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NHS
National Cancer Action Team

Radiotherapy Costing and Tariff Development Project

Update for 2011/12 Reference Costs

March 2013

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1 Background

1.1 Reference Costs for radiotherapy for 2006/07 and 2007/08 were reviewed by the Department of Health (DH) and the National Cancer Action Team (NCAT). These showed a wide variation in the unit costs reported, raising concerns that there were significant variations in data quality.

1.2 As a result, in July 2010, NCAT commissioned Bailey and Moore to undertake a review of radiotherapy costing[1]. The basis of this review was a meeting with every radiotherapy provider in England to discuss their approach to recording and costing radiotherapy activity. These meetings were informed by an analysis of the latest radiotherapy Reference Costs, which at the time was the 2008/09 collection.

1.3 The analysis contained in the July report was refreshed in January 2011, following the publication of 2009/10 Reference Costs, and again in November 2011, following the publication of 2010/11 Reference Costs.

1.4 Following the publication of 2011/12 Reference Costs on 8 November 2012, a further year's data is available. This data, together with comparative data from 2010/11, 2009/10 and 2008/09, forms the basis of this report

2 Analysis of 2011/12 Reference Costs

2.1 The Reference Costs exercise is a national collection of cost data undertaken by the Department of Health (DH) each year in June. Every NHS provider submits cost and activity data, based on the previous financial year's accounts. Our original July 2010 report was based on the 2008/09 Reference Costs collection. This was subsequently updated in January 2011 for 2009/10 Reference Costs and again in November 2011 for 2010/11 Reference Costs.

2.2 2011/12 Reference Costs were published on the DH web site on 8 November 2011[2].

2.3 The data downloaded from the DH web site showed that there were 51 providers of radiotherapy services in England in 2011/12. However, this includes one provider that has submitted very low activity volumes (Sherwood Hospitals NHSFT – 1 attendance). Assuming that this has been submitted in error, this results in the same 50 providers reporting radiotherapy data in 2011/12 as reported in previous years analysed.

2.4 As in our previous report, the providers above have been divided into 5 peer groups of 10 providers each, based on the fractions of treatment delivered in 2011/12 as reported in Reference Costs returns. This is to enable radiotherapy departments of similar size to be

[1] http://ncat.nhs.uk/sites/default/files/Radiotherapy%20Costing%20&%20Tariff%20Development%20Report%2009-10.pdf
[2] http://www.dh.gov.uk/health/2012/11/2011-12-reference-costs/

compared in groups rather than geographically which would, for example, compare small satellite units with major cancer centres. Changes in volumes reported since 2008/09, due to service developments or simply reporting anomalies, have meant that several trusts have moved between groups, but the overall composition of the groups has remained relatively stable.

2.5 A list of all providers that submitted Reference Costs for radiotherapy in 2011/12, and their allocated peer group, with 2008/09, 2009/10 and 2010/11 equivalents included for comparison is attached at **Appendix 1**.

2.6 An overview of the national picture, shown at **Appendix 2**, shows the following key data items:

- Planning – number of events and total cost as reported in 2011/12 Reference Costs
- Treatment – number of fractions and total cost as reported in 2011/12 Reference Costs
- Number of linacs in operation (including service efficiency and backup equipment but excluding non-operational equipment) as reported in the Cancer Commissioning Toolkit[3] (CCT) or, where data was not reported in the CCT, in the National Cancer Services Analysis Team's 2010 Radiotherapy Equipment Survey[4].

2.7 The following comparative data are shown at **Appendix 3** and presented as a series of charts at **Appendix 4**:

- Planning – unit cost (average cost per planning event)
- Treatment – unit cost (average cost per fraction delivered)
- Number of fractions per planning event
- Ratio of total costs of planning : total costs of treatment
- Average number of fractions delivered per linac
- Total cost quantum (planning and treatment) divided by number of linacs used

2.8 These comparisons should enable each Trust to see their own data compared to other Trusts in their peer group, as well as looking at the average for the peer group and the national average.

2.9 The comparative data also illustrates the wide range of values that were submitted by Trusts as part of their Reference Costs submission and provides an indicator of where there might be issues regarding the accuracy of counting and/or costing.

2.10 The costs used in the comparative data were all deflated by each Trust's Market Forces Factor (MFF). The MFF is a measure of "unavoidable" cost differences between NHS providers based on their geographical location, principally caused by the labour market (rates of staff pay) and the property market (cost of land and buildings)[5]. The MFF for each provider is published each year and forms part of the annual Reference Costs publication, as well as being used in the national Payment by Results (PbR) tariff and in resource allocation to PCTs. It is normal practice to deflate all submitted Reference Costs by the MFF when comparing between providers to ensure a fair "like for like" comparison between providers in different parts of England, once unavoidable cost differences have been removed.

[3] https://www.cancertoolkit.co.uk
[4] http://www.canceruk.net/rtservices/rtequip2010/
[5] https://www.wp.dh.gov.uk/publications/files/2013/02/PbR-and-the-MFF-in-2013-14.pdf

3 Analysis of changes since previous years' Reference Costs

Trusts with significant changes

3.1 There are 6 providers who have reported significantly different numbers of fractions or planning events compared to earlier years' submissions. These are highlighted in yellow on **Appendix 1** and summarised below:

Table 1: Trusts with significant changes

	Fractions reported 2011/12	Fractions reported 2010/11	Fractions reported 2009/10	Fractions reported 2008/09
Leeds Teaching Hospitals NHST	59,631	76,328	70,238	67,103
Royal Surrey County NHSFT	42,211	155,540	36,169	32,585
Imperial College Healthcare NHST	15,576	3,210	2,926	-
Peterborough & Stamford Hospitals NHSFT	10,736	553	789	814
Sherwood Forest Hospitals NHSFT	0	-	-	-
	Planning reported 2011/12	**Planning reported 2010/11**	**Planning reported 2009/10**	**Planning reported 2008/09**
Maidstone & Tunbridge Wells NHST	11,510	25,096	7,455	3,904

3.2 Although the reasons for these changes would need to be confirmed with the Trusts concerned, the following observations can be made:

- At Leeds Teaching Hospitals, activity has declined by 22% since 2010/11, reversing a previously rising trend. There is no obvious reason for this reduction. Possible reasons may be a reduction in available linacs during the year, changes in commissioning arrangements or data recording issues.
- Royal Surrey County have corrected an anomaly highlighted in our 2010/11 report, where fractions appeared to be hugely over-counted in that year. The volumes recorded now appear much more consistent with those reported by the Trust in 2009/10 and 2008/09.
- Imperial College submitted no data in 2008/09. For 2009/10 and 2010/11, they submitted volumes of approximately 3,000 fractions, which did not appear to be consistent with the number of linacs believed to be in operation (6). For 2011/12, they have submitted 15,576 fractions, which equates to approximately 2,700 fractions per linac. This still appears to be low, compared to the national average of 7,400 fractions per linac (see Appendix 3). The Trust has also never submitted any data for planning. It is understood that the Trust has not been able to capture the data in the national currencies and has historically reported only courses of treatment, rather than fractions and planning events.
- Peterborough and Stamford Hospitals NHSFT have historically submitted very low volumes of activity as they had no linacs on site. A substantially higher volume has been submitted for 2011/12. A new radiotherapy unit opened on site in April 2011 with 2 linacs and it is assumed that this explains the increase in activity[6].
- As mentioned in section 2.3 above, the minor value for attendances submitted by the Sherwood Forest Hospitals NHSFT is assumed to be an error, as no planning or treatment data has been submitted.

[6] http://www.peterboroughandstamford.nhs.uk/page/?title=Oncology+%26+Haematology&pid=12975

- Maidstone & Tunbridge Wells appear to have corrected an anomaly highlighted in our 2010/11 report, where planning volumes appeared to be very high in relation to the fractions delivered and the volumes they submitted in previous years. The volume submitted for 2011/12 appears to be more consistent, although still somewhat higher than 2009/10 and 2008/09. This may indicate issues with capturing and recording these events or possibly changes in counting or coding practice.

Changes to overall data

3.3 It is noticeable from Appendix 1 that the national total fractions of radiotherapy delivered has apparently fallen by 3.5% since 2010/11. This appears to reverse the trend of our previous reports, which have showed a rising trend since 2008/09. However, this is largely driven by the correction to volumes reported by Royal Surrey County noted in section 3.2 above. If this impact is normalised, by assuming Royal Surrey County's corrected volume for 2010/11 can be estimated using the median of their 2009/10 and 2011/12 submissions, the underlying national trend is a 3.1% rise in fractions delivered from 2010/11 to 2011/12:

Table 2: Normalisation of Royal Surrey County data from 2010/11

	2011/12 Fractions	2010/11 Fractions	% change
Unadjusted total (Appendix 1)	1,774,887	1,838,406	-3.5%
Remove erroneous RSC data from 2010/11	-	-155,540	-
Replace with median 2009/10 to 2011/12	-	39,190	-
Adjusted total for comparison	**1,774,887**	**1,722,056**	**+3.1%**

3.4 Overall, the data shows an increasing degree of consistency between Trusts since our initial analysis of 2008/09 Reference Costs and this is demonstrated in the tables below.

3.5 Table 3 shows the average of the unit costs submitted for planning for 2008/09 to 2011/12, together with the range, inter-quartile range and standard distribution of the data:

Table 3: Comparison of average unit costs for reported planning events

	2011/12	2010/11	2009/10	2008/09
Average unit cost – all England	**£601**	**£653**	**£574**	**£533**
Average unit cost – Peer Group 1	£521	£629	£530	£601
Average unit cost – Peer Group 2	£637	£656	£567	£553
Average unit cost – Peer Group 3	£615	£605	£560	£558
Average unit cost – Peer Group 4	£796	£719	£693	£333
Average unit cost – Peer Group 5	£740	£740	£605	£713
Lowest unit cost	£0	£0	£88	£85
Highest unit cost	£1,982	£2,642	£1,478	£1,562
Range	**£1,982**	**£2,642**	**£1,390**	**£1,477**
Lower quartile	£488	£449	£349	£301
Upper quartile	£869	£730	£854	£795
Inter-quartile range	**£381**	**£281**	**£505**	**£494**
Standard deviation	**£345**	**£452**	**£345**	**£351**

3.6 This shows that, although the inter-quartile range has increased since 2010/11 as a result of some outliers, the overall range and standard deviation of the distribution has improved. Looking more broadly at the trend since 2008/09, the reducing inter-quartile range indicates a central group of increasingly consistent submissions, but the broader measures of range and standard deviation have remained stubbornly high. This may indicate recurring problems at certain Trusts with capturing data from their radiotherapy systems in the required currency and then costing the activity accurately. Many of these outlying Trusts have submitted similar data each year, despite evidence that they are outliers in relation to peer group and national averages, which may suggest that insufficient resources are being deployed to review the situation.

3.7 Table 4 shows the average unit cost submitted for treatment in 2008/09, 2009/10 and 2010/11, together with range, inter-quartile range and standard distribution of the data:

Table 4: Comparison of average unit costs for reported fractions

	2011/12	2010/11	2009/10	2008/09
Average unit cost – all England	**£130**	**£128**	**£125**	**£123**
Average unit cost – Peer Group 1	£127	£124	£126	£121
Average unit cost – Peer Group 2	£126	£120	£111	£120
Average unit cost – Peer Group 3	£113	£127	£122	£120
Average unit cost – Peer Group 4	£154	£145	£148	£122
Average unit cost – Peer Group 5	£170	£146	£154	£170
Lowest unit cost	£74	£62	£49	£41
Highest unit cost	£275	£270	£313	£1,106
Range	**£202**	**£208**	**£263**	**£1,065**
Lower quartile	£109	£101	£104	£98
Upper quartile	£151	£146	£147	£154
Inter-quartile range	**£42**	**£45**	**£43**	**£57**
Standard deviation	**£45**	**£46**	**£48**	**£155**

3.8 A degree of improvement in the reporting of the costs of fractions has been noted in previous reports and this progress continues in 2011/12. The range, inter-quartile range and standard deviation have all improved over the years, indicating that this data may be easier to capture and record from radiotherapy systems than planning activity.

3.9 Tables 3 and 4 above and Appendices 3 and 4 exclude any data submitted by extreme outliers, marked in **red** on **Appendix 3.** These consist of the submissions by Imperial College Healthcare and Sherwood Forest Hospitals, which skew the overall distribution, as mentioned in section 3.2 above. It is, however, pleasing to note that no other data needed to be excluded from the 2011/12 Reference Costs submissions on the grounds of being an extreme outlier, whereas in previous years several Trusts' data needed to be excluded.

4 Potential impact of tariff based funding

4.1 In previous reports, an indicative radiotherapy tariff has been modelled, based on the average of the relevant year's reference costs. This has now been partially superseded by PbR policy, under which DH has published a non-mandatory tariff for 2012/13 and a mandatory tariff to be introduced in 2013/14 for external beam radiotherapy[7].

4.2 However, in order to aid consistency and to provide a comparator for the published national tariff, the indicative tariff modelling used in previous reports has been repeated, by Healthcare Resource Group (HRG), based on 2011/12 Reference Costs. An indicative tariff may also prove useful for those areas that are not within the scope of the national tariff, e.g. brachytherapy. The indicative tariff has been calculated by taking the national average unit cost for each HRG, deflated by each provider's PbR MFF.

4.3 A single tariff has been calculated for each HRG, irrespective of whether the patient was an inpatient, outpatient or day attender when receiving radiotherapy planning or treatment. This is for the following reasons:

- The feedback received at the meetings with providers indicated that these categories were not captured consistently across providers
- Current Radiotherapy Data Set guidance recommends recording all activity as outpatient activity, irrespective of whether the patient is admitted or not[8]
- Many providers reported that the costs of radiotherapy were not significantly different between different modalities of care
- This approach has also been taken by the PbR national tariff.

4.4 Because of the potential of outlying data to distort an average derived from Reference Cost data, a number of options to remove outliers were modelled:

- **Option 0: Exclude nothing** – a simple average of all data submitted, effectively making the assumption that any outliers at the lower end of the population are counterbalanced by outliers at the upper end of the population
- **Option 1: Exclude some specific items based on concerns identified in sections 3.2 and 3.9 above** – this excludes a small amount data that can be readily identified as outliers:

Table 5: Outlying data excluded from option 1

Organisation	HRGs	Rationale
Imperial College	All	Volumes abnormally low compared to linacs on site, very high unit cost
Sherwood Forest Hospitals	All	Believed not to be a radiotherapy provider and submitted data in error

- **Option 2: Exclude data outside the inter-quartile range** – this analyses the unit costs for each HRG and excludes the uppermost 25% and the lowermost 25% of values as outliers, i.e. includes only the "middle 50%" of the data and excludes the remaining 50%.
- **Option 3: Exclude data below the 10th percentile and above the 90th percentile** – this is similar to option 2, but excludes only the uppermost 10% and the lowermost 10% of

[7] http://www.dh.gov.uk/health/2013/02/2013-14-pbr/
[8] http://www.canceruk.net/rtservices/rtds/rtdsdownloads/RTDS_guidance_notes_for_information_departments.doc

values as outliers, i.e. includes only the "middle 80%" of the data and excludes the remaining 20%

- **Option 4: Exclude data more than one standard deviation from the mean** – this takes the average unit costs for each HRG and calculates the standard deviation of each population. The standard deviation is a statistically recognised measure of dispersion and forms the basis of most statistical methodologies for identifying outliers. Any data more than 1 standard deviation away from the mean is excluded. This approach excludes approximately 15% of the data, mostly at the upper end of the distribution.

4.5 The options were compared and, in our view, options 2 to 4 offered no advantage over option 1, which excludes the least data of all options. Therefore option 1 was used as the basis for the indicative tariff calculation, as it includes all Reference Cost data except for the specific items identified in Table 5 above. The indicative tariff calculated under each option, compared to the national PbR tariff published for 2013/14, is attached at **Appendix 5**.

4.6 It is then possible to model the impact on each Trust of introducing tariffs. This uses the 2013/14 national PbR tariff for those HRGs within its scope and the 'option 1' indicative tariff for other HRGs as the basis for Trust income. This can be compared to the costs reported in 2011/12 Reference Costs, deflated to 2013/14 prices. This analysis is attached at **Appendix 6**.

4.7 The analysis shows that many Trusts could be affected significantly as such tariffs are introduced, assuming Reference Costs reflects accurately the true cost of delivering their radiotherapy service. Some Trusts will be funded for significantly more than their reported costs and some significantly less. This illustrates that there remains a degree of variation from the national average cost across Trusts, even though this has reduced since 2008/09.

4.8 One other factor that may be of concern is the continued trend for Trusts in peer groups 1 to 3 to attract tariff income in excess of their reported costs, whereas Trusts in peer groups 4 and 5 mostly attract income below reported costs. This is illustrated by the peer group averages shown in Tables 3 and 4 above, where the average unit costs for peer groups 1 to 3 are mostly below the national average and those for peer groups 4 and 5 are above. This implies that larger Trusts will benefit from the introduction of tariffs, at the expense of smaller ones.

4.9 Therefore the conclusions reached in our July 2010 report remain pertinent. Any tariffs introduced based on national, regional or peer group benchmarks need to be introduced with extreme care and with further refinements over and above a simple national average price, so as not to destabilise the service financially. The following issues may need to be considered:

- Data such as Reference Costs need to be significantly "cleaned" of unexplained outlying data, using an approach similar to those adopted in section 4.4 above
- Unavoidable variances in costs over and above the MFF, such as those related to treatment of paediatrics and patients with co-morbidities
- Unit costs potentially being higher at smaller providers in geographically isolated areas.

4.10 Although DH will have undoubtedly cleaned the reference cost data used in the calculation of the PbR tariff and will also have sought clinical advice as to the relativities between some prices, it remains a cause for concern that the second and third bullet points under section 4.9 above do not appear to have been addressed. This may lead to unintended consequences, e.g. it becomes uneconomic for providers to treat more complex cases or where patients choose to be treated in smaller units in more remote locations.

5 Conclusions

5.1 Many of the findings and recommendations from the July 2010 report remain relevant and these are repeated at **Appendices 7, 8 and 9** for ease of reference.

5.2 Positive progress continues to be demonstrated from the analysis of the 2011/12 Reference Costs submission. Improvements in the consistency of costs reported for treatment were noted in previous years and this progress has continued in 2011/12. It is also pleasing to note in 2011/12 the very small amount of data that needed to be excluded from the various calculations on the grounds of being an extreme outlier.

5.3 It is nonetheless worrying that a significant amount of outlying data does remain, particularly in planning, and this will continue to throw doubt upon the quality of the costing of radiotherapy services. It is incumbent upon those organisations that lie a significant distance from national and peer group averages to ensure they have a clear understanding of the reasons behind their reported position or alternatively devote resources towards addressing their position.

5.4 The extension of Payment by Results (PbR) to radiotherapy, with nationally mandated currencies and tariff being introduced in April 2013 for external beam radiotherapy, may pose a risk to the continued development of radiotherapy services. Any tariffs developed for radiotherapy services using national, regional or peer group average costs as a benchmark will need to be introduced with extreme care around issues such as those identified in section 4.9 above. Otherwise, the introduction of tariffs may impact adversely on funding for services.

5.5 Those Trusts with poor systems for counting and costing radiotherapy activity will suffer under the introduction of HRG-based currencies and volume-driven tariffs. A clear understanding of the cost of radiotherapy services, the drivers of that cost and the underlying activity will be key to ensuring the continued delivery of the best possible radiotherapy services for patients. As a contribution to the continued understanding of these issues, the guidance notes issued with our July 2010 report are also attached herewith as **Appendices 10 and 11**.

Richard Bailey
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March 2013

Reference Costs 2011/12
Fractions by Trust and Peer Group Ranking 2008/09 - 2011/12

