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Do practice characteristics explain the effect of a financial incentive scheme (QP) to improve antibiotic prescribing in primary care practices in England?

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Background

The Quality Premium (QP): Offers financial reward to Clinical Commissioning Groups (CCGs) based on the quality of specific health services considered to be of national or local priority.

Improvement in antibiotic prescribing in primary care was added as one of the national priorities in the 2015/16 guidance.

2015/16 QP: reduction by 1% of the mean antibiotic items in England in 2013/14 (i.e. 1.161 items per Specific Therapeutic group Age-sex Related Prescribing Unit (STAR-PU)).

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Background

J Antimicrob Chemother 2018; **73**: 2883–2892
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Journal of Antimicrobial Chemotherapy

Age-related decline in antibiotic prescribing for uncomplicated respiratory tract infections in primary care in England following the introduction of a national financial incentive (the Quality Premium) for health commissioners to reduce use of antibiotics in the community: an interrupted time series analysis

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- Prescribing data from England shows a reduction of about 2.7 million antibiotic items following QP (between 2014/15 and 2016/17 financial years) (PHE, 2018).
- 3% drop in antibiotic prescribing rate in primary care practices at the introduction of the QP (Bou-Antoun et al., 2018).

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Background

- It is unclear the **mechanisms** by which the QP initiative impacted on antibiotic prescribing in primary care practices

- Variations in primary care practice characteristics that can contribute to differences in antibiotic prescribing rate

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Study Aim

- Investigate whether differences in primary care practice characteristics explain any of the effects of the 2015/16 Quality Premium (QP) on the prescribing rates in primary care practices.

Examined whether the QP had a differential effect on

1. High prescribing primary care practices
2. Primary care practices with a high prevalence of co-morbidities
3. Primary care practices with low workforce size
4. Primary care practices with high level of deprivation

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Methods and Analyses

- Natural experimental approach in investigating the mechanism of impact of the 2015/16 QP target .
- Longitudinal monthly prescribing data for 6,251 primary care practices in England from April 2014 to March 2016 (150,024 observations).

Outcome Variable

Continuous variable indicating the number of antibiotic items per STAR-PU prescribed by a practice in England per month.

Predictor Variables

Binary variable indicating the implementation of the 2015/16 QP.

Continuous variable representing the number of months since 2015/16 QP implementation.

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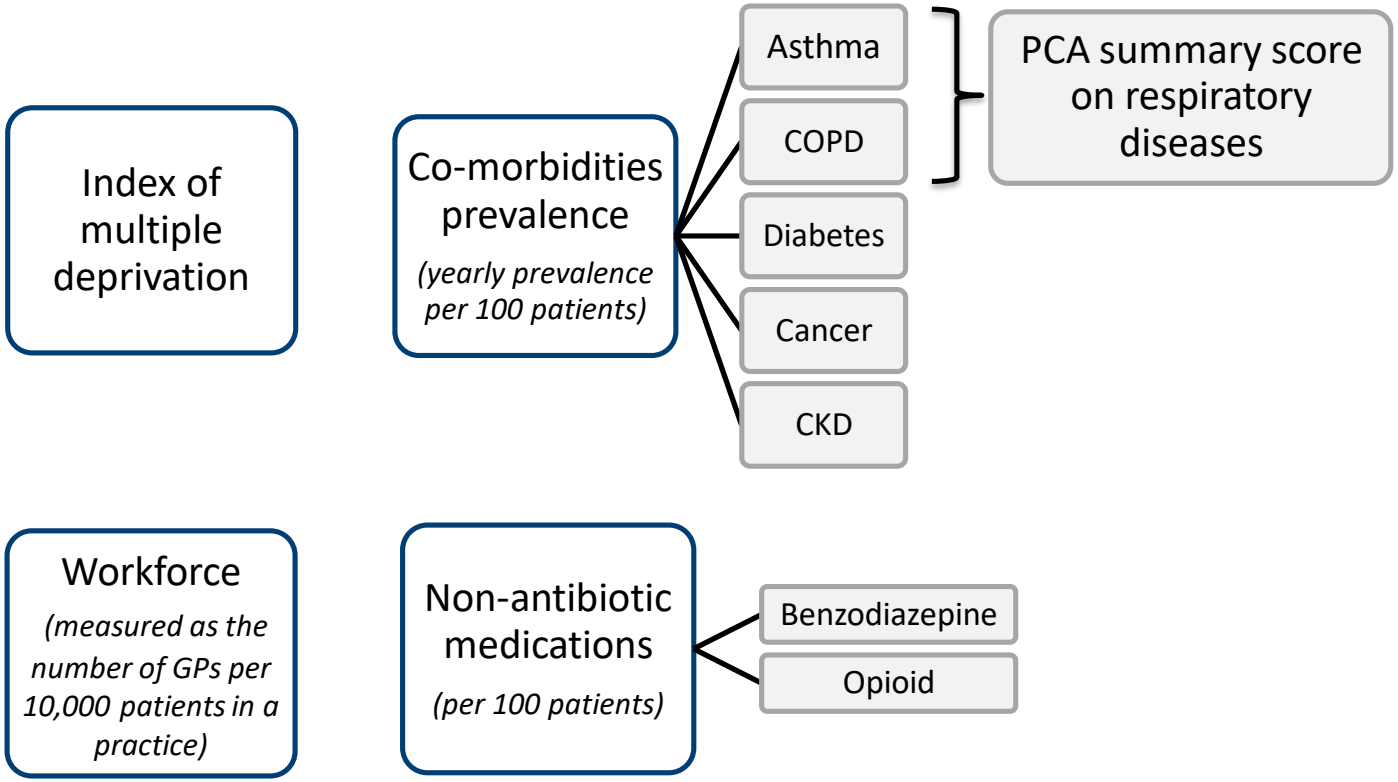
Methods and Analyses

