89	17.79	21.23	17.84	21.56	18.57	16.30	18.41	48.93	21.83
<i>Royal Shrewsbury Hospital</i>														
General Surg.	7.60	4.08	7.76	4.26	0.30	4.29	2.28	3.89	11.73	3.92	10.05	5.43	-4.48	6.47
Hernia repairs	-2.50	13.53	30.50	18.45	-0.37	15.93	40.74	15.92	26.89	14.46	17.00	16.05	34.51	15.40
Var. veins proc.	65.42	20.17	20.27	28.52	7.27	19.70	20.46	24.01	78.21	23.26	68.16	30.94	64.31	32.32
Digest. sys. ex.	-2.01	5.37	3.44	3.56	-9.02	4.04	-0.51	4.17	9.14	9.09	4.46	14.93	-22.13	11.59
Bladder exams	-17.77	8.80	-8.08	7.85	-12.81	7.39	-16.16	8.56	0.76	7.54	1.71	13.44	-40.18	18.63
Ophthalmology	4.70	3.47	25.40	4.98	8.80	4.93	14.35	5.10	42.12	4.82	41.08	4.94	7.25	4.54
Cataract removals	38.63	6.70	43.25	11.45	15.72	7.42	66.52	8.68	79.47	6.62	70.96	6.36	21.52	6.30
Gynaecology	-7.48	5.82	4.94	5.47	3.41	6.41	-1.30	6.78	18.75	6.91	-11.07	7.28	-17.57	5.59
Ear, Nose & Thrt.	-0.83	5.34	27.27	5.61	18.37	5.78	8.34	6.12	37.70	7.11	13.17	7.05	1.62	7.72
Tonsil removals	-1.84	10.01	15.18	11.94	5.00	12.50	50.13	10.16	85.19	14.48	11.57	15.88	6.20	19.56
<i>North East Wales NHS Trust</i>														
General Surg.	-	-	-1.24	11.88	-5.15	13.21	5.72	13.42	-16.00	14.09	-11.31	9.97	-14.27	10.13
Trauma & Ortho	-	-	-26.78	25.52	-63.92	26.40	-19.09	28.30	-79.68	32.04	-53.72	29.77	-56.66	23.39
Ophthalmology	-	-	23.91	14.59	21.31	20.37	11.82	18.34	-72.20	20.25	8.85	20.95	13.64	7.97
Gynaecology	-	-	1.70	14.91	17.99	16.81	-13.59	19.12	12.34	16.78	-2.14	15.75	-15.84	18.06

