

Analysis of rates of OPCS procedures and ICD diagnoses in XYZ-shire

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Executive Summary

- Levels of (what are counted as) inpatient admissions have increased year on year since 2003/04
 - The rate of increase is far in excess of demographic growth and national trends
 - One or more major providers have implemented changes resulting in the re-classify outpatient and A&E procedures to an ‘inpatient’ admission.
 - Using length of stay as a rough equivalent to PbR cost gives the equivalent to 30,000 excess bed days worth of inpatient cost (approx £6M) as a result of these shifts in counting.
- Low priority procedures make an exceedingly small contribution to the excess
 - Only wisdom teeth and Varicose Veins offer opportunity for a reduction in volume
- Coronary interventions are at the level expected for the population
- There appears to be 1,200 excess births per annum over capitation funded levels.

Suggested Actions

The PCT is advised to consider the following options:

- Review the level of lower and upper GI endoscopic interventions.
- Review the level of Orthopaedic interventions (especially arthroscopies and joint replacements)¹.
- Review the use of specific vascular codes (L13, L63, L79, L91).
- Review the issue of coding and counting in Obstetrics & Gynaecology.
- Review the counting of ‘inpatient’ in Plastic Surgery
- Request a review of how events related to cancer treatment are counted.
- Request a wider review of the issue of re-classification of outpatient and A&E procedures perhaps with the assistance of the Audit Commission.

¹ It should be noted that the level of Orthopaedic operations show the highest levels of variation in affluent populations indicating that there is considerable discretion regarding what is an acceptable level of intervention.

Introduction

The XYZ-shire PCT has requested the benchmarking of local rates of admission for both OPCS procedures and ICD diagnoses.

Local rates have been benchmarked against national averages after adjusting for the effects of age and deprivation.

The analysis has been conducted at the 3 digit level in order to arrive at a manageable number of groups with statistically significant totals.

The Data

The data covers all admissions for acute, maternity, mental health and community hospital care for the years 2003/04 to 2006/07. Data for 2006/07 was to the end of January grossed up to a full year. The number of admissions in 2006/07 appeared to be slightly lower than expected and this may be due to a known problem with the SUS data from ABC providers.

Summary

As can be seen in Table One events counted as an 'inpatient' have increased over time and appear to account for the bulk of the 'excess' of inpatient admissions compared to the expected number (assuming national average for events counted as inpatient).

While the counting of certain endoscopic procedures as an inpatient has increased over time it would also appear that the counting of cancer-related and haematology-related events as an 'inpatient' have also markedly increased over time.

Table One: Excess of events counted as an 'inpatient' within XYZ-shire

Year	ICD Diagnoses		OPCS Procedures	
	All	>3.5 SD above expected	All	>3.5 SD above expected
2003/04	-6,980	6,040	-4,660	-1,460
2004/05	1,210	10,120	-380	2,040
2005/06	6,230	15,320	4,320	6,850
2006/07	6,000	20,330	3,740	8,890

Note that in 2003/04 XYZ-shire was below national average. Also note that events where the excess is greater than 3.5-standard deviations higher than expected account for a disproportionate share of the apparent excess. These high excess events account for 7.9% of OPCS procedures (82 out of 1,062 procedures) and 9.1% of ICD diagnoses (149 out of 1,554 diagnoses).

Table two investigates whether it is high or low volume OPCS procedures which account of the high growth over time. As can be seen the bulk of growth in excess interventions is for procedure groups with an expected volume greater than 200 per annum. Under normal circumstances it is in these high volume groups that the PCT

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would have the ability to make a statistically significant reduction via demand management and where a 10% reduction translates a reduction which is worth the effort of implementing change. However, under a regime where the increase is due to re-classification the issue is more to do with Commissioning in the face of statistically significant shifts in provider behaviour.

The use of a standard deviation allows different volumes of activity to be compared on the same basis. Hence in Table Two an excess of > 3 standard deviations could be regarded as a statistically significant excess level of activity.

Table Two: OPCS procedures where activity is higher or lower than expected segmented by annual activity.