Practice characteristics adjusted for:



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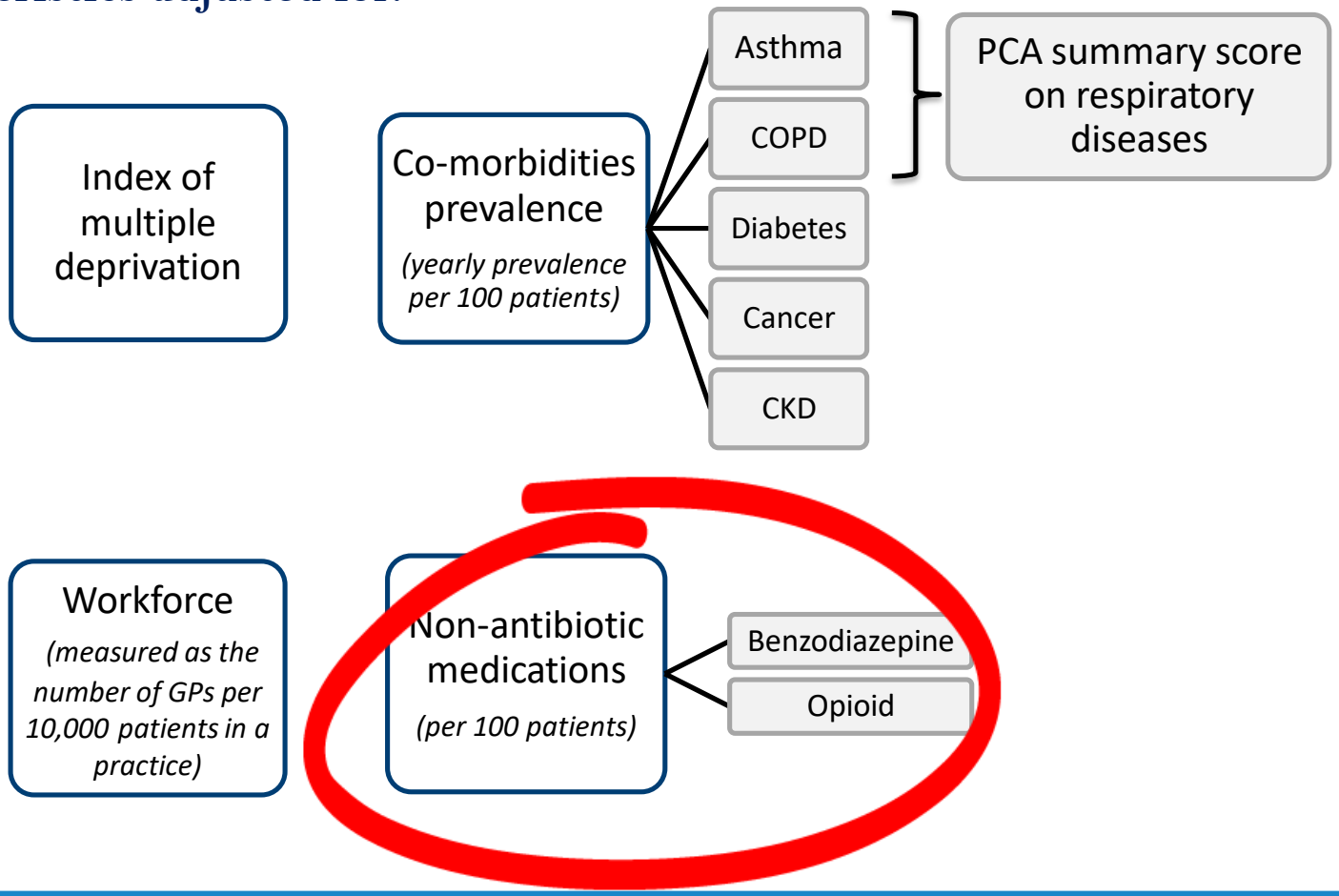
Methods and Analyses