Robert Jones and Agnes Hunt Orthopaedic Hospital NHS Trust

Figure 1: Number of procedures

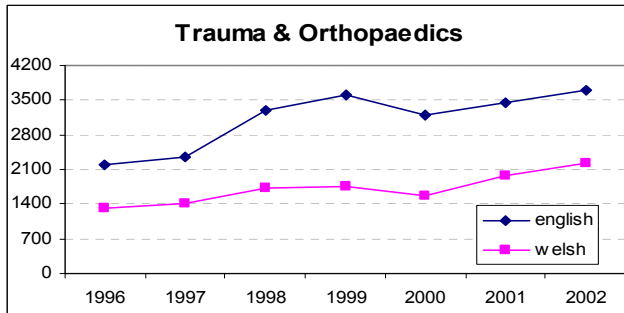


Figure 2: Difference in waiting time

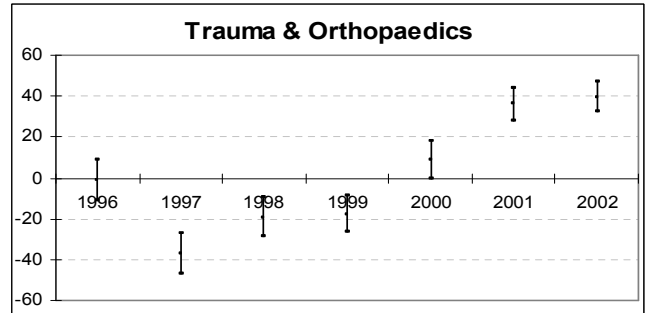


Figure 3: Number of procedures

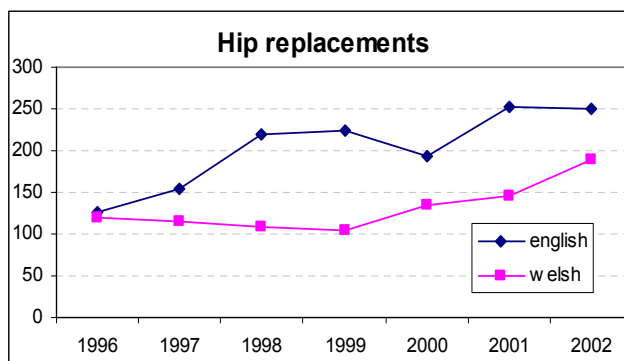


Figure 4: Difference in waiting time

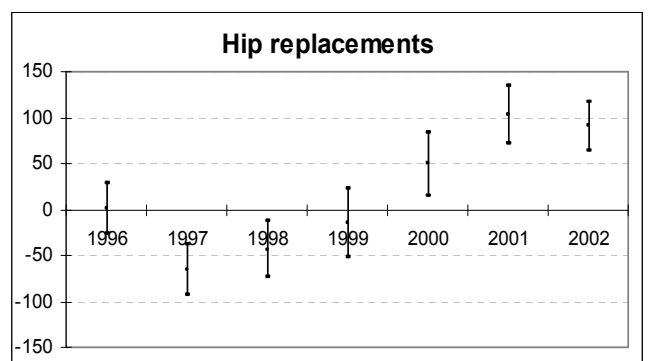


Figure 5: Number of procedures

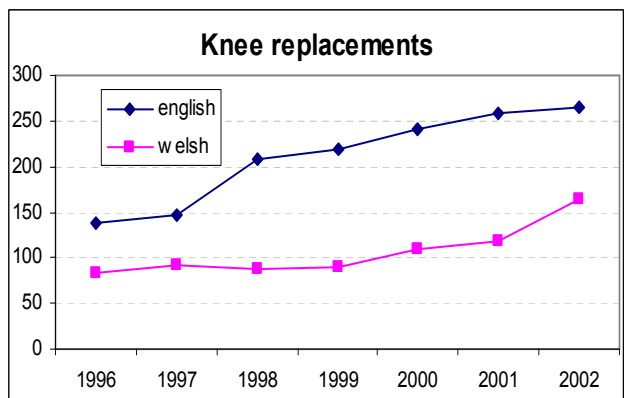


Figure 6: Difference in waiting time

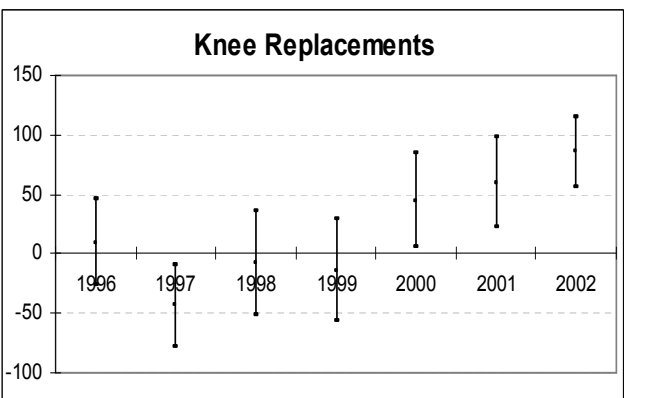


Figure 7: Number of procedures

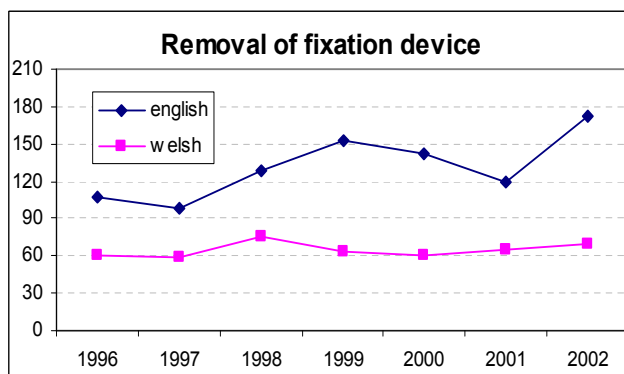
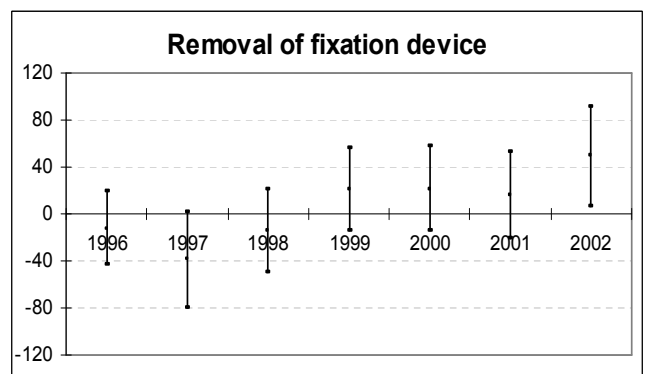


