Impact of the Southwark and Lambeth Integrated Care Older People's Programme on hospital utilisation and costs: controlled time series and cost consequence analysis: Appendix

Further details of statistical methods

This part of the appendix sets out the technical details of our statistical analysis. We consider four measures of secondary care use: A&E attendances, emergency admissions, outpatient attendances and elective admissions. The same methodology is applied to all four outcome measures. For each outcome we consider overall changes in the rates of admission within Southwark and Lambeth since the introduction of the Older People's Programme relative to what would have been expected based on what happened in areas of the country not implementing such a Programme. The counterfactual scenario was not explicitly calculated but implicitly built into the regression models and was based on practice specific pre-intervention levels and trends, changes seen in control practices over time as well as seasonality and a range of practice characteristics. All our analyses were completed using longitudinal Poisson regression modelling of practice admission/attendance rates.

Matching

The analysis makes use of a set of matched practices. Practices were matched using the so called 'genetic' matching algorithm[1] on baseline admissions/attendances and the rate of change of those admissions/attendances at baseline (with the exception of A&E attendances). The matching also included total list size, the proportion of patients registered with the practice over the age of 65, the proportion of patients registered with the practice over the age of 80, the proportion of patients registered with the practice that were male, the mean years since qualification of GPs, the number of patients per full time equivalent GP (a measure of workload) and the proportion of full time equivalents made up by male GPs, practice deprivation score and the proportion of the practice population describe themselves as white.

The matching was done to obtain five control practices per intervention practice. However, this was done with replacement meaning that one control practice could appear more than once in the comparison set. A total of 263 control practices were identified for the 94 intervention practices. Our original plan was to perform two sets of analyses. The first would include multiple copies of the data for those practices appearing in the matching set more than once. The purpose for doing this was to make the comparison set overall as close to the set of intervention practices as possible and reduce bias. The second set of analyses would only include each of the matched practices once. The reason for this was to avoid any exaggeration of statistical significance due to the artificially enhanced sample size. Unfortunately a number of practices in our analysis data set closed during the period of study and so maintaining an ideally matched overall sample throughout the period was not possible. For this reason we have only conducted the analysis including single copies of control practices. Because we used mixed effects regressions our findings can be interpreted as withinpractice changes and so between-practice differences which remain unchanged over time should not confound our observed associations. Furthermore, we adjust for all factors included in the matching process to improve robustness to such confounding.

Data processing

Data on hospital utilisation are taken from Hospital Episode Statistics. Here we make use of three separate datasets: admitted patient care, accident and emergency, and outpatients. Whilst the outpatients and accident and emergency datasets require little preliminary processing, the admitted patient care data does. The admitted patient care data is delimited at the level of the consultant led episode. Given a patient may receive care from more than one consultant's team during their time spent in hospital, it is important to link these episodes of care together to determine the actual number of admissions and the overall length of stay. We use the algorithm developed by the Centre for Health Economics, University of York, to define Continuous Inpatient Spells (CIPS) which also recognise that patients may be transferred between hospitals in anyone admission. Once the CIPS are constructed they are flagged according to whether the admission was elective or an emergency.

Once data pre-processing is complete, admissions or attendances of each type are aggregated for each quarter from April 2009 in groups defined by general practice of patient, age of patient (in five year bands from 65 upwards, up to 85 years old and one group for 85 years and older) and gender of patient. This gives 10 strata per practice at each time point. Data are restricted to those 65 years of age and older and to April 2009 onwards.

In order to model the rates of admissions we need to know the denominator populations to which these admissions refer. These are calculated from the number of patients registered with the practice in the appropriate age by gender strata. The data on practice population are recorded in April each year. These denominators are then applied to each quarter in the calendar year. We excluded data from practices in years in which their practice code did not appear in the denominator data, even when attendances or admissions were attributed to patients at the practice. Further, we excluded the data from practices in the year preceding that where the practice did not appear, in order to exclude practices where mergers or closures may have occurred during the year of analysis. Although such exclusions introduced missing data the model framework used (a longitudinal mixed effects model) is robust to missing data over time under the assumption that the data are missing at random conditional on the covariates in the model.[2]

Statistical analysis

We made use of a series of five models for each of the outcomes of interest to probe the effect of the intervention. The basic structure of each model is the same, differing only in the way in which we operationalise the intervention in the models. We first describe the general model in the absence of the intervention and then describe how the intervention is captured.

General model

The models used are mixed effect Poisson models, where the outcome is the number of admissions or attendances in each practice by age group and gender strata. In order to model rates rather than counts, an offset equal to the population denominator for that stratum (see Data section above) is applied in the model. Being a longitudinal model, there are multiple observations for each practice by age group and gender stratum (i.e. one for each quarter of data used). As such we consider the data to be clustered by practice and this is captured using a random intercept.

