Costing orthopaedic interventions

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This paper forms part of a longer series investigating the multiple limitations of the HRG tariff.

KEY POINTS

1. Orthopaedic departments will in general appear to be less efficient/higher cost due to the way the tariff is calculated.
2. Specialist Orthopaedic hospitals will be particularly affected.
3. As a general rule larger departments have higher costs per procedure.
4. The V4 HRG still appears to poorly adjust for complexity.
5. National average costs appear to be a poor way of calculating a fair tariff.

Introduction

Under Payment by Results (PBR) hospitals receive the bulk of their income from the Healthcare Resource Group (HRG) Tariff. The tariff in each HRG is the weighted average cost for all English hospitals. A key assumption within the national tariff is that all procedures or admissions with the same clinical codes must cost the same irrespective of the specialty in which the activity occurs. It has always been stated that groups of codes which go to construct a HRG are iso-resource, i.e. cost roughly the same (Jones 2001, IC 2007).

Recent research has challenged the validity of this assumption and it has been pointed out that the cost, length of stay, balance of bed days beyond the upper length of stay trim point and cost per bed day for each HRG is highly specialty dependant (Jones 2008a,c,d, 2009). There is also additional economy of scale factors to be considered and perhaps complexity issues which are not captured within the current way clinical information is collected and processed.

For some years the specialist Orthopaedic Trusts has been arguing that their true costs are not fully reflected in the HRG Tariff (SOA 2008). The new V4 HRG is supposed to more accurately reflect the specialist nature of treatment and should, in theory, refute the claims of 'unfair play' by the Orthopaedic specialist hospitals (IC 2007).

Discussion of the issues behind complexity has been considerably hampered by the fundamental HRG design criteria that 'HRG will cost the same irrespective of setting' (IC 2007). Cost, complexity and efficiency are sometimes confused. For instance, at identical efficiency a more complex case will always cost more. We need to tease apart these issues. The first problem to be overcome is that complexity is multidimensional:

1. Larger organizations become more complex and therefore have higher costs. Commonly called 'dis-economy of scale'. This factor is not addressed by HRGs.
2. Particular patients are more complex by virtue of pre-operative risk factors which can be measured by a variety of clinical scoring systems. This factor is poorly addressed by HRG using post-operative complications. In this respect Davenport et al (2005) have shown that the pre-operative risk factors are more predictive of cost variation than the post operative complications.
3. Particular treatments/procedures can occur in a more complex way but still receive the same procedure code, i.e. a debridement may take longer than expected due to the way the tissue detaches, etc. HRGs do not address this issue.
4. Particular procedures/diagnoses are more costly than others due to resource consumption. HRGs attempt to address this issue.

Hence a treatment centre with a narrow range of procedures and strict criteria for pre-operative risk will avoid costs associated with type 1 and 2 complexity issues. See www.veincentre.com as an example. Higher cost patients can then be shifted to nearby NHS hospitals.

The next problem is that efficiency is not well defined or measured. In the UK 'efficiency' is often measured using the average length of stay (LOS) which can be influenced by a range of pre-operative risk factors including age and by organizational attempts to reduce LOS by implementing clinical pathways, follow-up care at home, discharge to a nearby community hospital, etc.

This paper investigates the effect that an all specialty average price for each HRG has upon the apparent costs for Orthopaedic departments of different size and complexity. While clinical coding is a known issue this paper attempts to minimize this factor by using groups of similar sized Trusts and analysis cost variations between these groups.

Methods

Reference cost data (as HRG version 4) covering all English hospitals for 2006/07 was obtained from the department of Health (DH 2008). The data comes in CD format containing several large data bases. All analysis relates to adult Orthopaedics (specialty code 110) and hence Paediatric Orthopaedics (specialty code 214) has been excluded. Costs have been adjusted for the Market Forces Factor (MFF) and are inclusive of all excess bed day costs. This is to avoid the recently discovered observation that excess bed days are an artifact of the current HRGs (Jones 2008d). Specialty-HRG combinations as well as the usual HRG national average costs were calculated. Organisation type is as per the categories assigned to hospitals in the reference costs look-up tables contained on the CD. Day case and overnight elective costs have been analyzed separately. The national average case mix for Orthopaedics in both day case and elective was determined and this was then used to calculate the weighted average cost of an Orthopaedic elective intervention. The national average case mix was chosen to be the point at which all types of hospital had admissions; hence, daycase HRG with more than 150 finished consultant episodes (FCE) across the whole of England and for elective overnight HRG with greater than 48 FCE for England. In the few places where there was no price for one particular organization type the average price for the other organization types was inserted. This step ensures that the calculation of average price is not skewed. Relative costs are calculated by comparing actual and expected cost for each HRG to give an overall cost relative to other Orthopaedic departments using a calculation similar to that used to calculate the reference cost index (RCI).

Results

The specialty Orthopaedics is defined by some 414 day case and 559 elective overnight HRG V4 codes respectively. Of these 50% and 55% of HRG for day case and overnight respectively have 10 or fewer FCE in England. Highest activity is 38,736 HB55C (Minor hand procedures category 2) day case and 35,168 HB23C (Intermediate knee procedures) overnight. Only 31% of HRG describing the ‘average’ Orthopaedic case mix come from the HRG chapter devoted to Musculo-skeletal conditions.