Figure 8: Difference in waiting time



Royal Shrewsbury Hospital NHS Trust

Figure 9: Number of procedures

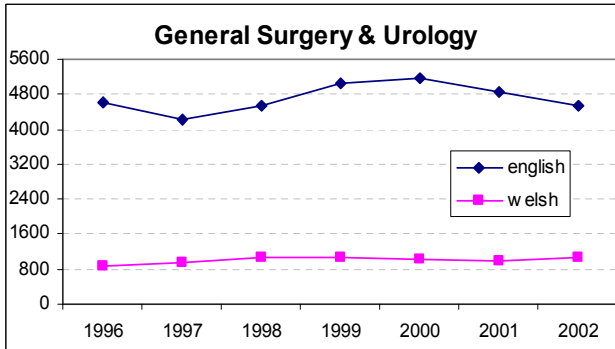


Figure 10: Difference in waiting time

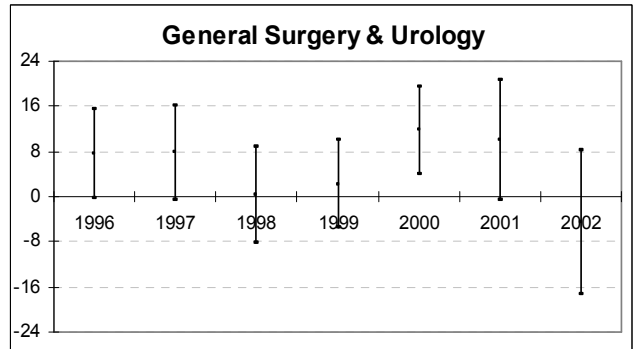


Figure 11: Number of procedures

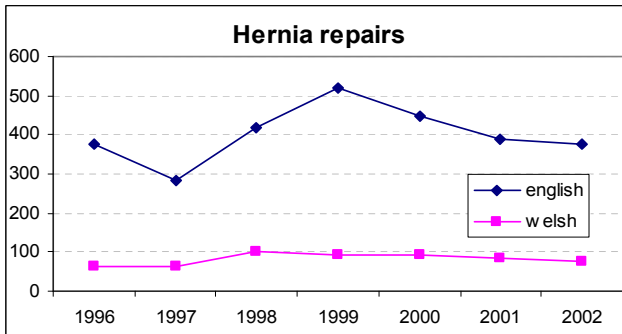


Figure 12: Difference in waiting time

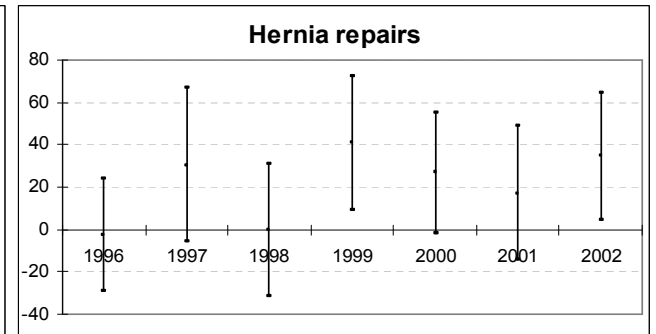