	2011/12 Reference Costs				*2010/11 Reference Costs*		*2009/10 Reference Costs*		*2008/09 Reference Costs*				
	Planning Events 2011/12	Fractions Delivered 2011/12	Activity Rank	**Activity Peer Group**	*Fractions Delivered 2010/11*	***Activity Peer Group***	*Fractions Delivered 2009/10*	***Activity Peer Group***	*Fractions Delivered 2008/09*	***Activity Peer Group***	Incr/ Dec in Fractions since 10/11	Incr/ Dec in Fractions since 09/10	Incr/ Dec in Fractions since 08/09
The Christie NHS Foundation Trust	7,877	98,318	1	1	*93,496*	***1***	*85,442*	***1***	*82,028*	***1***	5.2%	15.1%	19.9%
The Clatterbridge Cancer Centre NHS Foundation Trust	6,858	92,487	2	1	*91,873*	***1***	*88,784*	***1***	*89,479*	***1***	0.7%	4.2%	3.4%
The Royal Marsden NHS Foundation Trust	4,807	63,897	3	1	*61,154*	***1***	*57,859*	***1***	*49,324*	***1***	4.5%	10.4%	29.5%
Maidstone and Tunbridge Wells NHS Trust	11,510	63,393	4	1	*60,755*	***1***	*59,901*	***1***	*54,198*	***1***	4.3%	5.8%	17.0%
Sheffield Teaching Hospitals NHS Foundation Trust	5,751	60,351	5	1	*55,053*	***1***	*56,103*	***1***	*57,741*	***1***	9.6%	7.6%	4.5%
University Hospitals Birmingham NHS Foundation Trust	5,760	59,883	6	1	*55,949*	***1***	*55,547*	***1***	*51,509*	***1***	7.0%	7.8%	16.3%
Leeds Teaching Hospitals NHS Trust	7,354	59,631	7	1	*76,328*	***1***	*70,238*	***1***	*67,103*	***1***	-21.9%	-15.1%	-11.1%
The Newcastle upon Tyne Hospitals NHS Foundation Trust	4,246	58,708	8	1	*59,639*	***1***	*58,817*	***1***	*52,976*	***1***	-1.6%	-0.2%	10.8%
Lancashire Teaching Hospitals NHS Foundation Trust	21,266	54,389	9	1	*48,663*	***1***	*45,325*	***2***	*43,564*	***2***	11.8%	20.0%	24.8%
Guy's and St Thomas' NHS Foundation Trust	4,863	50,410	10	1	*48,186*	***2***	*46,931*	***1***	*44,872*	***2***	4.6%	7.4%	12.3%
East and North Hertfordshire NHS Trust	4,786	49,963	11	2	*47,061*	***2***	*42,019*	***2***	*44,722*	***2***	6.2%	18.9%	11.7%
Cambridge University Hospitals NHS Foundation Trust	4,487	48,413	12	2	*53,482*	***1***	*54,314*	***1***	*51,656*	***1***	-9.5%	-10.9%	-6.3%
Oxford University Hospitals NHS Trust	3,507	43,872	13	2	*42,047*	***2***	*38,131*	***2***	*36,446*	***2***	4.3%	15.1%	20.4%
Gloucestershire Hospitals NHS Foundation Trust	4,738	42,553	14	2	*44,200*	***2***	*40,209*	***2***	*36,326*	***2***	-3.7%	5.8%	17.1%
Royal Surrey County Hospital NHS Foundation Trust	1,502	42,211	15	2	*155,540*	***2***	*36,169*	***2***	*32,585*	***3***	-72.9%	16.7%	29.5%
Nottingham University Hospitals NHS Trust	3,094	41,605	16	2	*42,697*	***2***	*36,651*	***2***	*33,575*	***2***	-2.6%	13.5%	23.9%
South Tees Hospitals NHS Foundation Trust	3,165	41,181	17	2	*38,412*	***2***	*38,385*	***2***	*36,716*	***2***	7.2%	7.3%	12.2%
Hull and East Yorkshire Hospitals NHS Trust	2,928	40,572	18	2	*39,938*	***2***	*35,877*	***3***	*32,622*	***2***	1.6%	13.1%	24.4%
University Hospital Southampton NHS Foundation Trust	3,938	40,496	19	2	*38,792*	***2***	*37,052*	***2***	*38,835*	***2***	4.4%	9.3%	4.3%
University Hospitals Bristol NHS Foundation Trust	3,565	39,917	20	2	*33,881*	***3***	*43,206*	***2***	*45,148*	***1***	17.8%	-7.6%	-11.6%
University Hospitals Coventry and Warwickshire NHS Trust	3,742	39,510	21	3	*40,359*	***2***	*39,162*	***2***	*35,080*	***2***	-2.1%	0.9%	12.6%
The Royal Wolverhampton Hospitals NHS Trust	2,947	37,556	22	3	*31,859*	***3***	*30,110*	***3***	*25,943*	***3***	17.9%	24.7%	44.8%
Brighton and Sussex University Hospitals NHS Trust	1,931	33,908	23	3	*36,788*	***3***	*33,017*	***3***	*1,069*	***5***	-7.8%	2.7%	3071.9%
Poole Hospital NHS Foundation Trust	2,532	33,808	24	3	*31,695*	***3***	*32,773*	***3***	*31,757*	***3***	6.7%	3.2%	6.5%
Norfolk and Norwich University Hospitals NHS Foundation Trust	3,523	33,022	25	3	*32,557*	***3***	*28,611*	***3***	*23,775*	***4***	1.4%	15.4%	38.9%
University Hospital of North Staffordshire NHS Trust	1,946	29,848	26	3	*26,269*	***3***	*25,526*	***3***	*23,751*	***4***	13.6%	16.9%	25.7%
Portsmouth Hospitals NHS Trust	2,882	29,221	27	3	*28,552*	***3***	*26,737*	***3***	*29,029*	***3***	2.3%	9.3%	0.7%
University Hospitals of Leicester NHS Trust	2,803	28,251	28	3	*30,059*	***3***	*32,920*	***3***	*31,921*	***3***	-6.0%	-14.2%	-11.5%
Derby Hospitals NHS Foundation Trust	2,200	27,883	29	3	*25,116*	***4***	*24,955*	***4***	*25,822*	***3***	11.0%	11.7%	8.0%
Northampton General Hospital NHS Trust	2,123	26,282	30	3	*26,241*	***3***	*24,405*	***4***	*24,741*	***3***	0.2%	7.7%	6.2%
United Lincolnshire Hospitals NHS Trust	2,384	26,231	31	4	*25,704*	***3***	*25,158*	***4***	*27,431*	***3***	2.1%	4.3%	-4.4%
Barts and the London NHS Trust	1,894	26,144	32	4	*25,399*	***4***	*23,789*	***4***	*24,155*	***4***	2.9%	9.9%	8.2%
University College London Hospitals NHS Foundation Trust	2,075	24,233	33	4	*22,069*	***4***	*20,643*	***4***	*24,943*	***3***	9.8%	17.4%	-2.8%
Colchester Hospital University NHS Foundation Trust	2,144	23,523	34	4	*25,663*	***4***	*25,329*	***3***	*23,798*	***4***	-8.3%	-7.1%	-1.2%
Royal Devon and Exeter NHS Foundation Trust	3,253	23,461	35	4	*24,304*	***4***	*22,359*	***4***	*21,339*	***4***	-3.5%	4.9%	9.9%
North Middlesex University Hospital NHS Trust	1,885	22,166	36	4	*20,226*	***4***	*27,624*	***3***	*27,059*	***3***	9.6%	-19.8%	-18.1%
Southend University Hospital NHS Foundation Trust	2,002	21,880	37	4	*24,634*	***4***	*24,336*	***4***	*24,634*	***4***	-11.2%	-10.1%	-11.2%
Royal Berkshire NHS Foundation Trust	1,642	20,598	38	4	*18,686*	***4***	*19,639*	***4***	*16,195*	***4***	10.2%	4.9%	27.2%
Barking, Havering and Redbridge University Hospitals NHS Trust	1,460	19,936	39	4	*19,770*	***4***	*19,656*	***4***	*19,845*	***4***	0.8%	1.4%	0.5%
Royal Cornwall Hospitals NHS Trust	1,928	17,508	40	4	*17,489*	***5***	*16,582*	***5***	*16,266*	***4***	0.1%	5.6%	7.6%
Royal United Hospital Bath NHS Trust	1,519	16,998	41	5	*17,038*	***5***	*16,585*	***5***	*15,190*	***5***	-0.2%	2.5%	11.9%
Taunton and Somerset NHS Foundation Trust	0	16,102	42	5	*15,540*	***5***	*9,764*	***5***	*288*	***5***	3.6%	64.9%	5491.0%
Plymouth Hospitals NHS Trust	1,388	15,986	43	5	*18,264*	***4***	*17,568*	***4***	*18,935*	***4***	-12.5%	-9.0%	-15.6%
Imperial College Healthcare NHS Trust	0	15,576	44	5	*3,210*	***5***	*2,926*	***5***	*submitted no data*		385.2%	432.3%	-
Ipswich Hospital NHS Trust	1,621	15,510	45	5	*16,998*	***5***	*14,552*	***5***	*14,293*	***5***	-8.8%	6.6%	8.5%
Shrewsbury and Telford Hospital NHS Trust	1,021	15,146	46	5	*15,783*	***5***	*14,521*	***5***	*14,057*	***5***	-4.0%	4.3%	7.7%
South Devon Healthcare NHS Foundation Trust	1,008	11,959	47	5	*10,934*	***5***	*10,075*	***5***	*10,894*	***5***	9.4%	18.7%	9.8%
Peterborough and Stamford Hospitals NHS Foundation Trust	767	10,736	48	5	*553*	***5***	*789*	***5***	*814*	***5***	1841.4%	1260.7%	1218.9%
North Cumbria University Hospitals NHS Trust	902	10,287	49	5	*9,290*	***5***	*10,288*	***5***	*12,815*	***5***	10.7%	-0.0%	-19.7%
Royal Free Hampstead NHS Trust	962	9,358	50	5	*10,205*	***5***	*9,253*	***5***	*10,641*	***5***	-8.3%	1.1%	-12.1%
Sherwood Forest Hospitals NHS Foundation Trust	0	0	51	5	*submitted no data*		*submitted no data*		*submitted no data*		-	-	-
Royal National Hospital for Rheumatic Diseases NHS Foundation Trust		*submitted no data*			*5*	***5***	*submitted no data*		*submitted no data*		-	-	-
Hampshire PCT		*submitted no data*			*1*	***5***	*submitted no data*		*submitted no data*		-	-	-
West Kent PCT		*submitted no data*			*submitted no data*		*submitted no data*		*12,527*	***5***	-	-	-
Gloucestershire PCT		*submitted no data*			*submitted no data*		*submitted no data*		*1*	***5***	-	-	-
Grand Total	**172,486**	**1,774,877**			***1,838,406***		***1,656,612***		***1,570,433***		-3.5%	7.1%	13.0%

Appendix 1

Reference Costs 2011/12
Key Data by Trust

Organisation	Peer Group	No. of Planning Events	Planning MFF adj Cost	No. of Fractions	Treatment MFF adj Cost	Number of Linacs
The Christie NHS Foundation Trust	1	7,877	£7.4m	98,318	£12.2m	13.9
The Clatterbridge Cancer Centre NHS Foundation Trust	1	6,858	£4.9m	92,487	£10.1m	9.4
The Royal Marsden NHS Foundation Trust	1	4,807	£4.2m	63,897	£10.2m	11.0
Maidstone and Tunbridge Wells NHS Trust	1	11,510	£5.2m	63,393	£8.8m	7.3
Sheffield Teaching Hospitals NHS Foundation Trust	1	5,751	£2.4m	60,351	£4.5m	7.0
University Hospitals Birmingham NHS Foundation Trust	1	5,760	£3.2m	59,883	£7.8m	8.0
Leeds Teaching Hospitals NHS Trust	1	7,354	£3.9m	59,631	£11.9m	10.0
The Newcastle upon Tyne Hospitals NHS Foundation Trust	1	4,246	£3.8m	58,708	£5.5m	7.6
Lancashire Teaching Hospitals NHS Foundation Trust	1	21,266	£1.4m	54,389	£6.8m	4.8
Guy's and St Thomas' NHS Foundation Trust	1	4,863	£4.8m	50,410	£6.0m	7.0
Total, Peer Group 1		**80,292**	**£41.2m**	**661,467**	**£83.8m**	**86.0**
East and North Hertfordshire NHS Trust	2	4,786	£3.7m	49,963	£7.7m	9.0
Cambridge University Hospitals NHS Foundation Trust	2	4,487	£3.0m	48,413	£5.5m	8.0
Oxford University Hospitals NHS Trust	2	3,507	£3.8m	43,872	£3.8m	6.0
Gloucestershire Hospitals NHS Foundation Trust	2	4,738	£1.4m	42,553	£4.0m	5.6
Royal Surrey County Hospital NHS Foundation Trust	2	1,502	£1.1m	42,211	£5.0m	5.4
Nottingham University Hospitals NHS Trust	2	3,094	£2.0m	41,605	£5.7m	4.6
South Tees Hospitals NHS Foundation Trust	2	3,165	£1.5m	41,181	£6.1m	4.0
Hull and East Yorkshire Hospitals NHS Trust	2	2,928	£2.8m	40,572	£5.5m	6.0
University Hospital Southampton NHS Foundation Trust	2	3,938	£1.5m	40,496	£5.9m	6.0
University Hospitals Bristol NHS Foundation Trust	2	3,565	£1.9m	39,917	£4.1m	6.0
Total, Peer Group 2		**35,710**	**£22.8m**	**430,783**	**£53.3m**	**60.6**
University Hospitals Coventry and Warwickshire NHS Trust	3	3,742	£1.1m	39,510	£4.9m	5.0
The Royal Wolverhampton Hospitals NHS Trust	3	2,947	£2.4m	37,556	£2.8m	4.0
Brighton and Sussex University Hospitals NHS Trust	3	1,931	£1.1m	33,908	£4.3m	4.0
Poole Hospital NHS Foundation Trust	3	2,532	£1.2m	33,808	£4.0m	4.0
Norfolk and Norwich University Hospitals NHS Foundation Trust	3	3,523	£1.7m	33,022	£3.4m	3.7
University Hospital of North Staffordshire NHS Trust	3	1,946	£1.4m	29,848	£3.6m	4.0
Portsmouth Hospitals NHS Trust	3	2,882	£2.2m	29,221	£3.8m	4.0
University Hospitals of Leicester NHS Trust	3	2,803	£1.5m	28,251	£4.3m	4.1
Derby Hospitals NHS Foundation Trust	3	2,200	£2.5m	27,883	£2.2m	4.3
Northampton General Hospital NHS Trust	3	2,123	£1.3m	26,282	£2.6m	3.0
Total, Peer Group 3		**26,629**	**£16.4m**	**319,289**	**£36.0m**	**40.0**
United Lincolnshire Hospitals NHS Trust	4	2,384	£1.2m	26,231	£2.8m	3.0
Barts and the London NHS Trust	4	1,894	£1.9m	26,144	£4.3m	4.8
University College London Hospitals NHS Foundation Trust	4	2,075	£4.1m	24,233	£6.7m	4.0
Colchester Hospital University NHS Foundation Trust	4	2,144	£1.5m	23,523	£2.9m	3.0
Royal Devon and Exeter NHS Foundation Trust	4	3,253	£1.7m	23,461	£3.6m	3.0
North Middlesex University Hospital NHS Trust	4	1,885	£1.3m	22,166	£1.9m	3.0
Southend University Hospital NHS Foundation Trust	4	2,002	£1.0m	21,880	£2.8m	3.6
Royal Berkshire NHS Foundation Trust	4	1,642	£1.1m	20,598	£4.8m	3.0
Barking, Havering and Redbridge University Hospitals NHS Trust	4	1,460	£1.9m	19,936	£2.9m	3.0
Royal Cornwall Hospitals NHS Trust	4	1,928	£0.9m	17,508	£2.1m	2.0
Total, Peer Group 4		**20,667**	**£16.5m**	**225,680**	**£34.7m**	**32.3**
Royal United Hospital Bath NHS Trust	5	1,519	£1.1m	16,998	£2.6m	2.0
Taunton and Somerset NHS Foundation Trust	5	0	£0.0m	16,102	£4.2m	2.0
Plymouth Hospitals NHS Trust	5	1,388	£1.2m	15,986	£2.7m	2.0
Imperial College Healthcare NHS Trust	5	0	£0.0m	15,576	£7.4m	5.8
Ipswich Hospital NHS Trust	5	1,621	£0.6m	15,510	£2.0m	2.0
Shrewsbury and Telford Hospital NHS Trust	5	1,021	£1.5m	15,146	£1.3m	2.0
South Devon Healthcare NHS Foundation Trust	5	1,008	£0.6m	11,959	£2.5m	2.0
Peterborough and Stamford Hospitals NHS Foundation Trust	5	767	£0.1m	10,736	£1.5m	2.0
North Cumbria University Hospitals NHS Trust	5	902	£0.8m	10,287	£2.5m	2.0
Royal Free Hampstead NHS Trust	5	962	£1.0m	9,358	£1.3m	2.0
Sherwood Forest Hospitals NHS Foundation Trust	5	0	£0.0m	0	£0.0m	0.0
Total, Peer Group 5		**9,188**	**£6.8m**	**137,658**	**£28.1m**	**19.8**
TOTAL		**172,486**	**£103.6m**	**1,774,877**	**£235.8m**	**238.6**

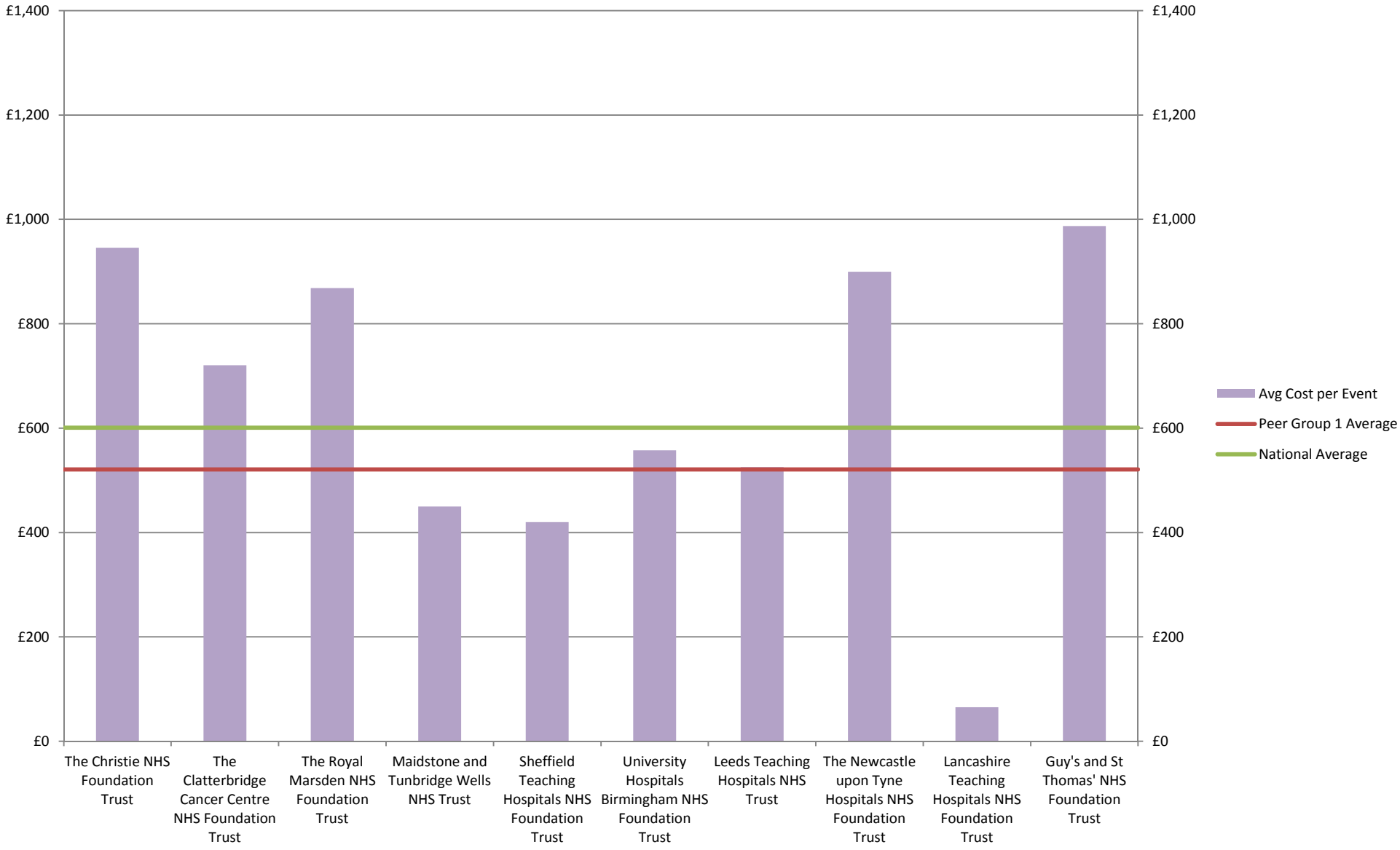
Reference Costs 2011/12
Key Ratios by Trust

Organisation	Peer Group	Avg Cost per Planning Event	Avg Cost per Treatment Fraction	Fractions per Planning Event	Planning Cost: Treatment Cost	Thousand Fractions per Linac	Cost Quantum per Linac
The Christie NHS Foundation Trust	1	£946	£124	12.5	38:62	7.1	£1.4m
The Clatterbridge Cancer Centre NHS Foundation Trust	1	£721	£109	13.5	33:67	9.8	£1.6m
The Royal Marsden NHS Foundation Trust	1	£868	£159	13.3	29:71	5.8	£1.3m
Maidstone and Tunbridge Wells NHS Trust	1	£450	£139	5.5	37:63	8.6	£1.9m
Sheffield Teaching Hospitals NHS Foundation Trust	1	£420	£74	10.5	35:65	8.6	£1.0m
University Hospitals Birmingham NHS Foundation Trust	1	£558	£131	10.4	29:71	7.5	£1.4m
Leeds Teaching Hospitals NHS Trust	1	£526	£200	8.1	24:76	6.0	£1.6m
The Newcastle upon Tyne Hospitals NHS Foundation Trust	1	£900	£93	13.8	41:59	7.7	£1.2m
Lancashire Teaching Hospitals NHS Foundation Trust	1	£65	£126	2.6	17:83	11.5	£1.7m
Guy's and St Thomas' NHS Foundation Trust	1	£987	£119	10.4	45:55	7.2	£1.5m
Total, Peer Group 1		**£521**	**£127**	**8.1**	**33:67**	**7.7**	**£1.5m**
East and North Hertfordshire NHS Trust	2	£769	£153	10.4	32:68	5.6	£1.3m
Cambridge University Hospitals NHS Foundation Trust	2	£679	£115	10.8	35:65	6.1	£1.1m
Oxford University Hospitals NHS Trust	2	£1,069	£86	12.5	50:50	7.3	£1.3m
Gloucestershire Hospitals NHS Foundation Trust	2	£300	£94	9.0	26:74	7.6	£1.0m
Royal Surrey County Hospital NHS Foundation Trust	2	£724	£118	28.1	18:82	7.8	£1.1m
Nottingham University Hospitals NHS Trust	2	£651	£137	13.4	26:74	9.1	£1.7m
South Tees Hospitals NHS Foundation Trust	2	£476	£149	13.0	20:80	10.3	£1.9m
Hull and East Yorkshire Hospitals NHS Trust	2	£971	£137	13.9	34:66	6.8	£1.4m
University Hospital Southampton NHS Foundation Trust	2	£377	£146	10.3	20:80	6.7	£1.2m
University Hospitals Bristol NHS Foundation Trust	2	£541	£103	11.2	32:68	6.7	£1.0m
Total, Peer Group 2		**£637**	**£126**	**12.2**	**30:70**	**7.2**	**£1.3m**
University Hospitals Coventry and Warwickshire NHS Trust	3	£290	£125	10.6	18:82	7.9	£1.2m
The Royal Wolverhampton Hospitals NHS Trust	3	£819	£76	12.7	46:54	9.4	£1.3m
Brighton and Sussex University Hospitals NHS Trust	3	£571	£127	17.6	20:80	8.5	£1.3m
Poole Hospital NHS Foundation Trust	3	£471	£117	13.4	23:77	8.5	£1.3m
Norfolk and Norwich University Hospitals NHS Foundation Trust	3	£488	£102	9.4	34:66	9.0	£1.4m
University Hospital of North Staffordshire NHS Trust	3	£724	£121	15.3	28:72	7.5	£1.3m
Portsmouth Hospitals NHS Trust	3	£755	£130	10.1	37:63	7.3	£1.5m
University Hospitals of Leicester NHS Trust	3	£532	£151	10.1	26:74	6.9	£1.4m
Derby Hospitals NHS Foundation Trust	3	£1,158	£81	12.7	53:47	6.6	£1.1m
Northampton General Hospital NHS Trust	3	£591	£100	12.4	32:68	8.8	£1.3m
Total, Peer Group 3		**£615**	**£113**	**12.0**	**31:69**	**8.0**	**£1.3m**
United Lincolnshire Hospitals NHS Trust	4	£496	£105	11.0	30:70	8.7	£1.3m
Barts and the London NHS Trust	4	£998	£164	13.8	31:69	5.5	£1.3m
University College London Hospitals NHS Foundation Trust	4	£1,982	£275	11.7	38:62	6.1	£2.7m
Colchester Hospital University NHS Foundation Trust	4	£678	£121	11.0	34:66	7.8	£1.4m
Royal Devon and Exeter NHS Foundation Trust	4	£522	£155	7.2	32:68	7.8	£1.8m
North Middlesex University Hospital NHS Trust	4	£680	£86	11.8	40:60	7.4	£1.1m
Southend University Hospital NHS Foundation Trust	4	£488	£129	10.9	26:74	6.1	£1.1m
Royal Berkshire NHS Foundation Trust	4	£642	£233	12.5	18:82	6.9	£2.0m
Barking, Havering and Redbridge University Hospitals NHS Trust	4	£1,299	£143	13.7	40:60	6.6	£1.6m
Royal Cornwall Hospitals NHS Trust	4	£474	£118	9.1	31:69	8.8	£1.5m
Total, Peer Group 4		**£796**	**£154**	**10.9**	**32:68**	**7.0**	**£1.6m**
Royal United Hospital Bath NHS Trust	5	£708	£154	11.2	29:71	8.5	£1.9m
Taunton and Somerset NHS Foundation Trust	5	£0	£260	0.0	0:100	8.1	£2.1m
Plymouth Hospitals NHS Trust	5	£869	£166	11.5	31:69	8.0	£1.9m
Imperial College Healthcare NHS Trust	5	£0	£472	0.0	0:100	2.7	£1.3m
Ipswich Hospital NHS Trust	5	£354	£132	9.6	22:78	7.8	£1.3m
Shrewsbury and Telford Hospital NHS Trust	5	£1,436	£87	14.8	53:47	7.6	£1.4m
South Devon Healthcare NHS Foundation Trust	5	£579	£213	11.9	19:81	6.0	£1.6m
Peterborough and Stamford Hospitals NHS Foundation Trust	5	£137	£137	14.0	7:93	5.4	£0.8m
North Cumbria University Hospitals NHS Trust	5	£912	£243	11.4	25:75	5.1	£1.7m
Royal Free Hampstead NHS Trust	5	£1,000	£144	9.7	42:58	4.7	£1.2m
Sherwood Forest Hospitals NHS Foundation Trust	5	£0	£0	0.0	0	0.0	£0.0m
Total, Peer Group 5		**£740**	**£170**	**13.3**	**25:75**	**6.8**	**£1.5m**
TOTAL		**£601**	**£130**	**10.2**	**31:69**	**7.4**	**£1.4m**

Lowest unit cost	£0	£74
Highest unit cost	£1,982	£275
Range	**£1,982**	**£202**
Lower quartile	£488	£109
Upper quartile	£869	£151
Inter-quartile range	**£381**	**£42**
Standard deviation	**£345**	**£45**
Mean minus 1 standard deviation	£342	£92
Mean plus 1 standard deviation	£1,031	£182

