ACRA(2015)28R

MEETING: Advisory Committee on Resource Allocation

DATE OF MEETING: 18 November 2015

TITLE OF REPORT/PAPER:

ACRA(2015)28 Refreshing the current CCG formula (Revised)

Only change is correction to rows 3 to 6 of Table 2 as cited at the meeting.

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ACTIONS REQUIRED:

ACRA is asked to:

- to recommend the use of the refreshed Nuffield formula, updated prescribing formula, updated maternity formula and updated emergency ambulance cost adjustment for use in 2016-17 CCG allocations.

REFRESHING THE CURRENT CCG FORMULA

INTRODUCTION

1. This paper presents the results of our work to refresh and update the current CCG formula for use in 2016-17 allocations. The data sources and methodologies used were presented to previous ACRA meetings and to TAG, and are not repeated in detail in this paper.

2. The components we have refreshed and updated are:

    a. the Nuffield formula which covers general and acute and A&E;

    b. the prescribing formula which covers the cost of the drugs prescribed by GP practices;

    c. the maternity formula; and

    d. the emergency ambulance cost adjustment (EACA).

3. Each is discussed in turn below. Their relative importance in the overall CCG formula is shown in Table 1, with the assumption that the NHS England Board maintains the share of the unmet need/health inequalities adjustment at 10%. Apart from the unmet need/health inequalities adjustment, the shares are based on recent spend by CCGs, and are subject to final updating for the most recent spend data.

Table 1: Shares of overall CCG formula

Component	Share in overall CCG formula
G&A and A&E plus community services	65%
Prescribing	12%
Mental health	10%
Maternity	3%
Unmet need adjustment	10%

4. The emergency ambulance cost adjustment index is applied to around 3% of the spend for HCHS (G&A, A&E, mental health, maternity and community services).

5. As set out in the papers for previous ACRA meetings:

    a. the mental health component is not being refreshed this year as the other components are more dated and the need to prioritise given the resources and time available;

b. Monitor is in the lead in setting providers' MFFs (Market Forces Factor) and is not updating providers' MFFs for 2016-17, but are planning to review the MFF later. The MFFs for CCGs are therefore unchanged from the formula for 2014-15, other than for the update to the purchaser-provider matrix (which gives the spend by CCG by provider for weighting the different providers' MFFs to give the CCGs' MFFs);

c. the Community Information Dataset (CIDS) is yet not available to allow the inclusion of community services in the refresh, and we understand it is not to become a mandatory submission. Mental health community services are already included in the current mental health formula which is based on the Mental Health Minimum Dataset, the coverage of which includes community mental health services. As in previous years, the general and acute formula is also applied to community services (other than mental health community services).

6. There may be multi-year allocations announced for CCGs. In this situation, we uplift the target allocations for 2016-17 based on the sub-national population projections from ONS.

7. The refresh and updates of the formulae follow the methodology of the current formulae. Work on methodologies is on the longer term work programme.

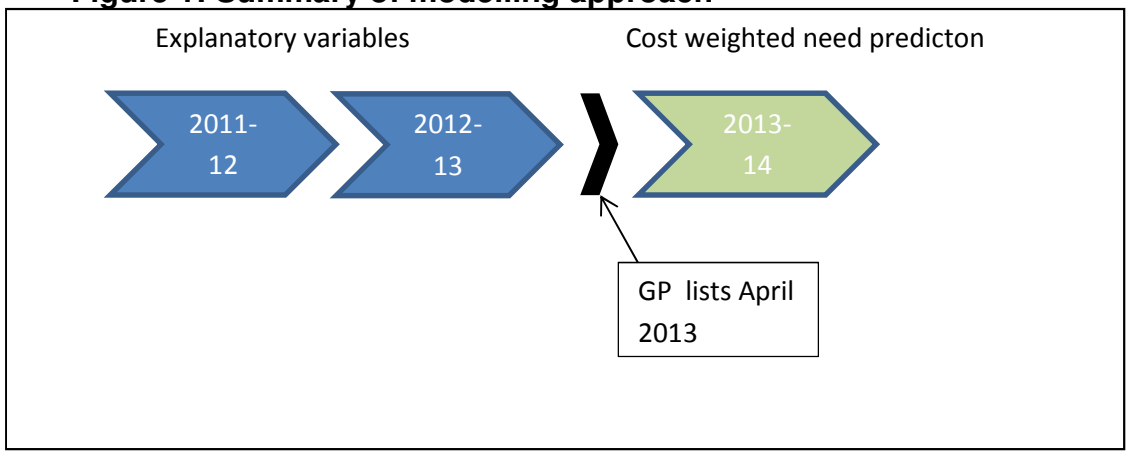
REFRESHING THE NUFFIELD FORMULA

8. The Nuffield person-based model was used for 2014-15 and 2015-16 allocations and covered general and acute and A&E. We have refreshed the Nuffield formula following the same approach to the modelling.

9. We presented a number of models to ACRA at the October meeting. These have hardly changed following finalisation of the costing of the data and the finalisation of the maternity, mental health and specialised activity to be omitted from the activity to be modelled.

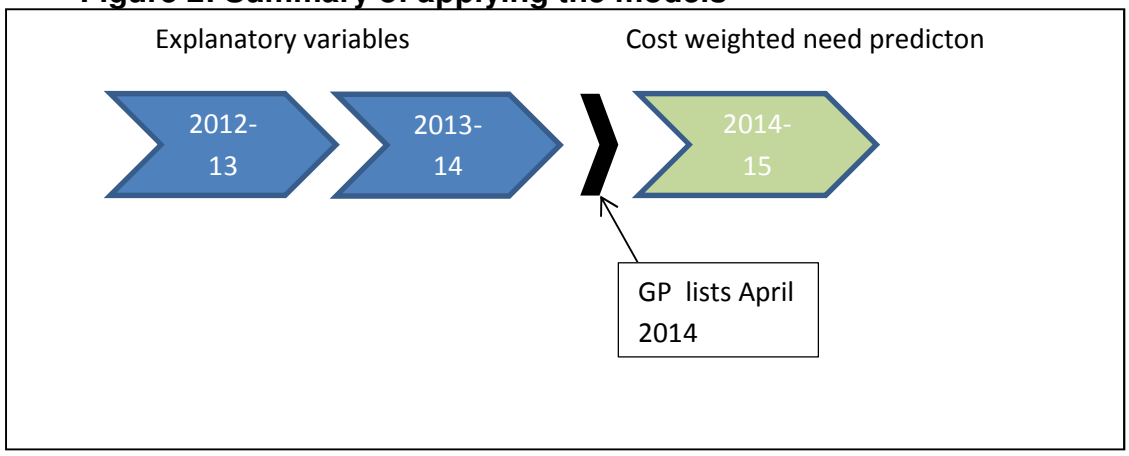
10. To recap, Nuffield modelled cost weighted need for 2009-10 using explanatory variables for the years 2007-08 and 2008-09. We have modelled cost weighted need for 2013-14 using explanatory variables for the years 2011-12 and 2012-13. The population base is GP registrations in April 2013. Figure 1 illustrates this.

Figure 1: Summary of modelling approach



11. In implementing the model to give predicted need by age-sex group by GP practice, we have moved forward by one year to predict costs in 2014-15 for registered lists as at April 2014 as illustrated in Figure 2[1].

Figure 2: Summary of applying the models



Summary of the data

12. We set out our data set at the 18 September and 21 October ACRA meetings. In summary we have from the HSCIC individual level, linked data on inpatient admissions, outpatients attendances, A&E attendances and critical care for the years 2011-12 to 2014-15. We have also individual level GP registration demographic data on 1st April for each year 2009-2015, linked at the person-level to the activity data. The activity data are from the SUS-PbR extract from the commissioning data set and the registration data are from the Personal Demographic Service (PDS). The data are pseudo-anonymised and only accessible at a secure data facility.

[1] We had concerns about the completeness of the 2014-15 data so did not model this year's costs. The 2014-15 data were extracted very soon after March 2015 and before they could be challenged by commissioners. Later submissions of 2014-15 data have more complete diagnoses data which are required to generate HRGs.

13. As set out in papers for previous ACRA meetings, we have cleaned the data, including seeking to identify and remove duplicate records.

14. We costed the 2013-14 data. 80% of spells came already fully costed in the data set as they have mandatory prices under Payment by Results. The costing in the SUS data set included the excess bed-days adjustments, unbundled costs and specialist top-ups paid under tariffs, and allows us to exclude the MFF.

15. Where PbR prices are not included in the SUS data, we: i) applied a tariff that exists but was not included in SUS data - this situation may arise where there are locally agreed variations; ii) where no tariff exists, we use reference costs; and iii) in the case where there are no reference costs, we used the specialty average cost. The same process is followed for outpatient attendances and A&E.

16. Attributed variables cover the characteristics of the small area where registered patients reside and characteristics of the supply of NHS services. They therefore have to be attributed to the registered patient based on where the patient resides, for example data from the 2011 Census and distance to providers.

17. We collected as close as possible the same, large set of attributed data as Nuffield. Some data are no longer available (or haven't been updated for a long time) and there have been changes to the welfare benefits system.