Annual Activity	Activity above or below expected				Difference as a standard deviation				Comments
	03/04	04/05	05/06	06/07	03/04	04/05	05/06	06/07	
>200	-3,512	+308	+4,645	+3,340	-17.6	+1.5	+22.3	+15.9	Major source of growth
100 to 200	-573	-560	-67	+95	-7.9	-7.7	-0.9	+1.3	High growth across 11 procedure groups
50 to 100	-370	-177	-222	-224	-5.4	-2.6	-3.1	-3.2	Slightly below expected
10 to 50	-5	+213	+249	+757	-0.1	+2.6	+3.0	+9.3	High growth across 30 procedure groups
Up to 10	-205	-163	-284	-226	-4.6	-3.7	-6.2	-5.2	No change over time

In order to further refine the exact sources of the excess activity the information given in Table Three shows which body systems are responsible for the greatest excess.

Table Three: Body systems showing greatest growth in excess to expected activity

OPCS Chapter	Activity above or below expected				Difference as a standard deviation			
	03/04	04/05	05/06	06/07	03/04	04/05	05/06	06/07
H (Lower GI)	-1,752	-361	1,041	1,222	-27	-5	+15	+17
L (Vascular)	261	565	605	559	+7	+14	+15	+14
X (Miscellaneous)	14	745	2,158	1,377	0	+8	+22	+14
M (Urinary)	469	464	669	849	+7	+7	+9	+12
V (Skull & Spine)	-2	97	83	233	0	+3	+3	+8
R (Pregnancy)	65	-85	-168	491	+1	-1	-2	+6
W (Other Orthopaedic)	119	-27	-94	393	+2	0	-1	+5
B (Endocrine & Breast)	20	150	153	146	+1	+5	+5	+5
G (Upper GI)	-2,747	-1,287	470	290	-43	-21	+7	+5

As can be seen nine out of a possible twenty-one body systems are responsible for the bulk of excess procedures and the growth seen over the past four years. The large changes in activity for Upper and Lower GI is due to the counting of endoscopies which changed in 2005/06 as a result of guidance issued by the SHA. It should be noted that nationally many other Trusts made similar changes in that year and hence the national figures also showed a corresponding increase. Hence there appears to be a far greater excess of upper GI endoscopies than lower GI.

Finally it should be noted that some procedures have a greater impact on commissioning due to the implied PbR effects. These are mainly located in Chapter X (Miscellaneous) and are not a Public Health but rather a Commissioning issue.

Growth in Volume of Admissions

The observed rate of growth in admissions is far beyond that expected from demographic change and is totally out of line with national trends. Indeed such growth suggests that one or more acute providers have made service changes which have resulted in the reclassification of what was previously outpatient and A&E type activities to an 'inpatient' admission.

As such the PCT is not faced with an intervention rate problem *per se* but with a commissioning and PbR problem due to the changes in how events get counted.

Additional light can be shed on these re-classification issues by looking at groups of diagnoses as an indicator of types of service.

As can be seen in Table Four events typically counted as an emergency admission have shown two changes seen in 04/05 and 06/07. These can probably be traced to acute-based structures for handling A&E type activities. In particular injuries & fractures and respiratory conditions counted as an 'emergency' admission specifically increased in 06/07 while a change in the organisation of cardiology emergency services appears to have occurred in 04/05.

The counting of 'elective' events appears to have shown continuous growth over time with changes in the counting of cancer services accounting for 2,400 extra 'inpatient' over the space of four years. A shift in the counting of metabolic disorders may have occurred mid-way through 05/06 and the counting of renal dialysis services changed in early 04/05. Female reproductive has always been higher than expected and continues to grow at an unprecedented rate.