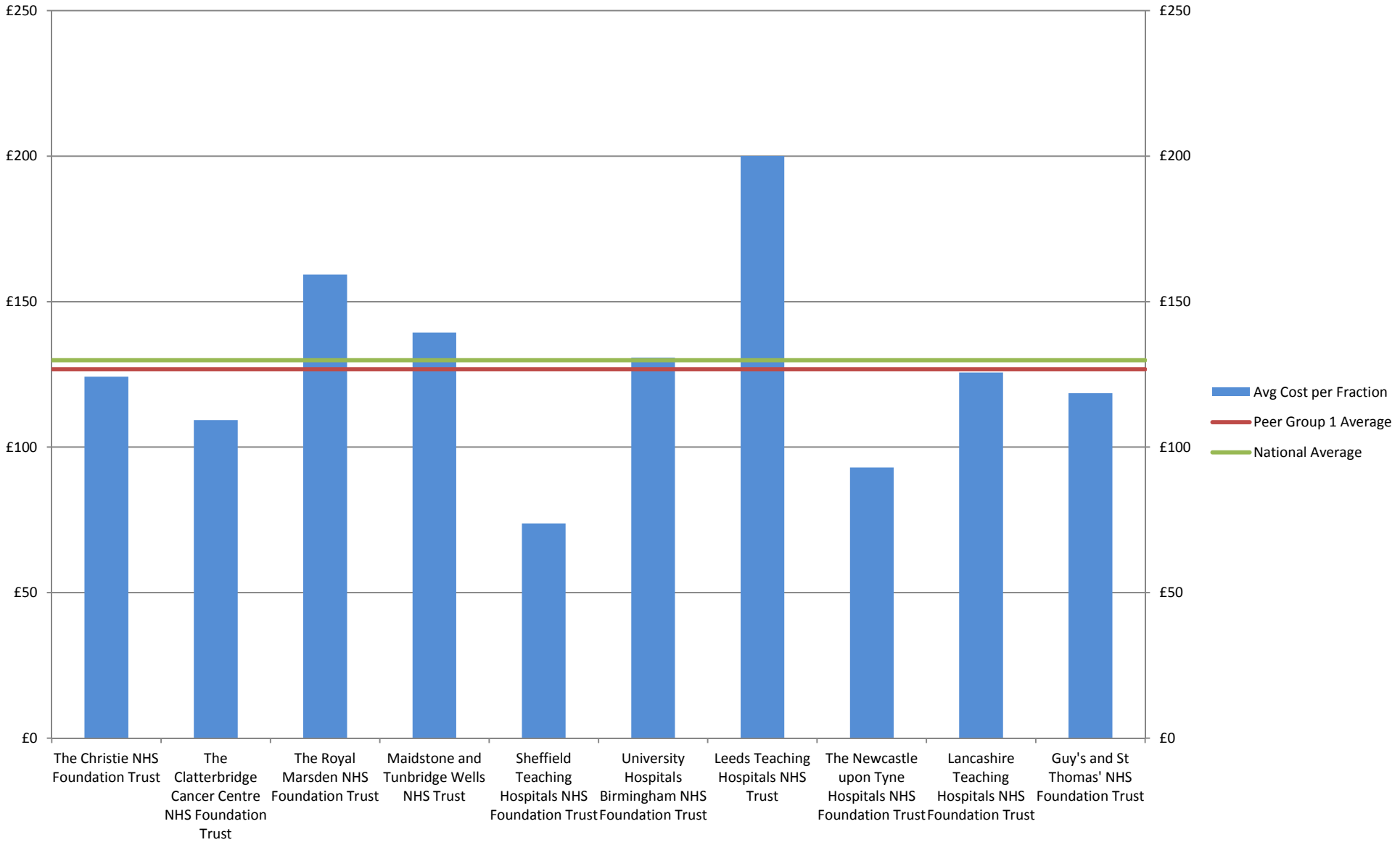
NB all measures above and peer group and national averages exclude the extreme outliers marked in red