Omitted activity

18. We excluded from the 2013-14 costs (but included in the explanatory variables for 2011-12 and 2012-13, such as diagnoses):

    - mental health;
    - maternity;
    - specialised services commissioned by NHS England, although their identification in the SUS PbR data is complex.
    - GUM services, which are commissioned by Public Health England;
    - privately funded care;
    - secondary dental care commissioned by NHS England;

- costs per individual over £100,000 to avoid exceptionally high cost individuals distorting the model (this affected 1,780 people and £87m of costs)[2].

19. We excluded completely the following groups as we have no linked GP practice:

    - armed forces and prisoners not registered with general practices but served by special defence and prison primary medical services (these services are commissioned by NHS England);

    - patients from overseas;

    - unregistered patients.

Models

20. We modelled 2013-14 costs per person using the characteristics of patients (users and non-users of services) in 2011-12 and 2012-13.

21. As set out in papers for earlier ACRA meetings the methodology involved:

    a. creating 152 morbidity flags for each patient from the diagnostic data for 2011-12 and 2012-13 using the first seven diagnostic positions (the flags are broadly associated diagnosis codes to provide a summary for the otherwise extremely detailed diagnosis fields in the data);

    b. creating morbidity count variables for the number of morbidity flags patients have. Nine dummy variables are included for morbidity counts: for each individual one dummy variable has the value of one and the other eight dummy variables have the value of zero. The dummy variables are for having 1 flag, 2 flags, 3 flags, …, 8 flags, and 9+ flags;

    c. include co-morbidity interaction variables, which is done at ICD chapter level. This tests if costs differ for particular combinations of diagnoses;

    d. using model selection methods to select a parsimonious set of attributed needs and supply variables which are recorded at either area level, MSOA and LSOA or at GP practice level.

22. The modelling is undertaken on a 15% sample of April 2013 registered patients and model performance is tested on an out of sample validation dataset which contains 100% people from 15% of GP practices where each GP practice has over 1000 patients. There are separate models for all ages, 0-14 years, 15-64 years and 65 years and over.

[2] Annex A provides the regional distribution of those for whom costs were truncated as requested at the last ACRA meeting. The number of individuals and cost are lower than reported at the last ACRA meeting following a review of the specialised services to be omitted.

Results

23. The goodness of fit are shown in Table 2. All three models are age-stratified, that is there are separate models in each for 0-14 year olds, 15-64 year olds and those aged 65 and over. The age-stratified models perform better than models for all age groups combined and ACRA at it last meeting agreed to recommend age-stratified models.

24. In Table 2:

    a. PBRA Nuffield uses the set of attributed needs and supply variables in Nuffield's model[3];

    b. PBRA CCG uses the same method to select attributed variables as used by Nuffield , a set of forwards and backwards stepwise procedures;

    c. PBRA T-stat which starts with all attributed variables and then removes sequentially the sets of variables below pre-defined t values.

25. Table 2 shows all the models perform well. All give similar results to the Nuffield all-age model in terms of redistribution and the percentage of practices with a change of more than 5% in their share.

26. Both PBRA CCG and T-stat perform better than using the variables found to be significant in the Nuffield model, we therefore recommend one of these two.

27. PBRA CCG performs slightly better than T-stat on most measures in Table 2, but predicts a slightly higher proportion of practices more than 10% from their observed costs. On the other hand T-stat is a little more parsimonious.

28. The main drivers in the models are diagnostic information and age-sex group variables. These alone give a R-squared of 81.57%, so the attributed variables are adding around 3.5%

29. Annex B gives all the variables for PBRA CCG and T-Stat. The coefficients and set of attributed need and supply variables are very similar.

30. At CCG level, the difference in weighted populations between T-stat and PBRA CCG is minimal. The difference in the weighted populations is in the range -1.86% to +1.24%, and the lower and upper deciles are -0.52% and +0.55%.

31. We have a slight preference for the T-stat model as it is a little more parsimonious.

[3] This model has been slightly altered since Nuffield by the inclusion of morbidity information of up to 7 diagnosis positions rather than 6, a new set of significant comorbidity interaction variables, and distance is measured as road distance rather than straight line distance.

Table 2: Goodness of fit and redistribution measures (at GP practice level)

	PBRA Nuffield	PBRA CCG	T-Stat Selection
R-Squared	0.8453	0.8509	0.8503
Mean absolute error (£)	31.33	30.37	30.45
Proportion not within 10%	0.231	0.215	0.213
Compared with observed costs			
Redistribution index	0.029	0.028	0.028
Mean absolute percentage change in share	7.17	6.99	6.97
Percentage of practice shares substantially affected [No's corrected]	0.516	0.492	0.49
Compared with Nuffield all age			
Redistribution index	0.0046	0.0094	0.0089
Mean absolute percentage change in share	1.0521	2.1592	2.0482
Percentage of practice shares substantially affected	0.0172	0.0747	0.0656
Number of significant attributed need variables	16	25	23
Number of significant attributed supply variables	1	6	5
AI models age-stratified			

Notes:

1. The R-squared statistic measures the amount of variation in the dependent variable that is explained by the model (better models have higher R-squared values).
2. The mean absolute prediction error (MAE) is the average absolute difference between observed cost and the predicted cost. Better models have a lower MAE.
3. The percentage not within 10% measure represents the proportion of predicted values that are not within 10% of the observed values. Better models have a lower value.
4. The redistribution index (RI) is the percentage of total resources that would be reallocated from the "losers" to the "gainers".
5. The mean absolute percentage change in share (MAPCIS) summarises the average magnitude of the changes in practice shares.
6. The percentage of practices shares substantially affected (PoPShaSA) shows how many practices would have their target shares changed by more than 5%.

32. We do not have individual level data for people registered with an England GP practice but treated in a Wales hospital. We are therefore missing diagnoses data for these when implementing the model. NHS Wales have provided us for those individuals registered in the four border CCGs and treated in Wales, detailed data on counts by age-sex group by primary diagnosis by specialty by main procedure by HRG by GP practice. This suggests around £5.6 m of activity in 2014-15 is missing from our data set and we could consider making a broad adjustment based on this estimate[4].

Changes from the Nuffield formula

33. We have applied the T-Stat model to calculate CCG weighted populations based on October 2015 registrations. The original Nuffield model was used for

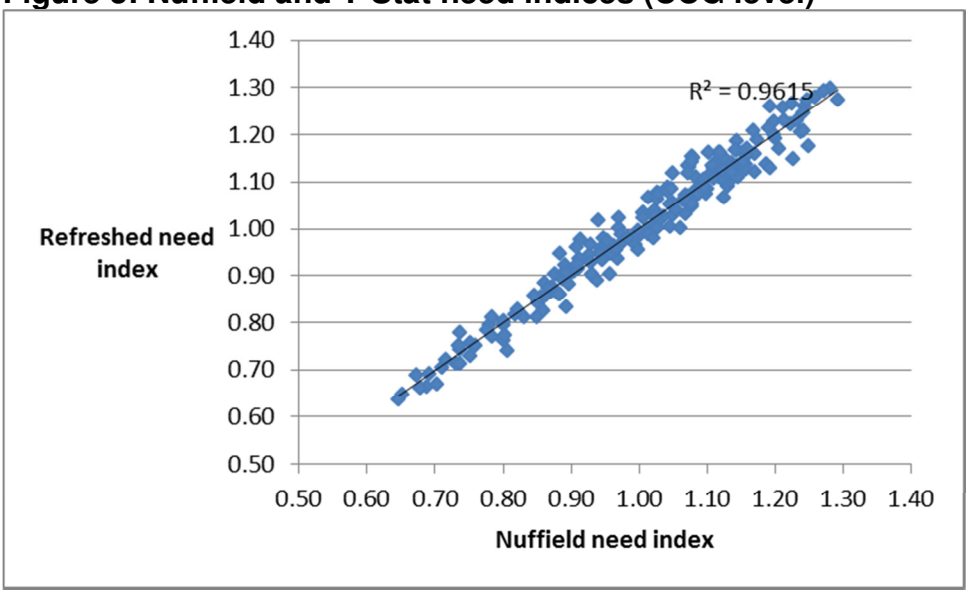
[4] We also ran the models excluding the four border CCGs and the coefficients were hardly changed

2014-15 and 2015-16 CCG allocations. We have also calculated CCG weighted populations using the original Nuffield model using October 2015 registrations. For each we have calculated the need index for each CCG, which is the weighted populations divided by the unweighted populations. These need indices exclude the MFF and the unmet need adjustment.

34. The national average need index for both models is set to 1.00. The indices have a very similar range for both models. The maximum and minimum for T-Stat are 1.30 and 0.64, and for the original Nuffield model they are 1.29 and 0.65.

35. Figure 3 plots the two need indices. They are very similar with a R-squared of 96% and no clear outliers.

Figure 3: Nuffield and T-Stat need indices (CCG level)



36. The maximum and minimum changes in the index in absolute terms are +0.08 and -0.08. The upper and lower deciles for the changes are +0.04 and -0.03.