Practice characteristics adjusted for:



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Methods and Analyses

Linear Generalised Estimating Equations models (GEE) with an autoregressive AR(1) covariance structure

The first model included variables on:

- 2015/16 QP implementation
- the number of months since implementation as the predictors
- adjusting for seasonality

We then introduced variables indicating practice characteristics to investigate whether the effect of the QP from the first model was retained, declined or intensified

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Methods and analyses

Subgroup analysis for differential effect of the 2015/16 QP (using interaction terms) based on:

High prescribing rate

- Differential effect among the top 20% prescribing practices based on the mean antibiotic items per STAR-PU prescribed in 2014/15.

Workforce size

- Number of GPs per 10,000 patients

Comorbidities

- Spline terms for
  - diabetes prevalence (knots at 3.93, 7.60, and 11.28), and
  - the PCA summary score for respiratory diseases (knots at -2.05, 0.32, and 2.70).

Level of Deprivation

- English indices of deprivation

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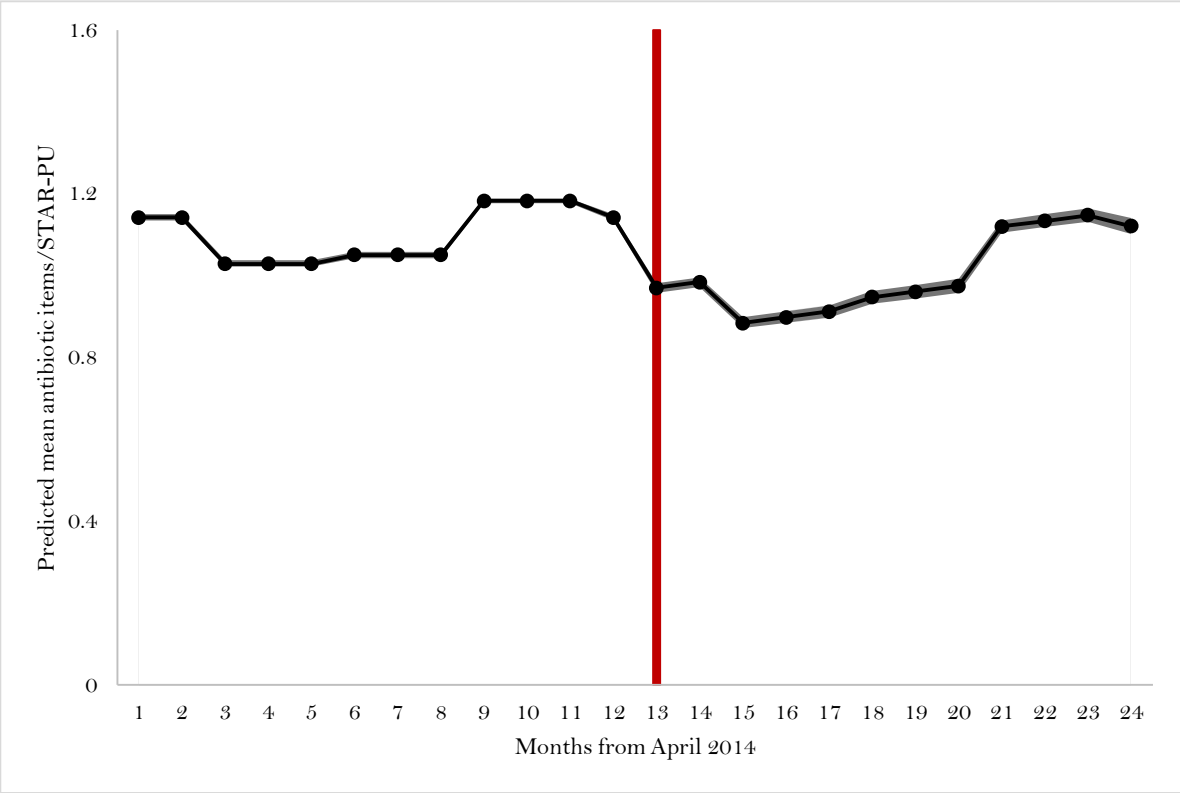
QP effect on antibiotic prescribing