Average Cost per Planning Event - Peer Group 1



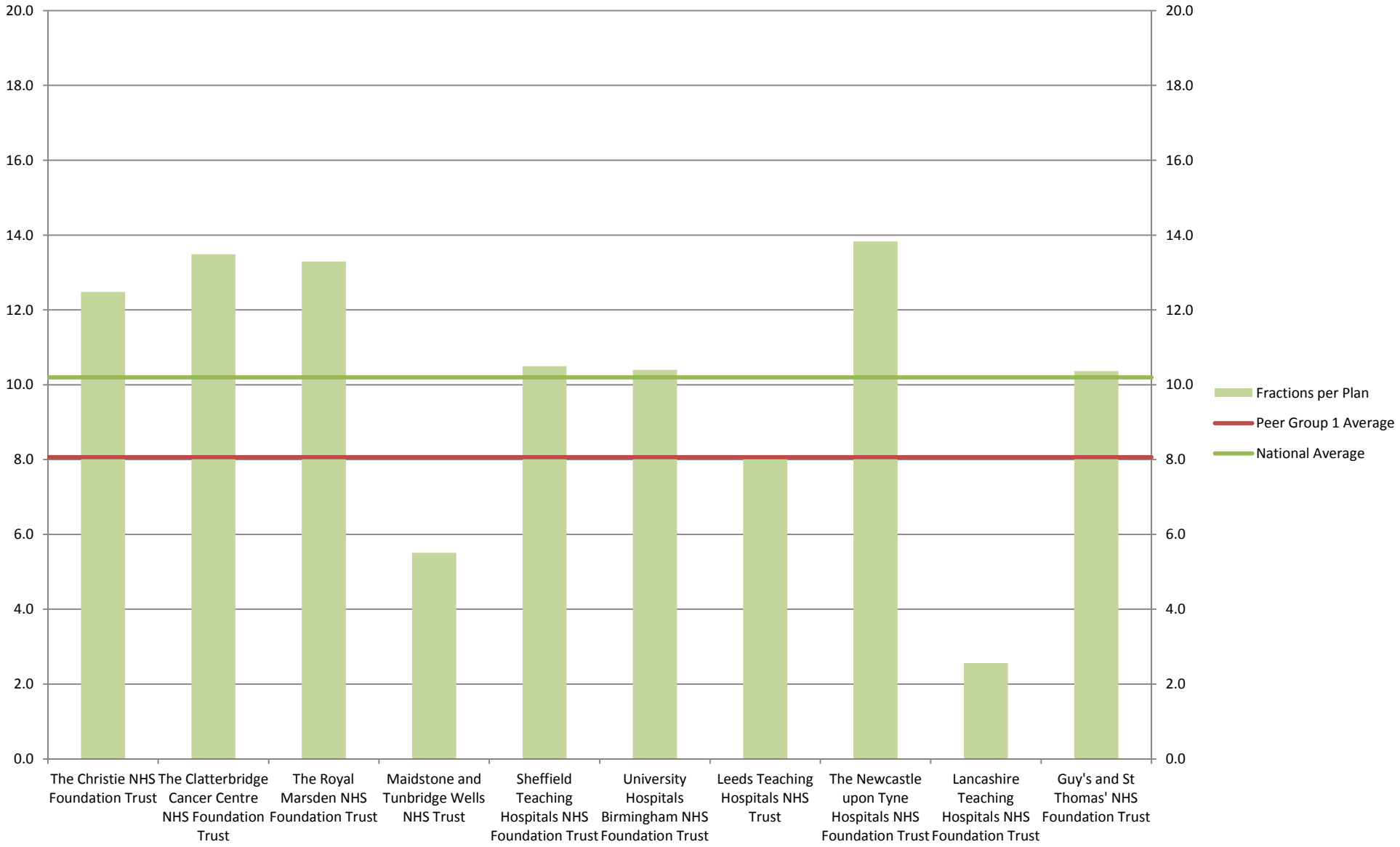
Appendix 4

Average Cost per Fraction - Peer Group 1



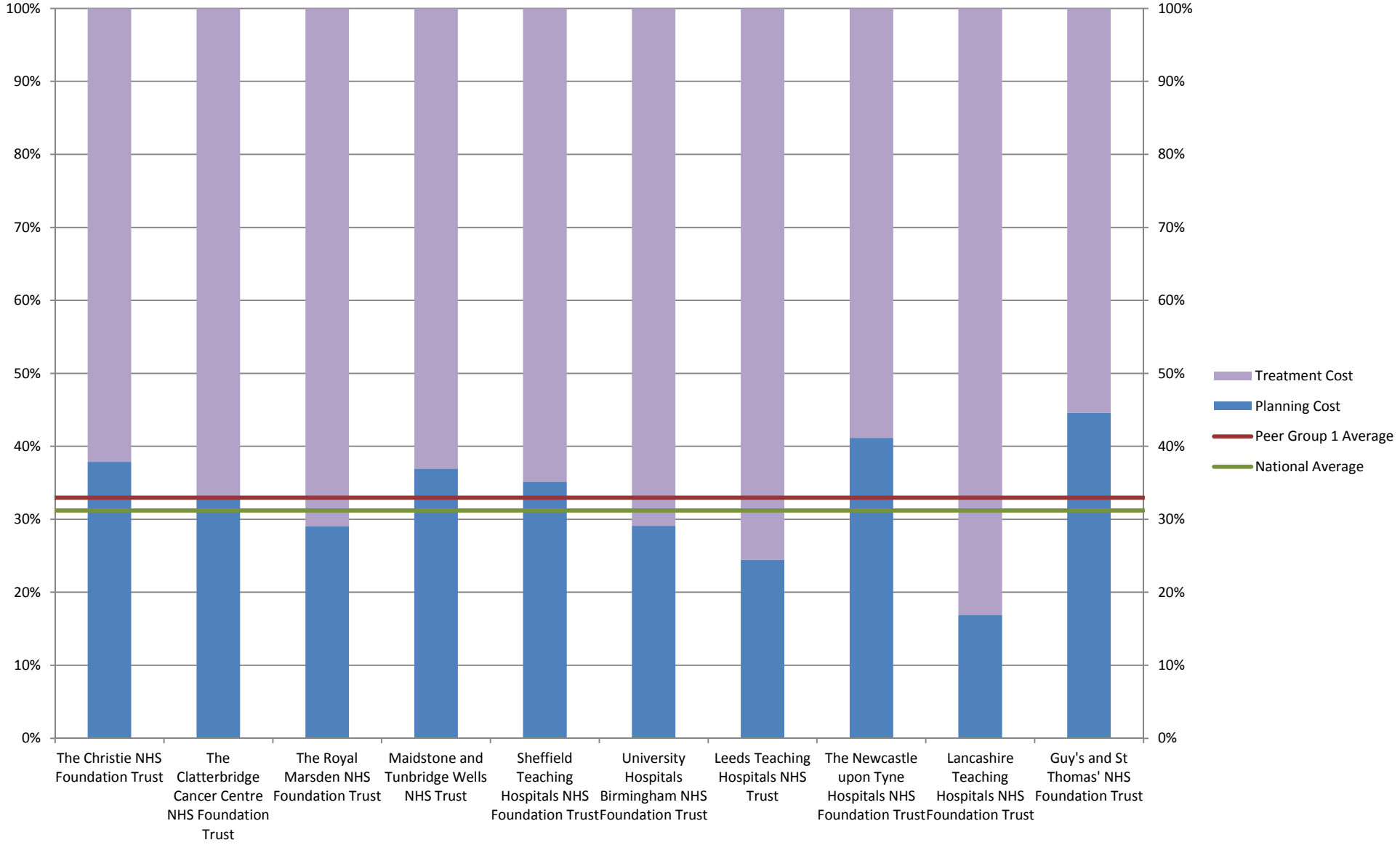
Appendix 4

Fractions per Plan - Peer Group 1



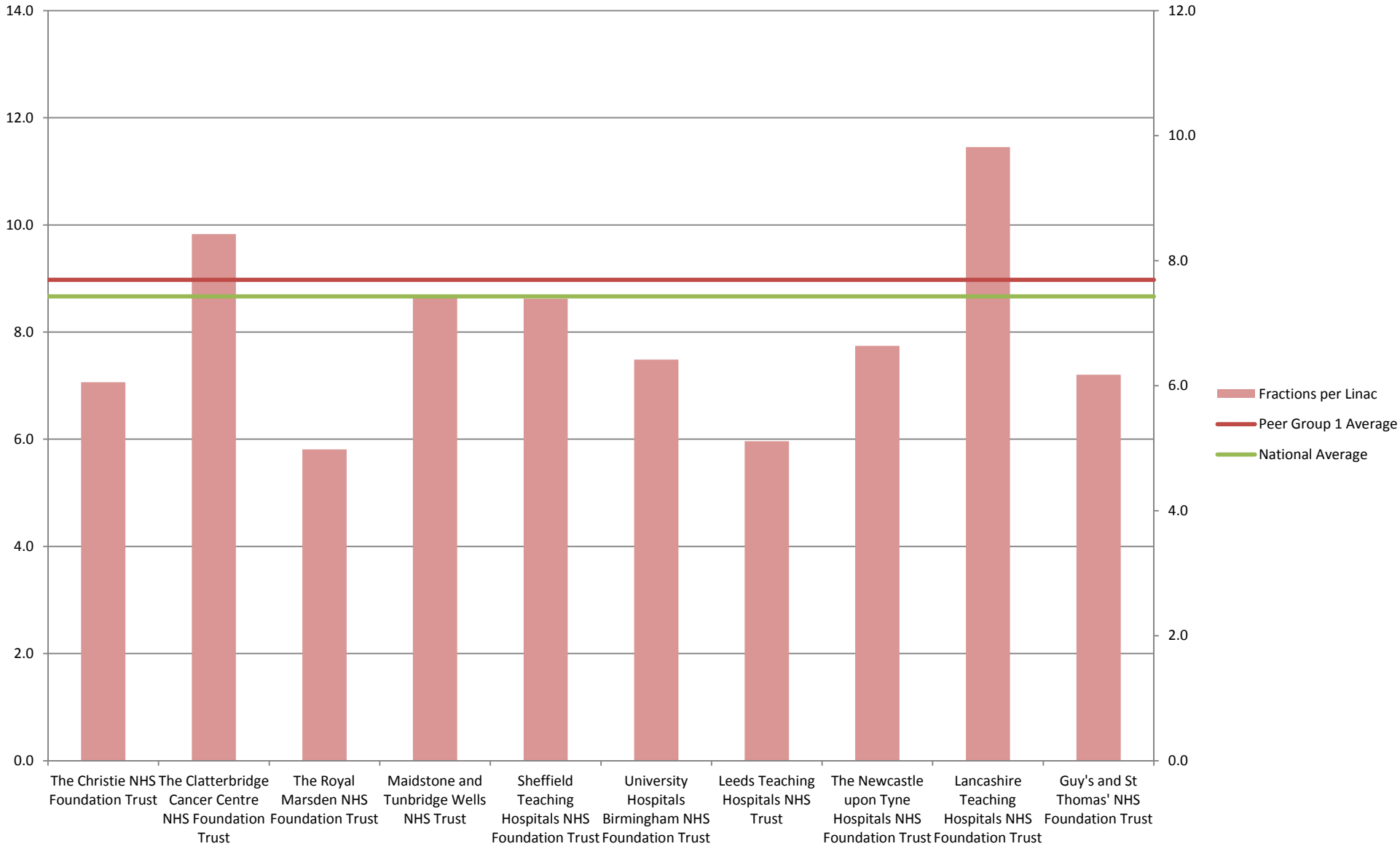
Appendix 4

Split of Planning Cost to Treatment Cost - Peer Group 1



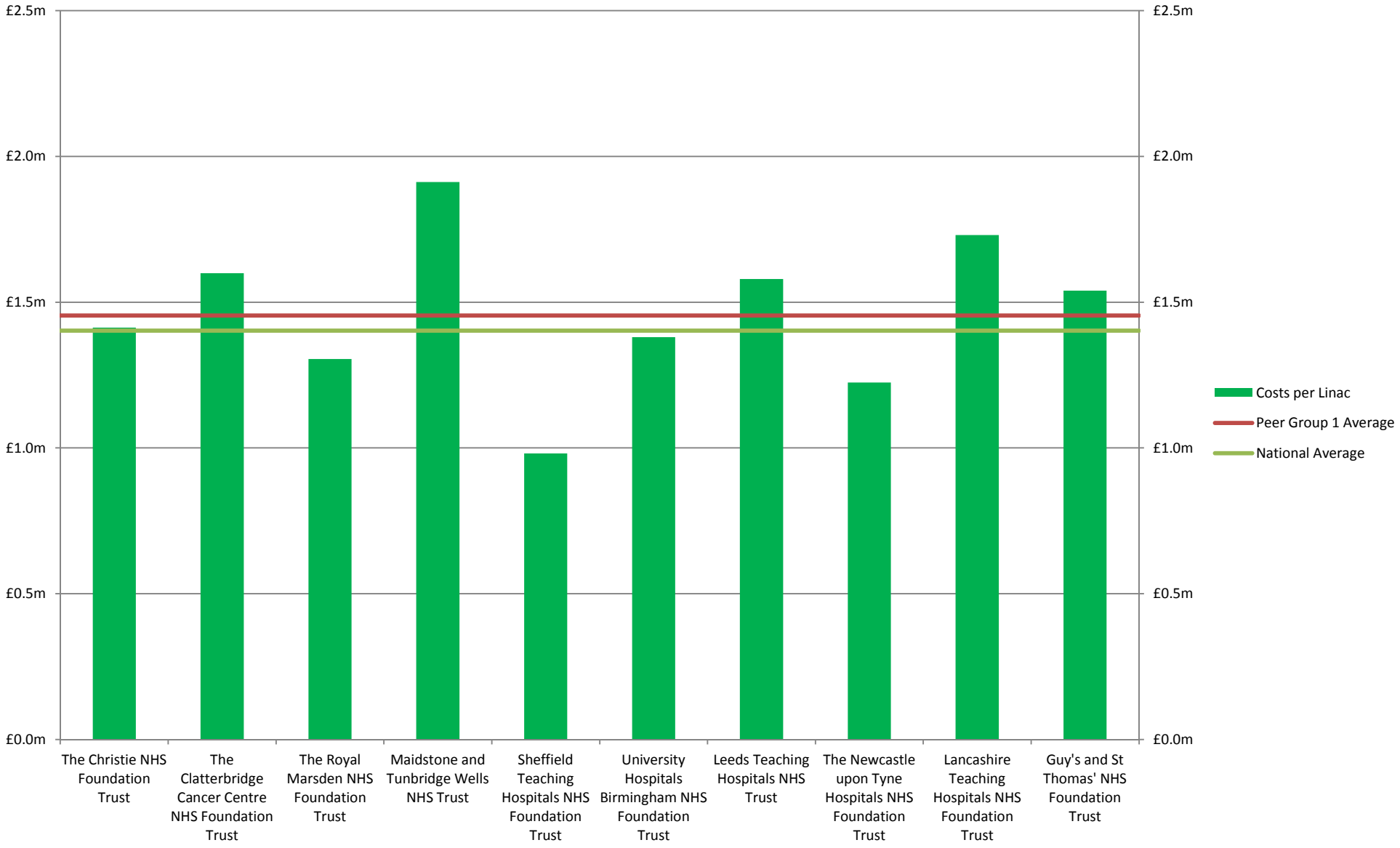
Appendix 4

Fractions per Linac - Peer Group 1



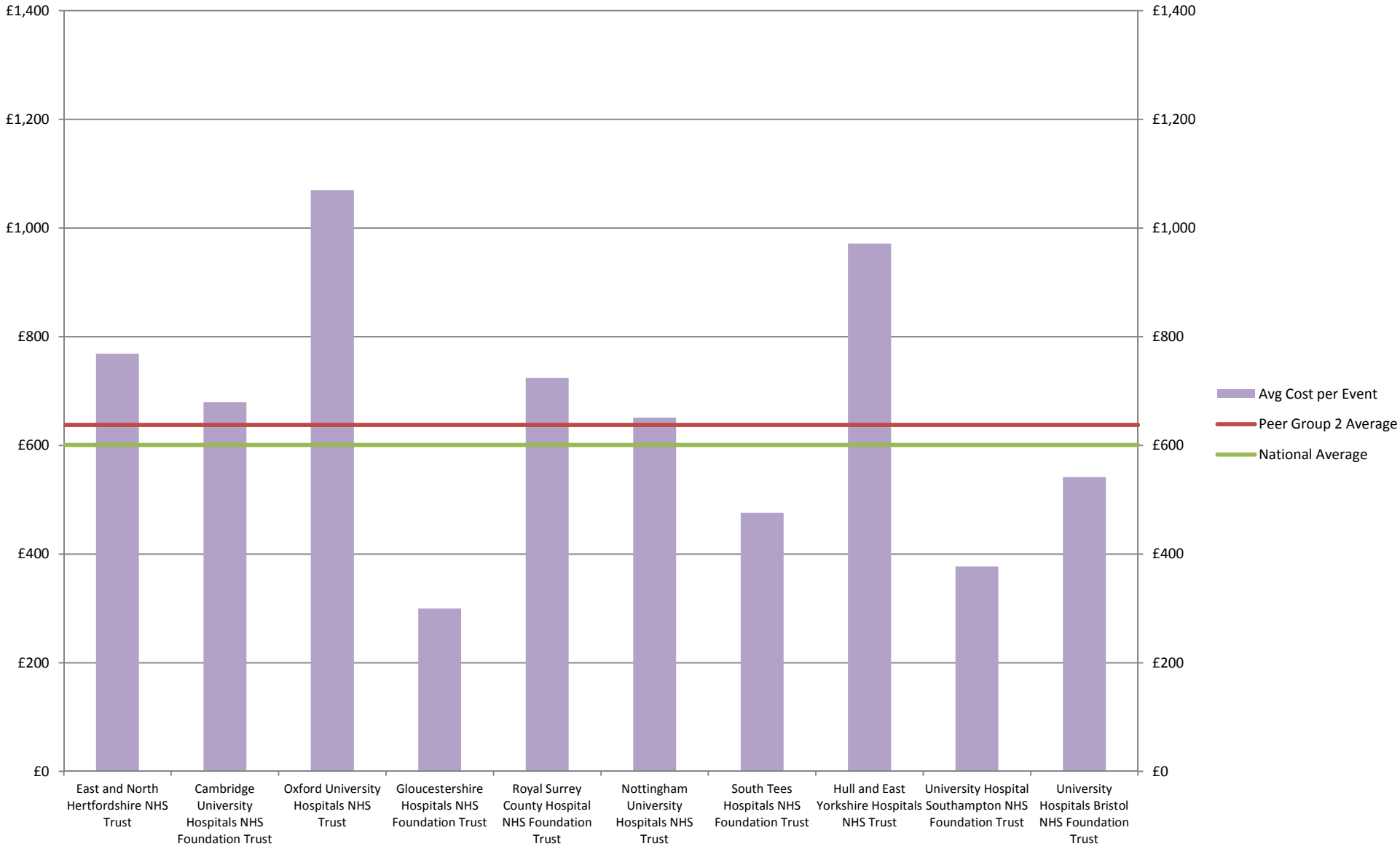
Appendix 4

Cost Quantum per Linac - Peer Group 1



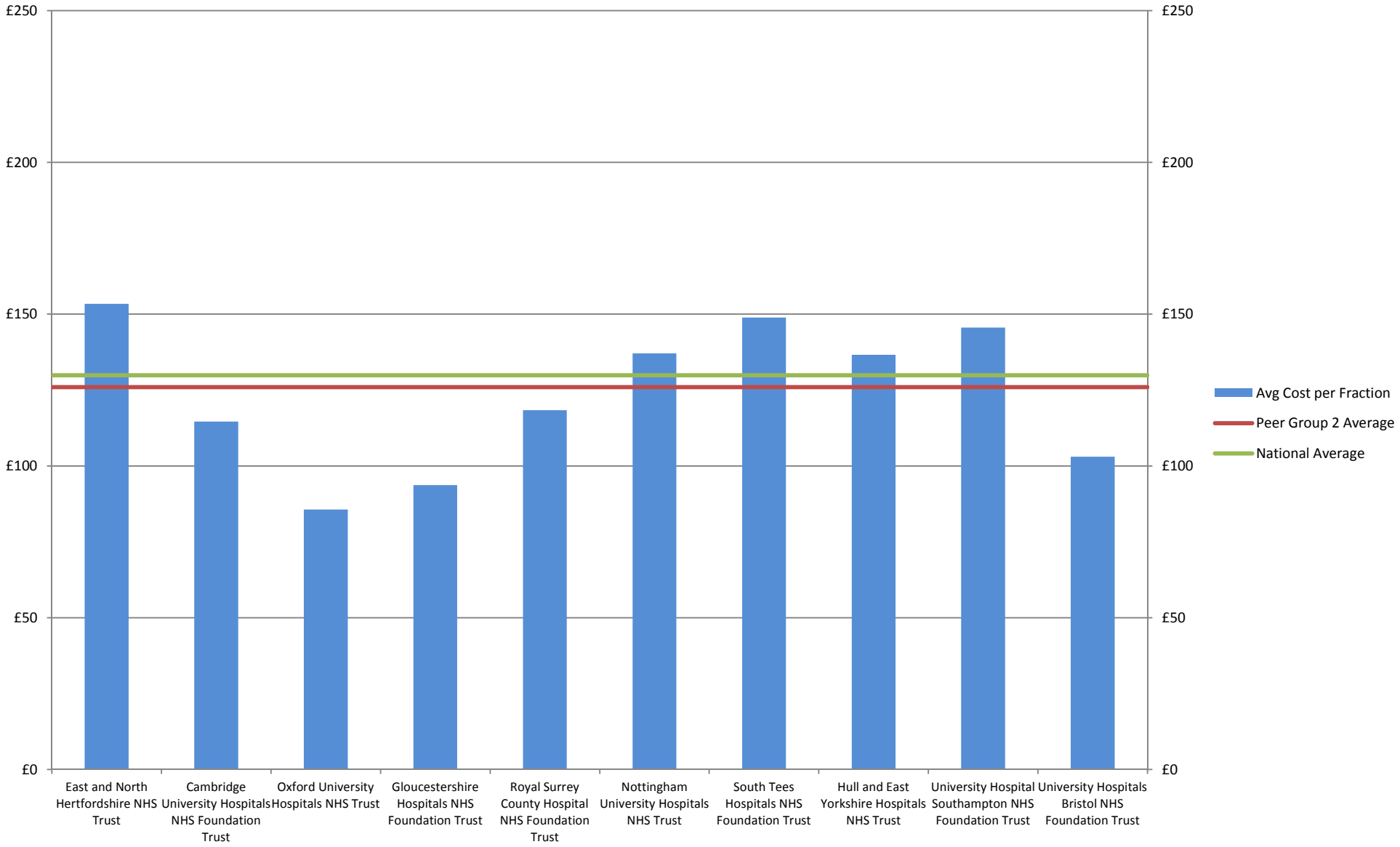
Appendix 4

Average Cost per Planning Event - Peer Group 2



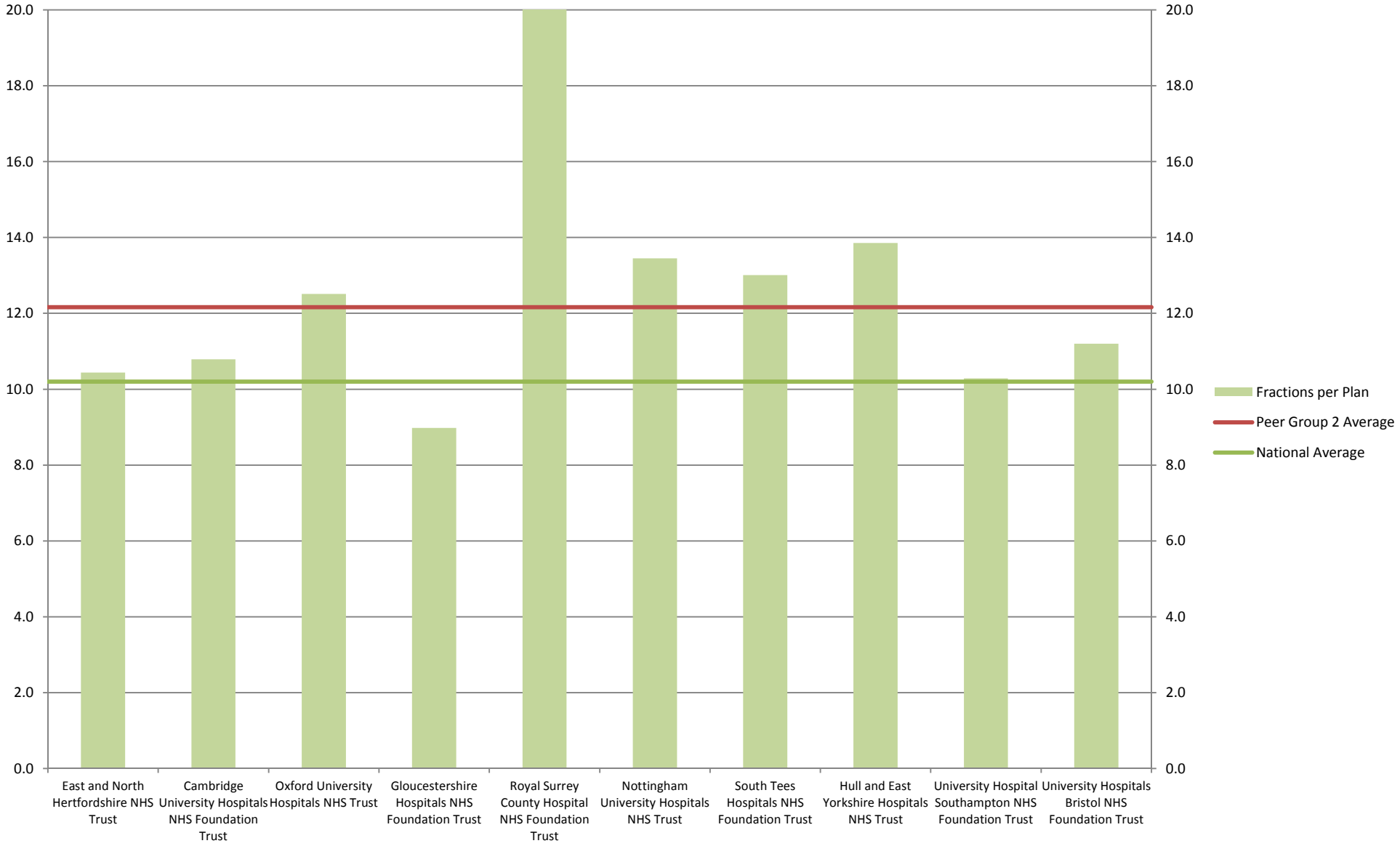
Appendix 4

Average Cost per Fraction - Peer Group 2



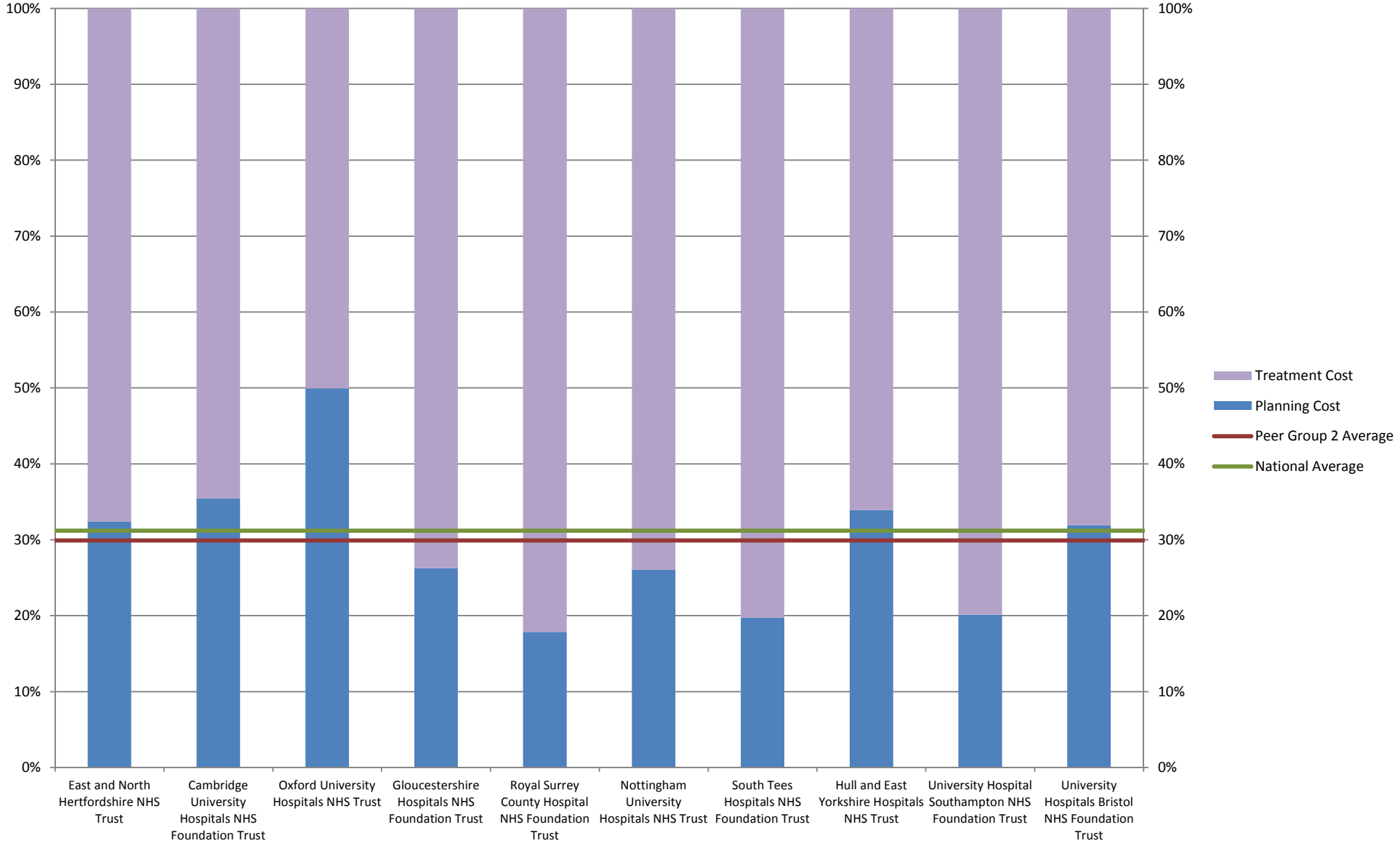
Appendix 4

Fractions per Plan - Peer Group 2



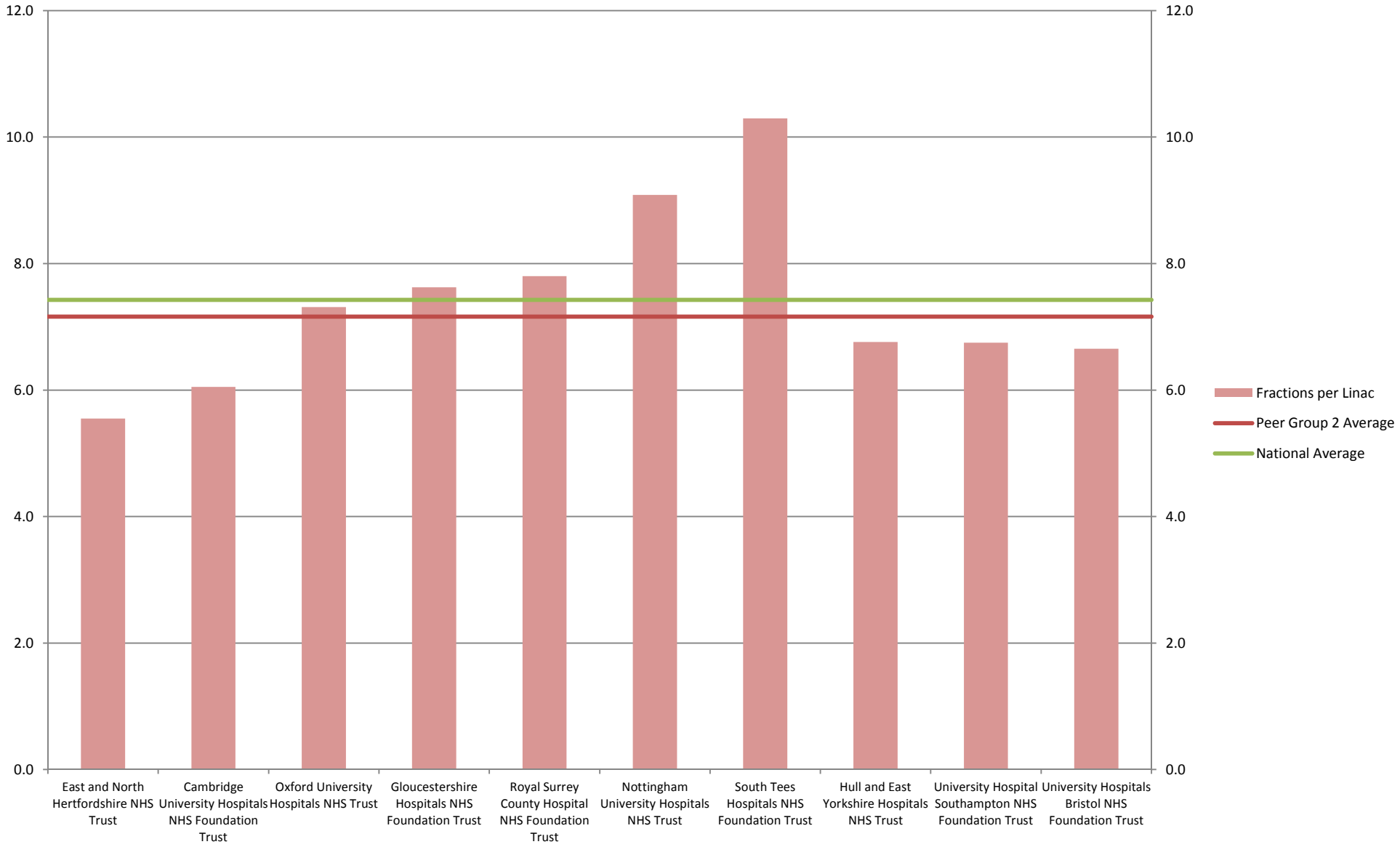