Table Four: Changes in what is counted as 'inpatient' for different diagnosis types²

Type of 'inpatient' activity	Excess				Excess (as STDEV)			
	03/04	04/05	05/06	06/07	03/04	04/05	05/06	06/07
'Emergency' type admissions	154	1,552	1,977	4,359	2	15	19	42
Injuries & fractures	701	570	752	1,403	14	11	14	27
Respiratory Conditions	-32	18	55	622	-1	0	1	12
Cardiology	222	1,148	1,181	1,396	4	19	19	22
'Elective' type admissions	4,335	7,355	11,996	13,831	34	57	90	105
Cancer services	431	971	1,700	2,852	7	15	25	42
Renal Dialysis	2,089	3,102	5,475	4,425	90	133	233	182
Metabolic disorders	-9	-8	92	269	-1	-1	6	17
Gynaecology type services	278	338	459	618	9	11	14	20

In conclusion, changes in counting of events as an 'inpatient' will have implied PBR effects and the PCT is advised to investigate in greater detail the 85 procedures which account for the high growth over time. These are given in Appendix One. The PCT

² Data in this table comes from the top 135 ICD diagnoses with a >3 standard deviation excess of what is counted as 'inpatient' activity in 06/07.

should also consider very carefully any further proposed changes in service delivery given the in-perpetuity effects via PbR.

Low Priority Procedures

The PCT was particularly interested in a group of low priority procedures. Analysis shows that these procedures only make a small contribution to the overall excess

Procedure	OPCS Code	03/04	04/05	05/06	06/07
Varicose Veins	L85	+144	+335	+312	+94
D&C	Q10	+48	+1	-22	+3
Myringotomy	D15	+5	+19	+41	+35
Wisdom Teeth	F09	+55	+101	+24	+138
Tonsillectomy	F34	-76	-108	-44	-86

Varicose Veins have had a high intervention rate over many years in XYZ-shire. Efforts to reduce the level of intervention during 06/07 appear to have worked; however, the excess has only been reduced back to that seen in 03/04. The 06/07 intervention rate is still 6 standard deviations higher than expected from national norms.

Regarding OPCS Q10 it should be noted that 60% of this activity will be Q10.3 (D&C) while 30% is Q10.1 (removal of products of conception from uterus). The overall level for Q10 appears to be at national average and the scatter from year to year is simply due to random variation around national average.

Intervention rates for D15 have never been more than 2.3 standard deviations higher than the expected level (in 05/06) and can be considered to be within acceptable limits.

Levels for F09 are just above 3 standard deviations. The PCT needs to consider if a change in the intervention rate is desirable. A 10% reduction would save about 60 to 70 admissions per annum which could be difficult to discern in the face of the background statistical variation.

Tonsillectomy is around 4 standard deviations below the expected level.

Coronary Interventions

The PCT was also interested in the level of coronary interventions. Procedures described by ICD codes K40 through to K50 were mostly within ± 1 standard deviation of the expected value in all years and overall were considered to be at the level expected for the population of XYZ-shire.

Births & Obstetrics

The actual proportion of live births in XYZ-shire is 0.9% of the national total. The age profile for XYZ-shire suggests that only a 0.85% share should apply and this share only reduces as an adjustment for deprivation is applied. In addition the PCT only receives a 0.79% share of the total capitation weighted NHS funding. A figure of

0.79% is close to the deprivation weighted share that one would expect for Maternity in XYZ-shire.

The level of births appears to be controlled by factors which are not well accounted for in the capitation formula. For example, deprivation only appears to influence the rate of teenage pregnancy but has little effect for older mothers. Ethnicity plays a greater role for non-teenage mothers and the proportion of full-time students has a significant negative effect on the level of births.

The conclusion is that XYZ-shire may have a hidden cost pressure of greater than 1,200 excess births (relative to funding) per annum.

Note that the data in the attached spreadsheets applies the actual rather than the expected share to enable comparison of excess assisted and other interventions which also appear to characterise Obstetrics within XYZ-shire.

Excess Admissions Expressed as Bed Days

The number of excess admissions can be converted into an approximate money value by using the national average length of stay. Over all four years the totality of all admissions equated to 25,000 to 30,000 bed days worth of excess cost. Including excess Obstetric admissions increased this by a further 3,000 bed days.

Note that Mental Health Admissions have a disproportionate effect on this measure due to the very long average length of stay.

However if we estimate that one bed day costs £200 then there is a long term excess cost of around £6,000,000 per annum in the XYZ-shire health care system.