In recent years the price of elective procedures has been calculated as the weighted average of overnight and day case costs in each HRG. This has led to unintended consequences regarding how ‘day case’ events are counted and coded (Jones 2007, Jones 2008b). It is almost certain that the NHS will revert back to separate overnight and day case tariffs in 2009/10 and hence the analysis of separate day case and overnight costs is timely.

It is not widely known that each HRG can occur across multiple specialties and that the average for an elective HRG is 16 specialties per HRG. The first HRG in which elective overnight Orthopaedic activity occurs is AA03Z (Intercranial procedures for trauma with minor diagnosis). Table 1 shows the national average cost for this HRG across the range of 14 specialties performing this procedure. The average cost ranges from £23,925 down to £696 while the HRG average is £2,907. As expected the bulk of activity is in Neurosurgery

where the average cost is £830 higher than the HRG (all specialty) average, i.e. the HRG tariff. On this occasion the Neurosurgeons make a loss of £830 per operation; Orthopaedic surgeons gain a profit of £1,596 and Oral & Maxillo-facial surgeons gain a profit of around £880, etc. While the one operation in Cardiology and Breast Surgery may be a coding error or a specialty code error the cost will still become part of the national average. Coding accuracy is known to be a problem especially when codes are assigned from the discharge summary rather than the case notes or directly by the surgeon (Jameson & Reed 2007, 2008; Joy, Velagala & Akhtar 2008).

Table 1: HRG average and specialty average cost for HRG AA03Z (Intracranial Procedures for Trauma with Minor Diagnosis) in English hospitals (2006/07).

Specialty	Consultant Episodes (FCE)	HRG 'Tariff'	Specialty Average Cost
Neurosurgery	215	£2,907	£3,737
Pain Management	45	£2,907	£864
Trauma & Orthopaedics	35	£2,907	£1,311
Anaesthetics	17	£2,907	£2,464
Oral Surgery	16	£2,907	£2,170
Maxillo-Facial Surgery	10	£2,907	£2,025
Paediatric Neurosurgery	4	£2,907	£5,589
Plastic Surgery	3	£2,907	£2,479
Neurology	3	£2,907	£3,335
Paediatrics	2	£2,907	£1,000
Paediatric ENT	1	£2,907	£23,925
ENT	1	£2,907	£696
Cardiology	1	£2,907	£4,072
Breast Surgery	1	£2,907	£2,741

The key points to be made from Table 1 is that while the groups of codes may have been deemed to be iso-resource by the process used to construct HRG AA03Z (as an example of all HRG), common sense seems to indicate otherwise. This comes from the fact that the specialty in which the procedure occurs is not deemed important enough to have any influence on the cost and hence sophisticated mathematical routines are applied to data where the most important variable has been omitted. This leads to the equivalent of a spurious correlation (Burns 1997, JSC 2008). HRG AA03Z occurs across all types of NHS organization including PCT run hospitals. This observation alone suggests that the FCE within this HRG may be, at best, less than homogeneous.

The second key point is that the process of allocating profit or loss against the various specialties occurs across all HRG and that the cumulative effect at both specialty and Trust total will be to generate the appearance of a spurious profit or loss. This cumulative effect will be neutral only when a hospital has national 'average' activity in all possible specialties and sub-specialties – a situation which does not exist at any individual hospital.

The mechanism by which specialty determines cost is to be found in the structure of the HRG tariff. Each HRG is made up from a range of procedures and/or diagnoses which are then converted into OPCS procedure codes or ICD-10 diagnosis codes. For example a HRG may comprise 14 procedure codes of which Orthopaedics may use eight, ENT two, Neurosurgery five, etc. Some may overlap between specialties and others may not. Under these

circumstances the specialty-specific clinical indications relevant to the use of the procedure codes will lead to the wide range of costs as seen in Table 1. Even within Orthopaedic procedures such as shoulder arthroscopy the range of procedures in each HRG can be too broad leading to wide ranges in costs (Hearnden & Tennet 2008).

Cost and Income

Having determined that it may wise to re-calculate HRG costs at specialty level we need to see what effect this will have on the costs and income received for running an Orthopaedic department. This information is summarized in Fig. 1 and 2 for day case and overnight admissions respectively. At the far left hand side of both figures the HRG average price (i.e. the national tariff or price paid for the work done) has been shown. The bar next to this gives the calculated average cost for HRG within the specialty Orthopeadics. The bars to the left then show that national average cost within Orthopaedic departments for different types of hospital be it Specialist, Teaching or Large, Medium or Small Acute.

From Fig. 1 we see that for day case procedures the HRG average price paid (the tariff) is only sufficient to cover costs incurred at medium and small sized hospitals and that all other Orthopaedic departments will incur higher costs than the price paid. These departments will be deemed to be 'inefficient' and pressure will be applied to save costs. This is a futile outcome based on a flawed reference point.