The models contain strata level categorical fixed effects for age group and gender. They also contain a number of practice level continuous fixed effects describing the practice. These are the total list size, the proportion of patients registered with the practice 65 and over, the proportion of patients registered with the practice aged 80 and over, the proportion of patients registered with the practice that were male, the practice deprivation score, the proportion of the practice population describe themselves as white, the number of GPs at the practice (excluding registrars), the number of full time equivalent GPs, the mean years since qualification of GPs, and the proportion of full time equivalents made up by male GPs. We also include an indicator for SLIC practices in case there remain any systematic differences between them and the control practices.

Background change in the model is captured using four fixed effects and two random effects. Firstly a categorical indicator variable is used for quarter of the year to capture seasonality. This protects against the confounding effect of interventions starting in a particular season and erroneously attributing the seasonal change to the intervention. A quarterly time variable has been created which is the number of quarters from January 2000, which was included as both a squared and cubic terms. Including these three variables as continuous fixed effects allows for the background trend over time to be increasing or decreasing and for this trend to be non-linear. Further, the time variable is included as random effect to allowing the modelled trends over time in admissions to be differential by practice.

Operationalising the intervention within the general regression model

Five models were constructed to model the effect of the various interventions on the range of hospital utilisation outcomes.

Model 1

In this model a categorical variable is included taking a value of 0 for all observations prior to the start of SLIC and for control practices at all time points. For SLIC practices it takes the value of the number of years since the start of the intervention, i.e. 1 in 2012/13, 2 in 2013/14 etc. The resulting rate ratios show on average the relative rate of admission in intervention practices compared to what would have been expected had the effect of the intervention been absent. This rate ratio represents the average difference over a financial year. The model treats all GP practices within the SLIC catchment area as receiving the intervention i.e. includes both practices that are and are not performing HAs/integrated care management.

Model 2

Recognising that not all practices are performing the intervention at the same level, we decided to perform a dose-response analysis. In order to do that we calculated for each practice at each quarter the cumulative number of HAs that had been performed. This was then divided by the number of over 65 year olds registered at that practice. Whilst in theory patients may have received more than one HA, we interpret this number as the proportion of over 65 year olds who have received an HA. This variable is by definition zero for non-SLIC practice and pre-intervention. Including this variable in our model captures this dose-response effect. The resulting rate ratio is the average change in the rate of admissions or attendances for a 1% increase in the proportion of the population over 65 receiving HA.

Model 3

As above but restricting the model only to SLIC practices. By doing this the SLIC practices act as their own control, comparing SLIC practices with high volumes of intervention with those with low volumes. Background trends in this model are informed by SLIC practices only.

Model 4 and 5

Models 4 and 5 repeat 2 and 3 but replacing HAs with integrated care management.

A summary of the models and their interpretation is show in box A1

Box A1. Summary of the five models assessing changes in hospital utilisation.

Changes in rates of admissions over time

Model 1: shows the average practice change in the rate of hospital use on a year-by-year basis relative to what would have been expected with not being part of the SLIC Programme. The model includes both practices that were and were not performing HAs/integrated care management. The results are presented for four financial years' (April to March) data, starting in April 2012 to March 2016.

The resulting rate ratios can be interpreted as the average difference between practices (the relative rate of admission in intervention practices, compared to control practices). A rate ratio of 1 indicates no change, while a rate ratio greater than 1 represents an increase in admissions in the intervention compared to what was expected and a rate ratio less than 1 represents a decrease in admissions in the intervention compared to what was expected.

Effect of increasing HAs and integrated care management (compared to control practices)

Model 2: shows the average change in the rate of hospital utilisation for the six outcomes for a 1% increase in the proportion of the population aged 65 and over receiving HA. As above, this model accounts for background changes informed by national trends in our control group of practices, individual practice preintervention trends, seasonality and individual practice characteristics. In contrast to model 1, here we treat practices not performing HAs as having zero "dose" of intervention, as with the control group of practices.

Model 4: shows the average change in the rate of hospital utilisation for the six outcomes for a 1% increase in the proportion of the population aged 65 and over receiving integrated care management. As above this model accounts for background changes informed by national trends in our control group of practices, individual practice pre-intervention trends, seasonality and individual practice characteristics. In contrast to model 1, here we treat SLIC practices not undertaking integrated care management as having zero 'dose' of intervention, along with the control group of practices.

Effect of increasing HAs and integrated care management (analysis restricted to SLIC practices)

Model 3: repeats analysis of model 2 but is restricted to SLIC practices. It shows the average change in the rate of hospital utilisation for the six outcomes for a 1% increase in the proportion of the population aged 65 and over receiving an HA. Background trends in this model are informed by SLIC practices only.

Model 5: the analysis repeats that of model 4 but is restricted to SLIC practices. It shows the average change the rate of hospital utilisation for the six outcomes for a 1% increase in the proportion of the population aged 65 and over receiving integrated care management. Background trends in this model are informed by SLIC practices only.

The resulting rate ratios for models 2 to 5 can be interpreted as the average difference between two practices, where one is performing HAs/integrated care management on 1% more of its patients aged 65 and over than the other. A rate ratio of 1 indicates no change, while a rate ratio greater than 1 represents an increase, and a rate ratio less than 1 represents a decrease, for example, in admissions.