Analytical Methods

Age Adjustment

The national data is available using the five standard DH age bands of 0-14, 15-59, 60-74, 75+. The national total activity was adjusted to that expected for XYZ-shire by applying the rate per 1,000 head in each of the age bands to the population for XYZ-shire in those age bands.

A better estimate of local rates can be obtained by using five year age bands. While data for OPCS and ICD codes were not available in five year age bands the equivalent HRG data is available. The HRG data was therefore used to check the adequacy of the five age band approach. On the whole the two methods give a calculated share which is within $\pm 1\%$ for 65% of HRG.

The standard five DH age bands are most prone to a discrepancy for Maternity since the age profile for births is a unique sub-set of the 15-59 year age band. Hence for XYZ-shire the more accurate method gives a 0.84% share for a normal delivery while the method using DH age bands gives a 0.92% share, i.e. overestimates the share by 10%. However, as discussed in the section on Births & Maternity the actual share for XYZ-shire is 0.9% and this has been used in the attached spreadsheets.

Adjustment for Deprivation

The Index of Multiple Deprivation (IMD) has been shown to be a very reliable measure of the totality of deprivation experienced by the residents of particular areas. In addition IMD also appears to correlate very well with demand for healthcare interventions.

In this work each diagnosis and procedure has been assigned a value for the proportional increase in the volume of intervention with IMD. For example, respiratory conditions show a marked increase in the rate per 1,000 head as IMD increases. Heart conditions and accidents also show an increase as IMD increases. Some cancers show no change with IMD while others show a large increase. Interestingly most elective Orthopaedic interventions show no change with IMD.

For XYZ-shire the additional adjustment for the effect of deprivation results in a lower rate of intervention than that expected from the national average. This is because the national average IMD is around 21 units while the IMD for XYZ-shire is only 8.4 units.

Excess Admissions Converted to Standard Deviation

The number of excess admissions needs to be seen in a relevant context. Most organisations express the excess as a percentage value, however, experience shows that converting all differences to the equivalent number of standard deviations allows all excess values to be converted to the same unit of measurement.

Where the value of 'excess' admissions is within ± 1 standard deviation of the expected value then the value is left blank, i.e. no action required. Where the excess admissions are greater than 3.5-standard deviations higher than expected they are put in **red bold**.

The data has been sorted with those lines having the highest standard deviation excess at the top of the table.

Calculation of Rate per 10,000 head

The calculated rate per 10,000 head employs the method of indirect standardisation, i.e. the national average rate is expressed in terms of the IMD and age profile of XYZ-shire.

A figure of 10,000 head has been used to represent a moderate to large GP practice.

Confidence Interval

The 95% confidence interval has been calculated by applying Poisson statistics to the expected volume of admissions.

Total Admissions

The data set uses total admissions rather than attempting to split admissions into separate elective and non-elective components. Most procedures and diagnoses are >80% elective or non-elective and rather than split the numbers down it is felt that a better overview is obtained by retaining the numbers as a total. The national average percentage of admissions expected to be non-elective is given as a reference point.

FCE Data

The raw data is in FCE since the HES national data is in FCE. Since there is usually one FCE per Spell (Admission) for elective admissions any bias will be confined to those procedures or diagnoses where there are typically more than 1 FCE per Spell.

From experience the national average number of FCE per Spell is usually slightly larger than the average for the south of England and so this will only act to slightly underestimate the size of any apparent 'excess'.

Adjustment of ICD R69

The ICD code R69 'unknown and unspecified causes of morbidity' is often used as a default code which is assigned when a provider organisation has no information available to assign a better diagnosis.

For this reason part of the national total was re-assigned to other diagnoses in order to give a better approximation to the level of coding where more information was available.