Appendix 4

Split of Planning Cost to Treatment Cost - Peer Group 2



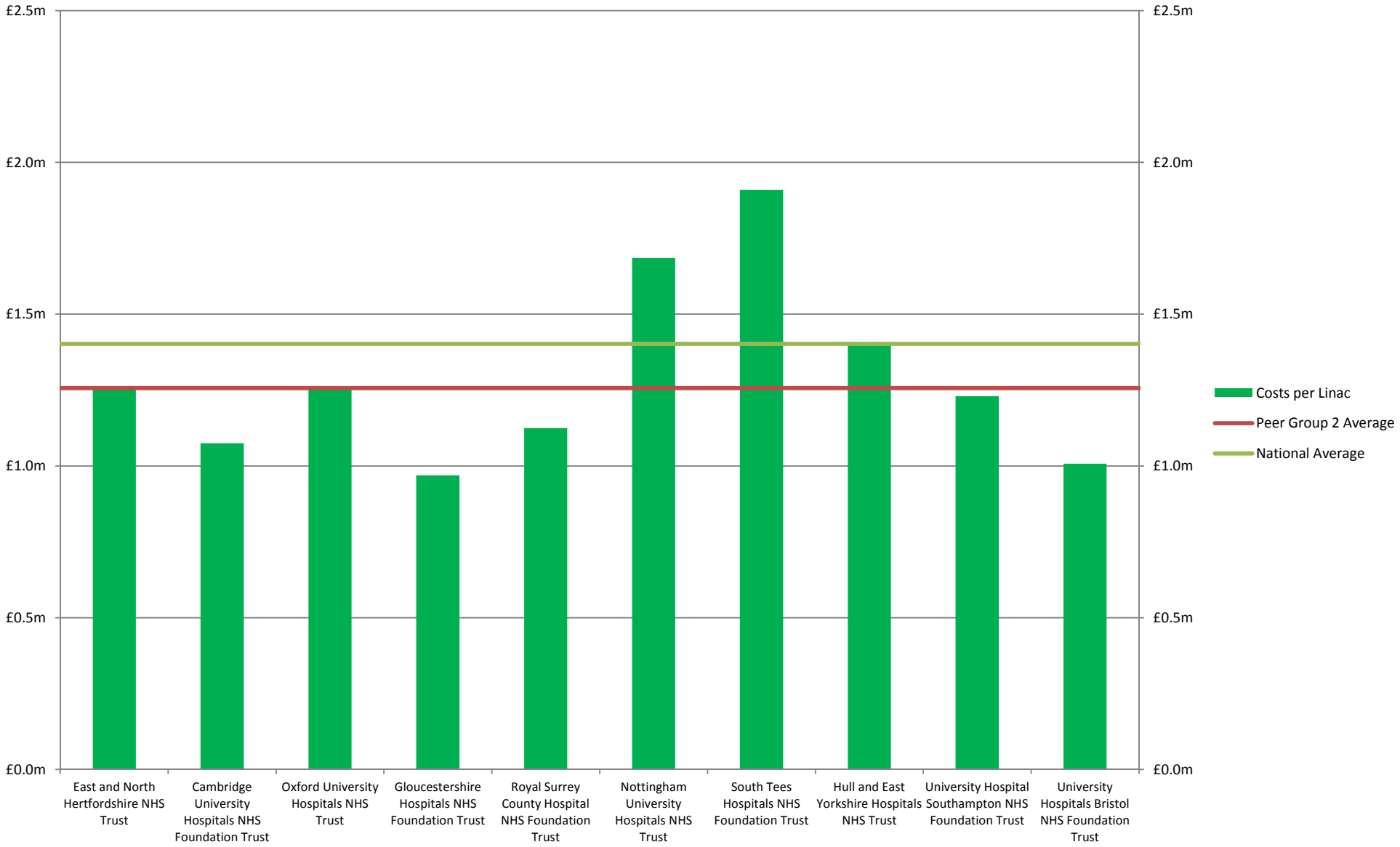
Appendix 4

Fractions per Linac - Peer Group 2



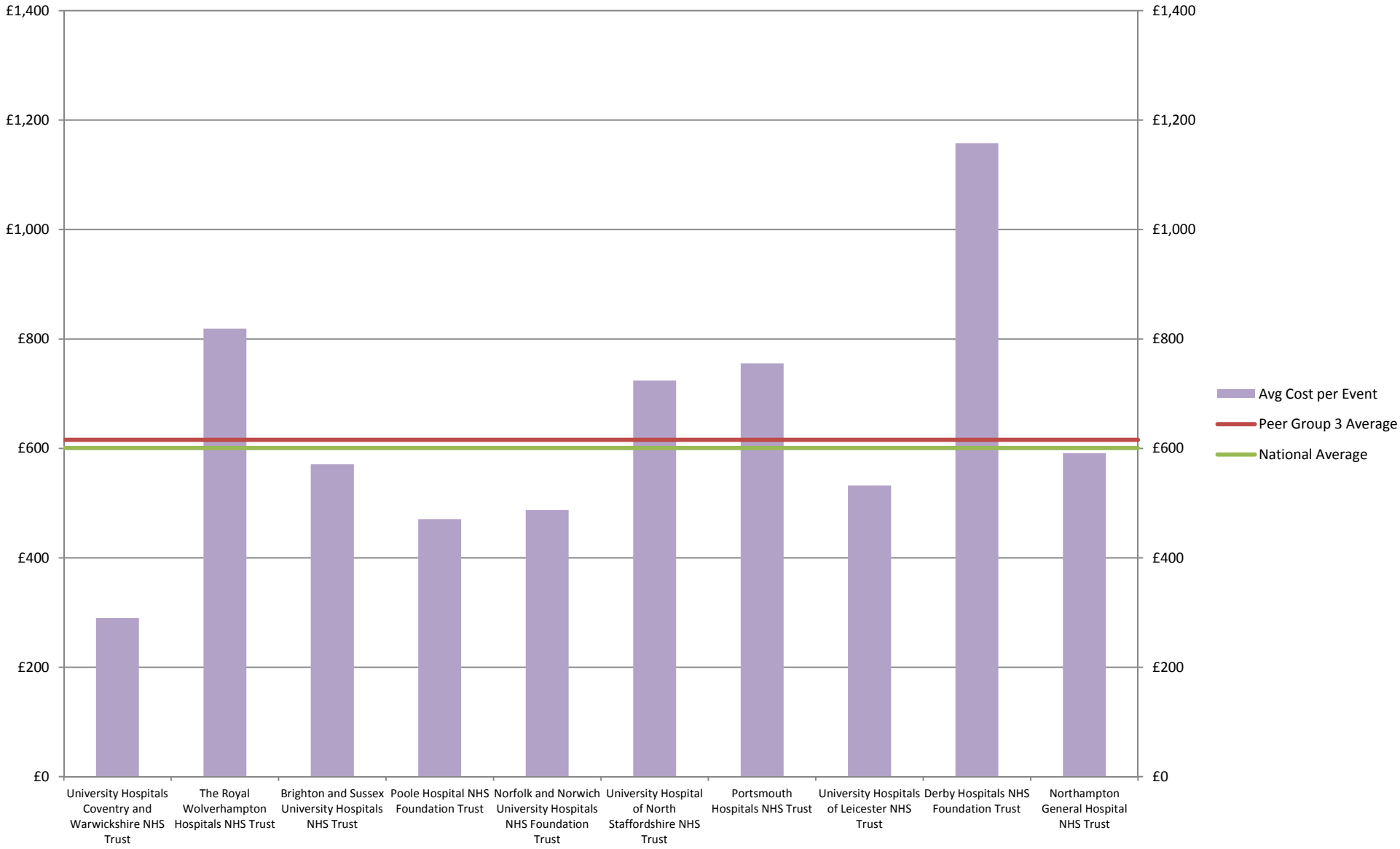
Appendix 4

Cost Quantum per Linac - Peer Group 2



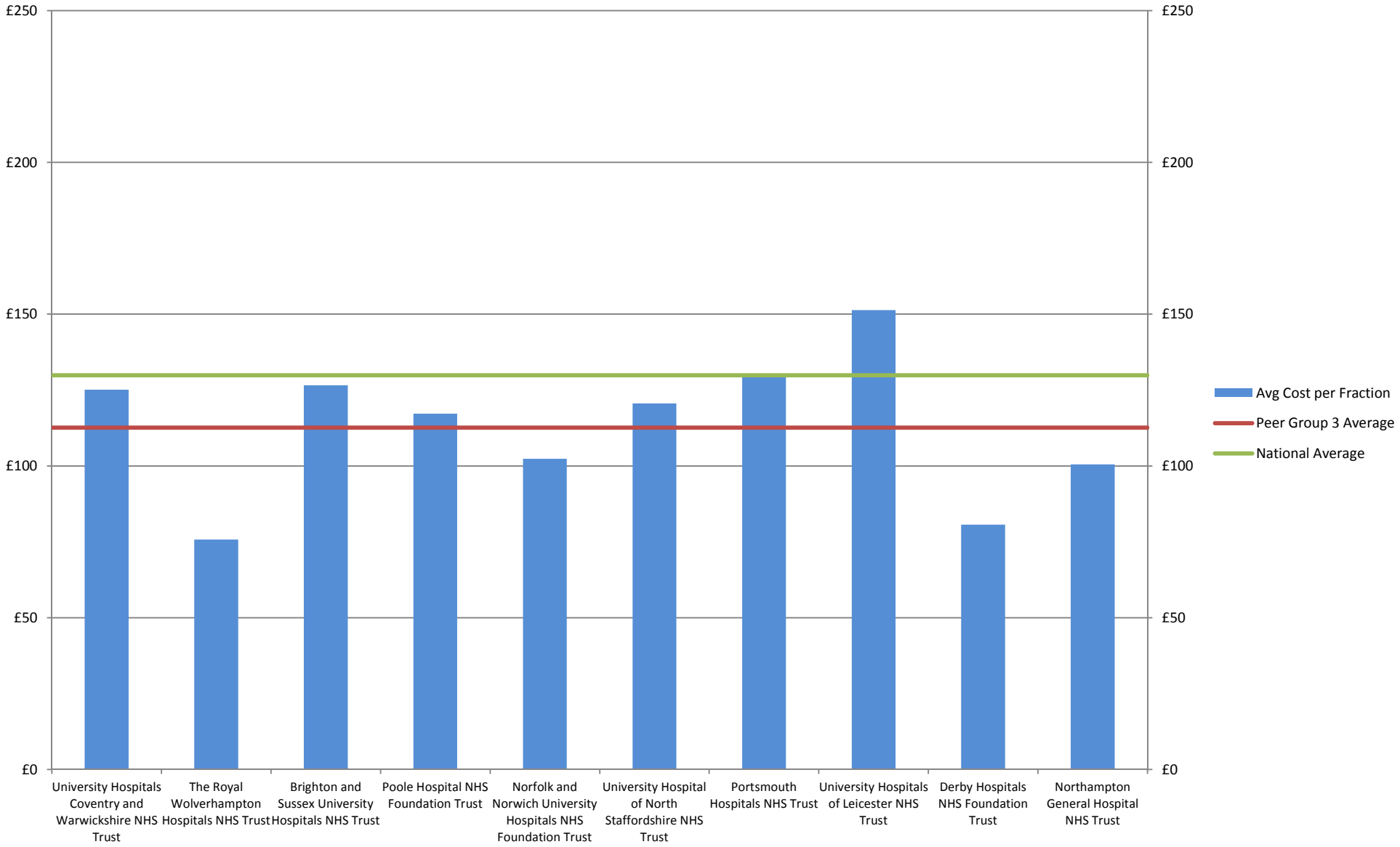
Appendix 4

Average Cost per Planning Event - Peer Group 3



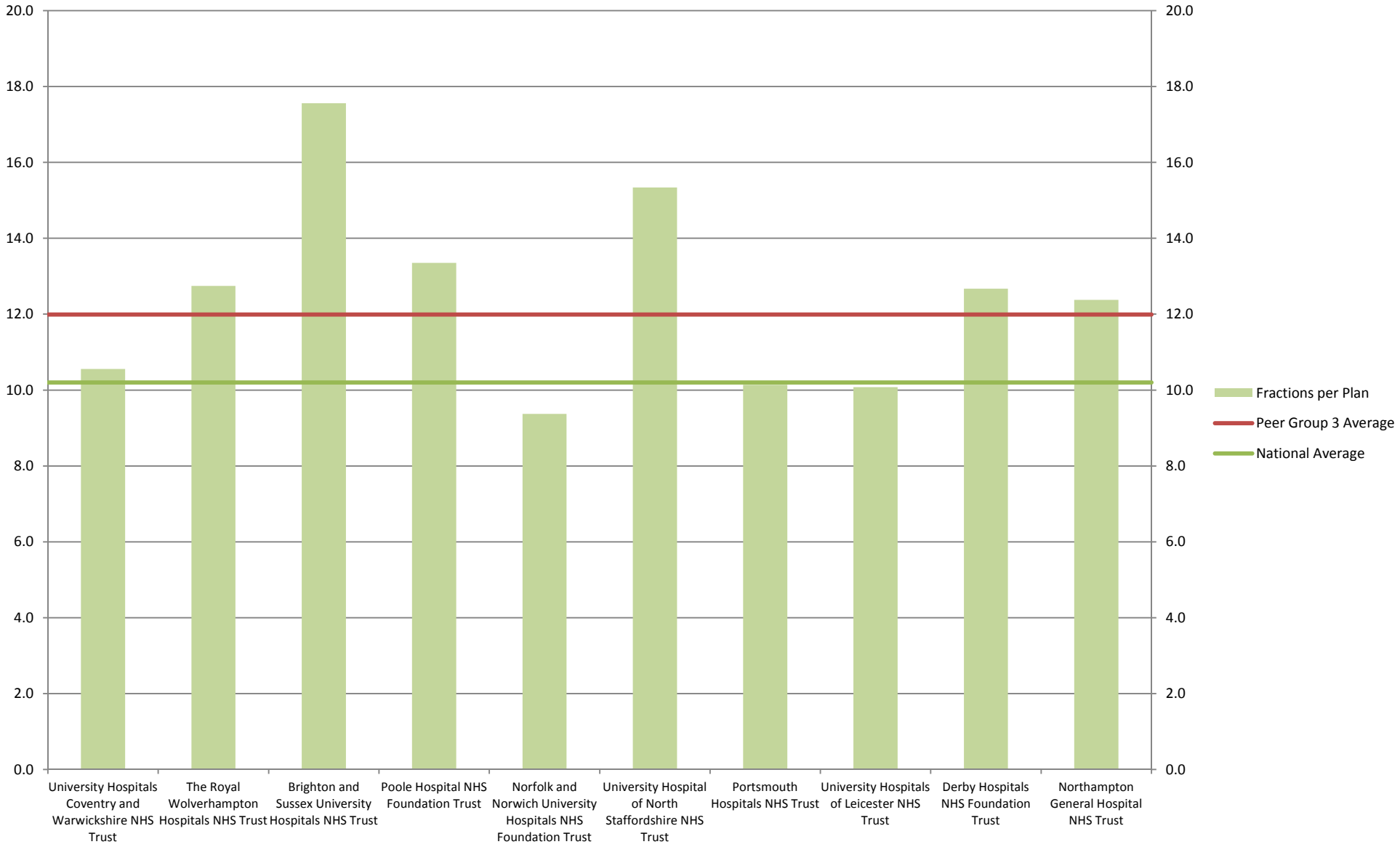
Appendix 4

Average Cost per Fraction - Peer Group 3



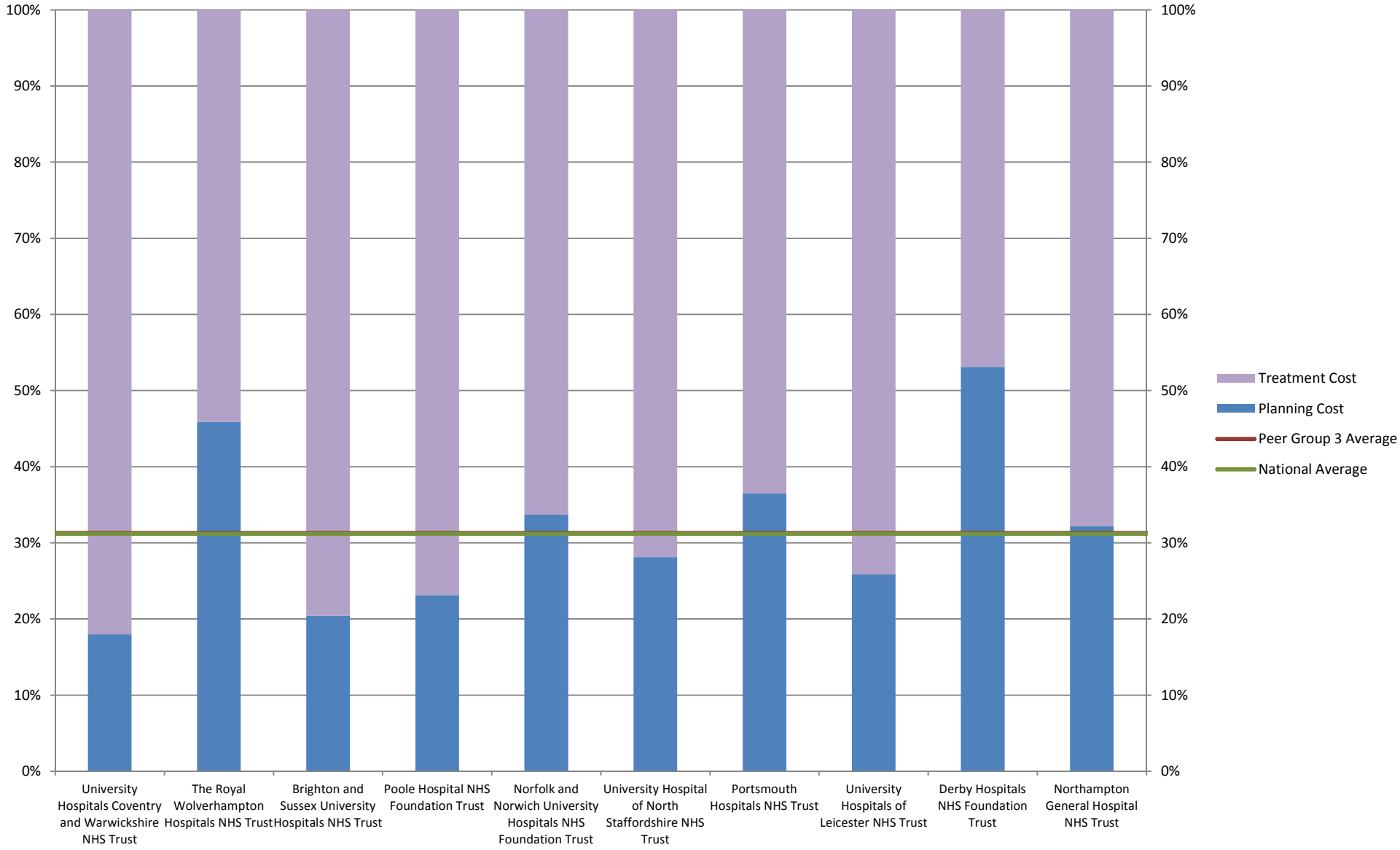
Appendix 4

Fractions per Plan - Peer Group 3



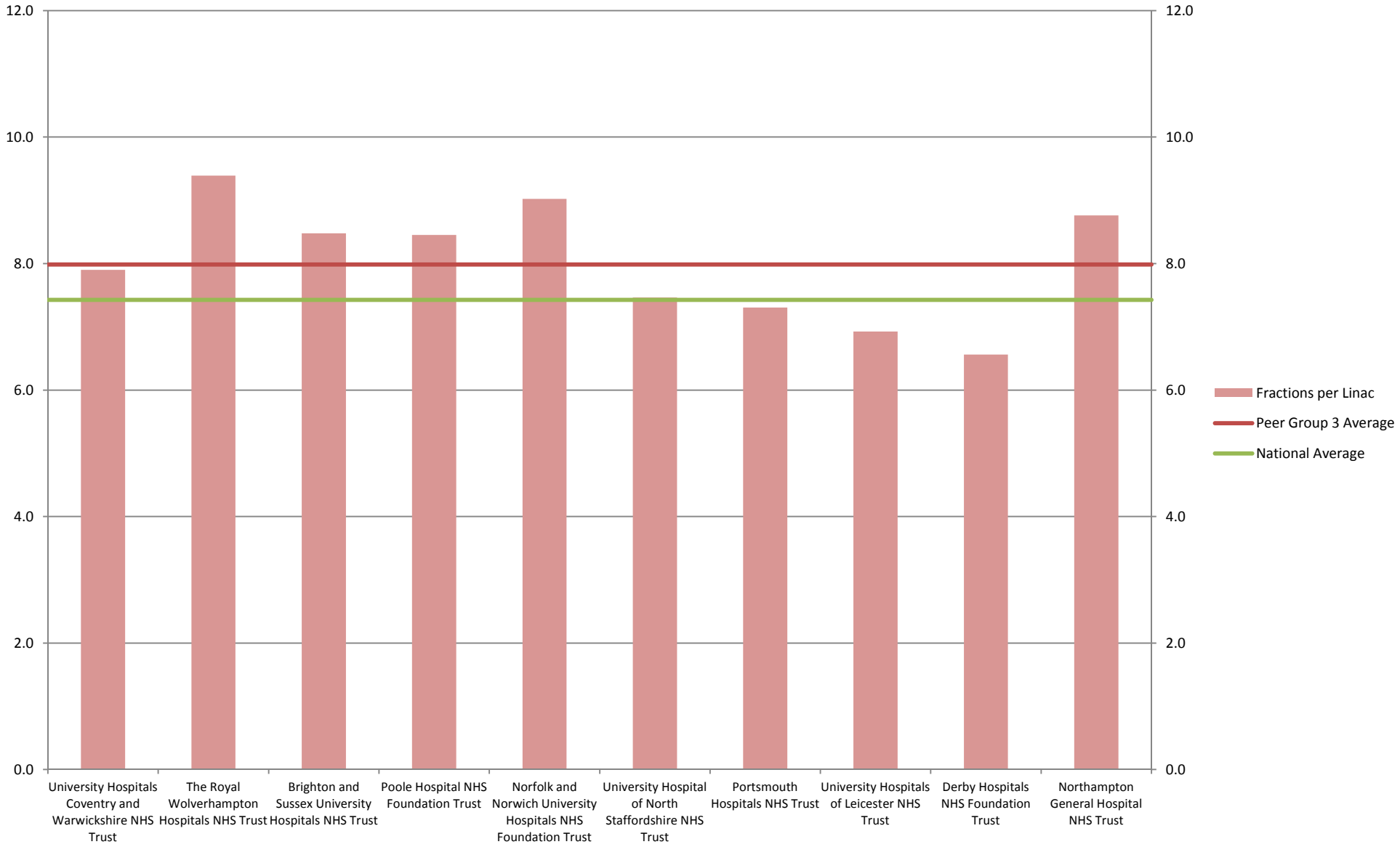
Appendix 4

Split of Planning Cost to Treatment Cost - Peer Group 3



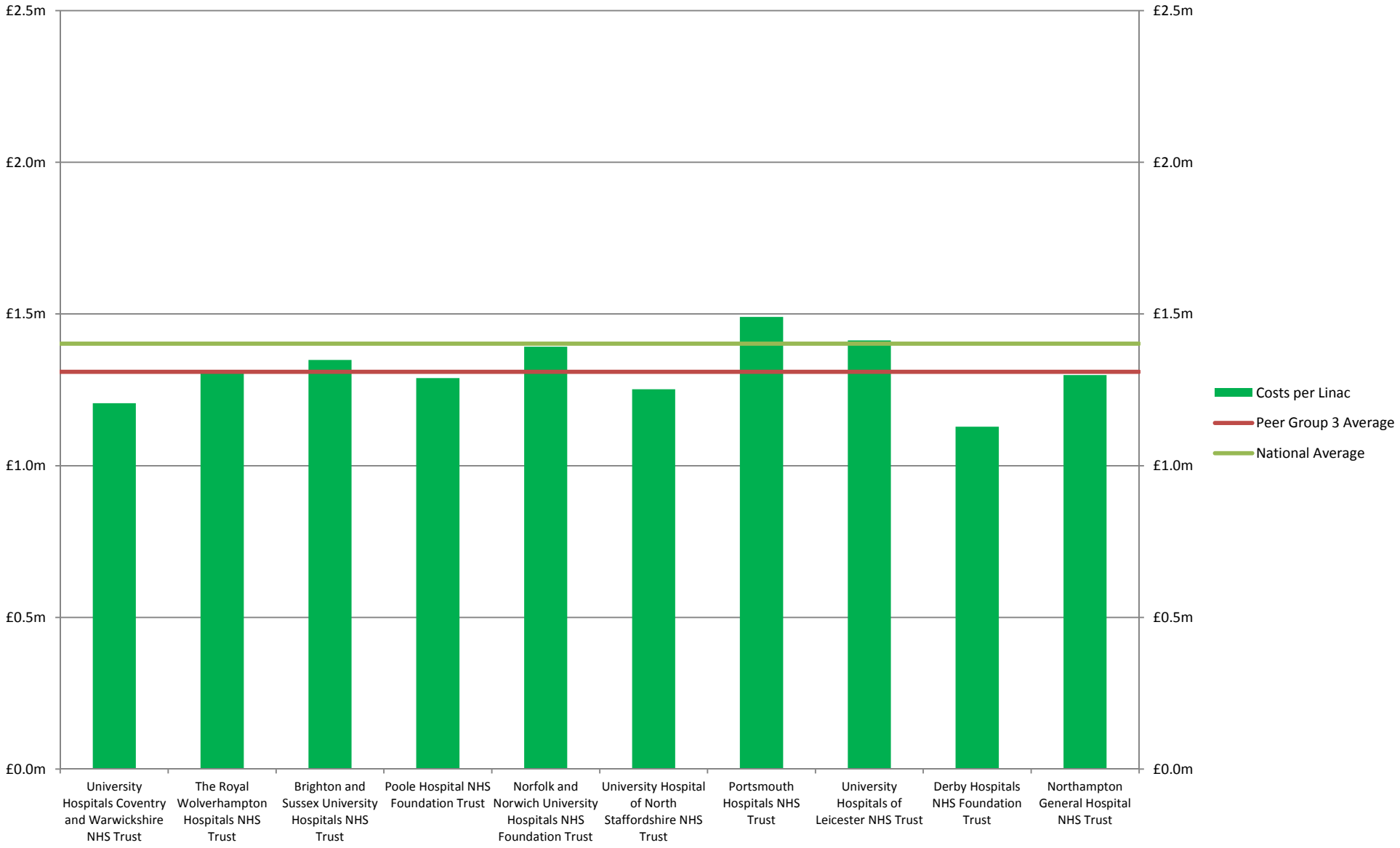
Appendix 4

Fractions per Linac - Peer Group 3



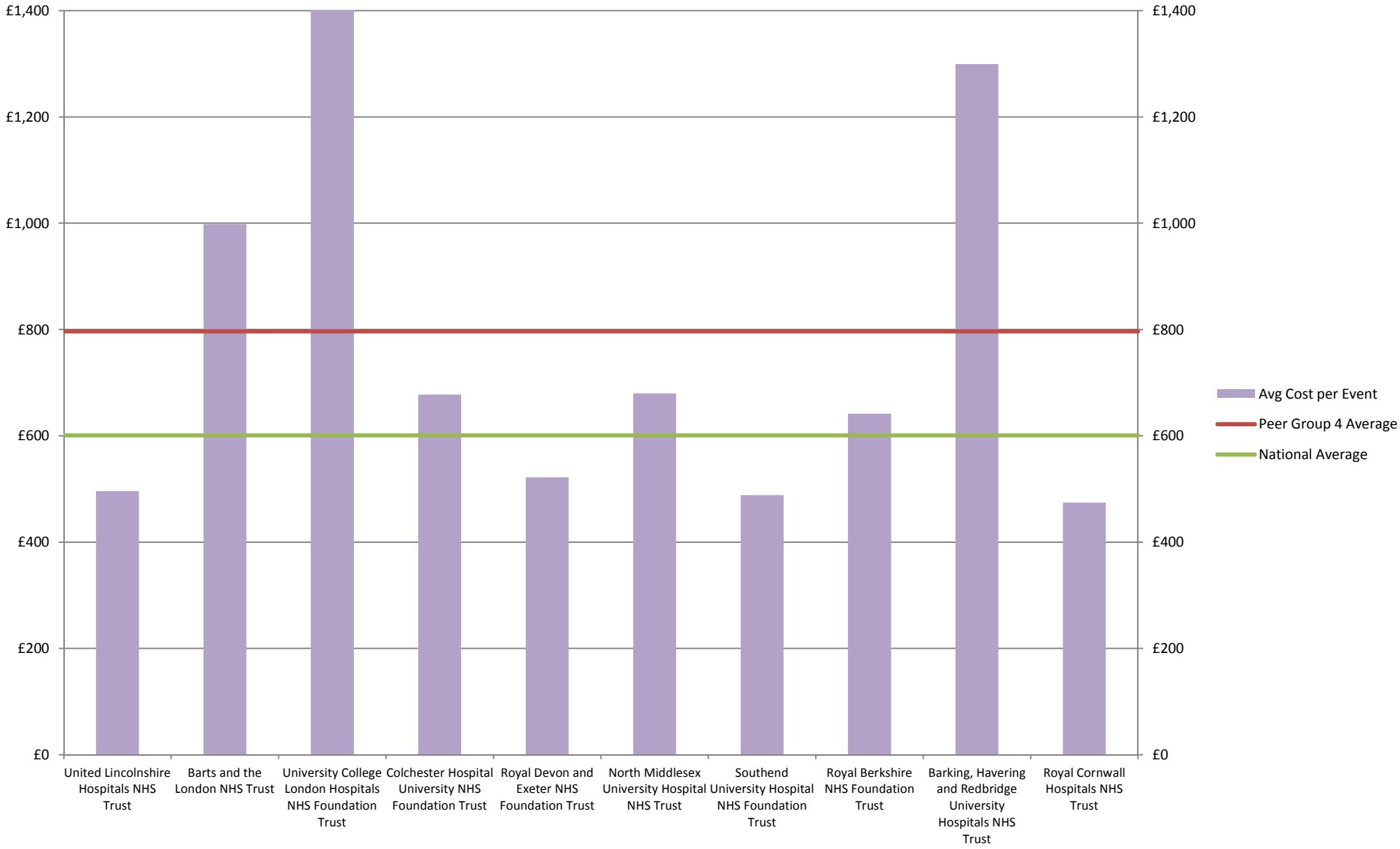
Appendix 4

Cost Quantum per Linac - Peer Group 3