Data structure, sample size and sensitivity analysis

All of the analyses were conducted at the GP practice-level. Outcome data used for the analyses come from Hospital Episode Statistics (HES) – a centrally held data warehouse containing details of all admissions, outpatient appointments and A&E attendances at NHS hospitals in England. Our dataset consists of 357 practices, including 94 practices in Southwark and Lambeth, and covers the time period from the three years prior to, and four years following, the start of the Programme (2nd quarter of 2009 to 1st quarter of 2016). For each GP practice we know the number of admissions and attendances in each five-year age band (5 age groups) for each gender and for each quarter over the seven years (28 quarters). We refer to each of these as a 'stratum', for example, the number of admissions or attendances for women in the age group 65 to 69 years old during the 1st quarter of

2015 in a specific GP practice. In total the data set consisted of 98,081 strata for hospital admissions/attendance, corresponding to a population of between 194,337 and 215,447 at any one time period (the actual population served changed over time). In analyses of admissions and A&E attendance which were restricted to SLIC practices the dataset included 25,702 strata corresponding to populations of between 50,356 and 53,869 in any one time period. When considering inpatient length of stay 87,338 strata were included in the model corresponding to between 35,410 and 45,816 admissions in any one quarter. Inpatient length of stay models restricted to SLIC practices included populations of between 10,542 and 12,596 in any one time period.

Initial inspection of the raw data showed that for some practices there were times where the rates of admission or attendances were very high in one or more of the strata (as above, these are fiveyear age bands subdivided by gender for each quarter in each of the three years prior to and four years following the start of the Programme). To examine the influence of these high rates we carried out sensitivity analyses excluding data where very high admission/attendance rates or mean lengths of stay were seen (excluding individual strata with more than one admission per person per quarter for A&E attendance and inpatient emergency admissions, more than three admissions per person per quarter for inpatient elective admissions or more than four admissions per person per quarter for outpatient appointments). In the inpatient length of stay analysis we excluded mean lengths of stay longer than 1 year. These sensitivity analyses excluded up to a maximum of 108 patients at risk for A&E admissions, 926 for outpatient appointments, 77 for elective admission and 21 for emergency admissions (these are maximum numbers per quarter, the number of exclusions varies by quarter). For inpatient length of stay a maximum of 160 admissions were excluded in a given quarter. None of the sensitivity analyses made a material difference to our conclusions and the detailed results are therefore not included in the report, but are available on request from the authors.

Further details of the economic analysis

In the appendix we also expand on the results shown in the main paper which refer to average NHS costs. In actuality, these vary across the country and routine NHS statistics report lowest and highest costs as well as the average value. In the first table here (table A3), we show the bounds of these tariff values. In the second table (A4) we additionally show as a sensitivity analysis the effect of using upper and lower bounds of costs and also upper, average and lower bounds of activity based on the confidence intervals reported in the statistical analysis.

Further results of the analyses: Tables

The main results are summarised in tables 1, 2 and 3 in the main paper. Here we reproduce more detailed outputs which contain analysis for each year in model 1 and full outputs from models 2 to 5. Model outputs are provided for each of the five outcome measures.

In the following tables (A1, A2 for length of stay and A5 to A14 for other outcomes), rate ratios for model 1 represent the relative change in the rate of admission or length of stay compared to what would have been expected in the absence of SLIC activity. In models 2 to 5 the rate ratios represent the average relative difference between two practices, where one is performing HAs or integrated care management on 1% more of its patients aged 65 and over than the other. A rate ratio of 1 indicates no change, while a rate ratio greater than 1 represents an increase, and a rate ratio less than 1 represents a decrease, in admissions. Observed attendance rate refers to the observed attendance rate in patients aged 65 and over across all SLIC practices included in the analysis. The expected rate has been calculated according to the model results and is equal to the observed rate/rate ratio. For Holistic Assessments (HAs) and Integrated Care Management (ICM), the expected change in attendances has been calculated from the model rate ratio for 18.9% of the 65 and over population receiving HAs and for 1.9% of the 65 and over population receiving integrated care management.

Table A1. Length of stay for all inpatient admissions: Comparison with control practices

Year	Rate ratio for length of stay[a] (95% CI)[b]	p-value[c]	Observed mean length of stay for SLIC practices[d] (in days)	Expected mean length of stay in the absence of SLIC intervention[d] (in days)
2012/13	1.073 (1.014-1.134)	0.014	28	26
2013/14	1.009 (0.942-1.081)	0.797	No significant change	No significant change
2014/15	1.004 (0.932-1.083)	0.907	No significant change	No significant change
2015/16	1.011 (0.937-1.090)	0.776	NS	No significant change

Table A2. Length of stay for all inpatient admissions: Effect of HAs and integrated care management