(without adjustment for practice characteristics)



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QP effect on antibiotic prescribing

- Model without adjustment for practice characteristics
  - -0.172 (95% CI -0.176 to -0.168)
- Model with adjustment for practice characteristics
  - -0.166 (95% CI -0.170 to -0.162)
- A small attenuation in the mean reduction in items prescribed immediately after QP
- This means variations in practice characteristics do not strongly explain the effect of the 2015/16 QP on antibiotic prescribing in primary care practices.

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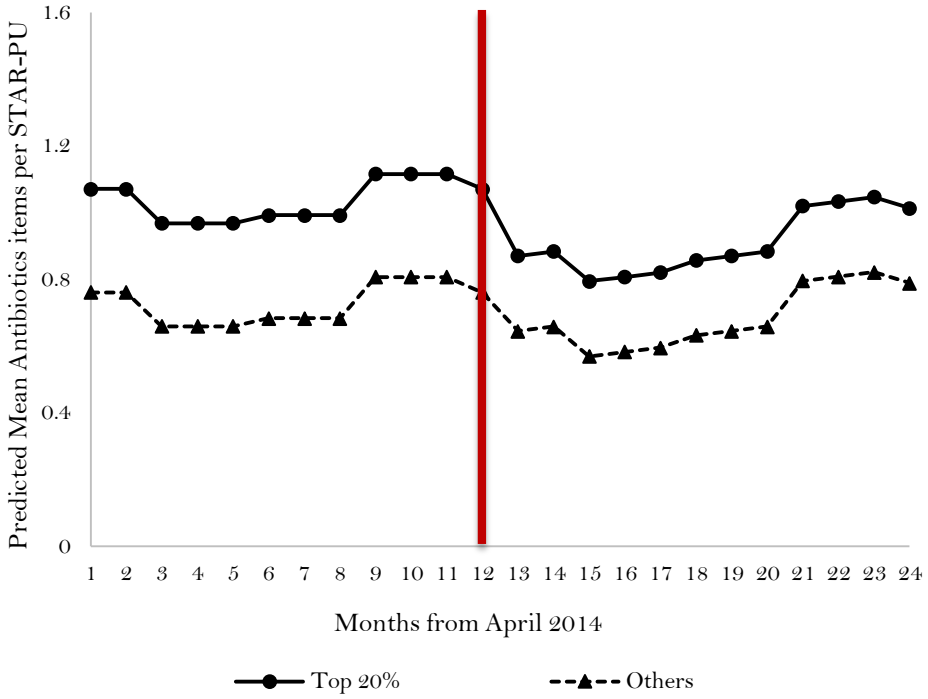
Subgroup analysis
1. High prescribing GP practices



The reduction in antibiotic prescribing following the QP implementation was greater among top 20% prescribers (-0.200 items/STAR-PU for top 20% prescribers) compared to other practices (-0.117 items/STAR-PU; interaction p<0.001).