Appendix One

Procedures with statistically significant higher levels of activity in 06/07

Description	% EM	Actual - Expected			Difference as standard deviation			Comments
		04/05	05/06	06/07	04/05	05/06	06/07	
Q20 Other operations on uterus	7%	84	204	216	19	43	48	Mainly biopsy of lesion of uterus, should be an outpatient procedure
L13 Transluminal operations on pulmonary artery	53%	179	177	218	32	25	33	Check the validity of clinical coding, far too high to be real
X29 Continuous infusion of therapeutic substance	13%	113	1,068	1,330	2	21	26	Oncology outpatient procedures have been re-classified as IP
W19 Primary open reduction of fracture of bone and intramedullary fixation	84%	8	133	284		9	21	Change in coding in 05/06
V48 Denervation of spinal facet joint of vertebra	0%	33	59	125	6	10	21	Change in counting in 06/07, OP procedures?
H25 Diagnostic endoscopic examination of lower bowel using fiberoptic sigmoidoscope	7%	31	792	738		23	21	Endoscopy - rate is high
S66 Other operations on nail bed	78%	80	103	126	13	16	19	Outpatient procedures re-classified as IP
X49 Other immobilisation	77%	7	13	70	2	3	18	Change in counting in 06/07, OP procedures?
H22 Diagnostic endoscopic examination of colon	2%	-317	371	548	-9	10	14	Endoscopy - rate is high
Q16 Other vaginal operations on uterus	2%	68	120	91	11	18	13	Usually excision of lesion - OP procedures?
X40 Compensation for renal failure	8%	116	253	323	5	11	13	Renal dialysis - commissioning to clarify
M45 Diagnostic endoscopic examination of bladder	2%	548	649	582	12	14	13	Endoscopy - rate is high
L91 Other vein related operations	20%	165	243	280	8	11	12	Insertion of catheter - Oncology, etc OP procedures
M49 Other operations on bladder	6%	39	68	207	2	4	12	Introduction of therapeutic substance - OP Oncology?
A62 Microsurgical repair of peripheral nerve	73%	28	18	36	9	6	12	Review use of code
Q02 Destruction of lesion of cervix uteri	3%	55	49	60	8	7	11	Mainly cauterisation of lesion, OP procedures
Q41 Other operations on fallopian tube	0%	73	57	79	10	8	11	Mainly dye test, OP procedure
S42 Suture of skin of other site	83%	57	80	103	7	9	11	Can be OP or A&E sutures reclassified to IP
B28 Other excision of breast	1%	167	155	192	9	9	11	Excision of lesion
A84 Neurophysiological operations	20%	-59	-44	81	-7	-5	10	Counting change in 06/07, check is this Electroencephalography or something else such as EEG and other minor tests
K61 Other cardiac pacemaker system	14%	-18	-17	61	-3	-3	10	Implantation or renewal of pacemaker, why the jump in 06/07

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		Actual - Expected			Difference as standard deviation			
W85 Therapeutic endoscopic operations on cavity of knee joint	8%	19	17	134			10	Arthroscopy, why the big jump in 06/07
L63 Transluminal operations on femoral artery	14%	-85	41	111	-7	3	9	As for L13 check the validity of coding
M14 Extracorporeal fragmentation of calculus of kidney	1%	22	38	98	2	3	9	Lithotripsy - why the increase in activity
F05 Other repair of lip	70%	45	48	52	7	8	9	Sutures - could be A&E activity reclassified to IP
W48 Other prosthetic replacement of head of femur	82%	4	15	36		4	8	Why the steady increase?
A57 Operations on spinal nerve root	2%	11	27	63	2	3	8	Injection of destructive substance - OP procedure?
C43 Other operations on conjunctiva	12%	6	15	23	2	5	8	Biopsy of lesion and other minor procedures - are these OP procedures?
S57 Exploration of other skin of other site	68%	46	45	100	4	4	8	Debridement of skin - can be minor OP procedures
V54 Other operations on spine	1%	88	79	140	5	4	8	Injection around spinal facet - OP/IP?
C79 Operations on vitreous body	22%	4	50	94		4	8	Check to see if excess is C79.4 injection into vitreous body
W52 Prosthetic replacement of articulation of other bone using cement	3%	26	31	42	5	5	7	Review Orthopaedic intervention rates
W58 Other reconstruction of joint	2%	23	39	51	4	5	7	Why the steady increase?
K58 Diagnostic transluminal operations on heart	4%	29	38	29	7	9	7	Conduction studies K58.2?
W26 Other closed reduction of fracture of bone	88%	78	94	100	5	6	7	Manipulation of fracture of bone
R03 Selective destruction of fetus	5%	5	4	8	4	4	7	Review Obs & Gynae
R04 Therapeutic percutaneous examination of fetus	2%	2	8	7		7	6	Review Obs & Gynae
L79 Other operations on vena cava	33%	-2	4	18		2	6	Insertion of filter?
W82 Therapeutic endoscopic operations on semilunar cartilage	3%	125	44	128	6	2	6	Arthroscopy, review Orthopaedic intervention rates
L85 Ligation of varicose vein of leg	0%	335	312	94	21	20	6	Varicose Veins
Q49 Therapeutic endoscopic operations on ovary	13%	12	23	40	2	3	6	Review Obs & Gynae
C47 Closure of cornea	27%	5	6	21		2	6	Removal of suture from cornea - OP procedure?
X50 External resuscitation	18%	58	42	70	5	4	6	Direct current cardioversion
S45 Removal of other substance from skin	58%	0	28	26		6	6	OP or A&E procedures re-classified
P23 Other repair of prolapse of vagina	0%	47	0	79	4		6	Review of Obs & Gynae
F09 Surgical removal of tooth	1%	101	24	138	4		6	Review of Oral & dental
Q12 Intrauterine contraceptive device	9%	60	80	58	6	8	6	Should be an OP procedure
H48 Excision of lesion of anus	2%	16	34	45	2	4	5	
V09 Reduction of fracture of other bone of face	17%	30	34	49	3	3	5	
S05 Microscopically controlled excision of lesion of	1%	31	6	6	19	3	5	