37. Figure 4 plots the absolute change in the indices (new minus current) against the IMD2015 overall score. Deprivation increases from left to right. There is no relationship – the R-squared is 3%. Figure 5 plots the absolute change in the indices (new minus current) against the percentage of registrations aged 65 and over. The percentage of registrations aged 65 and over increases from left to right. There is no relationship – the R-squared is 0.02%. The small scale of the vertical axis in Figures 4 and 5 is a reflection of the changes being small.

Figure 4: Change in need index by IMD2015 score (CCG level)

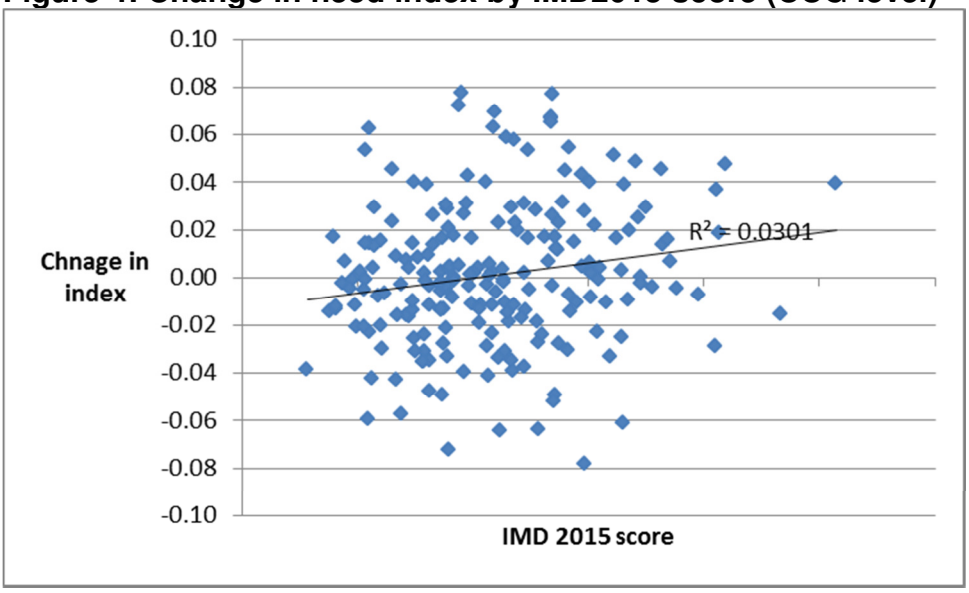
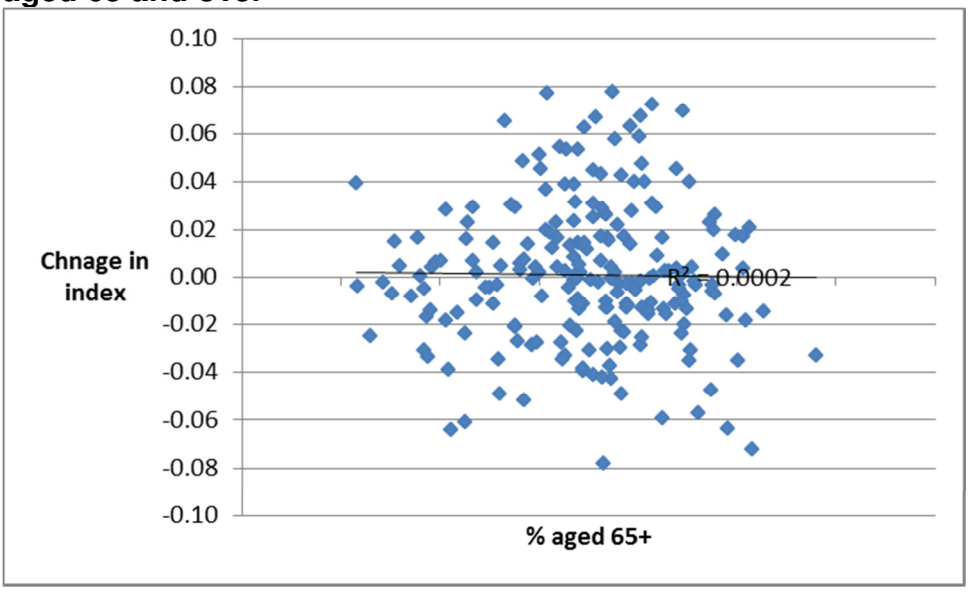


Figure 5: Change in need index by % of registrations aged 65 and over



38. As age and deprivation are not independent, more affluent CCGs tend to have older populations, we regressed the change in the index against the IMD score and percentage of the population aged 65 and over. There was no relationship, the adjusted R-squared was 2.5%.

PRESCRIBING

39. We have refreshed the prescribing formula which was last updated in December 2010 (Report of the Resource Allocation for Mental Health and

Prescribing (RAMP) Project - RARP35)[5]. As in RAMP, the modelling is undertaken at GP practice level.

40. The RAMP project modelled the costs of drugs prescribed by GP practices in 2008-09. We are re-running the regressions for the costs of drugs prescribed in 2013-14.

41. A breakdown of the costs of drugs prescribed by each GP practice is not available by age-sex group. A two-stage approach was therefore used in RAMP.

42. The first stage adjusts for need related to age and sex using the index of national spend on drugs per head by age and sex group developed by the HSCIC, and known as Age, Sex and Temporary Resident Originated Prescribing Units (ASTRO-PUs).

43. Multiplying the number of patients in each age-sex group in each GP practice by the national average spend per head index value for each age-sex group, and then normalising to total national spend gives for each GP practice the expected spend on drugs (at the national average age-sex costs). The second stage uses regression analysis to model across GP practices the ratio of actual spend on drugs to the expected age-sex adjusted spend on drugs.

44. The GP practice need and supply variables used in developing the RAMP model for the second stage have been updated and extended using the latest available data. However, some data used in 2010 are no longer available or very out of date, e.g. the Low Income Scheme Index (LISI) score which was found to be a significant explanatory variable in the RAMP model has not been updated since 2007 and is not available for new practices formed since 2007.

45. The data we have were set on in the papers for earlier ACRA meetings and the details are not repeated here.

Models

46. As set out in papers for earlier ACRA meetings, we have explored a number of approaches.

47. We first tried following the approach and variables as in RAMP. However, the RAMP model included three age-sex standardised QoF variables for 2001-06. More recent age-standardised QoF data are not available[6].

48. We used QoF data which were not age-sex standardised as explanatory variables. This caused problems in the performance of the model and led to counter-intuitive negative coefficients for some of the QoF data.

[5]http://webarchive.nationalarchives.gov.uk/20120503034600/http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/documents/digitalasset/dh_122619.pdf

[6] The age-sex standardised QoF data used in RAMP were from a special HSCIC/QResearch project.

49. The next approach was the one-stage approach, that is, using actual cost per head as the dependent variable while including age-sex group registered list shares as explanatory variables. This model also performed poorly; it resulted in large negative coefficients for males aged over 55. This is because if a practice has higher costs because a higher proportion of its patients are older females (at least partly because females live longer), the converse is that it has lower costs if a lower proportion are older females and a higher proportion are older males.

50. We then returned to the two-stage approach. TAG suggested considering the data set compiled by the University of Plymouth which has prevalence rates by age-sex groups (for those aged 16 and over in households) for LSOAs for common mental health disorders and CVD/CVD-related conditions[7].

51. The Plymouth data are often for the period 2006-2011. The source data are typically national surveys such as the Health Survey for England and the LSOA estimates are all micro-simulated from these to LSOAs using age group, sex, ethnicity, general health status (very good, good, fair, bad, and very bad), limiting long term Illness, tenure (owner occupier, social renting and private renting or other, and the Index of Multiple Deprivation (IMD2010) of LSOA of residence.

52. Exploratory work using this data set gave reasonable models. However, ACRA agreed that it would be better methodologically to use the factors used to micro-simulate to LSOAs. We have undertaken this since the last ACRA meeting and this has given us our preferred model.

53. We began by using the variables found to be significant in RAMP and undertook a model selection process from there by first removing any insignificant variables and testing alternatives based on those previously tested by the RAMP team, new data which are now available and areas for which there is improved data such as travel times.

54. We replaced LISI with IMD overall 2015. We also tested IMD Health and IMD Income, the results were very similar and IMD overall was preferred as a broad measure of deprivation. We tested also rurality but preferred distance to a GP practice as a better measure of remoteness.

55. Table 3 shows our preferred model and a comparison with RAMP. The adjusted R-squared is 65.2%, compared with 61.9% in RAMP. Many of the coefficients are similar to RAMP.

[7] We also looked at the prevalence rates developed by erpho. They are based on the 2003 and 2004 Health Surveys for England and 2009 populations (2001 Census based) and modelled to GP practices. We felt they were too dated to use and the same methodological issue with the Plymouth data also applies.