Figure 13: Number of procedures

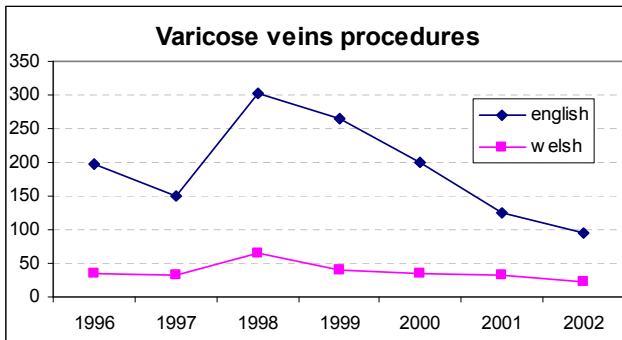


Figure 14: Difference in waiting time

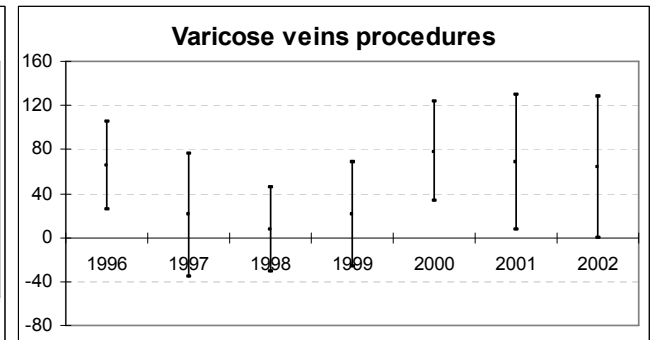


Figure 15: Number of procedures

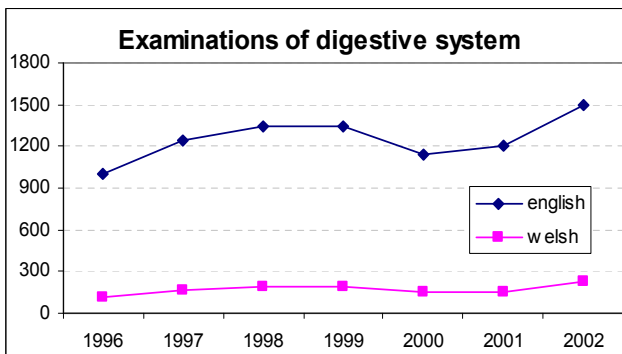


Figure 16: Difference in waiting time

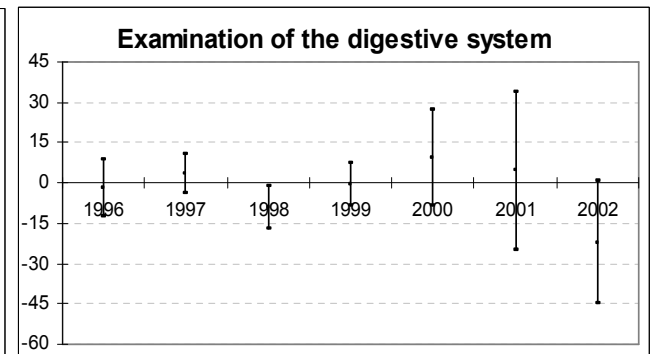


Figure 17: Number of procedures

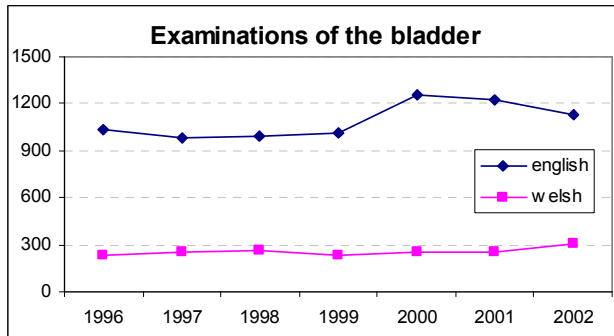


Figure 18: Difference in waiting time