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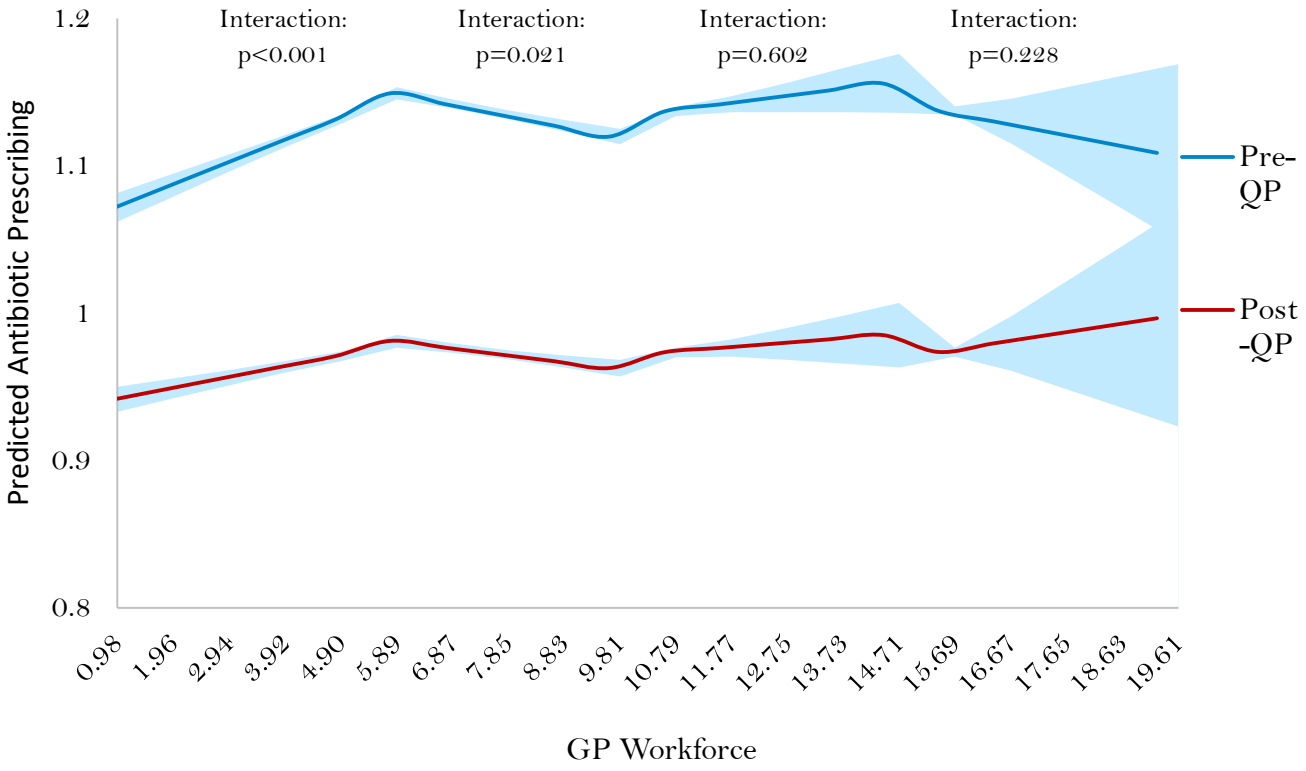
Subgroup analysis
2. GP practices with low workforce size



In primary care practices with less than 5 GPs per 10,000 patients, there was decrease in the pre-QP increasing-trend in antibiotic prescribing after the QP (from 0.015 to 0.007 items/STAR-PU).