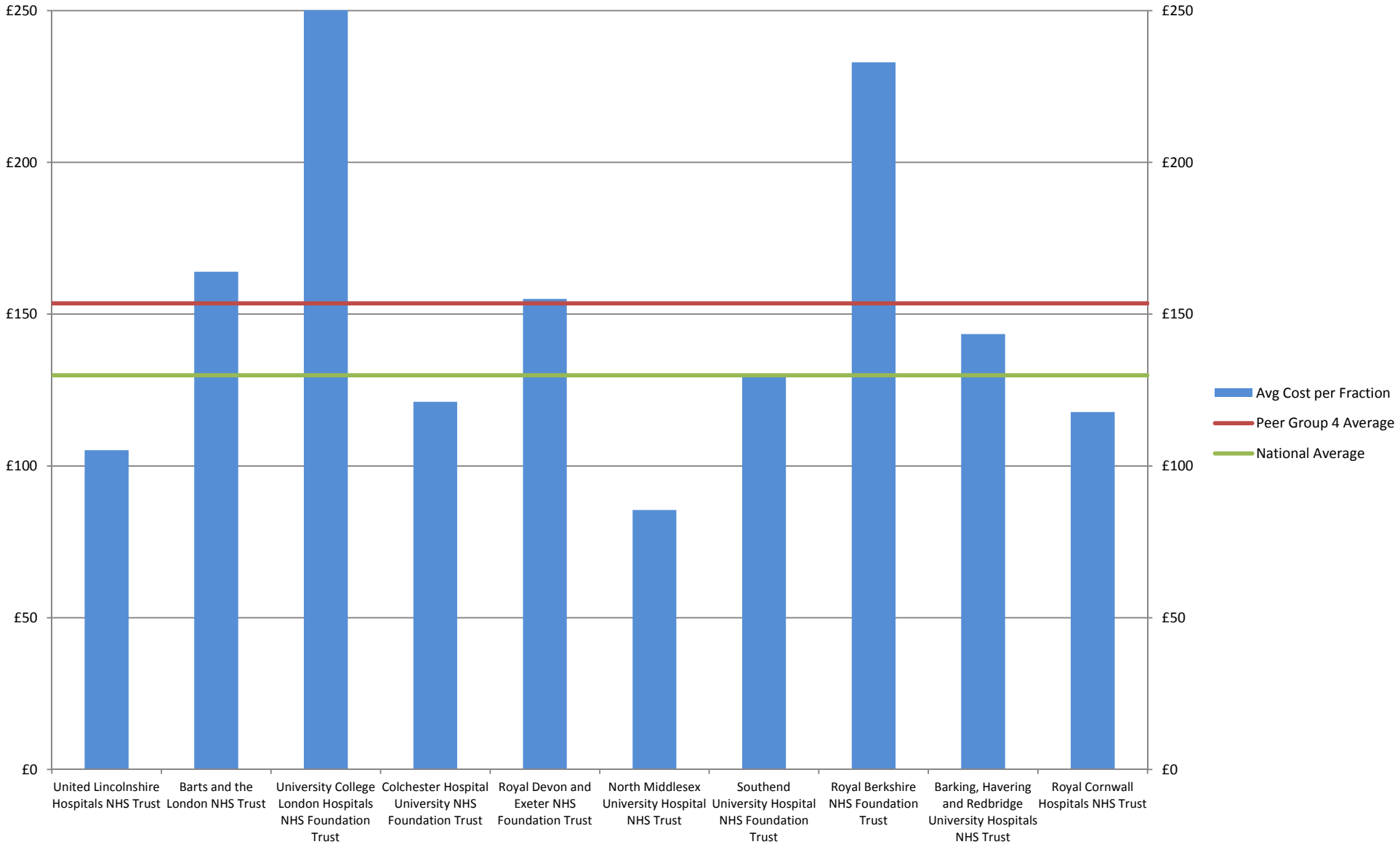
Appendix 4

Average Cost per Planning Event - Peer Group 4



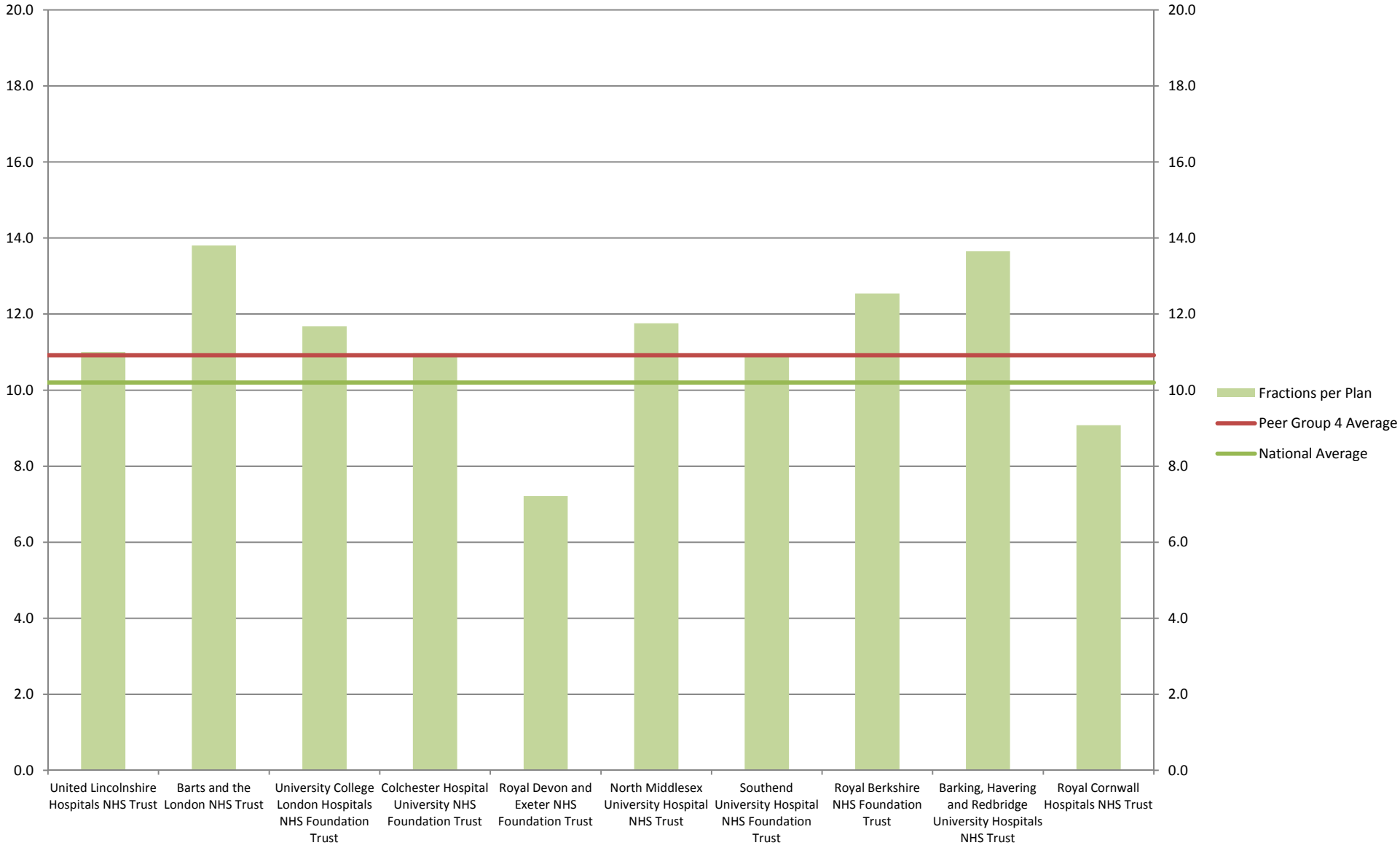
Appendix 4

Average Cost per Fraction - Peer Group 4



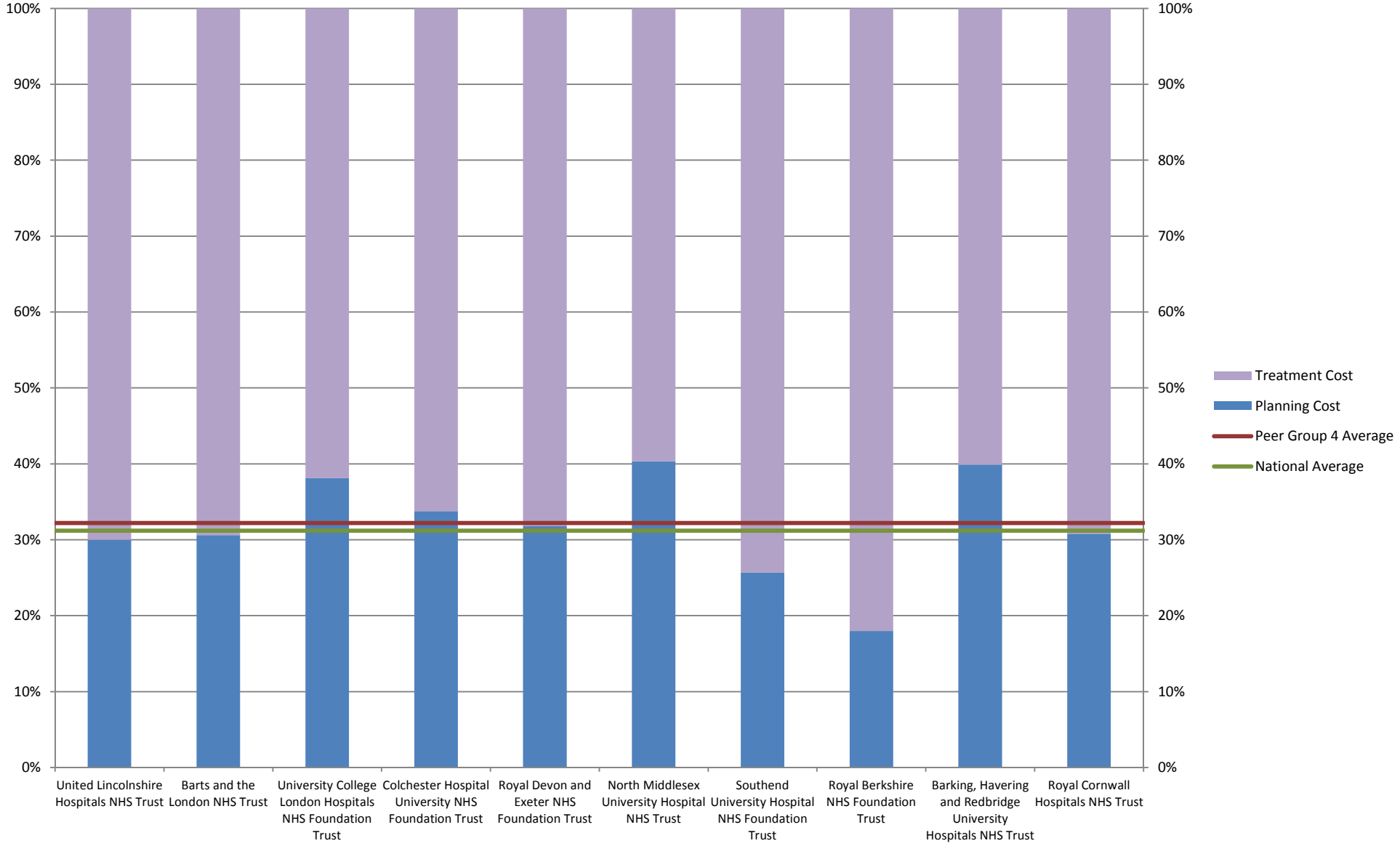
Appendix 4

Fractions per Plan - Peer Group 4



Appendix 4

Split of Planning Cost to Treatment Cost - Peer Group 4



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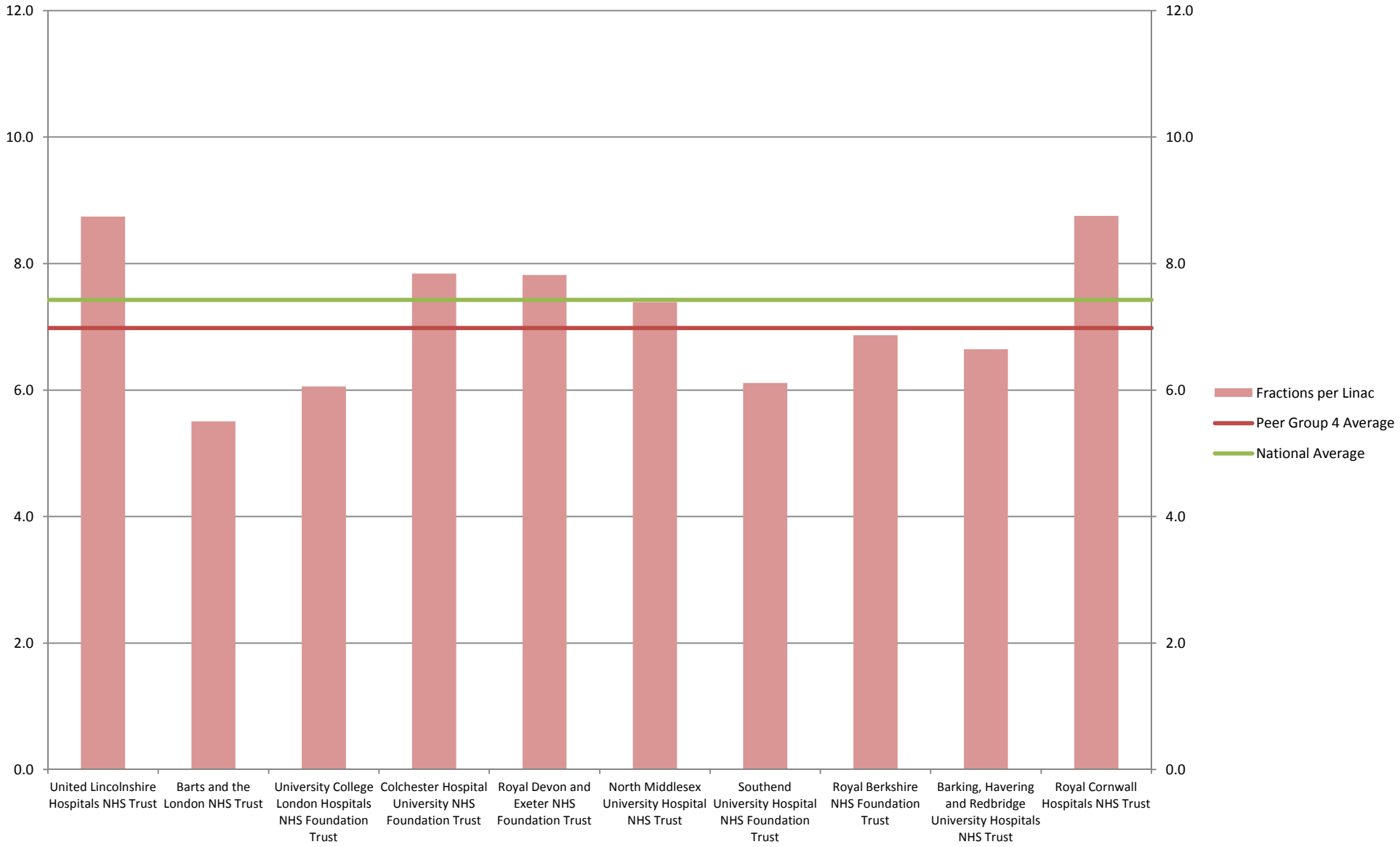
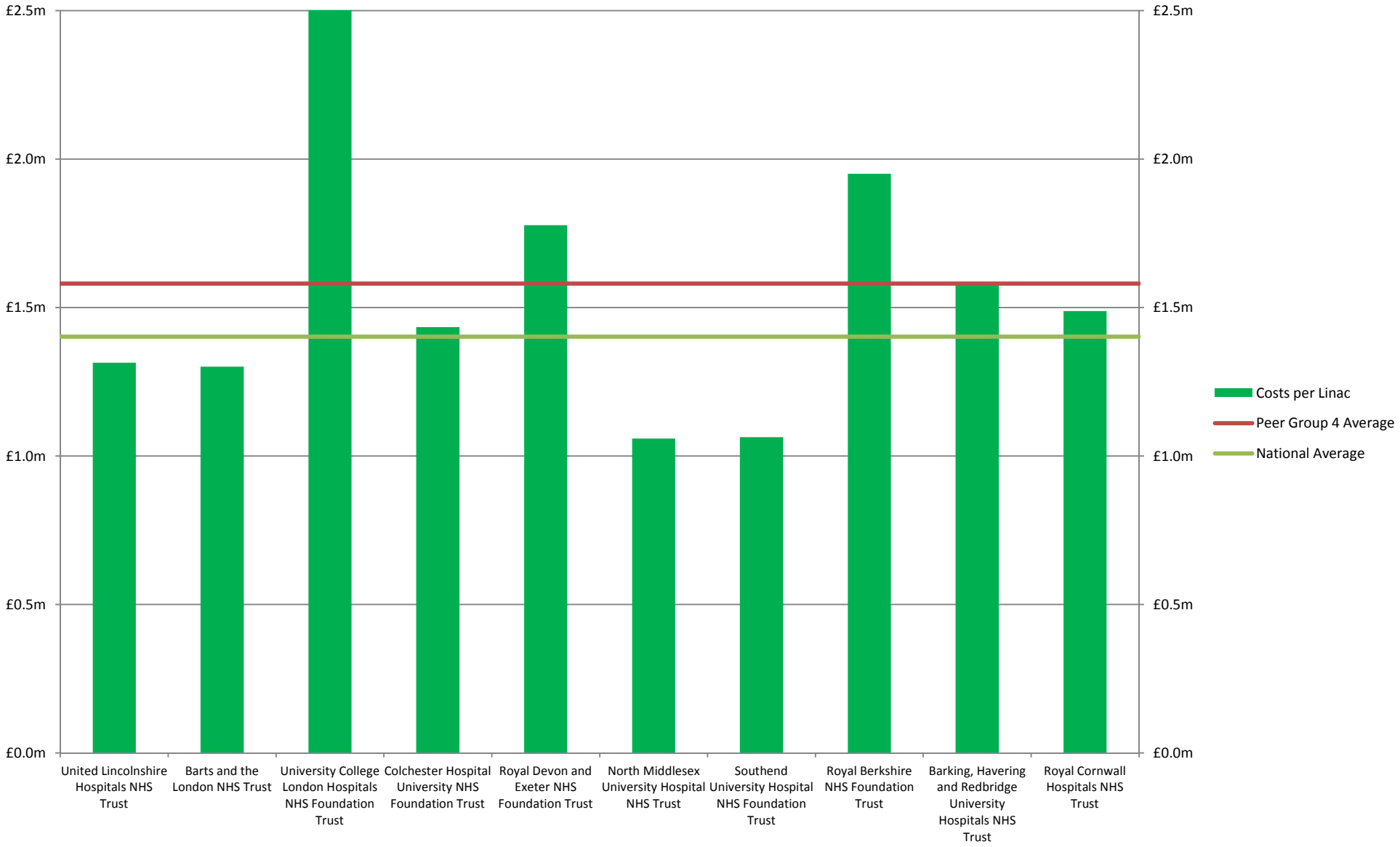
Fractions per Linac - Peer Group 4



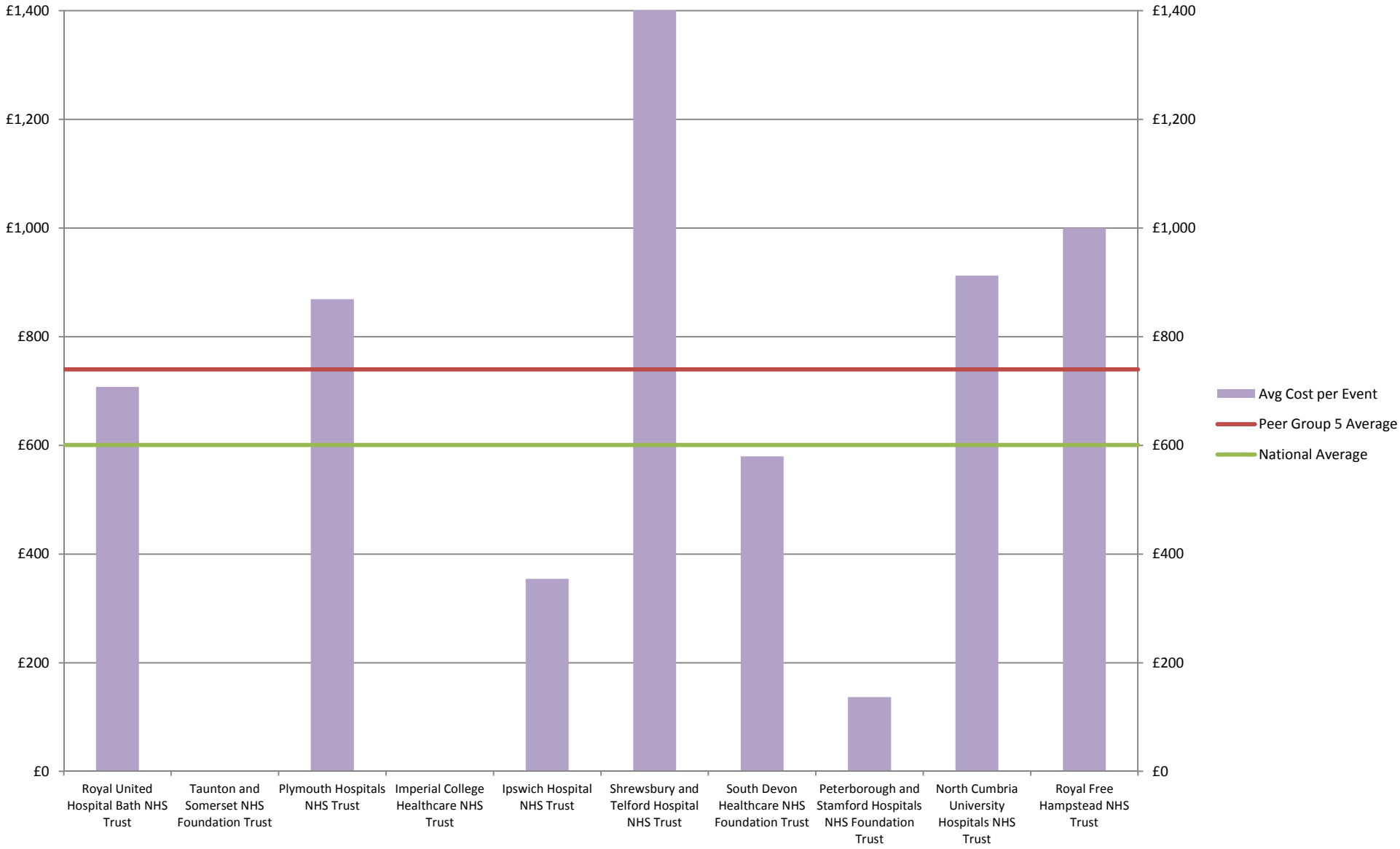
Appendix 4

Cost Quantum per Linac - Peer Group 4



Appendix 4

Average Cost per Planning Event - Peer Group 5



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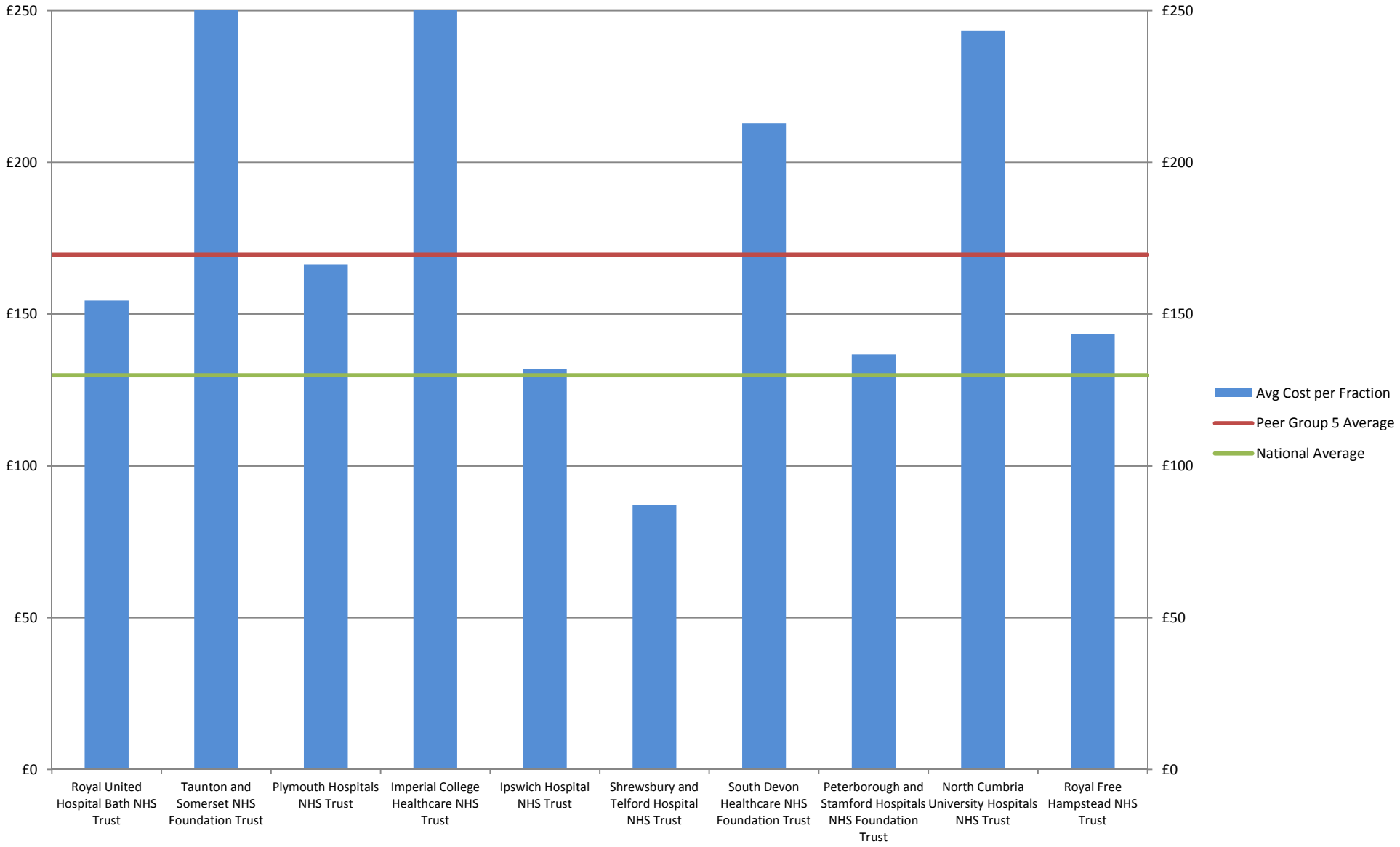
Average Cost per Fraction - Peer Group 5