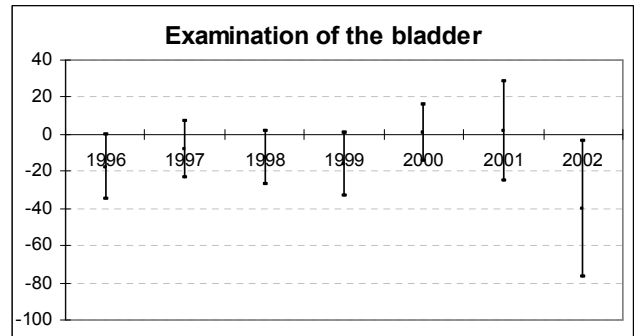


Figure 19: Number of procedures

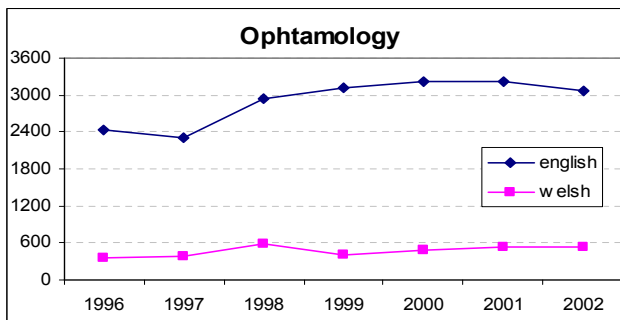


Figure 20: Difference in waiting time

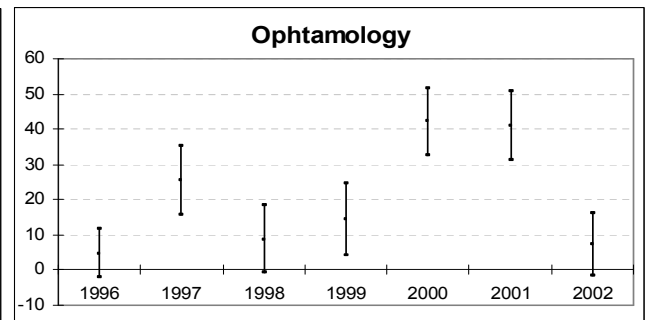


Figure 21: Number of procedures

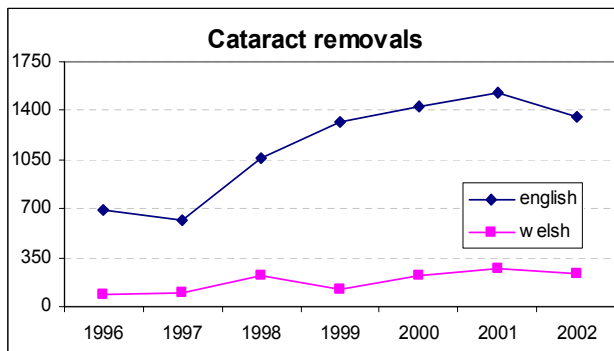


Figure 22: Difference in waiting time

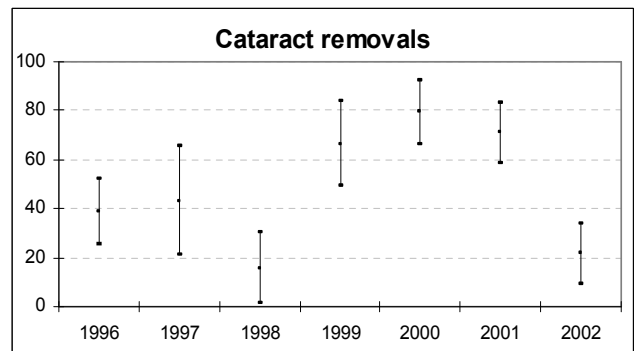


Figure 23: Number of procedures