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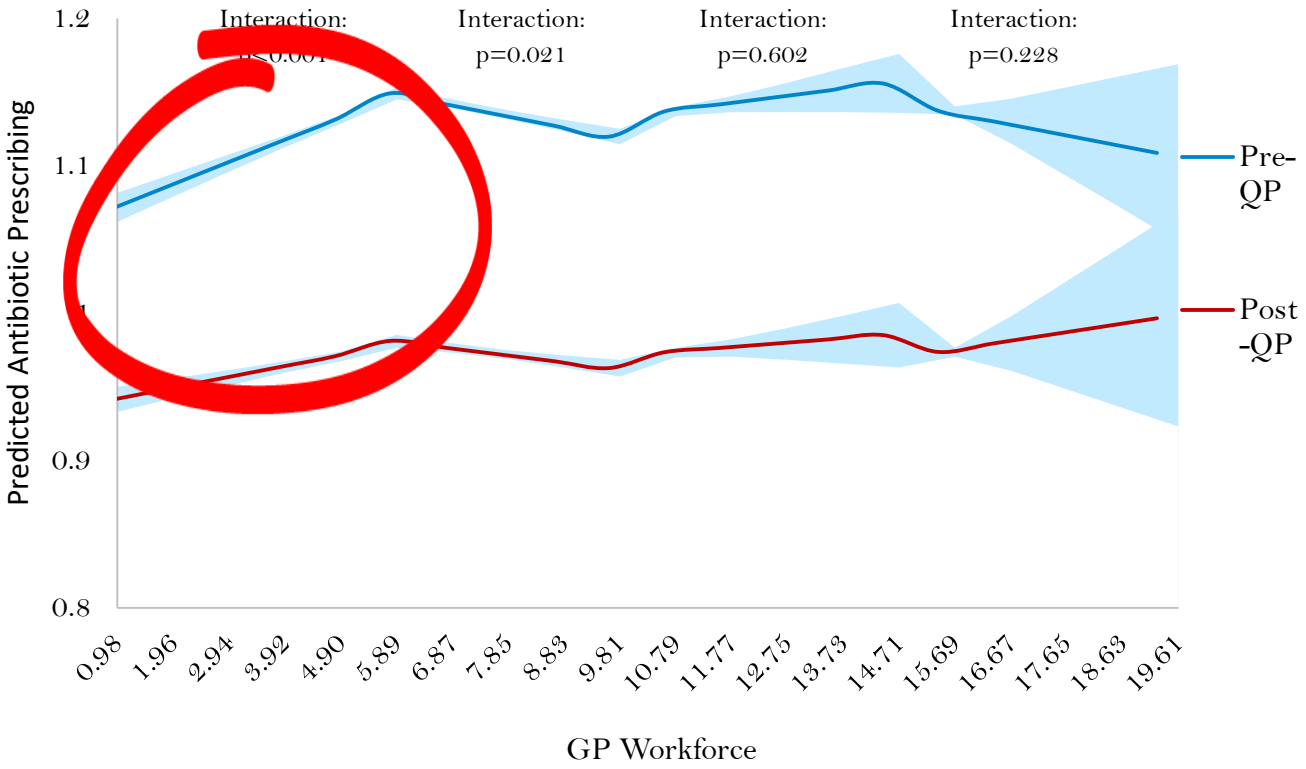
Subgroup analysis

2. GP practices with low workforce size



In primary care practices with less than 5 GPs per 10,000 patients, there was decrease in the pre-QP increasing-trend in antibiotic prescribing after the QP (from 0.015 to 0.007 items/STAR-PU).