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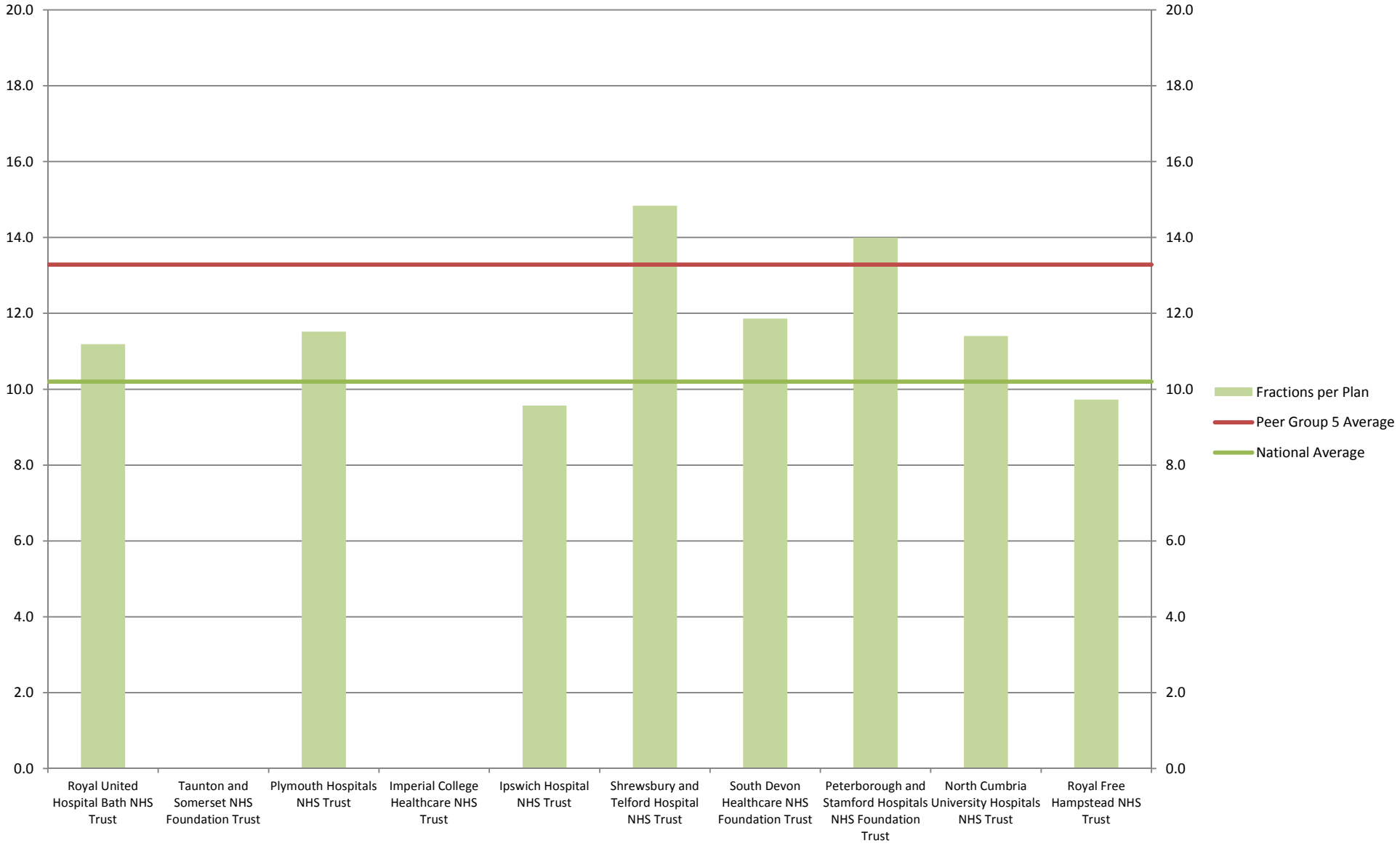
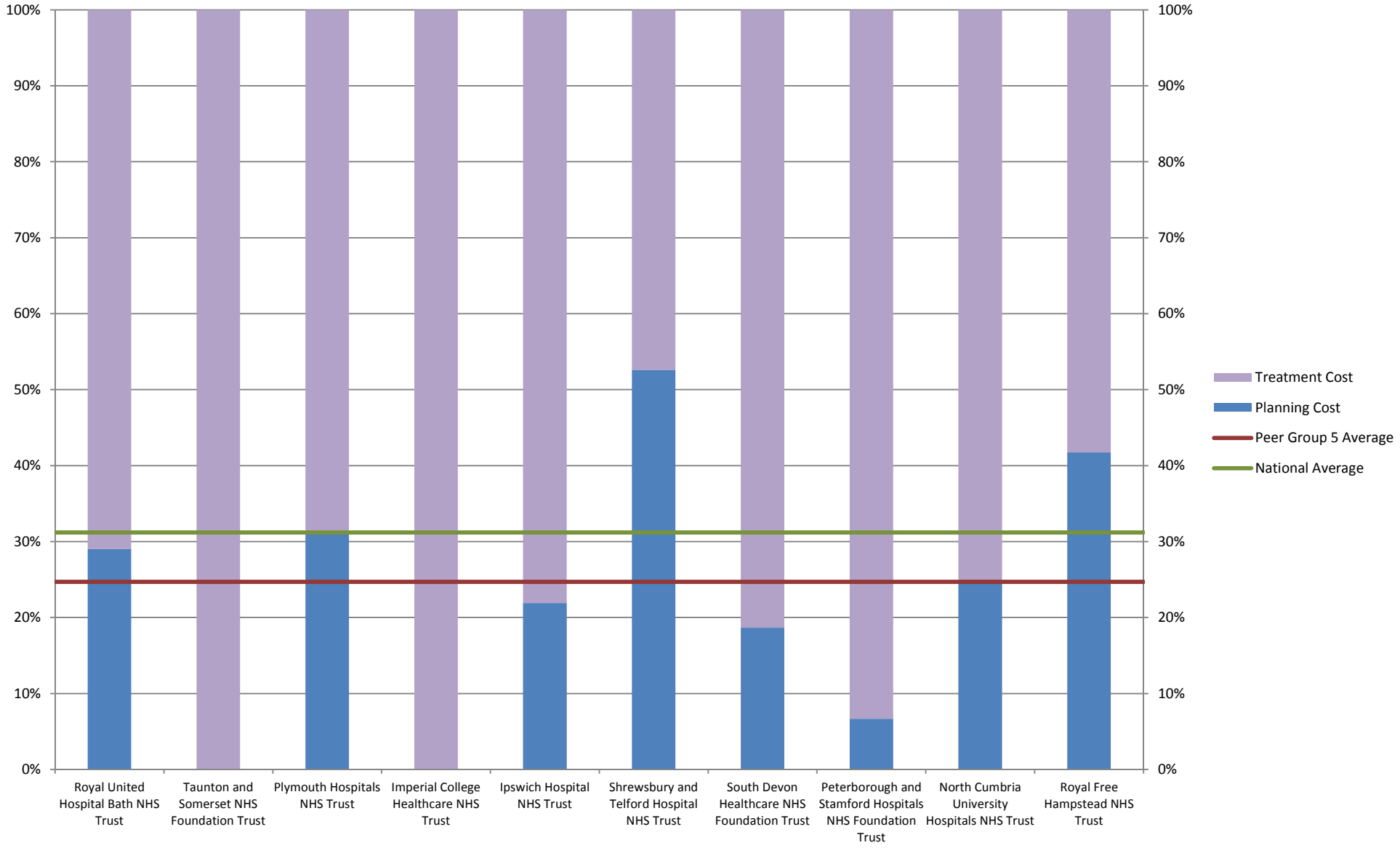


Appendix 4

Split of Planning Cost to Treatment Cost - Peer Group 5



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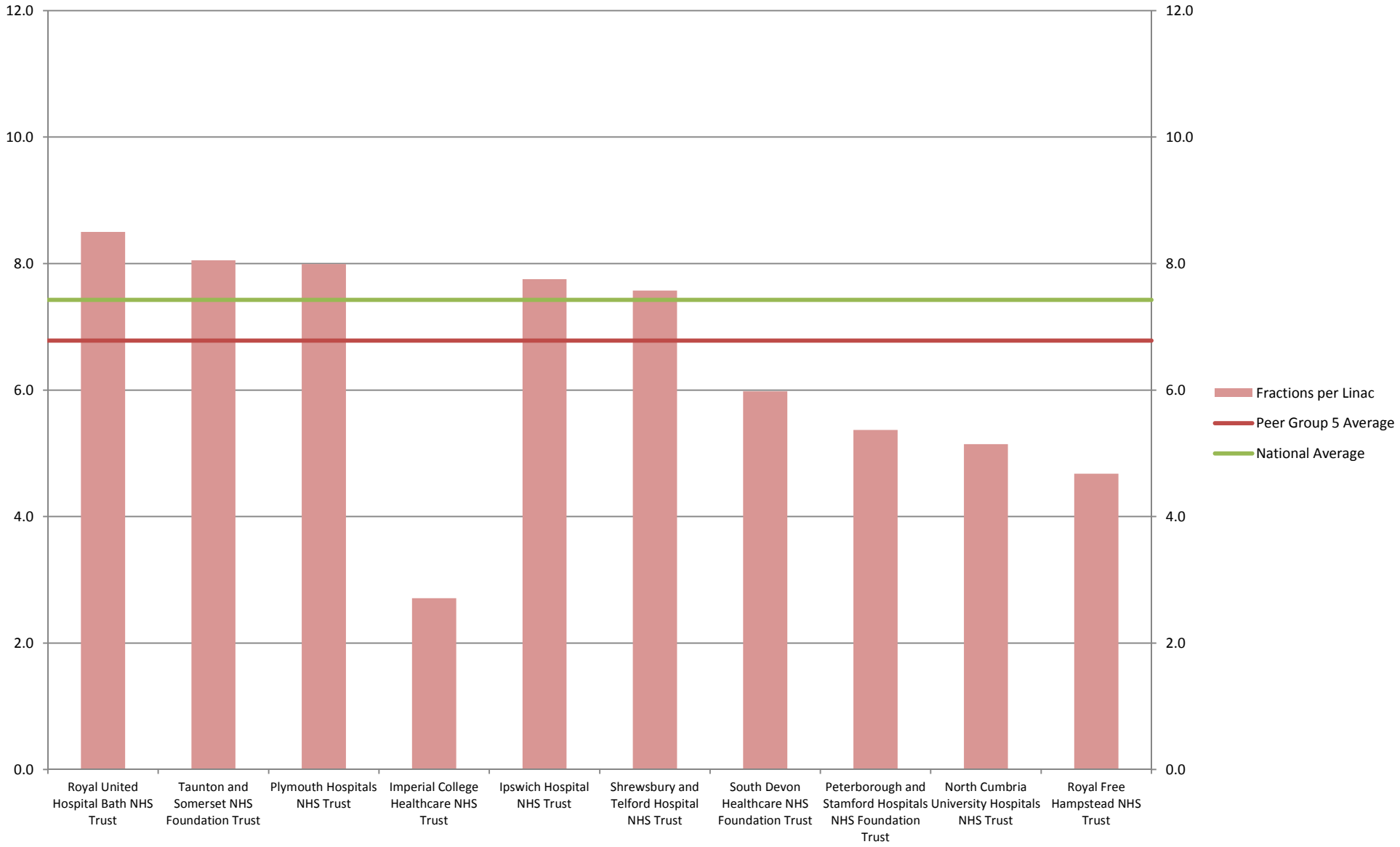
Fractions per Linac - Peer Group 5



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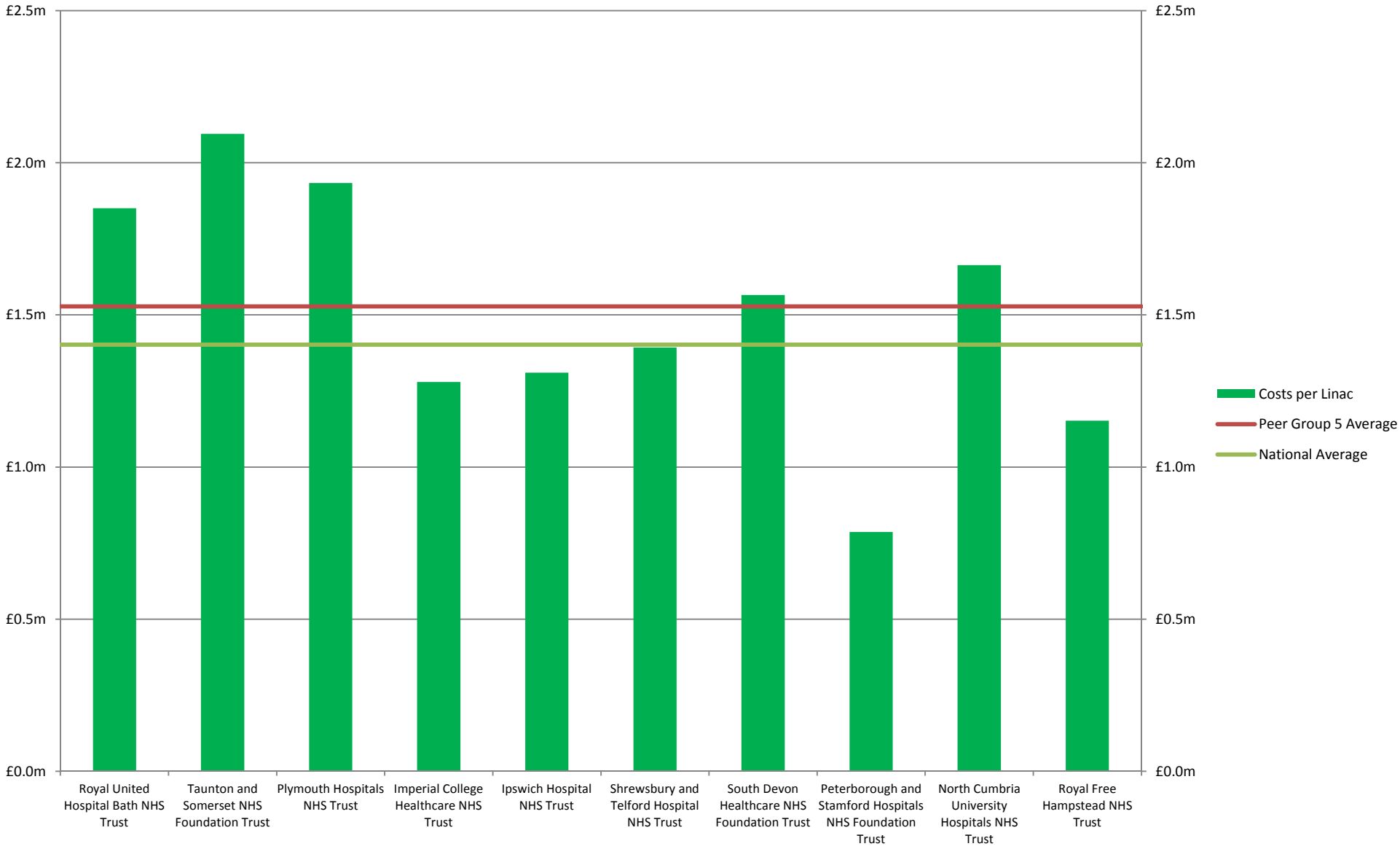
Cost Quantum per Linac - Peer Group 5



Appendix 4

Options for a Potential Radiotherapy Tariff

HRG code and description		National tariff 2013/14	Potential local tariffs based on Reference Costs 2011/12					Lowest Tariff	Highest Tariff	Range
			Unadjusted data	**Option 1** **All data except specific items**	Option 2 Only data between upper and lower quartiles	Option 3 Only data between 10th and 90th percentiles	Option 4 Only data within 1 std dev from mean			
Planning:										
SC40Z	Preparation for Intensity Modulated Radiation Therapy	£987	£1,036	**£1,015**	£1,091	£1,080	£994	£994	£1,091	£97
SC41Z	Preparation for Intensity Modulated Radiation Therapy, with Technical Support	£1,316	£1,756	**£1,721**	£1,620	£1,666	£1,975	£1,620	£1,975	£355
SC42Z	Preparation for Total Body Irradiation	£866	£2,033	**£1,992**	£976	£1,546	£1,507	£976	£2,033	£1,057
SC43Z	Preparation for Total Body Irradiation, with Technical Support	£866	£856	**£839**	£752	£792	£872	£752	£872	£120
SC44Z	Preparation for Hemi Body Irradiation	£425	£280	**£274**	£325	£325	£355	£274	£355	£81
SC45Z	Preparation for Simple Radiotherapy with Imaging and Dosimetry	£385	£315	**£308**	£407	£405	£321	£308	£407	£99
SC46Z	Preparation for Simple Radiotherapy with Imaging and Dosimetry, with Technical Support	£645	£570	**£558**	£649	£692	£675	£558	£692	£134
SC47Z	Preparation for Simple Radiotherapy with Imaging and Simple Calculation	£267	£271	**£266**	£301	£296	£288	£266	£301	£35
SC48Z	Preparation for Simple Radiotherapy with Imaging and Simple Calculation, with Technical Support	£441	£463	**£454**	£452	£454	£482	£452	£482	£30
SC49Z	Preparation for Superficial Radiotherapy with Simple Calculation	£162	£210	**£206**	£222	£236	£183	£183	£236	£53
SC50Z	Preparation for Superficial Radiotherapy with Simple Calculation, with Technical Support	£218	£392	**£384**	£329	£349	£341	£329	£392	£63
SC51Z	Preparation for Complex Conformal Radiotherapy	£577	£745	**£730**	£735	£741	£773	£730	£773	£43
SC52Z	Preparation for Complex Conformal Radiotherapy, with Technical Support	£769	£896	**£878**	£849	£966	£807	£807	£966	£159
SC53Z	Preparation for Intraluminal Brachytherapy	-	£731	**£717**	£708	£687	£932	£687	£932	£245
SC54Z	Preparation for Intracavitary Brachytherapy	-	£987	**£967**	£826	£873	£890	£826	£987	£161
SC55Z	Preparation for Interstitial Brachytherapy	-	£929	**£910**	£863	£922	£1,075	£863	£1,075	£212
SC56Z	Other External Beam Radiotherapy Preparation	£0	£264	**£259**	£620	£657	£238	£238	£657	£419
SC57Z	Other Brachytherapy Preparation	-	£1,170	**£1,146**	£908	£751	£817	£751	£1,170	£419
Treatment:										
SC21Z	Deliver a Fraction of Treatment on a Superficial or Orthovoltage Machine	£73	£110	**£77**	£83	£81	£86	£77	£110	£33
SC22Z	Deliver a Fraction of Treatment on a Megavoltage Machine	£89	£98	**£94**	£94	£96	£94	£94	£98	£4
SC23Z	Deliver a Fraction of Complex Treatment on a Megavoltage Machine	£123	£112	**£109**	£111	£111	£115	£109	£115	£6
SC24Z	Deliver a Fraction of Radiotherapy on a Megavoltage Machine using General Anaesthetic	£220	£417	**£408**	£308	£396	£433	£308	£433	£125
SC25Z	Deliver a Fraction of Total Body Irradiation	£389	£387	**£338**	£361	£339	£365	£338	£387	£49
SC26Z	Deliver a Fraction of Intracavitary Radiotherapy without General Anaesthetic	-	£582	**£611**	£472	£540	£463	£463	£611	£148
SC27Z	Deliver a Fraction of Intracavitary Radiotherapy with General Anaesthetic	-	£664	**£820**	£547	£694	£557	£547	£820	£273
SC28Z	Deliver a Fraction of Interstitial Radiotherapy	-	£784	**£1,647**	£1,292	£614	£626	£614	£1,647	£1,033
SC29Z	Other Radiotherapy Treatment	£0	£325	**£318**	£200	£323	£311	£200	£325	£125
SC30Z	Deliver a Fraction of Intraluminal Brachytherapy	-	£1,328	**£1,301**	£743	£1,349	£1,472	£743	£1,472	£729
SC31Z	Deliver a Fraction of Adaptive Radiotherapy on a Megavoltage Machine	£181	£173	**£170**	£162	£161	£176	£161	£176	£15

NB all tariffs above exclude MFF

Appendix 5

Reference Costs 2011/12
Potential Impact of Tariffs on Trusts

Organisation	Peer Group	Costs reported in RC 2011/12 deflated to 2013/14 prices			Income modelled under tariffs			Gain/ (Loss)
		Planning	Treatment	Total	Planning	Treatment	Total	
The Christie NHS Foundation Trust	1	£7.1m	£11.6m	£18.7m	£5.1m	£13.0m	£18.1m	-£0.7m
The Clatterbridge Cancer Centre NHS Foundation Trust	1	£4.6m	£9.4m	£14.0m	£4.0m	£13.0m	£16.9m	£3.0m
The Royal Marsden NHS Foundation Trust	1	£4.5m	£11.0m	£15.6m	£3.2m	£10.8m	£14.0m	-£1.6m
Maidstone and Tunbridge Wells NHS Trust	1	£5.1m	£8.8m	£13.9m	£5.5m	£8.3m	£13.8m	-£0.1m
Sheffield Teaching Hospitals NHS Foundation Trust	1	£2.2m	£4.1m	£6.3m	£2.7m	£7.1m	£9.8m	£3.5m
University Hospitals Birmingham NHS Foundation Trust	1	£3.0m	£7.3m	£10.3m	£3.3m	£7.9m	£11.2m	£0.9m
Leeds Teaching Hospitals NHS Trust	1	£3.6m	£11.1m	£14.8m	£3.8m	£7.7m	£11.5m	-£3.2m
The Newcastle upon Tyne Hospitals NHS Foundation Trust	1	£3.5m	£5.1m	£8.6m	£2.2m	£7.6m	£9.7m	£1.1m
Lancashire Teaching Hospitals NHS Foundation Trust	1	£1.3m	£6.3m	£7.6m	£7.8m	£5.6m	£13.4m	£5.8m
Guy's and St Thomas' NHS Foundation Trust	1	£5.5m	£6.8m	£12.3m	£2.9m	£8.4m	£11.4m	-£0.9m
Total, Peer Group 1		**£40.5m**	**£81.5m**	**£122.0m**	**£40.5m**	**£89.4m**	**£129.9m**	**£7.9m**
East and North Hertfordshire NHS Trust	2	£3.7m	£7.8m	£11.6m	£2.7m	£7.6m	£10.3m	-£1.2m
Cambridge University Hospitals NHS Foundation Trust	2	£3.0m	£5.4m	£8.4m	£2.5m	£7.7m	£10.1m	£1.8m
Oxford University Hospitals NHS Trust	2	£3.7m	£3.7m	£7.4m	£1.9m	£5.6m	£7.5m	£0.1m
Gloucestershire Hospitals NHS Foundation Trust	2	£1.3m	£3.8m	£5.1m	£2.1m	£5.4m	£7.4m	£2.3m
Royal Surrey County Hospital NHS Foundation Trust	2	£1.1m	£5.2m	£6.3m	£1.0m	£5.2m	£6.2m	-£0.1m
Nottingham University Hospitals NHS Trust	2	£1.9m	£5.3m	£7.2m	£1.5m	£5.2m	£6.7m	-£0.5m
South Tees Hospitals NHS Foundation Trust	2	£1.4m	£5.6m	£7.0m	£1.5m	£6.5m	£8.1m	£1.0m
Hull and East Yorkshire Hospitals NHS Trust	2	£2.6m	£5.0m	£7.6m	£1.6m	£4.9m	£6.5m	-£1.1m
University Hospital Southampton NHS Foundation Trust	2	£1.4m	£5.7m	£7.2m	£1.8m	£4.9m	£6.6m	-£0.5m
University Hospitals Bristol NHS Foundation Trust	2	£1.9m	£4.0m	£5.9m	£2.1m	£5.5m	£7.6m	£1.7m
Total, Peer Group 2		**£22.0m**	**£51.5m**	**£73.5m**	**£18.6m**	**£58.4m**	**£77.0m**	**£3.5m**
University Hospitals Coventry and Warwickshire NHS Trust	3	£1.0m	£4.7m	£5.7m	£1.7m	£4.7m	£6.4m	£0.7m
The Royal Wolverhampton Hospitals NHS Trust	3	£2.2m	£2.6m	£4.9m	£1.6m	£4.7m	£6.2m	£1.4m
Brighton and Sussex University Hospitals NHS Trust	3	£1.1m	£4.1m	£5.2m	£1.0m	£4.0m	£5.0m	-£0.2m
Poole Hospital NHS Foundation Trust	3	£1.1m	£3.8m	£4.9m	£1.2m	£4.2m	£5.4m	£0.5m
Norfolk and Norwich University Hospitals NHS Foundation Trust	3	£1.6m	£3.1m	£4.6m	£1.9m	£4.1m	£5.9m	£1.3m
University Hospital of North Staffordshire NHS Trust	3	£1.3m	£3.3m	£4.6m	£1.4m	£3.8m	£5.2m	£0.6m
Portsmouth Hospitals NHS Trust	3	£2.1m	£3.7m	£5.8m	£1.4m	£3.9m	£5.3m	-£0.5m
University Hospitals of Leicester NHS Trust	3	£1.4m	£4.0m	£5.4m	£1.1m	£3.4m	£4.4m	-£0.9m
Derby Hospitals NHS Foundation Trust	3	£2.4m	£2.1m	£4.5m	£1.1m	£3.5m	£4.7m	£0.2m
Northampton General Hospital NHS Trust	3	£1.2m	£2.5m	£3.7m	£1.2m	£3.3m	£4.5m	£0.8m
Total, Peer Group 3		**£15.4m**	**£33.8m**	**£49.2m**	**£13.6m**	**£39.5m**	**£53.1m**	**£3.9m**
United Lincolnshire Hospitals NHS Trust	4	£1.1m	£2.5m	£3.6m	£1.3m	£3.5m	£4.7m	£1.2m
Barts and the London NHS Trust	4	£2.1m	£4.7m	£6.8m	£1.5m	£4.2m	£5.6m	-£1.2m
University College London Hospitals NHS Foundation Trust	4	£4.8m	£7.7m	£12.5m	£1.7m	£4.4m	£6.1m	-£6.4m
Colchester Hospital University NHS Foundation Trust	4	£1.4m	£2.7m	£4.1m	£0.9m	£2.6m	£3.5m	-£0.6m
Royal Devon and Exeter NHS Foundation Trust	4	£1.5m	£3.3m	£4.9m	£1.5m	£2.9m	£4.4m	-£0.5m
North Middlesex University Hospital NHS Trust	4	£1.4m	£2.0m	£3.4m	£1.2m	£2.9m	£4.0m	£0.6m
Southend University Hospital NHS Foundation Trust	4	£0.9m	£2.7m	£3.7m	£1.2m	£3.6m	£4.7m	£1.1m
Royal Berkshire NHS Foundation Trust	4	£1.1m	£4.9m	£6.0m	£0.7m	£2.5m	£3.2m	-£2.8m
Barking, Havering and Redbridge University Hospitals NHS Trust	4	£2.0m	£3.0m	£5.0m	£0.9m	£2.9m	£3.7m	-£1.2m
Royal Cornwall Hospitals NHS Trust	4	£0.8m	£1.8m	£2.7m	£0.8m	£2.0m	£2.8m	£0.2m
Total, Peer Group 4		**£17.0m**	**£35.5m**	**£52.5m**	**£11.5m**	**£31.4m**	**£42.9m**	**-£9.6m**
Royal United Hospital Bath NHS Trust	5	£1.0m	£2.5m	£3.6m	£0.7m	£1.9m	£2.6m	-£0.9m
Taunton and Somerset NHS Foundation Trust	5	£0.0m	£3.9m	£3.9m	£0.0m	£2.0m	£2.0m	-£1.9m
Plymouth Hospitals NHS Trust	5	£1.1m	£2.4m	£3.5m	£0.7m	£2.0m	£2.7m	-£0.8m
Imperial College Healthcare NHS Trust	5	£0.0m	£8.2m	£8.2m	£0.0m	£8.2m	£8.2m	
Ipswich Hospital NHS Trust	5	£0.5m	£1.9m	£2.4m	£0.9m	£2.1m	£3.0m	£0.5m
Shrewsbury and Telford Hospital NHS Trust	5	£1.3m	£1.2m	£2.6m	£0.5m	£1.8m	£2.4m	-£0.2m
South Devon Healthcare NHS Foundation Trust	5	£0.5m	£2.3m	£2.8m	£0.4m	£1.7m	£2.1m	-£0.7m
Peterborough and Stamford Hospitals NHS Foundation Trust	5	£0.1m	£1.4m	£1.5m	£0.5m	£1.6m	£2.1m	£0.6m
North Cumbria University Hospitals NHS Trust	5	£0.8m	£2.3m	£3.1m	£0.4m	£1.3m	£1.7m	-£1.4m
Royal Free Hampstead NHS Trust	5	£1.1m	£1.5m	£2.6m	£0.5m	£1.5m	£2.0m	-£0.5m
Sherwood Forest Hospitals NHS Foundation Trust	5	£0.0m	£0.0m	£0.0m	£0.0m	£0.0m	£0.0m	
Total, Peer Group 5		**£6.5m**	**£27.6m**	**£34.0m**	**£4.7m**	**£24.0m**	**£28.7m**	**-£5.3m**
TOTAL		**£101.3m**	**£229.9m**	**£331.2m**	**£88.9m**	**£242.8m**	**£331.7m**	**£0.5m**

Summary of findings of July 2010 report

Counting and Recording Activity

The introduction of RTDS has greatly improved both the data and management's understanding of data quality issues. Extracting volumes of fractions delivered appears to be relatively straightforward from computerised radiotherapy systems.