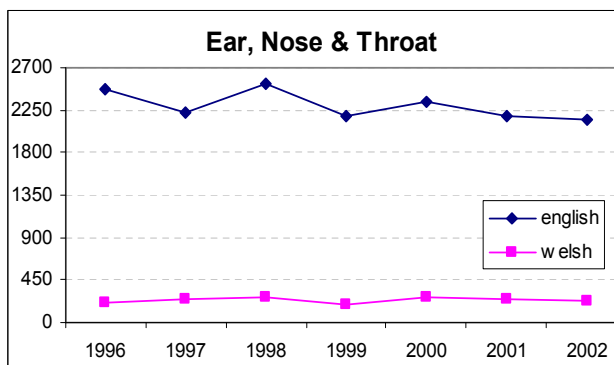


Figure 24: Difference in waiting time

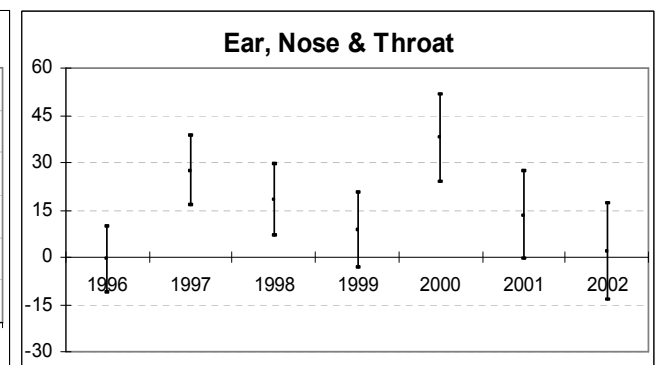


Figure 25: Number of procedures

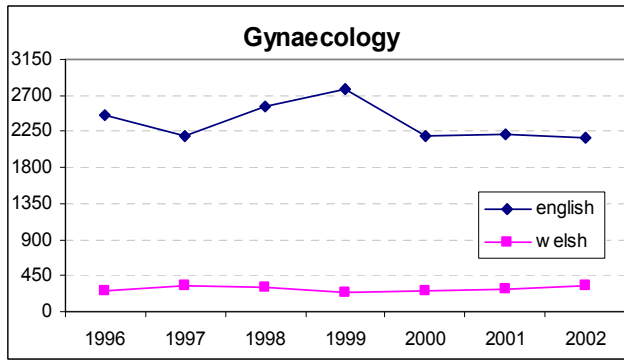


Figure 26: Difference in waiting time

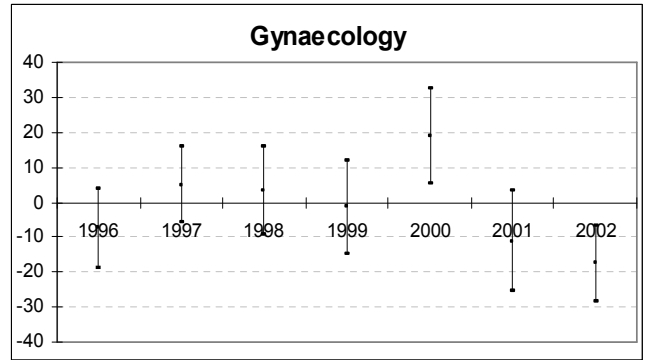


Figure 27: Number of procedures

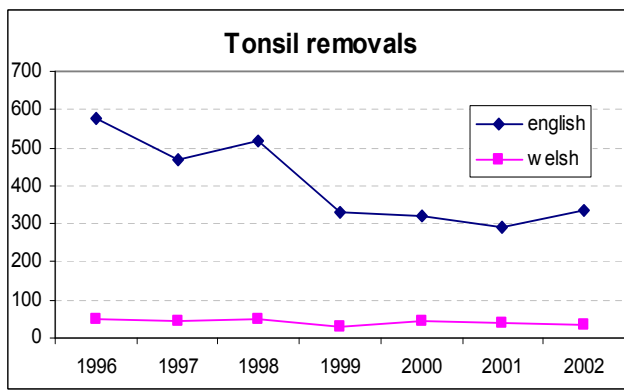
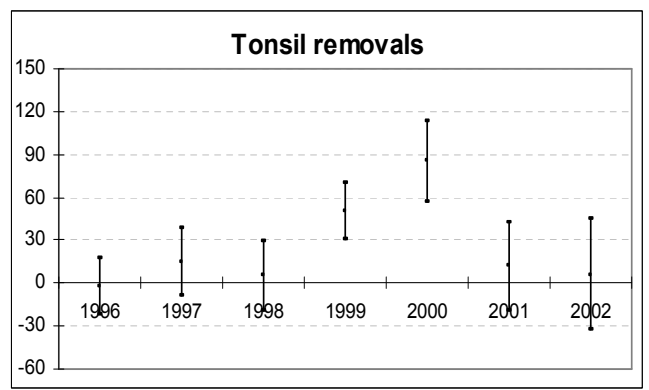