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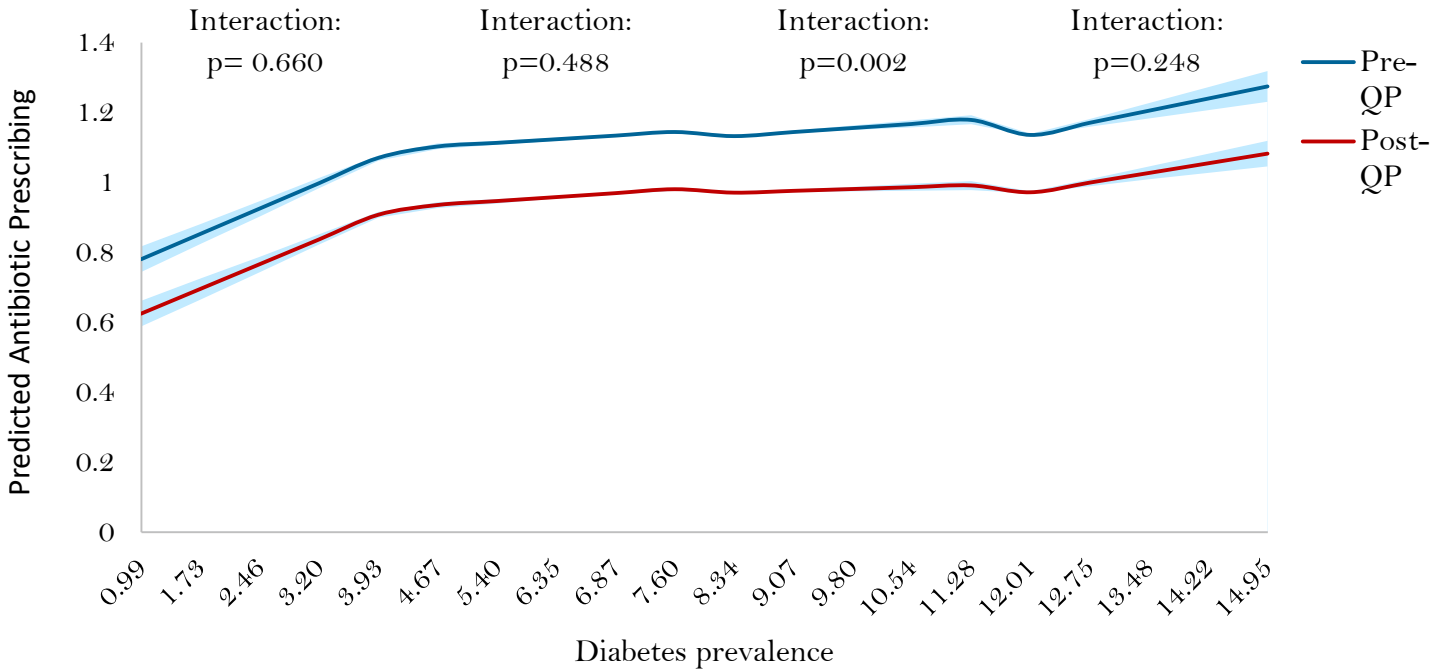
Subgroup analysis

3. GP practices with a high prevalence of diabetes



In primary care practices with diabetes prevalence of between 8 and 11%, there was a decrease in the pre-QP increasing-trend in antibiotic prescribing after the QP (from 0.016 to 0.007 items/STAR-PU).

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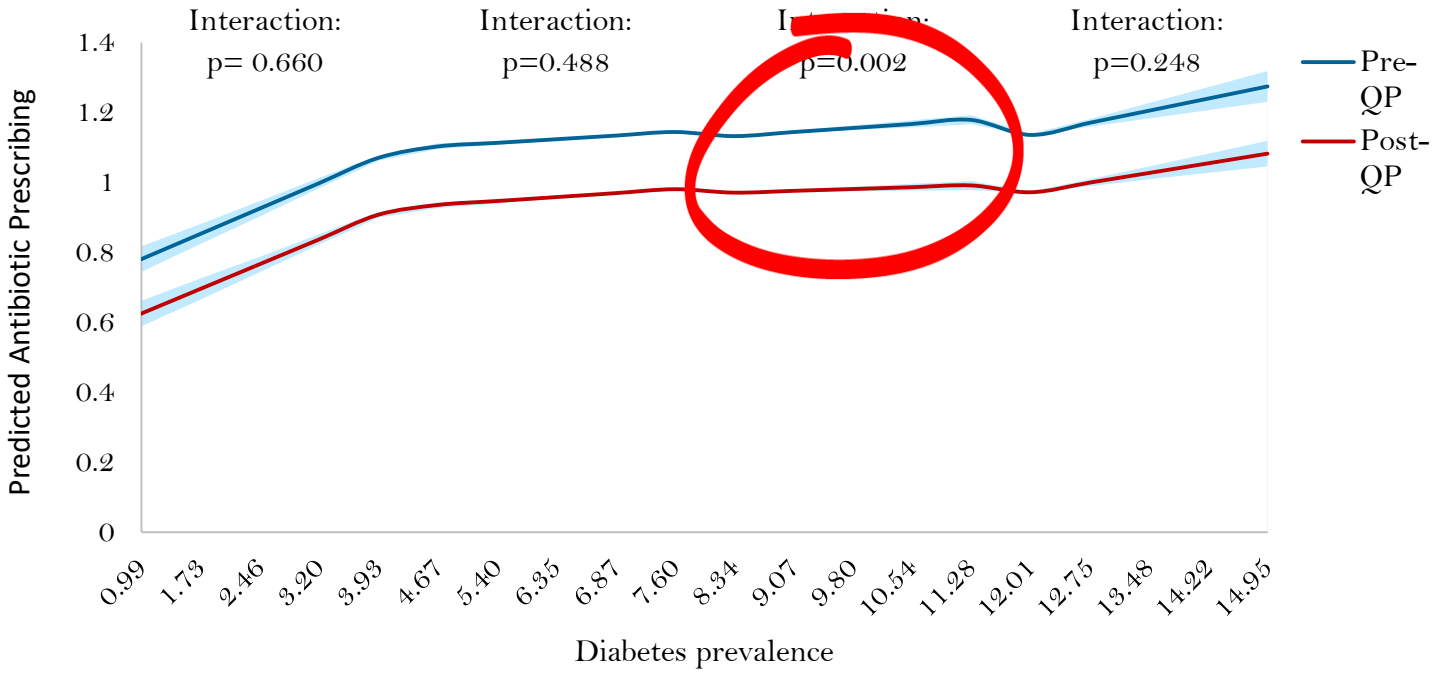
Subgroup analysis