Table 3: Prescribing model

Variable	RAMP	REFRESH
Practice characteristics/supply variables		
Dispensing practice	0.04***	0.019***
One-partner practice	-0.045***	-0.018***
Prop. UK qualified GPs in practice	0.047***	0.006***
Av. GP age in practice	-0.001***	-0.001***
Potential generic savings	3.501***	0.150***
Prop. outpatients seen <4 weeks	-0.094***	
IMD Living Environment - Distance to GP (2015)		-0.004***
Needs indicators (year of data)		
LISI (2008)	0.005***	
IMD Score (Overall 2015)		0.008***
Prop. >75 years who are >85 years	0.248***	0.218***
Prop. >70 years claiming DLA	0.894***	0.450***
SMR (all ages)	0.116***	0.001***
Generalised fertility rate	0.926***	0.599***
Age-sex standardised proportion non-white		0.216***
Age-sex standardised proportion tenure social		0.102***
Age-sex standardised limiting long term illness		0.141***
Age-stand. CHD prev.	0.162***	
Age-stand. Diabetes prev.	0.047***	
Age-stand. Hypertension prev	0.078***	
Practices with most aged 20-24 (Top 1%)		-0.198***
Observations	8105	55,763,599
Adjusted R^2	0.619	0.652
Regional indicators	152 PCTs	211 CCGs
Minimum list size	500	500
*** p<0.01, ** p<0.05, * p<0.1		

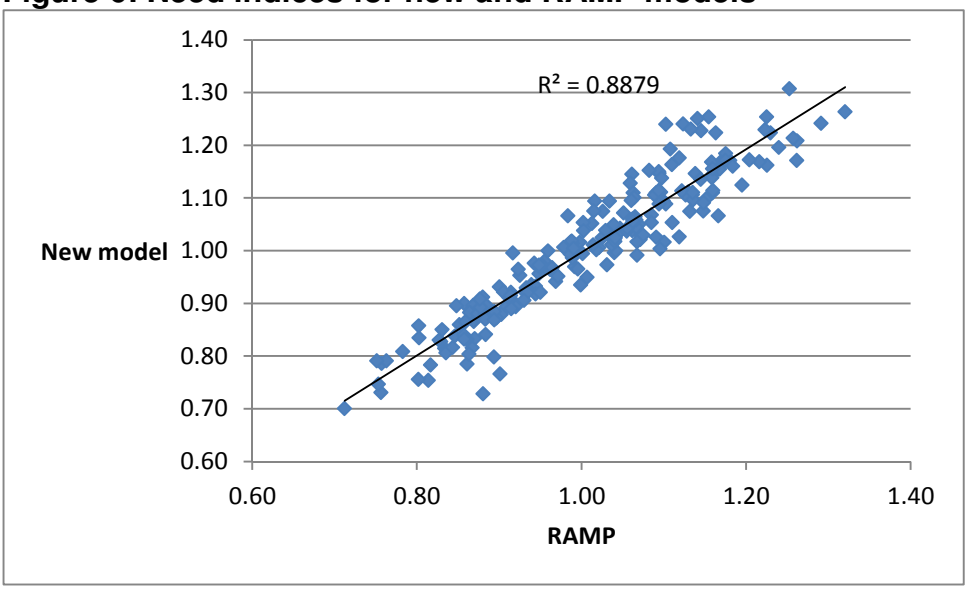
Notes :
1. Practices with a ratio of actual to age-sex standardised costs of either over 2.5 or below 0.5 have been removed on basis of being atypical (55 practices). For example they focus on helping those with drug dependency, for which they receive other funding sources.
2. Gen savings is a measure of the savings the practice could make by prescribing generic drugs in place of branded drugs for the top 20 drugs prescribed by the practice.
3. Practices with the highest proportion of their registrations aged 20-24 seeks to identify student practices.
4. We weighted by practice size to avoid a practice with 500 registrations having the same influence on the model as a practice with 25,000 registrations. Weighting enters each practice in the model the same number of times as it's list size. The number of observations is therefore the total list size.

56. We have calculated weighted populations for both the preferred model and RAMP based on October 2015 registrations. For each we calculated need indices, which are weighted populations divided by unweighted populations, with the England average for both set 1.00.

57. The range of the need indices is very similar, the maximum and minimum for the new preferred model are 1.31 and 0.70, and for RAMP 1.30 and 0.71. The maximum change in the need index is 0.14 and the minimum is -0.15. The upper decile for the changes is 0.05 and the lower decile is -0.06.

58. Figure 6 plots the RAMP index against the index for the new model, the indices are very similar with a R-squared of 0.89.

Figure 6: Need indices for new and RAMP models



59. Figures 7 and 8 plot the change in the absolute value of the index against IMD2015 (increasing from left to right) and the percentage of registrations aged 65 and over (also increasing from left to right). There are no relationships, the R-squared for IMD2015 is 0.5% and for age is 6.6%.

Figure 7: Change in need index versus IMD2015

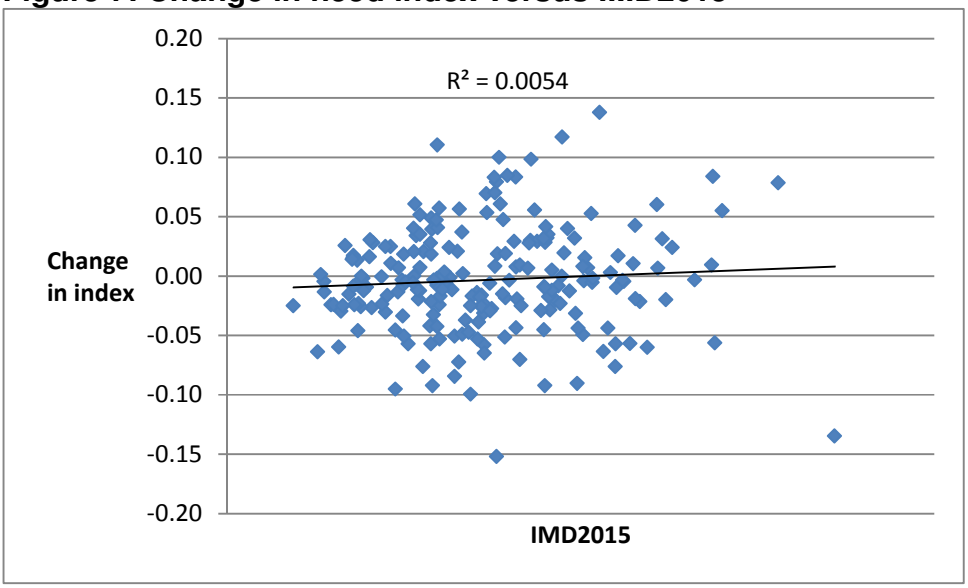
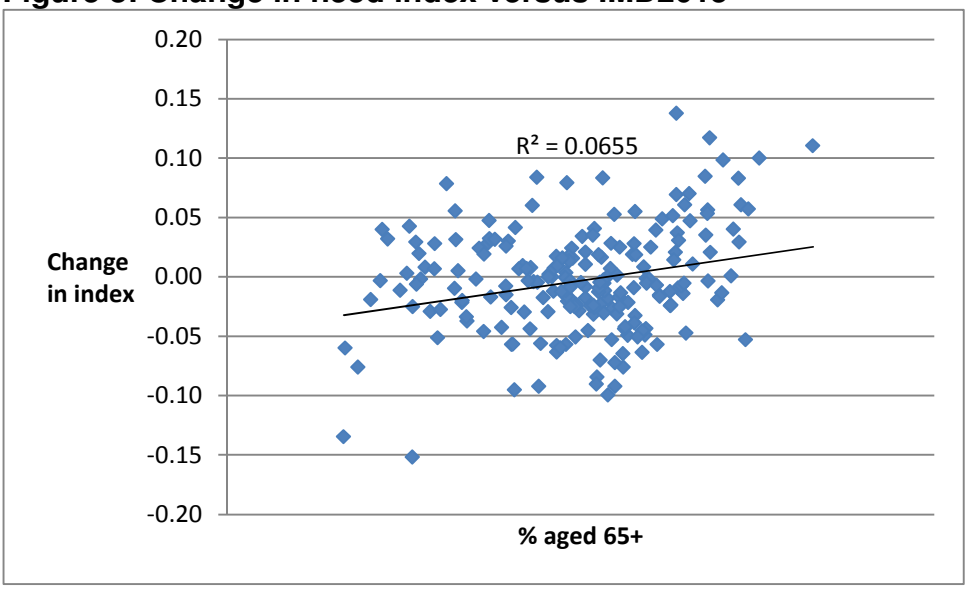


Figure 8: Change in need index versus IMD2015



MATERNITY

60. The current maternity formula was developed by CARAN and used data from 2004-05 and 2005-06. It is based on the number of births and the predicted cost per birth. For each allocation round we have updated the number of births and applied the predicted cost per birth from CARAN.

61. We have modelled costs per birth for 2013-14 using the inpatient, outpatient and A&E data assembled for the refresh of the Nuffield formula.

62. The CARAN model was estimated at MSOA level. We are modelling at the individual level.

63. The variables found to be significant in the CARAN report were the mean house price, the proportion of low weight births, and a supply variable of maternity capacity.

64. We have taken a different approach and following advice from TAG and ACRA are not testing average house prices.

65. We have included the 152 morbidity flags used in the refresh of the Nuffield formula, since co-morbidity is likely to affect the cost per birth.

66. For the attributed variables, we have identified in our wide data set the variables which as closely as possible relate to those which determine the maternity pathway payments[8]. We have not tested variables from our broad data set which do not seem relevant to maternity, such as benefits paid to those aged 65 and over and single pensioner households. More formal

[8] These are at https://www.gov.uk/government/publications/maternity-pathway-payment-system-guidance-for-nhs-providers-and-commissioners

stepwise variable selection did not give a better model. CCG dummy variables are also included.