From Fig. 2 we see that for elective overnight work medium and small hospitals make; on average, a profit on every procedure (thereby being deemed to be 'efficient') while Teaching and Large Acute hospitals will roughly break-even (i.e. perceived average 'efficiency'). However the costs incurred at the Specialist Orthopaedic hospitals is on average over £500 per procedure higher than the tariff. This gap cannot be to do with economy of scale (i.e. small vs. large acute) but would appear to be to do with complexity which is not encapsulated within the clinical information currently used in the tariff.

Organisation Type

We now need to ask the fundamental question, why do the specialist Orthopaedic hospitals cost more than Teaching & Large acute hospitals? Are there hidden complexity issues or are the specialist Orthopaedic hospitals just inefficient. Of the 559 elective overnight HRG defining Orthopaedics in general only 251 are performed at specialist Orthopaedic hospitals. General inefficiency would imply that all 251 will cost more while hidden complexity issues will result in a smaller list of more expensive interventions.

To investigate this issue the average cost of each HRG at specialist Orthopaedic hospitals was compared to the average cost of the same HRG at teaching & large acute hospitals (which both have similar average costs as per Fig. 2). Some 44% of HRG (21% of activity) describing procedures conducted at specialist Orthopaedic hospitals cost less than the equivalent Teaching & Large Acute cost. A further 36% cost up to 50% more and the remaining 20% cost >50% more than the equivalent at a Teaching or Large acute hospital.

Table 2 gives a list of HRG with a cost greater than 5% higher and where there is a large enough number of procedures to calculate robust averages. The choice of a group consisting of large acute plus teaching hospitals is an attempt to exclude the possibility of higher costs at the specialist orthopaedic hospitals due to size. As can be seen the specialist Orthopaedic

hospitals have a case mix rich in particular procedures such as HA01B (reconstruction procedures), HD36C (malignancies), etc. The very fact that this list contains a mixture of very major down to seemingly minor procedures would seem to indicate that there are hidden complexities which the V4 HRG groups are failing to reflect. Pre-operative risk factors such as American Society of Anesthesiologists (ASA) score, POSSUM score, etc are not reflected in the currently collected clinical codes while other factors such as hemophilia may be coded but not utilized in the HRG groupings (Mohamed et al 2002, Davenport et al 2005, Rix & Bates 2007). Factors such as age are also poorly represented in the HRG groups. In some HRG groups a rather diverse collection of procedure codes may be acting to dilute the impact of specific procedure codes used only in the specialist Orthopaedic hospitals.

Table 3 investigates the issue of complexity from the viewpoint of the range in procedures conducted at different organisations. As can be seen large acute hospitals offer the widest range of procedures and have the highest FCE per HRG. Specialist Orthopaedic hospitals offer the lowest range of procedures (apart from PCT run community hospitals) and have the lowest FCE per HRG. The average FCE per HRG is a measure of the ability to gain economy of scale at procedure level, i.e. prosthesis discounts and production line type efficiency. It would seem that the more complex cases (within a narrow range of procedures) are referred to the specialist Orthopaedic centers for treatment thereby shifting patient-centered costs from one hospital to another.

Efficiency

Figure 3 attempts to separate out the issues of efficiency using length of stay as an (imperfect) measure of efficiency. To understand the argument Fig. 3 and Fig. 2 should be compared. In terms of cost (Fig. 2) large acute and teaching hospitals are comparable; however, in terms of length of stay the large acute hospitals have almost identical outcomes to both medium and small acute hospitals. Most importantly specialist Orthopaedic hospitals perform better than their Teaching counterparts. If we make the assumption that Teaching and Specialist Orthopaedic hospitals treat a more complex cohort of patients referred to them by all sizes of acute hospitals then we must conclude that the specialist Orthopaedic hospitals are more efficient that their Teaching counterparts. Hence their higher elective cost is not due to length of stay efficiency issues. Complexity must always reflect in a higher cost. In the UK for elective adult admissions one day in hospital costs between £135 (Dermatology) to £490 (Cardiothoracic transplant) with Orthopaedics costing around £285 per day (Jones 2008a). At an average Orthopaedic inpatient cost of £3,000 one day represents around 10% of costs. Given the high cost of orthopaedic prostheses cost efficiency can also be achieved by standardization and /or bulk discounts in the larger hospitals (which will reflect in lower cost and not LOS).

Also given in Fig. 3 are the average cost arising from different views of an ‘average’ case mix. Note that for small, medium and large trusts the variation between the four different case mix groups is small while the variation is larger for Teaching hospitals and Specialist Orthopaedic hospitals. Complexity in all its forms may be implicated.

Effect of Size

The final issue that may affect cost is organization size. Previous studies have demonstrated that economy of scale is usually available up to a certain point above which costs then rise due to the ‘dis-economy of scale’ seen in larger hospitals (Scottish Executive 1999, Secta

2003). Fig. 4 investigates the effect of size on the relative cost of Orthopaedic departments. The cost of day case procedures has been chosen to avoid the confounding effects of differential length of stay (LOS) efficiency for overnight procedures. Economy of scale factors may be possible somewhere up to £250,000 of activity, which is well below the size of most acute hospitals; however there is a general trend to higher relative costs (dis-economy of scale) as the size of the department increases.