Figure 28: Difference in waiting time



North East Wales NHS Trust

Figure 29: Number of procedures

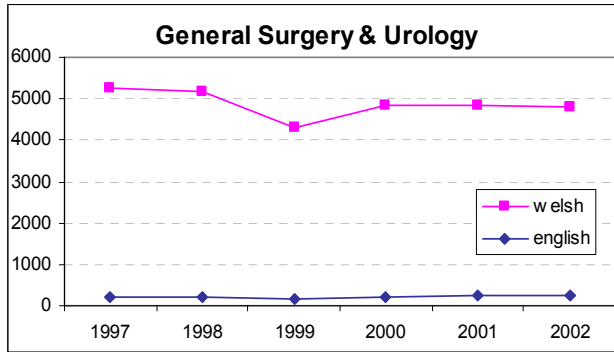


Figure 30: Difference in waiting time

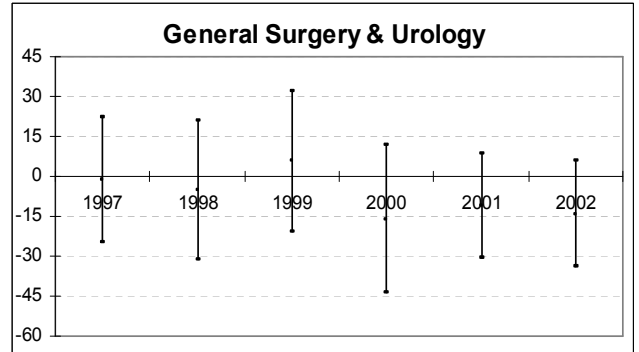


Figure 31: Number of procedures

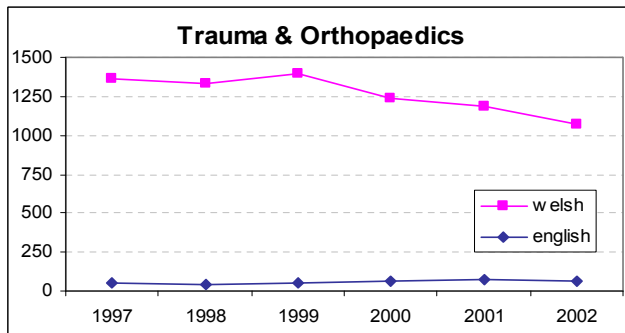


Figure 32: Difference in waiting time

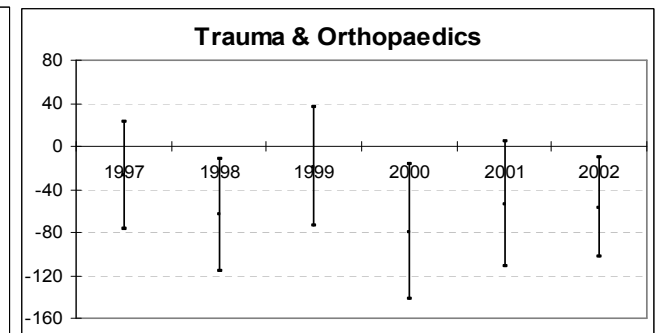


Figure 33: Number of procedures

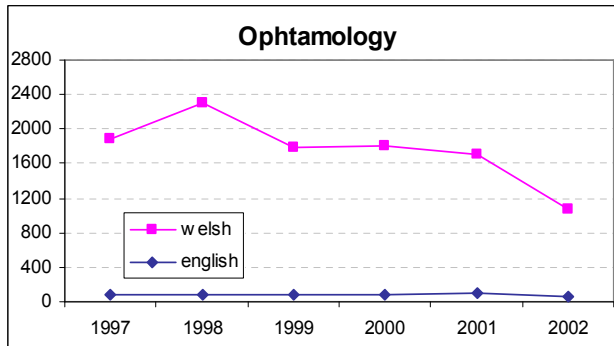


Figure 34: Difference in waiting time

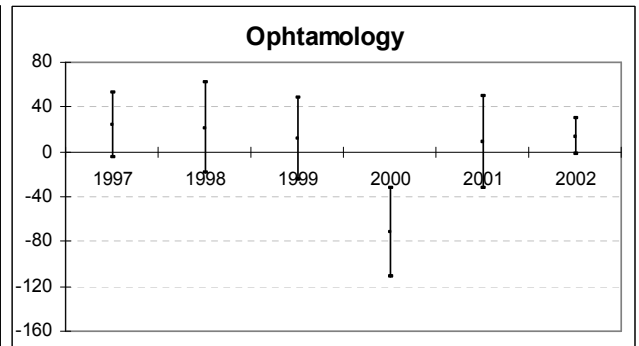


Figure 35: Number of procedures

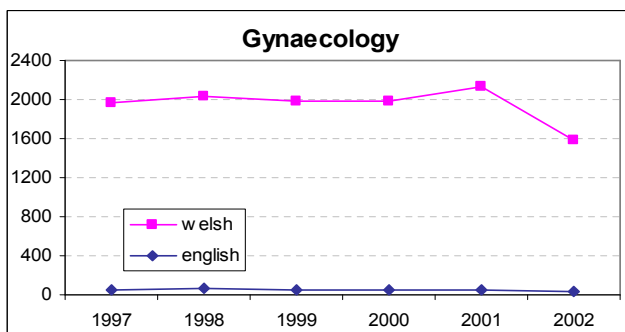


Figure 36: Difference in waiting time