67. Our preferred model is in Table 4 (omitting the morbidity flags). Since the last ACRA meeting we have included a variable for multiple births in the same spell. ACRA suggested birth order might be important. We do not have exactly this in our data set, but we do know if the mother also gave birth in 2011-12 and 2012-13 and have used this to create a simple birth order variable. The model presented at the previous ACRA meeting had erroneously included a few gynaecology spells which was why older women were appearing as significant. These have now been removed.

Table 4: Maternity model

	Variable	Coefficient
Age Groups	< 20	26.60***
	20-24	17.90***
	25-29	0
	30-34	1.893
	35-39	21.17***
	40-44	80.53***
	45-49	213.4***
	50+	190.6***
Supply	Overnight_beds	-5.072***
	Obstetrics ultra-sound	0.0205***
Birth Order	First Birth, but not in 2013-14	-548.1***
	First Birth	0
	Second birth	-109.9***
Multiple Births in Year	Two births in year	3351.1***
Need variables	Low Birth Weight	173.2***
	IMD15 Overall	0.487**
	Pakistani	1.596***
	Black-African	3.079***
	Never Worked	-13.95***
	Prop Social Housing	0.261*
	QoF Diabetes Prev	3.560**
	Constant	634.1***
	Observations	774664
	R2	0.301
	R2 GP practice	0.6154
* p<0.05	** p<0.01	*** p<0.001

68. The R-squared at the individual level is 30% and 62% at GP practice level, outperforming the CARAN model which had a R-squared of 29% at MSOA level.

EMERGENCY AMBULANCE COST ADJUSTMENT

69. The Emergency Ambulance Cost Adjustment (EACA) takes account of the differential cost of providing ambulance services in different parts of the country. It is akin to the MFF as an adjustment for cost, not need.

70. The current formula, unchanged since its inception in 1998-99 apart from mapping to the different commissioning organisations over time, is based on the volume of activity, the severity of activity and a measure of rurality.

71. We have been provided times to incidents, times at the incident, and times to convey to hospital (including time at the hospital) by four ambulance Trusts: East Midlands Ambulance Service, North East Ambulance Trust South West Ambulance Service, and the London Ambulance Trust. The times are the average for each MSOA.

72. We have modelled the times by MSOA across the combined data set from the four different Trusts, separately for see and treat and see and convey.

73. Our preferred models are in table 5. The main variables are time to major A&E Departments (estimated travel times from independent software, which includes average speeds on different types of roads), population density, average age of the MSOA population (longer time at the scene may be needed for frail patients), and a rurality classification. Dummy variables are also included for the four ambulance trusts.

Table 5: See and treat and see and convey models

See and Convey			See and Treat	
VARIABLES			VARIABLES	
Distance to Accident and Emergency	1.632***		Distance to Accident and Emergency	1.133***
Distance (Squared)	-0.012***		Distance (Squared)	-0.024***
Log of Population Density	-1.094***		Log of Population Density	-0.882***
Average Age in MSOA	0.251***		Average Age in MSOA	0.432***
Rural Town and Fringe (Sparse)	-1.246***		Rural Town and Fringe (Sparse)	-2.628***
Rural Village and Dispersed	2.365***		Rural Village and Dispersed	0.676***
Rural Village and Dispersed (Sparse)	1.563***		Rural Village and Dispersed (Sparse)	-0.521***
Urban City and Town	-0.629***		Urban City and Town	0.556***
Urban City and Town (Sparse)	-1.051***		Urban City and Town (Sparse)	-2.166***
Urban Major Conurbation	-1.982***		Urban Major Conurbation	1.854***
Urban Minor Conurbation	2.677***		Urban Minor Conurbation	4.435***
Constant	78.356***		Constant	44.060***
Observations	1,766,332		Observations	655,261
R-squared	0.81		R-squared	0.465
Adj. R2	0.81		Adj. R2	0.465
Robust standard errors in parentheses				
*** p<0.01, ** p<0.05, * p<0.1				

74. When applying the coefficients across the country and combining see and treat and see and convey using the number of incidents, the ten CCGs with the

highest index value and ten CCGs with the lowest index values are in Table 6. The first column is the index and the second column is after multiplying by 3% - the proportion of HCHS spend on ambulance services.

Table 6: EACA index – 10 highest and 10 lowest values by CCG

CCG	Index	Index after applying to 3% of HVCHS spend
NHS West Suffolk	1.12	1.007
NHS North Norfolk	1.16	1.007
NHS Kernow	1.11	1.006
NHS Newbury and District	1.11	1.006
NHS South Norfolk	1.12	1.005
NHS South Lincolnshire	1.13	1.005
NHS Canterbury and Coastal	1.10	1.005
NHS Horsham and Mid Sussex	1.10	1.005
NHS South Kent Coast	1.11	1.005
NHS Lincolnshire East	1.11	1.005
NHS Central London (Westminster)	0.91	0.996
NHS Central Manchester	0.89	0.996
NHS West London (Kensington and Chelsea,	0.91	0.996
NHS Southwark	0.89	0.996
NHS Islington	0.90	0.996
NHS Newham	0.88	0.996
NHS Camden	0.89	0.996
NHS City and Hackney	0.88	0.996
NHS Hammersmith and Fulham	0.89	0.996
NHS Tower Hamlets	0.87	0.996

75. The results are not implausible and depend on the location of major A&E departments.

76. While the modelling is not perfect due to the lack of more detailed data, we believe is an improvement on the current EACA which dates back to 1998-99 and estimated for the then 100 or so Health Authorities.

Annex A :

Regional distribution of truncated costs

Region	Truncated costs (£000s)	Truncated costs %	Number of people
London	39,710	45.74	869
Midlands and East	11,639	13.41	308
North	12,396	14.28	227
South	23,048	26.55	374
Missing	31	0.04	2
Total	86,825		1780

The table below summarises the number of outpatient attendances. It excludes those in the data set who did not attend their appointment. The high growth in 2013-14 is across all the categories. We still suspect some of the growth in 2013-14 is due to the introduction of unbundled diagnostic tariffs but have so far not been able to cut the data in a way to test this.

Outpatient attendances

Outpaptient attendances	2010-11	2011-12	2012-13	2013-14
Follow Up Attendance - Single Professional (WF01A)	40,925,728	44,256,198	44,965,555	48,197,062
First Attendance - Single Professional (WF01B)	17,620,513	18,595,676	18,996,385	20,489,274
Non-Admitted Non Face to Face Attendance - Follow-up (WF01C)	347,401	435,535	635,077	857,618
Non-Admitted Non Face to Face Attendance - First (WF01D)	94,393	130,178	192,106	240,996
Follow Up Attendance - Multi Professional (WF02A)	786,395	926,876	1,014,762	1,101,839
First Attendance - Multi Professional (WF02B)	361,062	412,052	411,790	457,647
Multiprofessional Non-Admitted Non Face to Face Attendance - Follow-up (WF02C)	638	1,775	1,455	1,397
Multiprofessional Non-Admitted Non Face to Face Attendance - First (WF02D)	189	297	137	134
Invalid HRG Code (UZ10Z)	583,756	535,880	422,966	606,308
ALL OTHER HRG CODES	11,541,852	7,587,003	9,424,918	11,092,370
Total	**72,261,927**	**72,881,470**	**76,065,151**	**83,044,645**

Annex B: PBRA CCG and T-Stat models

	PBRA CCG			PBRA T-STAT SELECTION		
	Ages 0-14	**Ages 15-64**	**Ages over 65**	**Ages 0-14**	**Ages 15-64**	**Ages over 65**
Males						
<1	0			0		
1 to 4	-170.6***			-170.5***		
5 to 9	-212.3***			-212.2***		
10 to 14	-193.2***			-193.2***		
15 to 19		0			0	
20 to 24		-3.979			-4.157	
25 to 29		-13.75***			-13.69***	
30 to 34		-8.977***			-8.768***	
35 to 39		4.611			4.831	
40 to 44		35.22***			35.38***	
45 to 49		76.40***			76.44***	
50 to 54		121.3***			121.2***	
55 to 59		197.9***			197.7***	
60 to 64		288.1***			287.7***	
65 to 69			0			0
70 to 74			173.4***			173.1***
75 to 79			360.0***			359.8***
80 to 84			565.3***			565.2***
85 and over			813.7***			813.9***
Females						
<1	-84.36***			-84.39***		
1 to 4	-209.2***			-209.2***		
5 to 9	-233.3***			-233.3***		
10 to 14	-206.7***			-206.8***		
15 to 19		16.92***			16.88***	
20 to 24		10.35***			10.17***	
25 to 29		21.05***			21.15***	
30 to 34		41.12***			41.39***	
35 to 39		66.07***			66.32***	
40 to 44		98.70***			98.87***	
45 to 49		139.2***			139.3***	
50 to 54		175.1***			175.0***	
55 to 59		206.1***			205.9***	
60 to 64		271.1***			270.7***	
65 to 69			-39.42***			-39.60***
70 to 74			106.4***			106.2***
75 to 79			243.7***			243.7***
80 to 84			427.6***			427.8***
85 and over			592.7***			593.6***
Morbidity flags						
A00-A09 Intestinal infectious diseases	144.3***	292.8***	217.3**	144.3***	292.8***	217.7**
A15-A19 Tuberculosis	702.9	151.2	1191.7	702.7	150.9	1193.4
A20-A49 Certain bacterial diseases	239.3	695.9***	388.3***	239.4	695.9***	388.7***
A50-A64 Infections with predominantly sexual mode of transmission	-5.445	426.4	-3972.9***	-4.412	427.0	-3982.9***
A65-A79 Other infectious and parasitic disorders	92.53	180.6	-186.9	92.26	179.8	-186.2