PCT run Orthopaedic units have a generally higher than average cost which is presumably due to having to buy in surgeons from nearby acute Trusts. One large PCT has abnormal costs perhaps due to a gross apportionment error; however, these costs will still form part of the calculated national average. University, Teaching & Specialist hospitals appear to have costs which are intrinsically the same as in similar sized DGH departments. The relative cost at some of the very large Trusts may be difficult to attribute due to the fact that they are made up from multiple smaller sized hospitals. This may explain the greater divergence in relative costs for Trusts with more than £5M of day case activity. Can we surmise that the greater sub-specialisation available to any larger department is increasing the potential for increasing complexity of interventions within what otherwise appears to be standard HRG groups? Size should also bring with it higher organizational costs relating to scheduling larger numbers of surgeons and procurement of a wider range of surgical aids although the larger departments should benefit the most from bulk discounts in procurement.

An additional point of comment is required around the difference in costs between different types of hospital for day case and overnight procedures (Fig 1 vs. Fig 2). The boundary between day case and outpatient procedure has been poorly applied (Jones 2007, 2008d). In this respect there are 25 HRG where PCT run Orthopaedic units account for more than 50% of the entire national activity. This may be the tip of the iceberg for outpatient procedures incorrectly counted as a day case. The DH have stated that any outpatient procedure costing more than twice the cost of an outpatient attendance can qualify as a locally negotiated outpatient procedure price (PbR 2006). In 2008/09 the Orthopaedic price for a first and follow-up outpatient attendance (adult/child) is only £152/£161 and £75/£86 respectively. Jameson & Reed (2007) have pointed out that large numbers of joints are injected or aspirated (outpatient procedures) in an outpatient setting. It is quite possible that many of the hospitals with apparent lower than average costs count far more of these and other outpatient procedures as a ‘day case’ thereby diluting their average cost.

Specialist and teaching hospitals all fulfill a dual role, namely, general acute services for the surrounding population and specialist services covering patients from further afield. The proportion of general and specialist will vary considerably between hospitals. Hence it is possible that similar procedure and diagnosis codes may be describing patients with very different pre-operative risk scores. In this respect one study has shown that the pre-operative risk factors alone account for 33% of cost variation for the same procedure (Davenport et al 2005). While V4 HRG (and all previous versions) contain with- and without-complication splits it is still possible that specialist Orthopaedic hospitals have a richer mix of higher pre-operative risk factor patients within these splits. In this respect the data relating to day case costs is probably more a reflection of general Orthopaedic services while that relating to overnight elective will have a higher element of specialist services. This would explain the lack of difference between specialist and general acute in Fig 4 and the large difference in costs at specialist Orthopaedic hospitals seen between Fig. 1 and Fig. 2. Comments such as these are generalizations and while specialist Orthopaedic hospitals only account for 5% of

national day case activity there are 33 HRG where these hospitals account for more than 20% of national day case activity (as expected for a specialist centre).

Conclusions

The assumption that specialty does not matter is acting to inadvertently penalize or favour Trusts whose case mix deviates from the national average, i.e. single specialty centers such as the specialist Orthopaedic hospitals. The cost benefit (profit) will show up in those other specialties which also conduct procedures that group to the wide range of HRG typically representative of Orthopaedics as a specialty. This will not affect the overall reference cost index (a measure of efficiency based on average cost) as long as the overall pan-specialty case mix is roughly national average. However, for the Orthopaedic specialist hospitals there will be genuine higher costs which cannot be recouped due to the absence of the other surgical specialties. Additional pre-operative & operative complexity costs which may still be ignored by the current V4 HRG could then act to make the situation worse.

The V4 grouper software uses an inbuilt ranking for all procedure codes, however, if multiple codes of the same ranking are present it uses the first code in the series. The way in which post-operative infections are recorded also affects the HRG to which the admission is assigned. The effect of this on average costs at the different organization types requires additional research.

We must reach the conclusion that the case made by the Orthopaedic Alliance of inadequate funding may be justified and that V4 HRG are still a poor reflection of the multi-faceted concept of 'complexity'. The issue of relative cost also appears to be part of a wider issue relating to the size of Orthopaedic departments. Under the current tariff the smaller Orthopaedic departments are likely to be deemed to be 'efficient' and should find it far easier to make a profit.

HRG were introduced to combat what was seen as unacceptable variation in costs between NHS organisations. It would appear that the HRG may have themselves become the greatest hindrance to understanding the real cause of cost variation!

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Conflict of Interest:

None

Table 3: Effect of organization type on the range of procedures (as HRG) and average number of admissions per HRG.

Organisation Type	Day Case		Overnight	
	HRG per Trust	Average FCE per HRG	HRG per Trust	Average FCE per HRG
Large Acute	102	23	144	20
Medium Acute	82	19	112	15
Small Acute	74	15	101	12
Teaching	79	16	132	13
Specialist Orthopaedic	72	48	176	29
PCT	12	78	9	51

Table 2: Elective overnight interventions where the cost at a specialist Orthopaedic hospital is more than 1.05-times higher than the average cost at Teaching & Large Acute hospitals.