Rate ratio for length of stay[a] (95% CI)[b]	p-value[c]	Expected change in length of stay per 10,000 HAs or per 1,000 ICMs
Model 2 – Effect of HAs (cumulative total over four years compared to control practices)		
0.999 (0.997-1.001)	0.467	No significant change
Model 3 – Effect of HAs (cumulative total over four years – SLIC practices only)		
1.000 (0.997-1.002)	0.754	No significant change
Model 4 – Effect of Integrated care management (cumulative total over four years compared to control practices)		
0.995 (0.983-1.007)	0.420	No significant change
Model 5 – Effect of Integrated care management (cumulative total over four years – SLIC practices only)		
0.996 (0.981-1.012)	0.657	No significant change

Table A3. Economic analysis: Low, Average and High standard NHS Tariff Value Range (2017/18)

	Lowest	Average	Highest
A&E Attendances	£91	£184	£322
Emergency Admissions	£628	*	£2,953
Elective Admissions	£2,517	£3,903	£4,162
Out-patients	£138	£138	£138

*not available

Table A4. Economic analysis: Net cost in comparison to control practices of the Older People's Programme per Southwark and Lambeth resident ≥65: sensitivity analysis using low, average and high

NHS tariffs and lower, average and upper bounds of estimated impact on hospital utilisation

	Lower bound of activity			Mean bound of activity			Upper bound of activity		
	Lowest tariff	Average tariff	Highest tariff**	Lowest tariff	Average tariff	Highest tariff	Lowest tariff	Average tariff	Highest tariff
Total SLIC cost	£149	£149 -£103 -	£149	£149	**£149**	£149	£149	£149	£149
Total offset	£99		-£154	-£70	**-£86**	-£106	-£45	-£15	-£45
Net Total SLIC cost	£47	£50	£4	£79	**£64**	£43	£105	£134	£105
Total SLIC cost (net infrastructure costs)	£91	£91	£91	£91	**£91**	£91	£91	£91	£91
Net Total SLIC cost	-£12	-£8	-£63	£21	£5	-£15	£46	£76	£46

*The figures in bold are those presented and discussed in the main paper. ** For A&E attendance the figure of £2953 was used for both upper and average tariff.

Table A5. A&E attendance: Comparison with control practices

Year	Rate Ratio[a] (95% CI)[b]	p-value[c]	Observed rate for SLIC practices (A&E attendances per 1000 patients per year)	Expected rate in the absence of intervention (A&E attendances per 1000 patients per year)
2012/13	1.020 (1.002-1.038)	0.032	144	141
2013/14	1.001 (0.978-1.025)	0.931	No significant change	No significant change
2014/15	0.973 (0.946-1.002)	0.068	No significant change	No significant change
2015/16	0.944 (0.913-0.976)	0.001	144	153

Table A6. A&E attendance: Effect of HAs and integrated care management

Rate Ratio[a] (95% CI)[b]	p-value[c]	Expected change in number of A&E attendances per 10,000 HAs[e] or per 1,000 ICMs[f]
Model 2 – Effect of HAs (cumulative total over four years compared to control practices)		
1.000 (0.999-1.000)	0.306	No significant change
Model 3 – Effect of HAs (cumulative total over four years – SLIC practices only)		
1.000 (0.999-1.001)	0.760	No significant change
Model 4 – Effect of integrated care management (ICMs, cumulative total over four years compared to control practices)		
1.004 (0.999-1.008)	0.114	No significant change
Model 5 – Effect of integrated care management (cumulative total over four years – SLIC practices only)		

1.000 (0.995-1.006)	0.911	No significant change

Table A7. Emergency admissions: Comparison with control practices

Year	Rate Ratio[a] (95% CI)[b]	p-value[c]	Observed rate for SLIC practices[d] (emergency admissions per 1000 patients per year)	Expected rate in the absence of intervention[d] (emergency admissions per 1000 patients per year)
2012/13	1.043 (1.019-1.067)	<0.001	77	74
2013/14	1.031 (1.001-1.062)	0.043	77	75
2014/15	1.019 (0.983-1.056)	0.301	No significant change	No significant change
2015/16	1.011 (0.971-1.052)	0.600	No significant change	No significant change

Table A8. Emergency admissions: Effect of HAs and integrated care management

Rate Ratio[a] (95% CI)[b]	p-value[c]	Expected change in number of emergency admissions per 10,000 HAs[e] or per 1,000 ICMs[f]
Model 2 – Effect of HAs (cumulative total over four years compared to control practices)		
1.000 (0.999-1.001)	0.497	No significant change
Model 3 – Effect of HAs (cumulative total over four years – SLIC practices only)		
1.001 (1.000-1.002)	0.201	No significant change
Model 4 – Effect of Integrated care management (ICM, cumulative total over four years compared to control practices)		
1.004 (0.998-1.009)	0.177	No significant change
Model 5 – Effect of Integrated care management (ICM, cumulative total over four years – SLIC practices only)		
1.005 (0.998-1.011)	0.190	No significant change