	PBRA CCG			PBRA T-STAT SELECTION		
	Ages 0-14	**Ages 15-64**	**Ages over 65**	**Ages 0-14**	**Ages 15-64**	**Ages over 65**
A80-A89 Viral infections of the central nervous system	55.99	-4.640	326.2	56.22	-4.470	324.3
A90-A99 Arthropod-borne viral fevers & viral haemorrhagic fevers	-196.6*	-40.79	-1217.5	-196.2*	-40.16	-1212.2
B00-B09 Viral infections characterized by skin & mucous mem. lesns.	105.2	226.6	65.12	105.2	226.4	65.98
B15-B19 Viral hepatitis	-341.4	712.3***	1367.2*	-341.9	711.7***	1367.2*
B20-B24 Human immunodeficiency virus [HIV] disease	0	0	0	0	0	0
B25-B34 Other viral diseases	141.4***	207.3**	138.3	141.4***	207.4**	137.5
B35-B49 Mycoses	394.3	423.6***	114.0	394.3	423.7***	114.1
B50-B64 Protozoal diseases	-161.2	-434.1**	-909.7	-162.1	-435.6**	-910.5
B65-B83 Helminthiases	336.6*	-47.48	74.55	336.9*	-47.89	73.53
B85-B99 Other infectious and parasitic diseases	-246.4	-54.99	-431.8	-246.2	-55.04	-433.7
C00-C14 Malignant neoplasm of liporal cavity and pharynx	-472.4	518.3**	471.9*	-471.6	518.2**	471.4*
C15-C26 Malignant neoplasm of digestive organs	-254.6	1991.8***	880.4***	-254.8	1991.9***	880.2***
C30-C39 Malignant neoplasms of respiratory & intrathoracic organs	-379.3	868.4***	583.6***	-379.2	868.5***	583.2***
C40-C41 Malignant neoplasm of bone and articular cartilage	-524.1	-788.3*	191.3	-524.1	-788.5*	190.9
C43-C44 Malignant neoplasms of skin	-179.4	227.1***	126.2***	-178.6	227.1***	125.9***
C45-C49 Malignant neoplasms of mesothelial and soft tissue	2152.7	491.1	362.4	2152.9	491.5	363.6
C50 Malignant neoplasm of breast	0	834.1***	281.3***	0	833.9***	281.4***
C51-C58 Malignant neoplasms of female genital organs	-58.55	891.0***	682.3***	-59.26	891.1***	682.1***
C60-C63 Malignant neoplasms of male genital organs	63.93	343.1***	376.6***	64.11	343.1***	376.4***
C64-C68 Malignant neoplasms of urinary tract	-340.5	211.5	321.0***	-340.5	211.5	321.5***
C69-C72 Malignant neoplasms of eye, brain & other parts of CNS	8.110	-227.0	-625.8**	8.191	-227.2	-626.2**
C73-C80, C97 Malignant neoplasm. of thyroid and oth. endo. Glands etc.	0	1468.9	384.2	0	1469.4	386.0
C81-C96 Malignant neoplasms of lymphoid, haematopoietic & rel. tiss.	2127.9***	4189.1***	3284.6***	2127.9***	4188.9***	3284.7***
D00-D48 In situ & benign neoplasms and others of uncertainty	144.9	182.7***	389.4***	145.0	182.7***	389.4***
D50-D64 Anaemias	718.8***	430.2***	471.6***	718.8***	430.1***	471.6***
D65-D89 Diseases of the blood and blood-forming organs	-625.1	229.2*	163.4	-625.3	229.2*	162.8
E00-E07 Disorders of thyroid gland	342.2	118.7***	129.3***	342.1	118.8***	129.2***
E10-E14 Diabetes Mellitus	1204.0***	582.9***	567.4***	1204.1***	583.0***	567.7***
E15-E90 Endocrine nutritional and metabolic diseases	271.1***	289.9***	135.3***	271.1***	289.9***	135.5***
F00-F03 Dementia	0	127.6	-339.0***	0	127.2	-338.1***

	PBRA CCG			PBRA T-STAT SELECTION		
	Ages 0-14	**Ages 15-64**	**Ages over 65**	**Ages 0-14**	**Ages 15-64**	**Ages over 65**
F04-F09 Other organic including symptomatic mental disorders	-221.3	312.9	60.14	-220.9	312.6	59.84
F10-F19 Mental and behavioural disorders due to psychoactive subst.	64.93	203.1***	303.0***	65.09	203.0***	302.8***
F20-F29 Schizophrenia, schizotypal and delusional disorders	-101.5	133.4**	214.9*	-102.1	132.9**	215.2*
F30-F39 Mood [affective] disorders	345.7	232.2***	207.7***	345.5	232.2***	208.0***
F40-F69 Neurotic, behavioural & personality disorders	121.8	215.8***	293.5***	121.7	215.8***	293.9***
F70-F79 Mental retardation	1265.2**	994.4***	228.6	1265.2**	994.2***	229.0
F80-F99 Other mental and behavioural disorders	429.8***	439.3***	86.49	430.0***	439.2***	87.85
G00-G09 Inflammatory diseases of the central nervous system	-99.69	-110.1	-469.1	-99.92	-110.3	-470.0
G10-G13, G30-G32 Other degenerative diseases (incl. Alzheimer).	1282.0*	535.7***	72.78	1282.1*	535.2***	72.67
G20-G26 Extrapyramidal & movement disorders (incl. Parkinsonism).	394.4	776.2***	854.8***	394.2	776.0***	855.2***
G35-G37 Demyelinating diseases (incl Multiple Sclerosis) of the CNS.	85.16	1181.2***	996.8***	85.19	1181.2***	997.2***
G40-G47 Epilepsy migraine & other episodic disorders	449.6***	377.7***	344.3***	449.7***	377.6***	344.4***
G50-G73 G90-G99 Other diseases & disorders of the nervous syst.	299.0*	402.3***	380.4***	299.1*	402.4***	380.5***
G80-G83 Cerebral palsy & other paralytic syndromes	972.1***	432.7***	231.4**	972.1***	432.4***	231.7**
H00-H06, H15-H22, H30-H36, H43-H59 Other disorders of the eye etc.	248.8***	202.3***	227.4***	248.8***	202.2***	227.5***
H10-H13 Disorders of conjunctiva (including conjunctivitis)	-1.831	150.3	-93.93	-2.099	150.0	-93.84
H25-H28 Disorders of lens (including cataracts)	-325.1	161.7***	-46.74*	-324.8	161.8***	-46.84*
H40-H42 Glaucoma	1114.4	123.0	58.53	1114.2	122.9	58.45
H60-H95 Diseases of the ear and mastoid process	326.8***	236.2***	3.387	326.8***	236.3***	3.292
I00-I09 Rheumatic heart disease	-762.6*	249.9	137.5*	-762.9*	249.7	137.3*
I10-I15 Hypertensive diseases	195.5	256.9***	91.18***	195.6	257.1***	91.14***
I20-I25 Ischaemic heart diseases	-569.0	266.6***	262.8***	-568.8	266.7***	262.9***
I26-I28 Pulmonary heart disease & diseases of pulmonary circulation	765.8	559.2***	293.3***	765.5	559.1***	293.4***
I30-I52 Other forms of heart disease	291.2	461.5***	394.4***	291.3	461.4***	394.4***
I60-I69 Cerebrovascular diseases	393.1	132.3*	13.49	392.8	132.2*	13.33
I70-I79 Diseases of arteries, arterioles & capillaries	819.1	1009.6***	722.7***	819.1	1009.5***	722.8***
I80-I89 Diseases of veins & lymphatic system nec.	64.08	249.9***	201.6***	63.88	249.9***	201.5***
I95-I99 Other & unspecified disorders of the circulatory system	-299.6	743.9***	318.2***	-299.7	743.9***	318.2***
J00-J06 Acute upper respiratory infections	163.9***	154.3***	481.9*	163.9***	154.5***	482.3*
J10-J18 Influenza & pneumonia	265.0***	477.8***	437.7***	265.0***	477.8***	437.8***