HRG	Description	Consultant Episodes (FCE)		Ratio of costs
		Specialist Orthopaedic	Teaching + Large Acute	
HB99Z	Other Procedures for non Trauma	2329	3710	1.57
HB23B	Intermediate Knee Procedures for non Trauma with CC	2118	3720	1.09
HB23C	Intermediate Knee Procedures for non Trauma w/o CC	1279	3274	1.20
HB12C	Major Hip Procedures for non Trauma Category 1 w/o CC	986	2053	1.07
HA99Z	Other Procedures for Trauma	658	1703	1.93
HB32Z	Intermediate Foot Procedures for non -Trauma Category 2	533	1055	1.38
HA05Z	Reconstruction Procedures Category 2	406	388	1.34
HA06Z	Reconstruction Procedures Category 1	373	311	2.09
HB22C	Major Knee Procedures for non Trauma Category 1 w/o CC	367	788	1.08
HA01B	Reconstruction Procedures Category 6 with CC	329	168	1.63
HB41B	Major Arm Procedures for non Trauma with CC	315	540	1.28
HB41C	Major Arm Procedures for non Trauma w/o CC	278	691	1.42
HB15C	Minor Hip Procedures for non Trauma Category 2 w/o CC	263	218	1.50
HD24C	Non-Inflammatory Bone or Joint Disorders w/o CC	260	621	2.53
HD24B	Non-Inflammatory Bone or Joint Disorders with CC	256	517	1.13
HC04C	Extradural Spine Intermediate 1 w/o CC	235	602	1.18
HA01C	Reconstruction Procedures Category 6 w/o CC	222	183	1.48
HB33C	Intermediate Foot Procedures for Non -Trauma Category 1 w/o CC	215	596	1.26
HB43C	Intermediate Arm Procedures for non Trauma Category 1 w/o CC	192	681	1.21
HB44C	Minor Arm Procedures for non Trauma Category 2 w/o CC	187	579	1.24
HC03C	Extradural Spine Intermediate 2 w/o CC	184	251	1.22
HB31Z	Major Foot Procedures for non -Trauma	184	353	1.72
HB34C	Minor Foot Procedures for Non -Trauma Category 2 w/o CC	179	569	1.35
HC04B	Extradural Spine Intermediate 1 with CC	171	392	1.20
HB45C	Minor Arm Procedures for non Trauma Category 1 w/o CC	166	289	1.34
HB53Z	Intermediate Hand Procedures for non Trauma Category 2	166	494	1.39
HC03B	Extradural Spine Intermediate 2 with CC	160	200	1.26
AB04Z	Major Pain Procedures	150	286	1.18
HB33B	Intermediate Foot Procedures for Non -Trauma Category 1 with CC	139	257	1.25
HB13Z	Intermediate Hip Procedures for non Trauma Category 2	136	107	1.19
HA04B	Reconstruction Procedures Category 3 with CC	123	354	1.24
HB15B	Minor Hip Procedures for non Trauma Category 2 with CC	120	110	1.71
HB55C	Minor Hand Procedures for non Trauma Category 2 w/o CC	113	413	1.05
HD36C	Pathological Fractures or Malignancy w/o CC	112	20	2.21
HB14C	Intermediate Hip Procedures for non Trauma Category 1 w/o CC	109	161	1.62
HB43B	Intermediate Arm Procedures for non Trauma Category 1 with CC	100	278	1.32
HA21B	Major Knee Procedures Category 2 for Trauma with CC	99	167	1.44
HB16B	Minor Hip Procedures for non Trauma Category 1 with CC	98	60	1.13
HB24B	Minor Knee Procedures for non Trauma Category 2 with CC	98	152	1.40
HB34B	Minor Foot Procedures for Non -Trauma Category 2 with CC	89	234	1.35
HB55B	Minor Hand Procedures for non Trauma Category 2 with CC	84	173	1.20
HB44B	Minor Arm Procedures for non Trauma Category 2 with CC	83	191	1.54
WA12X	Complications of Procedures with Intermediate CC	72	70	1.35
HB42C	Intermediate Arm Procedures for non Trauma Category 2 w/o CC	71	299	1.50
HB35C	Minor Foot Procedures for Non -Trauma Category 1 w/o CC	66	281	1.16
JC07Z	Minor Skin Procedures Category 1	65	207	1.53
HC02C	Extradural Spine Major 1 w/o CC	61	101	1.64
HA21C	Major Knee Procedures Category 2 for Trauma w/o CC	60	103	1.50
HC01Z	Extradural Spine Major 2	59	101	2.24
HB11B	Major Hip Procedures for non Trauma Category 2 with CC	57	96	1.08
HB42B	Intermediate Arm Procedures for non Trauma Category 2 with CC	56	182	1.83
HB14B	Intermediate Hip Procedures for non Trauma Category 1 with CC	53	69	1.69
HA04C	Reconstruction Procedures Category 3 w/o CC	51	231	1.38
HC02B	Extradural Spine Major 1 with CC	51	89	1.50
PA01B	Nervous System Disorders w/o CC	50	17	1.81
HB11C	Major Hip Procedures for non Trauma Category 2 w/o CC	48	86	1.43

Footnote: In terms of total number of procedures (FCE) the teaching + large acute group has 10-times the number of procedures as the specialist Orthopaedic hospitals, i.e. at equal case mix the FCE in the Specialist Orthopaedic column should be one-tenth that of the Teaching + Large acute column. Hence the specialist Orthopaedic case mix is very rich in the HRG listed in this table.