Recording planning events was more problematic for the following reasons:

- There is no simple definition of the term in the NHS Data Dictionary
- Connecting for Health and Reference Costs guidance on coding and RTDS guidance on coding are inconsistent
- Trusts need to extract the data from their own recording systems in such a way that records (or calculates) one event per treatment course

Most Trusts had developed a methodology for extracting this data or via proxy measures. However, by calculating the ratio of treatment fractions to planning events against peer group and national averages (see graphs included in **Appendix 4**), a significant number of Trusts remain as outliers, suggesting problems in this area. There are, therefore, several difficulties that Trusts need to overcome when counting planning events for Reference Costs:

Allocating Costs to Radiotherapy

Many Trusts reported well-developed costing processes in place, however, this was not always evidenced by the results of the benchmarking of reference costs. There were also a number of Trusts whose processes were rudimentary. The variation in the quality and robustness of costing appeared to be largely dependent on the level of resources that Trusts put into costing.

There is evidently a risk that fundamental errors in costing methodology will occur if the principles of the NHS Costing Manual are not followed carefully and if the issues raised in the July report are not dealt with appropriately by Trusts. In addition, important details, such as the split of costs between planning and treatment, can be materially distorted if costing methodology is incorrectly applied.

Additional costing guidance for Trusts is attached at **Appendix 10**.

Cost Variations

The expensive equipment used to deliver a radiotherapy service has the potential to significantly vary costs between individual Trusts, as well as between financial years. The combination of the factors set out in this section will be one of the major determinants of a Trust's average radiotherapy unit costs. Important factors that affect Trust costs are summarised at **Appendix 11**.

These factors mean that radiotherapy Reference Costs will suffer from a relatively high degree of volatility compared to other hospital services. This should be borne in mind when benchmarking radiotherapy costs and drawing conclusions from costing data. This degree of variation in cost also has significant implications for the development of a national tariff for radiotherapy.

Recommendations for Radiotherapy Services

Trusts should count activity accurately

A more sophisticated level of commissioning (i.e. where Trusts are moving away from block contracts) will need to be supported by a greater degree of accuracy and detail in recording activity. Payment will be based on validated activity data recorded in accordance with the national standards and if systems are not in place to deliver the RTDS, Trusts may lose income.

The pace of technological development will also reinforce the need for a good understanding of current and future work. Planning for developments and capacity will need to be based on accurate activity data and projections, especially if the Trust needs to make a case for further funding.

If Commissioner and Trusts are to have a productive and successful dialogue about future planning of radiotherapy services, both parties need to have confidence in the activity data recorded.

Trusts should have a robust costing process

Trusts need to ensure that adequate resources are deployed to provide reliable costing information for radiotherapy services. To achieve this, different parts of the organisation (radiotherapy management, management accounts, costing leads, informatics) need to work effectively together.

Trusts will need to ensure that the financial contribution made by radiotherapy is understood (i.e. how the costs compare to the income currently received in SLAs). This is often achieved through the introduction of Service Line Reporting/ Patient Level Costing.

Processes should also include ensuring the reference costs submissions are reconciled to these costs, to support the compilation of any national tariff which is likely to be based on a national average of reference costs.

Trusts should understand key cost drivers

Trusts will need to ensure they understand the key components of their costs and the factors that drive their costs. In many cases, the predominant factor will be the capital investment underlying the service. However, other important factors, such as skill mix employed, will also need to be analysed.

Trusts need to understand how their costs may vary both from year to year and compared to other Trusts within its peer group. This will enable them to benchmark the costs of their services, then identify and maximise potential efficiencies. If they work to reduce variations caused by counting and costing issues, this will expose the real issues driving their cost base.

As funding is stretched, Commissioners will be looking for further efficiencies and cost improvements to be delivered. Benchmarking also provides a tool to identify where the cost structure can be altered so as to deliver the service in a more cost efficient way.

Commissioning arrangements must be fit for purpose

There are a variety of arrangements in place for the commissioning of radiotherapy across Trusts. Some areas have progressed to sophisticated cost and volume contracts, defined by HRG and reimbursed at a locally-agreed tariff. Others remain on fixed block contracts which are historically determined and rolled forward each year with nothing more than a standard inflationary uplift.

Moving to a national tariff system means that commissioning will need to move uniformly on to cost and volume contracts. Arrangements under block contract should be urgently reviewed, perhaps using shadow contracts at locally agreed prices to understand the potential impact of a tariff system.

While this will provide Trusts with opportunities in terms of attracting additional funding if activity or casemix increases, the onus will be on them to record activities consistently and accurately. They will also need to understand their own costs and whether the tariff covers them sufficiently at differing levels of activity.

Trusts will also need to bear in mind likely future settlements for health budgets. Despite rising activity and technological developments, commissioners will not have unlimited funding. Trusts and Commissioners will both be exposed to risk and will need to work collaboratively to address the future needs of the radiotherapy service.

Feedback from the project should be shared with the PbR Team

There is an opportunity to share feedback from this exercise to inform the setting of any future tariff. This could include a summary of the particular issues affecting radiotherapy services and recommendations, such as the following:

Issue	**Recommendation**
Cost variations between trusts	Trusts to manage within tariff.
Volatility of costs – capital costs	The volatile nature of costs of RT services could be mitigated by allowing local top-up payments, for example to allow Trusts to invest in new technology by supporting revenue costs of significant capital investment.
Speed of growth in technology	As above
Speed of introduction of new treatments	New treatments and regimes could be covered by specific exclusions to the tariff and covered by a locally agreed price until the tariff “catches up” and they become more widespread.
Complexities (e.g. Paeds)	Tariffs for complex treatment if material, such as for children, could be addressed by an adjustment to the existing HRGs, for example by splitting according to age or co-morbidities
Incentivising quality	“Best Practice” tariff could be introduced.

Next steps

To continue to improve coding and recording of activity

Trusts will continue to improve their performance in delivering the RTDS, with the target for data quality and completeness being introduced by the end of the year.

Further guidance is needed to address the lack of clarity re counting, and inconsistencies.

- Draft further guidance where need was identified in meetings e.g., re planning events.
- Identify where guidance is inconsistent
- Set out the issues, make further recommendations to Connecting for Health and continue to pursue

To ensure all Trusts have a robust costing methodology and that the variance in reference costs is reduced

Extreme outliers on the analysis of 2009/10 reference costs were mainly due to anomalies in costing and counting.

- The graphs at **Appendix 4** indicate those Trusts which are outliers and where a review of methodology would be advisable.
- The trend of narrowing the gap between upper and lower quartiles should continue by employing all means available to disseminate good costing practice and benchmarking data. Additional costing guidance for Trusts is attached at **Appendix 10**.

Provide feedback from meetings to attendees

- Send out 2009/10 Reference Cost comparison spreadsheet to all attendees
- Consider putting this report onto a Reference Costs Forum for information.
- Send out attendees lists (geographically and in peer groups) to promote networking.
- Feedback sessions to be arranged placing Trusts into peer groups and facilitating discussion of the issues arising from the report

Provide feedback to PbR team

Key issues, along with recommendations should continue to be sent to the PbR team. This would detail how any tariff structure could be adapted so that the issues raised in the report do not adversely affect provision of the service.

To provide additional feedback, a small group of pilot sites, selected from across all peer groups, could be formed to “road test” an indicative tariff. This would be based on national average reference costs and should model its effect over 10 years, the capital life cycle of a Linac.

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1. INTRODUCTION

The purpose of the paper is to provide guidance on allocating costs to the unbundled radiotherapy cost pool and, within that pool, to individual delivery and planning activities / HRGs.

It is based on a paper produced by Susan Gibbin, with the assistance of the Radiotherapy finance leads, in April 2009. It has been revised in the light of discussions with all Radiotherapy providers during the course of May and June 2010.

2. CONTEXT

It is recognised nationally that the quality of radiotherapy data collection and associated reference costing may not be robust enough to develop a national tariff at this stage. Therefore supplementary advice has been provided to assist organisations in improving their costing processes. A key part of this was a costing template developed by the National Cancer Action Team, which many Trusts have already started to use during the course of 2007/08 and 2008/09.

Following our discussions with radiotherapy providers, a number of key themes emerged where providers indicated that extra guidance may be helpful. This paper provides assistance to trusts seeking to complete the template but is also intended to provide general guidance to all trusts when costing radiotherapy services.

3. THE TEMPLATE

The radiotherapy template is optional. However, Trusts are asked to complete the "cost summary" worksheet, which summarises the total cost pool for radiotherapy across various categories. This will allow trusts' costs to be benchmarked and the results will be shared with trusts.

The remaining worksheets are designed to capture activities based on each organisation's local descriptions as defined within their radiotherapy department. Capturing activity and costs at this granular level provides sufficient flexibility to allow costs to be mapped to both the existing and any future OPCS / HRG data definitions. Alternatively, Trusts may have their own systems and spreadsheets for capturing this detail.

It is assumed that organisations will follow national costing guidance in calculating the radiotherapy cost pool. This guidance should therefore be used in conjunction with the following national standards:

- Reference Cost Guidance for 2009/10 collection: http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_112590
- NHS Costing Manual 2009/10 edition: http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_112597
- Acute Health Clinical Costing Standards 2009/10: http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_095359

4. RECORDING AND COUNTING ACTIVITY

Activity is likely to be held on radiotherapy systems rather than on PAS. Therefore it is unlikely to be in a suitable format for running through the HRG grouper software and OPCS codes will have to be assigned manually to local descriptions of activity. From these codes, HRGs can be derived.

Useful guidance on what type of activities map to each HRG can be found at: http://www.ic.nhs.uk/webfiles/Services/casemix/Prep%20HRG4/Radiotherapy%20HRG%20Definitions.pdf

This should be read in conjunction with the relevant HRG grouping documentation for the year in question. The 2009/10 files are at: http://www.ic.nhs.uk/services/the-casemix-service/using-this-service/reference/downloads/costing/hrg4-2009-10-reference-costs-grouper-documentation

Some additional guidance documents have been provided for OPCS coding on the Radiotherapy Data Set (RTDS) web site at: http://www.canceruk.net/rtservices/rtds

In respect of Planning HRGs, it is important to remember that Reference Costs guidance allows only one planning event to be recorded per course of treatment. Therefore, if multiple planning attendances relating to the same course of treatment are being recorded, only the first attendance should be counted and any subsequent attendances should be excluded. An alternative approach, used by several Trusts, is simply to count courses of treatment and use this as a proxy for planning events.

The RTDS guidance mentioned above allows for planning events to be recorded for every prescription rather than one per course of treatment. It is therefore imperative that organisations are clear how they are recording this activity and can reconcile between the different conventions.

Treatment HRGs are measured in fractions and this should be more straightforward to collect from radiotherapy systems. However, it is important to remember to exclude the following types of activity which may be present in the data:

- Multiple fractions in a single visit – the HRG design means these should be recorded as a single fraction except in exceptional circumstances such as hyper-fractionated radiotherapy
- Non-NHS treatment (e.g. private patients)
- Non-treatment exposures (e.g. planning activity which should be included as part of the planning event for that course of treatment, equipment quality assurance, etc)

5. ALLOCATION TO THE COST POOL

A key objective is to ensure that only appropriate costs end up in the unbundled radiotherapy cost pool. As noted above, the expectation is that organisations follow national guidance and costing standards in determining which costs should be allocated and apportioned to radiotherapy.

However, to minimise any confusion and ambiguity guidance has been developed in line with the NCAT template. This guidance provides more detail than that available nationally to improve, where possible, consistency of approach. The table below offers advice on a number of areas, based on the issues Trusts highlighted during the course of our discussions.

Area	Comment
Medical Staffing (Consultants and Junior Doctors)	Clinical Oncology medical staff often provide services to Radiotherapy as well as other departments, so costs need to be separated initially to take account of the time they spend on Radiotherapy specifically. This needs to be done on the basis of their agreed job plans, if available. This information can be supplemented with further knowledge about how their time is organised. In the case of junior medical staff, the allocation of their time will often be on the basis of best estimate. However, the net cost of their time, after netting off central funding for training and education, is unlikely to be significant. Some of their Radiotherapy time will be associated with planning and delivery, and some with radiotherapy care delivered in other settings, e.g. outpatient clinics. Therefore their radiotherapy time needs to be further sub-divided into that spent on planning, treatment and other activities not part of the unbundled radiotherapy cost pool. Activities to be <u>excluded</u> from the radiotherapy cost pool: ▪ Ward rounds (cost should be allocated to the core HRG for the patient spell) ▪ Outpatient consultation clinics (cost should be allocated to Clinical Oncology outpatients) ▪ Radiotherapy Treatment Review / Floor Clinics (outpatient activity as above) ▪ Multi-Disciplinary Team Meetings (reported separately for reference cost purposes) The costs of R&D, postgraduate education and nationally funded Clinical Excellence awards should not be allocated to patient care. This can be achieved by both identifying the time and excluding it or, more crudely, by netting off the income received for such activities from the total cost pool. Time spent on non-clinical duties (e.g. SPAs) needs to be allocated across clinical time as an indirect cost on an appropriate basis (usually evenly across clinical PAs unless another basis is specifically preferred). The activities remaining in the radiotherapy cost pool should only include those that contribute directly to the planning and delivery of radiotherapy. It is expected that the majority of medical time will be spent in planning rather than treatment. It is advisable to maintain a clear distinction between external beam radiotherapy and brachytherapy, as these treatments tend to be organised quite differently. Furthermore, the NCAT template only analyses the cost of external beam radiotherapy. Brachytherapy will be the subject of a separate review in the future.

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Area	Comment
Radiographers	The job plan templates can be modified for local use to identify the time spent by Therapeutic Radiographers in their key activities. As an alternative, local job planning systems or spreadsheets can be used. Once complete, this time allocation can be used to allocate their costs to those activities, some of which will be planning and treatment. Again, it is advisable to separate out, where possible, brachytherapy from external beam. The activity templates ask trusts to identify the time spent by groups of staff spent either directly planning the treatments, or in direct contact with patients having radiotherapy delivered. Time spent by staff supporting but not directly undertaking planning or delivery (e.g. supervisory staff) should also be allocated to those activities as an indirect cost on an appropriate basis.
Medical/Radiation Physics, Equipment Maintenance, etc	Organisations have different arrangements for testing and maintaining their equipment. Some trusts use in house Physics staff, where the costs and job plans should be relatively easy to identify. Ideally their time spent on their activities should be identified using a similar method to Radiographers wherever possible so as to maintain consistency. This area may be more difficult where these services are procured from an external body (another trust or a PFI/MES contractor) and reasonable estimates will have to be made in such cases.
Nursing Staff	With the exception of specialist nursing staff involved in a limited range of radiotherapy treatments (e.g. brachytherapy), it is unlikely that nursing costs will be a significant part of the radiotherapy cost pool. As with medical staff time, the following are to be <u>excluded</u> from unbundled radiotherapy cost pool: ▪ Ward nursing (cost should be allocated to the core HRG for the patient spell) ▪ Input into outpatient clinics (cost should be allocated to Clinical Oncology outpatients) ▪ Radiotherapy Treatment Review / Floor Clinics (outpatient activity as above)
Other Supporting Staff	There will be a range of other staff, e.g. administrative staff on reception, that will support planning and treatment although not directly involved.

Area	Comment
	These indirect costs need to be allocated to planning and treatment on an appropriate basis, e.g. reception staff on the basis of patient attendances.
Diagnostic Imaging	Diagnostic Imaging (e.g. MRI, CT, etc) provided as part of the diagnosis and staging of cancer should not be included in the radiotherapy cost pool. These costs form part of the unbundled cost pool for diagnostic imaging. Only scans performed as part of the radiotherapy planning and treatment process (i.e. after the decision to treat with radiotherapy has been made) should be included within the pool. It is likely that this activity will be performed within the radiotherapy department rather than the imaging department.
Fixed Assets	The depreciation and capital charges associated with the equipment used to deliver radiotherapy are likely to form a significant part of the cost pool. It is therefore imperative that the revenue costs relating to fixed assets are calculated with the utmost care. This implies having an accurate and up-to-date asset register wherever possible, covering both the equipment and the buildings used in radiotherapy. Particular attention should be paid to the following: ▪ Source of funding for assets needs to be recorded and documented – donated or government granted (e.g. NOF) assets attract no capital charges and depreciation is offset by a transfer from reserves ▪ Age profile of equipment and remaining life of assets under the organisation's accounting policies – this will have a significant impact on the calculation of depreciation and capital charges ▪ Recognising in full the correct accounting treatment of leased assets being brought on balance sheet, whether under conventional finance leases or longer-term PFI/MES arrangements ▪ Being aware of which activities individual assets are used for so that costs can be allocated accurately between the various planning and treatment HRGs, e.g. Linacs will be predominantly used in treatment and as such their cost should not be spread evenly across all activities ▪ Buildings – depreciation and capital charges based on a known book value wherever possible, rather than, for example, a total for a building apportioned by floor area.
Provider to Provider recharges	Where providers supply radiotherapy services on behalf of other providers (e.g. planning services provided by a larger trust), care needs to be taken that the activity and associated costs are counted against only one organisation.

Area	Comment
	The NHS Costing Manual suggests the following default treatment: ▪ "The receiving NHS organisation should record both the costs and activity. Such costs should be added to the cost of the Finished Consultant Episode/Spell/attendance/client if necessary; ▪ "The providing NHS organisation should match the income and expenditure as with support services, but any resultant activity (FCEs/Spells/attendances etc) should be excluded and reconciled through the appropriate statement detailed in Chapter 11. Thus, the matching principle of activity and cost is maintained as the costs are offset by the income and the activity is not double counted across the NHS as a whole."
Contributions from Income	Significant sources of income, predominantly from private patient activity, were indicated by some trusts. Such income needs to be netted off the cost pool, preferably by excluding private patient activity together with the associated cost. If this is not possible, total income for radiotherapy should be netted off the total cost pool. Similar principles should apply to contributions from other income sources, such as research and teaching income, although these are expected to be relatively immaterial.
Corporate Overheads	In addition to the direct and indirect costs described above, there will be a range of organisation-wide overhead costs to be apportioned to radiotherapy. These apportionments will normally be calculated across the whole trust by trusts' costing systems. Suggested bases of apportionment can be found in the NHS Costing Manual (Appendix 2) and Acute Health Clinical Costing Standards. The issue of utilities (energy, water, etc) may warrant some additional attention, as radiotherapy is thought to be a disproportionate user of these services and a standard apportionment across the trust (usually floor area or building volume) may understate the true cost. Experts in facilities, estates, etc. may be able to suggest a suitable weighting if this issue is thought to be material. Once a share of overheads has been apportioned to the radiotherapy cost pool, wherever possible, a reasonable method should be used to allocate these between the various activities/HRGs relating to planning and treatment. This may be a continuation of the apportionment basis used by the costing system or an alternative method may be required. For example, the main driver of the individual HRGs is time and this may be the most appropriate basis upon which to allocate the overheads across activities.

6. SUMMARY

The radiotherapy cost pool needs to be built up carefully using the approach described above. In particular, costs relating to inpatient and outpatient care need to be identified and excluded.

Allocating the cost pool further between individual activities and/or HRGs requires a great deal of local knowledge and close co-operation between radiotherapy service managers, business accountants for the service and Reference Costs leads.

However, Trusts should always be aware of the materiality of the issues they are attempting to resolve – e.g. junior doctor time was identified by many trusts as a problematic issue yet allocating their net cost (after netting off income for training and education) on different bases is unlikely to affect the cost pool significantly.

An effective "sense check" that an organisation can apply to verify its cost pool and the associated activity is to benchmark itself with other similar organisations. The template summary worksheet is designed to facilitate this by analysing the cost pool over key staff groups, non pay, capital, etc. Collating this data nationally and feeding back the results to trusts should provide a vital aid to improving the quality of radiotherapy costing.

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- Carolyn Crossland (Christie)
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- Cynthia Cardozo (Royal Marsden)

Factors driving costs variations

Cost	Note	Increases costs	Decreases costs
Capital funding			
Availability of capital funding	Particularly for smaller units, where cost of 1 linac may be more than annual capital budget.	PFI/MES/leasing - may be more expensive to run in the short term but may mean less "down time" and protection from future price increases	Raise funds through charitable donations, run machines beyond expected life
Donated vs. funded	Significant numbers of linacs were funded from NOF monies and other donations. These are now being replaced with Trusts bearing the costs.	Replacing donated linacs by purchasing or leasing new machines	Purchasing linacs from newly donated funds
Capital profile			
No of Linacs	Fractions delivered per linac - some Trusts keep a standby machine for service efficiency or where linacs not used full time due to, say, staff shortages	Cost per fraction higher where assets are not fully utilised	Trusts "sweat" the assets.
Age of Linacs	Using older linacs for longer or replacing them	Higher prices and costs of new technology mean the cost of capital is higher.	Where fully depreciated, usually >10 yrs, there is no cost of capital.
Replacement profile	A phased programme of replacement will even out stepped increases in capital costs	Replacing more than one machine in a year	Phasing replacements over a number of years
Staffing			
Skill mix	Different staffing models for services. Varies due to clinical judgement on service delivery as well as from necessity, e.g. availability of staff locally	Higher skill mix levels – e.g. Physics staff calculate dosage	Lower skill mix – e.g. use dosimetrists
Numbers and rotas	Establishment used for service delivery plus how rotas are used, e.g. structured to minimise overtime	Higher staff numbers, use of overtime – but may mean extra income	Lower staff numbers, overtime
Availability of Junior docs/ students	Teaching hospitals will have access to student staff to carry out some roles – but increased training hours.	Additional costs of training students	Students used for delivering services
Service delivery			
Complexity of activity	Complexity of work – may be outside HRG bands	More time required per patient	More time required per patient
New technology	Required to deliver new techniques/treatments	Updating assets	Better health outcomes
Model of service delivery	Use SLAs with other Trusts How planning is delivered e.g. CTs etc	Decisions on how service is delivered may bring prices above or below the average.	
No. of sites, Double-running costs	Where service is delivered over more than one site	Losing economies by duplication across > one site	Single site, sharing staff across one site.