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		Actual - Expected			Difference as standard deviation			
skin								
M27 Therapeutic ureteroscopic operations on ureter	21%	10	25	32	2	4	5	Review of Obs & Gynae
M65 Endoscopic resection of outlet of male bladder	6%	37	57	70	2	4	5	
M77 Diagnostic endoscopic examination of urethra	6%	19	12	20	5	3	5	
C10 Operations on eyebrow	20%	18	26	27	3	4	5	Excision of lesion or sutures. A&E work reclassified?
G45 Endoscopic examination of upper GI tract	9%	-1,163	438	262	-21	8	5	
E13 Other operations on maxillary antrum	4%	25	24	19	5	5	5	
M43 Endoscopic operations to capacity of bladder	1%	26	24	20	5	5	4	
M53 Vaginal operations to support outlet of bladder	0%	25	19	40	3	2	4	
T67 Primary repair of tendon	80%	34	58	56	3	4	4	
S55 Exploration of burnt skin of other site	73%	20	15	13	6	4	4	
C11 Operations on canthus	2%	7	9	28			4	
M61 Open excision of prostate	2%	9	13	25	2	2	4	
S41 Suture of skin of head or neck	88%	15	25	30	2	3	4	A&E work reclassified to IP?
M38 Open drainage of bladder	33%	47	28	24	8	5	4	
B08 Excision of thyroid gland	1%	4	38	33		4	4	
T31 Other operations on anterior abdominal wall	31%	5	4	20			4	
K57 Other therapeutic transluminal operations on heart	3%	4	-11	27			4	
W41 Replacement of knee joint not using cement	1%	71	49	27	10	7	4	Arthroscopy - review Orthopaedic intervention rates
A67 Release of entrapment of peripheral nerve at other site	1%	11	14	18	3	3	4	
G15 Other endoscopic operations on oesophagus	17%	-9	18	25		3	4	
W74 Other reconstruction of ligament	2%	-9	-7	24	-2		4	
H52 Destruction of haemorrhoid	3%	-21	18	38	-2	2	4	
X32 Exchange blood transfusion	12%	-1	3	12			4	
X48 Immobilisation using plaster cast	73%	71	3	30	8		3	Should be A&E work or fracture clinic OP work
D17 Other operations on ossicle of ear	0%	13	4	11	4		3	Should be stapedectomy
C66 Extirpation of ciliary body	9%	11	6	14	3		3	
S44 Removal of other inorganic substance from skin	67%	1	1	18			3	A&E work reclassified to IP?
D01 Excision of external ear	1%	4	15	13		4	3	Excision of periauricular abnormality - why the jump in 05/06