Figure 1: Average cost of a day case admission in the specialty Orthopaedics. National average case mix has been applied.

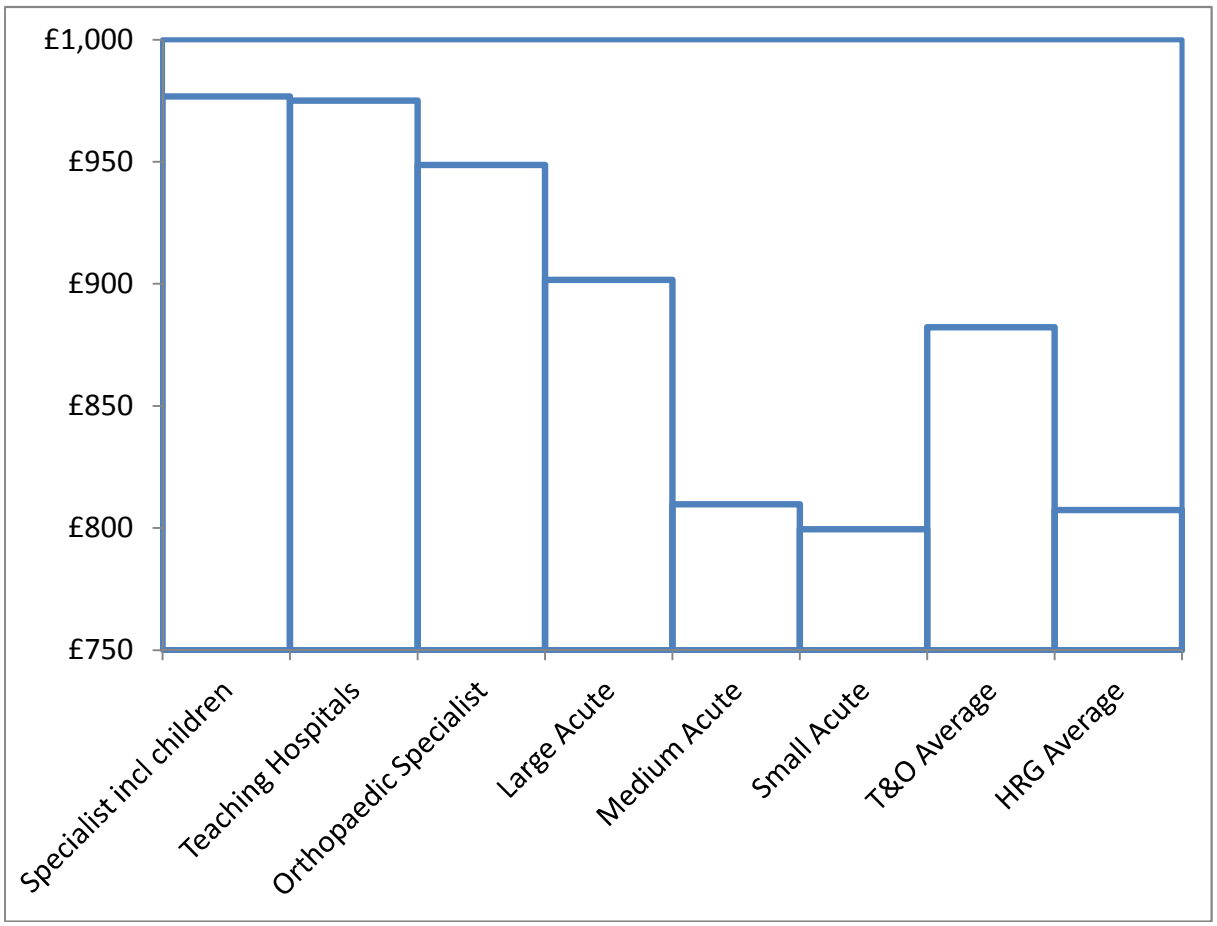


Figure 2: Average cost of an overnight elective admission in the specialty Orthopaedics. National average case mix has been applied.