Table A9. Emergency admissions for ambulatory care sensitive conditions: Comparison with control practices

Year	Rate Ratio (95% CI)*	p-value	Observed rate for SLIC practices[d] (ACSC admissions per 1000 patients per year)	Expected rate in the absence of intervention[d] (ACSC admissions per 1000 patients per year)
2012/13	1.072 (1.026-1.120)	0.002	21	19
2013/14	1.118 (1.056-1.184)	<0.001	21	19
2014/15	1.149 (1.076-1.228)	<0.001	22	19
2015/16	1.073 (1.004-1.147)	0.037	20	19

Table A10. Emergency admissions for ambulatory care sensitive conditions: Effect of HAs and integrated care management

Rate Ratio (95% CI)*	p-value	Expected change in number of ACSC admissions per 10,000 HAs[e] or per 1,000 ICMs[f]

Model 2 – Effect of HAs (cumulative total over four years compared to control practices)		
1.001 (1.000-1.003)	0.073	No significant change
Model 3 – Effect of HAs (cumulative total over four years – SLIC practices only)		
1.001 (0.998-1.003)	0.516	No significant change
Model 4 – Effect of Integrated care management (ICM, cumulative total over four years compared to control practices)		
1.008 (0.998-1.017)	0.127	No significant change
Model 5 – Effect of Integrated care management (ICM cumulative total over four years – SLIC practices only)		
1.005 (0.992-1.017)	0.476	No significant change

Table A11. Outpatient attendance: Comparison with control practices

Year	Rate Ratio[a] (95% CI)[b]	p-value[c]	Observed rate for SLIC practices[d] (outpatient attendances per 1000 patients aged 65 and over per year)	Expected rate in the absence of intervention[d] (outpatient attendances per 1000 patients aged 65 and over per year)
2012/13	0.961 (0.954-0.968)	<0.001	1093	1137
2013/14	1.004 (0.995-1.014)	0.375	NS	NS
2014/15	0.973 (0.961-0.985)	<0.001	1213	1247
2015/16	0.921 (0.908-0.935)	<0.001	1220	1324

Table A12. Outpatient attendance: Effect of HAs and integrated care management

Rate Ratio[a] (95% CI)[b]	p-value[c]	Expected change in number of outpatient attendances per 10,000 HAs[e] or per 1,000 ICMs[f]
Model 2 – Effect of HAs (cumulative total over four years compared to control practices)		
1.000 (1.000-1.000)	0.557	No significant change
Model 3 – Effect of HAs (cumulative total over four years – SLIC practices only)		
1.002 (1.001-1.002)	<0.001	9149
Model 4 – Effect of Integrated care management (ICM, cumulative total over four years compared to control practices)		
1.003 (1.001-1.005)	<0.001	1491
Model 5 – Effect of Integrated care management (ICM, cumulative total over four years – SLIC practices only)		
1.008 (1.006-1.010)	<0.001	4172

Table A13. Elective admissions: Comparison with control practices

Year		Rate Ratio[a] (95% CI)[b]	pvalue[c]	Observed rate for SLIC practices[d] (elective admissions per 1000 patients aged 65 and over per year)	Expected rate in the absence of intervention[d] (elective admissions per 1000 patients aged 65 and over per year)
2012/13		1.001 (0.982-1.020)	0.945	No significant change	No significant change

2013/14		0.990 (0.965-1.016)	0.454	No significant change	No significant change
2014/15		0.955 (0.924-0.987)	0.005	156	164
2015/16		0.938 (0.902-0.975)	0.001	153	164

Table A14. Elective admissions: Effect of HAs and integrated care management

Rate Ratio[a] (95% CI)[b]	**p-value[c]**	**Expected change in number of elective admissions per 10,000 HAs[e] or per 1,000 CMs[f]**
Model 2 – Effect of HAs (cumulative total over four years compared to control practices)		
1.001 (1.000-1.001)	0.165	No significant change
Model 3 – Effect of HAs (cumulative total over four years – SLIC practices only)		
1.004 (1.003-1.005)	<0.0001	2399
Model 4 – Effect of Integrated care management (cumulative total over four years compared to control practices)		
1.012 (1.007-1.016)	<0.001	735
Model 5 – Effect of Integrated care management (cumulative total over four years – SLIC practices only)		
1.024 (1.018-1.030)	<0.0001	1501

Further results of the analysis: Figures

The following figures show differences between control and intervention practices at baseline.