	PBRA CCG			PBRA T-STAT SELECTION		
	Ages 0-14	**Ages 15-64**	**Ages over 65**	**Ages 0-14**	**Ages 15-64**	**Ages over 65**
J20-J22 Other acute lower respiratory infections	311.1***	658.7***	351.0***	311.1***	658.8***	351.3***
J30-J39 Other diseases of upper respiratory tract	72.23**	154.7***	123.9	72.29**	154.8***	124.1
J40-J47 Chronic lower respiratory diseases	283.0***	309.5***	465.6***	283.0***	309.6***	465.4***
J60-J70 Lung diseases due to external agents	1288.6	891.4***	122.8	1288.5	891.0***	123.4
J80-J99 Other diseases of the respiratory system	755.7***	521.4***	362.9***	755.7***	521.3***	362.8***
K00-K14 Diseases of oral cavity, salivary glands & jaws	138.0***	135.4***	281.4***	138.2***	135.5***	281.3***
K20-K31 Diseases of oesophagus stomach & duodenum	287.7***	293.9***	165.9***	287.7***	293.9***	165.9***
K35-K38 Diseases of appendix	14.83	-10.18	-305.8**	14.71	-10.07	-305.4**
K40-K46 Hernia	73.26	132.1***	66.53**	73.28	132.2***	66.51**
K50-K52 No infective enteritis & colitis	34.71	594.9***	247.2***	34.71	595.0***	247.1***
K55-K63 Other diseases of intestines	247.4***	282.0***	166.0***	247.5***	282.0***	166.0***
K65-K67 Diseases of peritoneum	588.4	240.5***	-30.94	588.4	240.5***	-30.85
K70-K77 Diseases of liver	1087.6	1124.4***	747.8***	1087.5	1124.3***	747.8***
K80-K87 Disorders of gall bladder, biliary tract & pancreas	610.7	337.2***	180.4***	610.6	337.2***	180.3***
K90-K93 Other diseases of the digestive system	400.5***	319.6***	150.8***	400.4***	319.6***	150.8***
L00-L14 L55-L99 Other infections and disorders of the skin	97.72*	163.5***	154.1***	97.74*	163.5***	154.2***
L20-L30 Dermatitis and eczema	160.3***	100.7	272.7*	160.2***	100.8	272.8*
L40-L45 Papulosquamous disorders (including Psoriasis)	1221.3*	360.1***	73.24	1221.7*	360.3***	73.77
L50-L54 Urticarial and erythema	234.6	262.0	-72.80	234.6	262.2	-72.90
M00-M25 Arthropathies	667.0***	525.8***	378.2***	667.0***	525.8***	378.2***
M30-M36 Systemic connective tissue disorders	663.1*	775.6***	376.1***	663.1*	775.6***	375.9***
M40-M54 Dorsopathies	515.7**	352.8***	377.2***	515.7**	352.8***	377.1***
M60-M79 Soft tissue disorders	141.8*	323.0***	273.3***	141.7*	323.1***	273.3***
M80-M94 Osteopathy and chondropathies	615.2***	515.0***	299.6***	615.2***	515.0***	299.5***
M95-M99 Other disorders of the musculoskeletal system & conn. tiss.	2174.9	684.7***	1377.7***	2174.5	684.8***	1377.1***
N00-N08, N10-N16 Diseases of the kidney	249.6*	685.9***	667.8***	249.7*	685.8***	668.1***
N17-N19 Renal failure	-190.4	2063.1***	801.2***	-190.2	2063.1***	801.1***
N20-N23 Urolithiasis	545.1	147.7***	-13.65	545.0	147.7***	-13.80
N25-N29 Other disorders of kidney & ureter	-112.2	320.3*	443.5***	-112.1	320.3*	443.8***
N30-N39 Other diseases of the urinary system	226.3***	357.7***	263.1***	226.3***	357.8***	263.2***
N40-N51 Diseases of male genital organs	38.23	37.28	-49.07	38.25	37.38	-49.08
N60-N64 Disorders of breast	-93.27	152.7**	-46.65	-92.83	152.8**	-46.34

	PBRA CCG			PBRA T-STAT SELECTION		
	Ages 0-14	**Ages 15-64**	**Ages over 65**	**Ages 0-14**	**Ages 15-64**	**Ages over 65**
N70-N77 Inflammatory diseases of female pelvic organs	264.0	99.99***	-89.40	263.9	100.1***	-89.33
N80-N98 No inflammatory disorders of female genital tract	200.0*	152.4***	8.715	200.0*	152.5***	8.611
N99 Other disorders of the genitourinary system	-317.1	52.30	-194.3	-317.9	52.48	-194.5
O00-O08 Pregnancy with abortive outcome	-16.48	95.11***	2643.6	-15.01	95.16***	2632.6
O10-O75, O85-O92, O95-O99 Complications of labour and delivery	39.55	133.9***	-116.6	41.95	134.0***	-113.6
O80-O84 Delivery	138.0	61.63***	0	140.1	61.53***	0
P00-P04 Complications of foetus/neonate affected by maternal	73.59	0	0	73.03	0	0
P05-P96 Other conditions originating in the perinatal period	467.8**	238.9	-1284.1	468.0**	239.1	-1287.8
Q00-Q89 Congenital malformations	282.9***	340.7***	-86.73	282.9***	340.8***	-87.40
Q90-Q99 Chromosomal abnormalities nec.	601.2***	527.9**	10.89	601.3***	528.0**	11.47
R00-R09 Symptoms & signs inv. the circulatory/respiratory system	247.1***	186.7***	226.0***	247.1***	186.7***	226.0***
R10-R19 Symptoms & signs inv. the digestive system & abdomen	171.1***	227.9***	193.9***	171.1***	228.0***	194.0***
R20-R23 Symptoms & signs inv. the skin & subcutaneous tissue	182.5***	171.8***	235.7**	182.4***	171.8***	235.7**
R25-R29 Symptoms & signs inv. the nervous & musculoskeletal sys.	287.6**	438.7***	490.4***	287.5**	438.7***	490.4***
R30-R39 Symptoms & signs involving the urinary system	222.7***	165.9***	5.064	222.7***	166.0***	5.120
R40-R46 Symptoms & signs inv. Cognition, perception etc.	387.8***	189.7***	93.50*	387.9***	189.7***	93.94*
R47-R49 Symptoms & signs inv. speech & voice	114.8	-9.681	188.2*	115.0	-9.569	187.9*
R50-R68 General symptoms & signs	279.4***	237.4***	179.8***	279.4***	237.4***	179.7***
R69 Unknown & unspecified causes of morbidity	-607.9***	73.44	-147.0	-608.6***	73.35	-144.8
R70-R89 Abnormal findings of bodily fluids or samples without diag.	104.9	439.6***	224.1***	104.9	439.6***	224.1***
R90-R94 Abnormal findings on diagnostic imaging/function studies	500.9*	249.9***	63.89	500.8*	249.9***	63.98
R95-R99 Ill-defined & unknown causes of mortality	0	580.5***	-489.8***	0	581.1***	-499.1***
S00-S09 Injuries to the head	129.7***	175.7***	187.1***	129.8***	175.6***	187.3***
S10-S19 Injuries to the neck	423.9	166.6	356.1	423.7	166.5	356.2
S20-S29 Injuries to the thorax	331.6	131.8	211.8*	331.6	131.5	212.0*
S30-S39 Injuries to abdomen, lower back, lumbar spine & pelvis	60.06	268.4***	-1.296	60.18	268.3***	-1.605
S40-S49 Injuries to the shoulder & upper arm	82.13	291.9***	63.78	82.18	292.0***	64.09
S50-S59 Injuries to the elbow & forearm	112.7***	203.0***	-39.53	112.8***	203.0***	-39.37
S60-S69 Injuries to the wrist & hand	116.0*	163.9***	-74.63	116.1*	163.9***	-74.53
S70-S79 Injuries to the hip & thigh	284.2***	453.9***	-317.3***	284.5***	453.8***	-317.2***