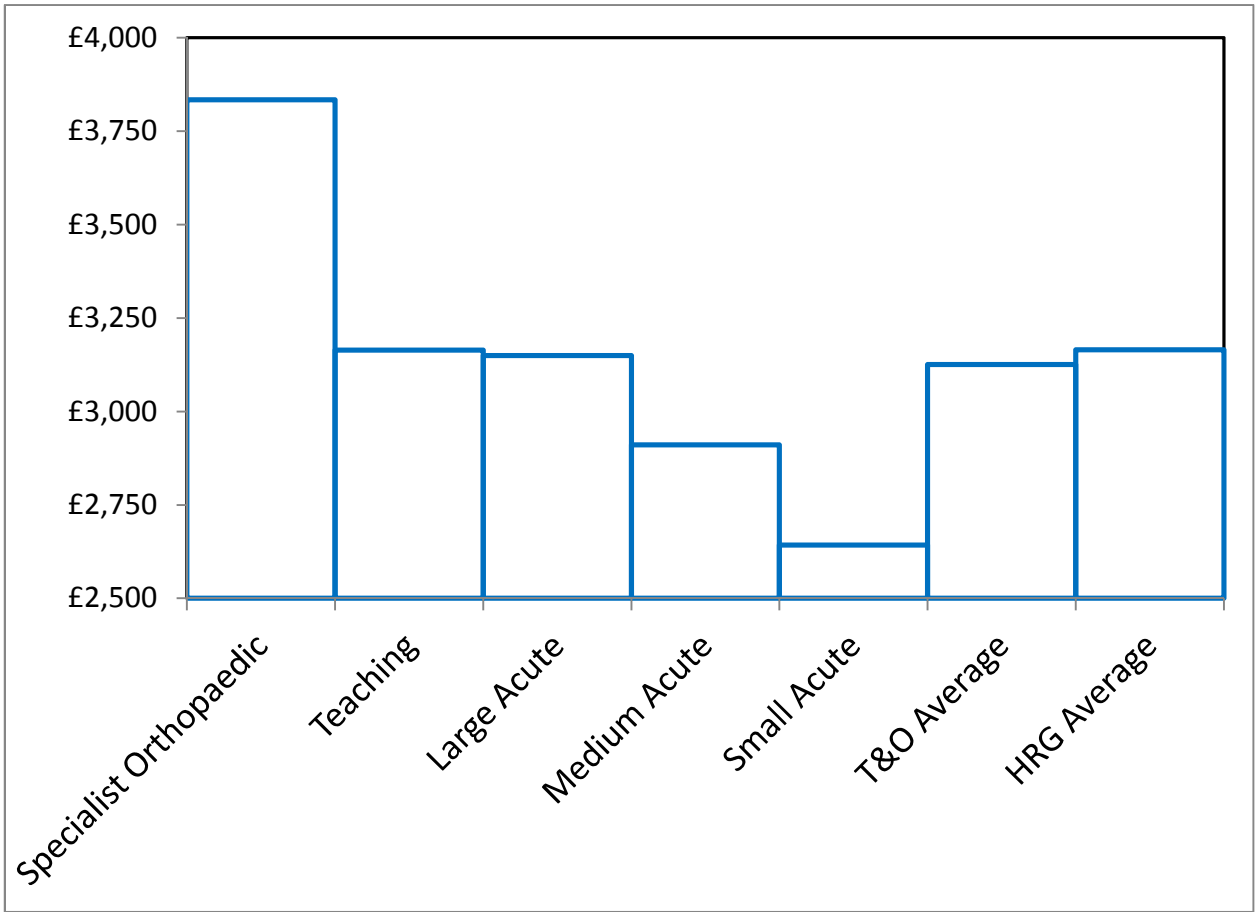
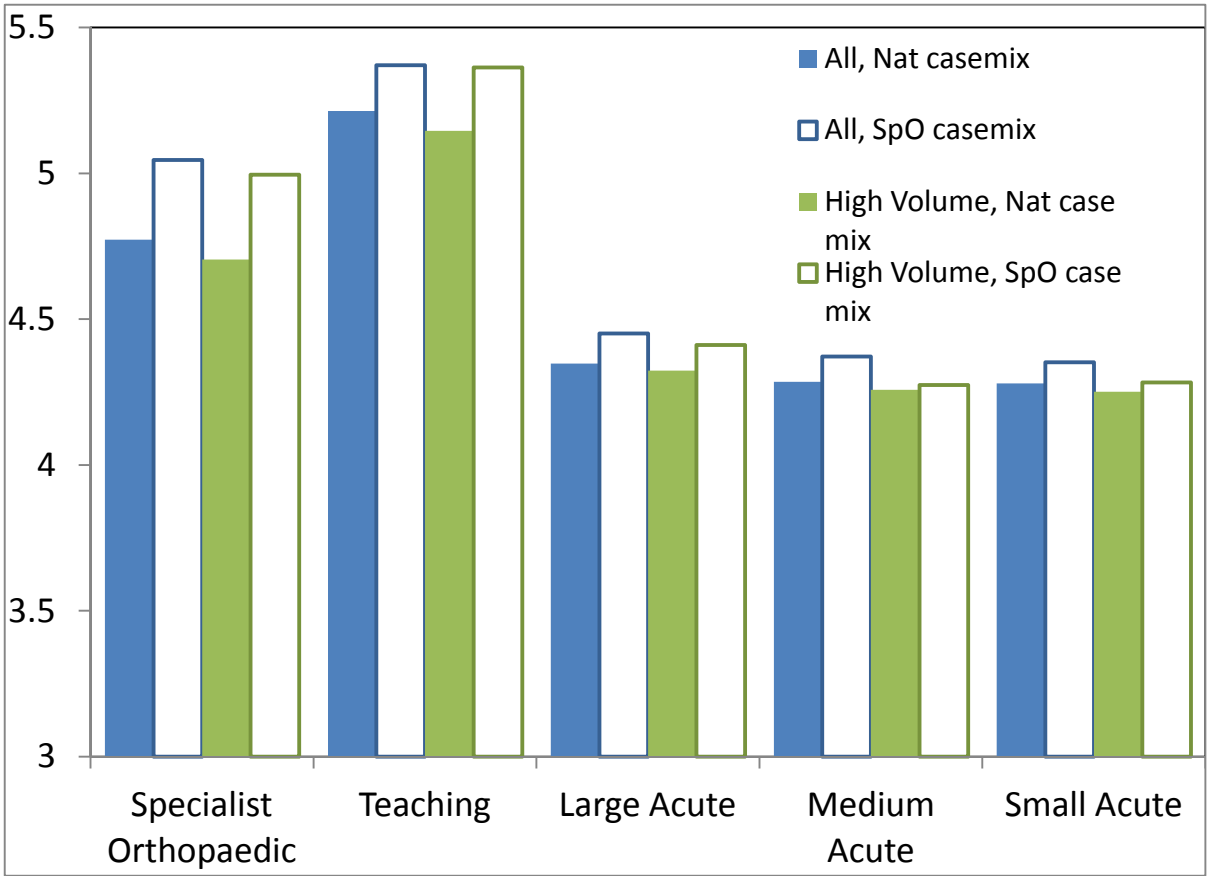
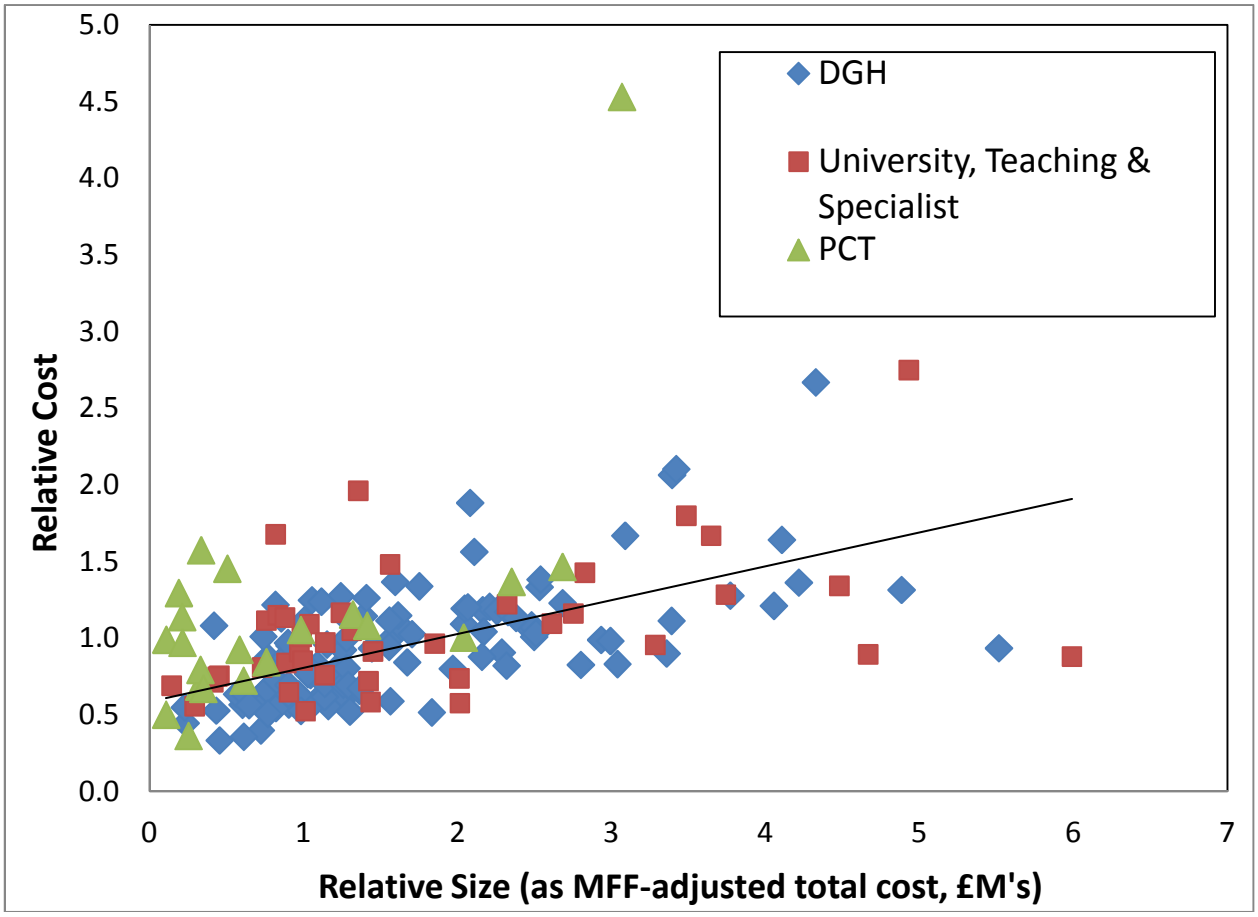


Figure 3: Average elective overnight length of stay (days) for Orthopaedic interventions at different organization types.



Nat = national
SpO = Specialist Orthopaedic

Figure 4: Relative cost of day case procedures for Orthopaedic departments of different size.



Footnote: Relative cost has been case-mix adjusted. A relative cost of 1.0 is at 'national average'. Data for organisations with less than £100,000 activity have been excluded on the basis of extreeme variability.