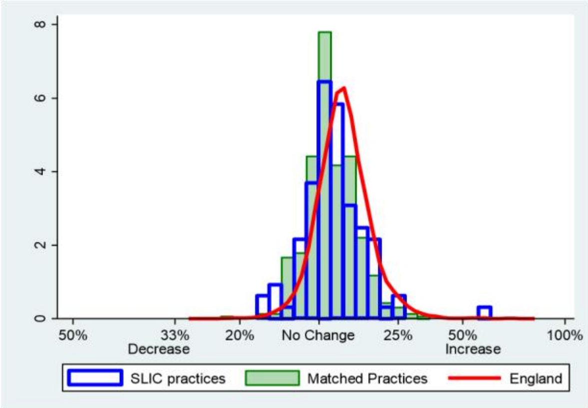

Figure 1. Age adjusted emergency admission rate for over 65 year olds, 2010/11

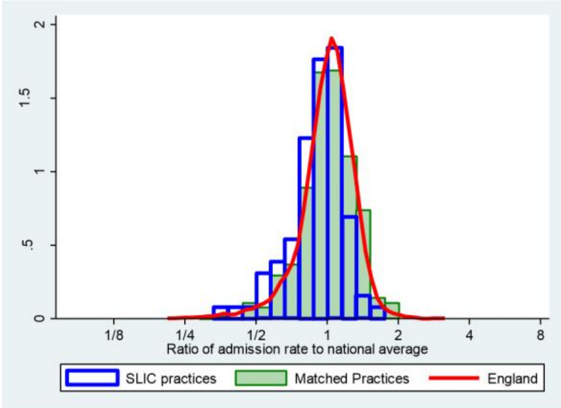

Figure 2. Age adjusted elective admission rate for over 65 year olds, 2010/11

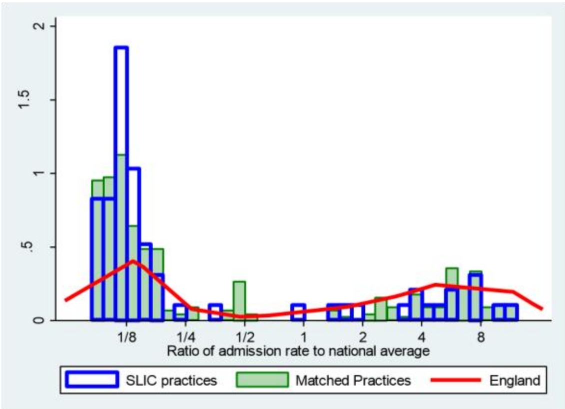

Figure 3. Age adjusted emergency admission rate: ACSC admissions for over 65 year olds, 2010/11

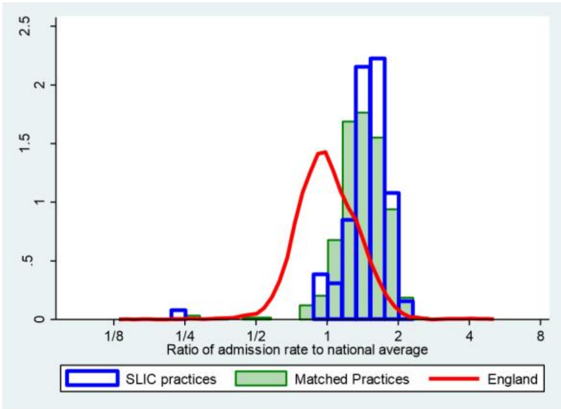

Figure 4. Age adjusted outpatient attendance rate for over 65 year olds, 2010/11

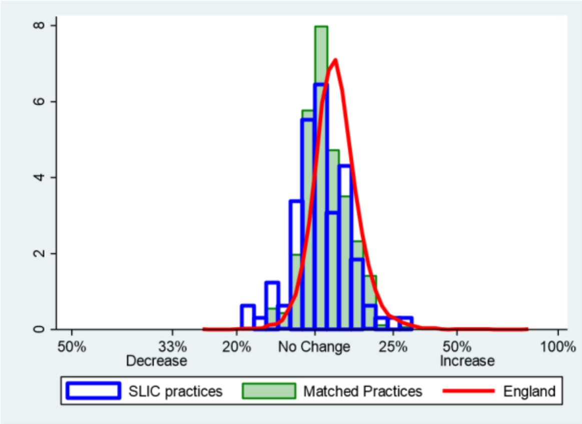

Figure 5. Age adjusted annual relative change in emergency admission rate for over 65 year olds

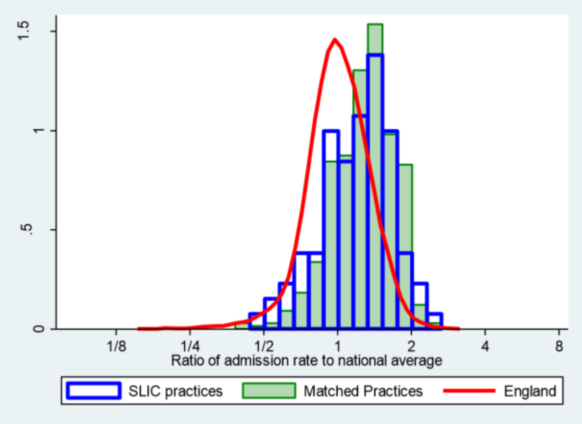

Figure 6 Age adjusted annual relative change in elective admission rate for over *65 year olds*