	PBRA CCG			PBRA T-STAT SELECTION		
	Ages 0-14	**Ages 15-64**	**Ages over 65**	**Ages 0-14**	**Ages 15-64**	**Ages over 65**
S80-S89 Injuries to the knee & lower leg	200.1***	185.4***	37.91	200.2***	185.4***	37.81
S90-S99 Injuries to the ankle & foot	264.8*	158.5**	174.9	265.0*	158.4**	175.0
T00-T07 Injuries involving multiple body regions	63.59	352.1*	-4.698	63.59	352.1*	-3.468
T08-T14 Injuries to unspecified part of trunk limb or body	44.30	219.4	-191.8	44.02	219.2	-191.8
T15-T19 Effects of foreign body entering through natural orifice	48.97	239.5**	149.2	49.13	239.5**	149.4
T20-T32 Burns and corrosions	139.9**	65.99	667.5	139.9**	66.05	667.9
T33-T35 Frostbite	0	3605.8	-2308.0**	0	3607.6	-2309.2**
T36-T50 Poisonings by drugs medicaments & biological substances	182.0**	255.7***	-49.14	181.8**	255.7***	-49.23
T51-T65 Tox. effects. of substances. chiefly non-medicinal as to source	82.39	121.8**	-77.41	82.45	121.7**	-77.32
T66-T78 Other and unspecified effects of external causes	103.6*	207.2*	487.2**	103.5*	207.2*	486.3**
T79 Certain early complications of trauma	-23.70	200.1	-487.2*	-23.43	199.7	-486.0*
T80-T88 Complications of surgical & medical care nec.	573.3***	483.9***	637.7***	573.3***	483.9***	637.6***
T90-T98 Sequelae of injuries of poisoning & other consequences	88.71	60.12	300.2	88.72	59.96	300.4
VVV	187.0***	81.32*	-19.07	187.0***	81.23*	-19.89
WWW	183.7***	102.8***	143.2**	183.6***	102.8***	143.1**
XXX	255.1***	105.0**	200.8*	255.2***	105.0**	200.8*
YYY	-59.69	244.9***	142.0***	-59.68	244.9***	142.0***
Z00-Z13 Examination and investigation	148.3***	112.9***	32.26	148.3***	112.8***	32.33
Z20-Z29 Potential health hazards related to communicable diseases	522.4*	325.0***	330.7**	522.4*	324.9***	331.0**
Z30-Z39 Health services in circumstances related to reproduction	28.56	75.06***	288.5	28.15	75.11***	289.6
Z40-Z54 Persons encountering health services for specific care	581.7***	745.2***	810.3***	581.7***	745.2***	810.4***
Z55-Z65 Potential health hazards reltd. to socioeconomic & psychosoc	187.0	176.0***	213.4***	187.2	175.8***	213.6***
Z70-Z76 Persons encountering health services in other circs.	955.1***	163.9***	64.79	954.9***	163.8***	65.05
Z80-Z99 Persons with potential health hazards related to family	290.7***	252.2***	159.8***	290.7***	252.2***	159.8***
U Unclassified	1001.9**	1461.1***	888.6***	1002.0**	1461.1***	888.5***
Morbidity Interactions						
a00b99-g00g99	518.5**	234.7	89.75	518.4**	234.7	89.64
a00b99-h00h59	194.1	701.7**	220.8	194.1	701.9**	220.6
a00b99-o00o99	2440.1***	-533.3***	0	2439.3***	-533.2***	0
a00b99-q00q99	368.6**	440.9	675.5	368.6**	441.0	676.4
a00b99-z00z99	-16.48	298.0***	111.4	-16.49	298.0***	111.0
c00d48-h00h59	278.2	-185.8	-184.0**	278.3	-186.0	-184.1**
c00d48-l00l99	34.35	-177.4	-209.0**	34.44	-177.5	-209.0**
c00d48-n00n99	110.2	-90.64	-124.4*	110.2	-90.67	-124.5*

	PBRA CCG			PBRA T-STAT SELECTION		
	Ages 0-14	**Ages 15-64**	**Ages over 65**	**Ages 0-14**	**Ages 15-64**	**Ages over 65**
c00d48-p00p96	118.9	-1616.8*	-86.27	116.5	-1616.3*	-93.33
c00d48-z00z99	-65.52	102.5**	130.0***	-65.64	102.5**	129.9***
d50d89-k00k93	-276.1	-134.1	-370.9***	-276.2	-134.0	-371.2***
d50d89-o00o99	437.2	-634.1***	-5424.8***	437.0	-634.2***	-5455.2***
d50d89-z00z99	948.9**	482.5***	274.4***	948.9**	482.6***	274.8***
e00e90-g00g99	164.1	82.73	52.21	164.2	82.70	52.16
e00e90-h00h59	1100.2*	308.0***	46.08	1100.1*	308.0***	46.03
e00e90-i00i99	-91.64	-156.5***	-133.0***	-91.62	-156.5***	-133.1***
e00e90-l00l99	103.9	322.3***	167.1**	103.7	322.3***	166.8**
e00e90-o00o99	521.8	-149.0***	11460.4***	523.5	-149.1***	11434.9***
e00e90-r00r99	331.8***	11.81	28.38	331.8***	11.72	28.33
e00e90-z00z99	346.2**	59.72*	-42.42	346.3**	59.74*	-42.39
f00f99-i00i99	-53.33	-12.52	-61.75	-53.37	-12.58	-61.85
f00f99-j00j99	212.6	-31.00	-28.03	212.6	-31.04	-28.44
f00f99-o00o99	236.4	-65.26***	3838.7***	235.7	-65.35***	3827.9***
f00f99-r00r99	-20.81	-13.27	14.43	-20.88	-13.29	14.63
h00h59-l00l99	404.6	563.9**	117.2	404.6	564.0**	117.1
i00i99-k00k93	427.9	-60.58**	-48.66*	427.8	-60.57**	-48.69*
i00i99-l00l99	102.7	282.1***	131.7*	102.9	282.1***	131.7*
j00j99-o00o99	294.1	-159.6***	-5688.7***	293.2	-159.5***	-5688.3***
k00k93-n00n99	181.2	38.52	55.39	181.3	38.44	55.48
k00k93-q00q99	311.0**	324.9**	111.5	310.9**	324.8**	111.6
l00l99-m00m99	453.8	142.2*	86.52	454.1	142.2*	86.62
l00l99-r00r99	43.03	201.2***	159.4*	43.04	201.1***	159.4*
m00m99-n00n99	180.3	16.27	-247.9***	180.5	16.25	-248.0***
m00m99-o00o99	-397.1	-243.0***	-446.0	-401.8	-243.0***	-434.1
n00n99-q00q99	90.92	136.4	803.6***	90.88	136.4	803.7***
n00n99-s00t98	115.4	392.4***	50.44	115.4	392.3***	50.56
n00n99-z00z99	1.204	-15.30	113.5***	1.115	-15.28	113.6***
o00o99-r00r99	-2930.3***	-132.3***	3551.7***	-2928.3***	-132.3***	3555.2***
o00o99-z00z99	124.5	-0.164	-6791.4***	123.2	-0.123	-6772.7***
v01y98-z00z99	-102.5	-2.627	-33.83	-102.4	-2.650	-33.75
Morbidity Count 9						
No morbidities	0	0	0	0	0	0
2 morbidities	-98.36***	-51.89***	181.6***	-98.34***	-51.82***	181.2***
3 morbidities	-273.6***	-209.8***	34.97	-273.5***	-209.7***	34.92
4 morbidities	-390.0***	-248.1***	121.1**	-390.0***	-248.0***	120.7**
5 morbidities	-288.8***	-240.0***	37.80	-288.7***	-239.8***	37.52
6 morbidities	-508.2***	-400.8***	-101.0***	-508.1***	-400.7***	-101.1***
7 morbidities	-541.6***	-362.3***	25.73	-541.6***	-362.1***	25.70
8 morbidities	-512.9***	-399.0***	-52.21	-512.7***	-398.8***	-52.20
9 morbidities	-691.8***	-604.3***	-208.1***	-691.8***	-604.2***	-208.0***
New GP practice	28.51***	46.28***	-44.62**	28.62***	45.94***	-43.83**
Private care	-77.28	-34.92	-180.8**	-77.98	-35.63	-182.0**
Attributed Needs						
Log population variance		-56.78***			-61.48***	
All Usual Residents Aged 16+			-0.667***		0.00233	-0.659***
All Usual Residents Aged 16 to 74			0.693***			0.721***

	PBRA CCG			PBRA T-STAT SELECTION		
	Ages 0-14	**Ages 15-64**	**Ages over 65**	**Ages 0-14**	**Ages 15-64**	**Ages over 65**
Resident Population			-0.848***			-0.856***
Proportion Single Pensioner Households			10.99***			10.20***
Proportion aged 16-74 people never worked		1.241***			1.888***	
Proportion Single (never married)		0.500***	2.114***		0.392***	3.105***
Proportion Divorced		1.316***			1.708***	
Rented from private landlord or letting agency	-0.437***	-0.928***		-0.430***	-1.084***	-2.352***
Owner occupiers (Owned with a Mortgage or Loan)		0.634***	1.595***			
Proportion (un standardised) with not good health (NGH)		3.545***	20.23***		1.462*	15.80***
All people living in the area (from ONS mid-2011-lsoa-quinary-estimates(Census based))			0.871***			0.851***
Average with (long term) medical condition for those with at least one		8.179*	52.11**		9.800*	54.45**
2012-13 QOF KD Total Exceptions		0.0419**	0.102		0.0411**	0.110*
2012-13 QOF Epilepsy Prevalence (or estimated prevalence if preve)		29.77***			32.58***	
2012-13 QOF Mental Health Prevalence (or estimated prevalence if preve)		7.771***			7.168**	
Health Deprivation and Disability Score	10.84***	12.78***		15.40***	14.12***	
Children and Young People Sub-domain Score	5.465***	5.403***				
Attributed Supply						
Direct Distance		-0.567***				
Adult critical beds Jan 13			14.50***		1.524	13.41***
2012-13 Median wafting times (weeks) for Dermatology Patients		-8.508***	-31.29**		-6.571*	-28.25*
2012-13 Median wafting times (weeks)of the 95th percentile for Neurosurgery Patients			-23.18***		-4.037**	-22.65***
2012-13 QOF Obesity Weighted Achievement Score		5.487***				
Constant	370.0***	-496.7**	195.3***	369.8***	62.16***	290.8***
Observations	**1401037**	**5511690**	**1374208**	**1401037**	**5511690**	**1374208**
Adj R-Squared	**0.0981**	**0.117**	**0.0971**	**0.0981**	**0.117**	**0.0972**

* p<0.05, ** p<0.01, *** p<0.001

The models also include CCG dummies