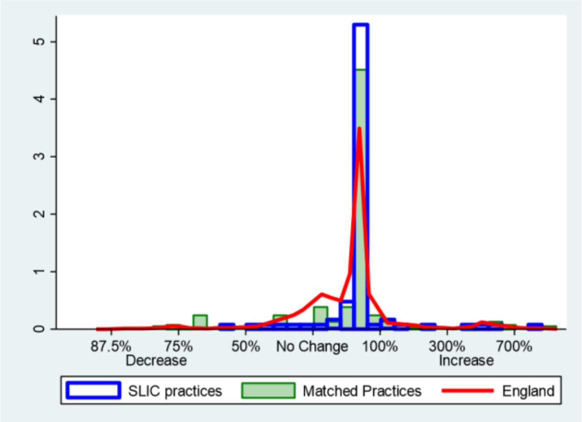

Figure 7. Age adjusted annual relative change in emergency admission rate and ACS conditions admissions for over 65 year olds

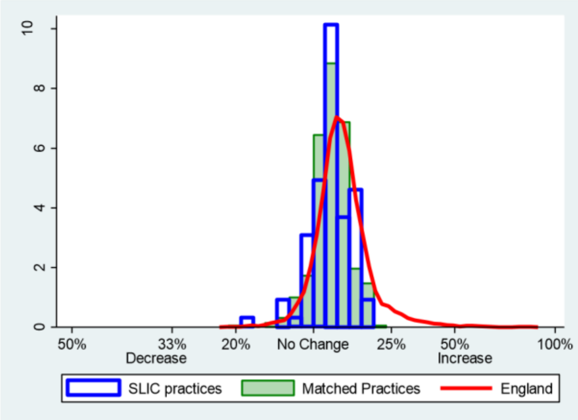

Figure 8. Age adjusted annual relative change in outpatient attendance rate for over 65 year olds

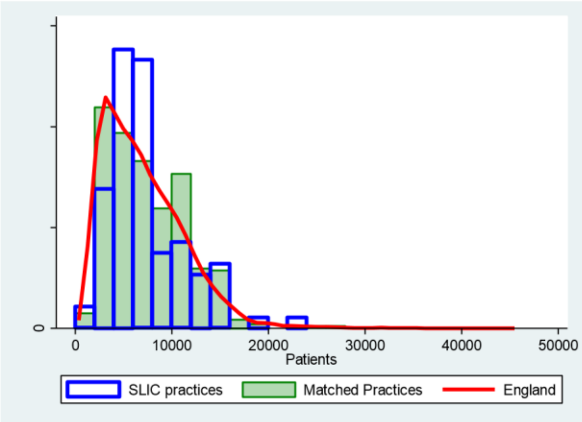

Figure 9. Practice list size

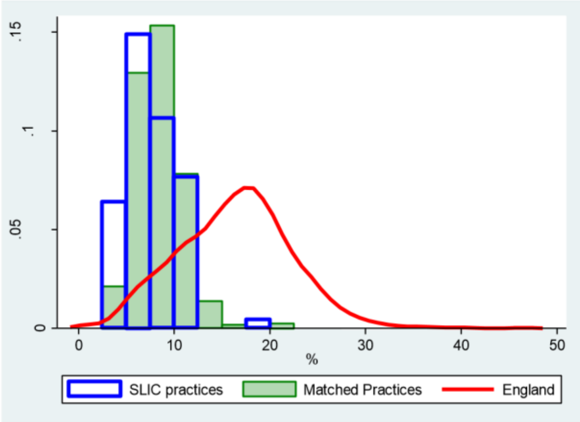

Figure 10. Percentage of practice population over the age of 65

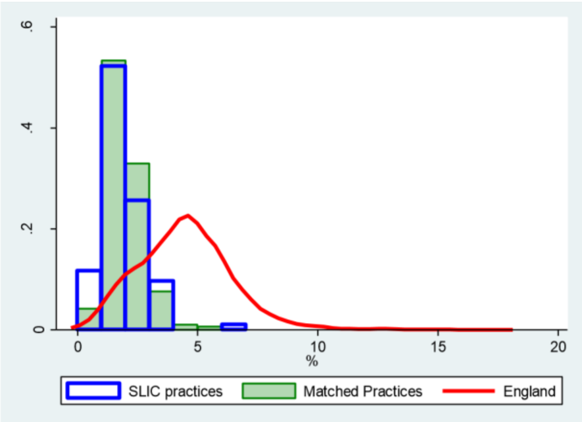

Figure 11 Percentage of practice population *over the age of 80*

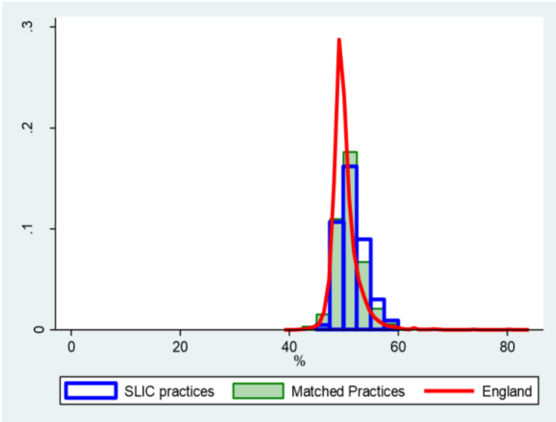

Figure 12. Percentage of practice population who are male

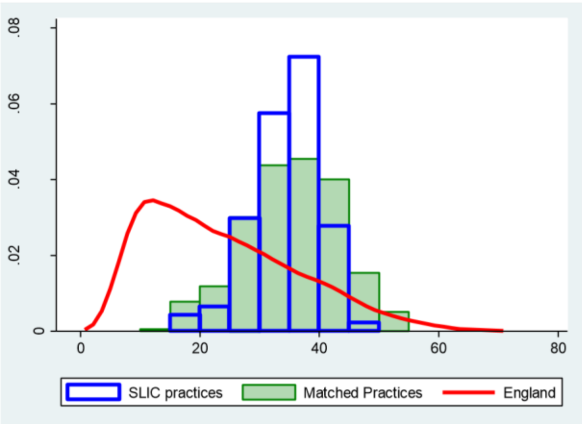

Figure 13. Practice deprivation score

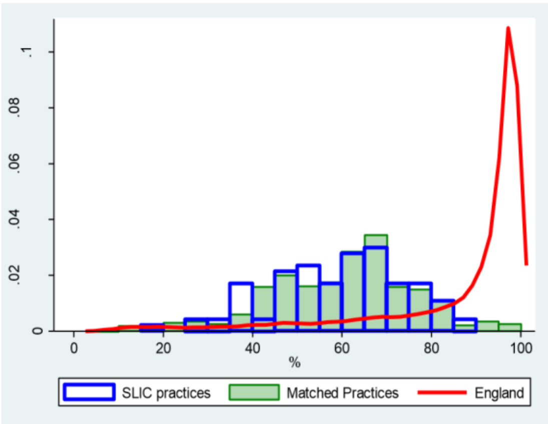

Figure 14. Percentage of practice population who describe themselves as white

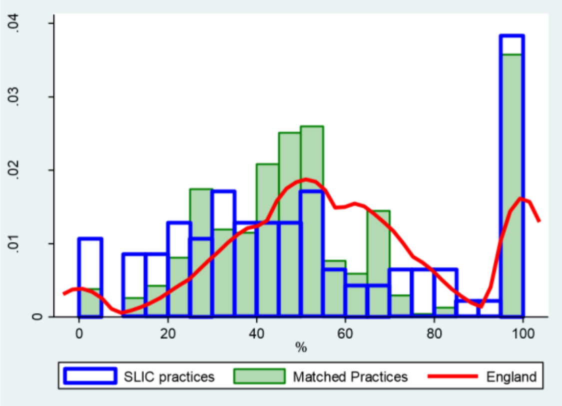

Figure 15. Percentage of full-time equivalents made up of male GPs

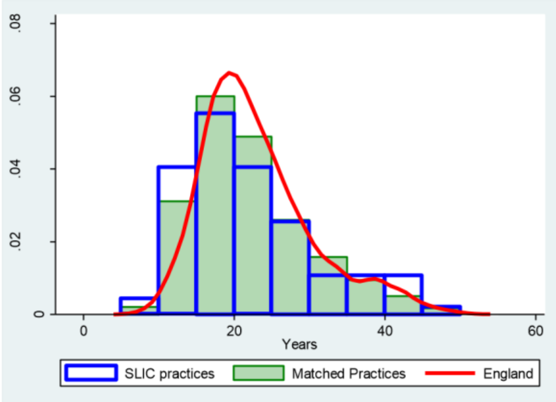

Figure 16. Mean years since qualification of GPs

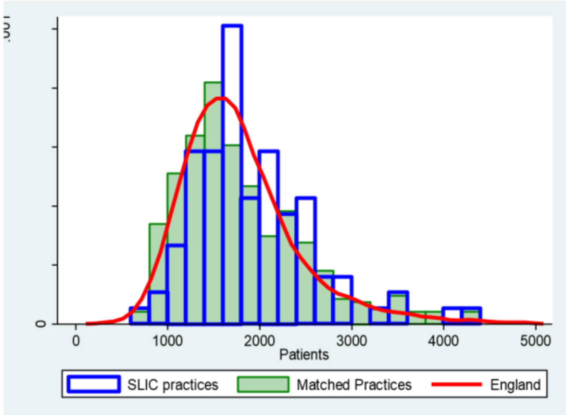

Figure 17. Patients per full-time equivalent

1 Sekhon JS. Multivariate and propensity score matching software with automated balance optimization: the matching package for R. 2011. Journal of Statistical Software 2011; 42. doi
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2 Gibbons RD, Hedeker D, DuToit S. Advances in analysis of longitudinal data. Annu Rev Clin Psychol. 2010; 6: 79–107.