3. GP practices with a high prevalence of diabetes



In primary care practices with diabetes prevalence of between 8 and 11%, there was a decrease in the pre-QP increasing-trend in antibiotic prescribing after the QP (from 0.016 to 0.007 items/STAR-PU).

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Subgroup analysis

- No significant differential effect by deprivation level and prevalence of respiratory conditions

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Conclusion

- The consistency of the effect after accounting for differences in practice characteristics indicates the inclusiveness of the 2015/16 QP in reaching diverse populations.

- The differential effect on high prescribing practices might be explained by the targeted implementation of the QP by CCGs on high prescribing practices with more need to reduce prescribing.

- The higher effect on practices with higher diabetes prevalence might be an indication of the ability of these practices to work towards reducing their antibiotic prescribing rate while coping with other needs arising from the complexity of their patient population.

- Our findings on the targeted impact of the Quality Premium on high antibiotic prescribers are important to policymakers and antibiotic stewardship programs in the design and implementation of interventions.

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Acknowledgement

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https://www.expmedndm.ox.ac.uk/stepup/home

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Descriptive

	Mean Entire study population (2014/15 & 2015/16) (95% CI)	Mean Period before QP (2014/15) (95% CI)	Mean Period after QP (2015/16) (95% CI)	Mean Top 20% prescribers (2014/15 & 2015/16) (95% CI)
Antibiotic items per STAR-PU	1.057 (1.055 to 1.059)	1.106 (1.103 to 1.108)	1.009 (1.007 to 1.011)	1.357 (1.354 to 1.360)
Asthma prevalence (%) (per 100 patients)	5.941 (5.935 to 5.947)	5.980 (5.971 to 5.989)	5.901 (5.893 to 5.911)	6.295 (6.281 to 6.309)
COPD prevalence (%) (per 100 patients)	1.878 (1.873 to 1.882)	1.861 (1.855 to 1.867)	1.894 (1.888 to 1.900)	2.301 (2.291 to 2.312)
Cancer prevalence (%) (per 100 patients)	2.346 (2.342 to 2.350)	2.264 (2.258 to 2.270)	2.428 (2.421 to 2.434)	2.230 (2.291 to 2.309)
CKD prevalence (%) (per 100 patients)	4.129 (4.119 to 4.139)	4.143 (4.129 to 4.157)	4.115 (4.101 to 4.129)	4.420 (4.398 to 4.442)
Diabetes prevalence (%) (per 100 patients)	6.635 (6.626 to 6.645)	6.544 (6.532 to 6.557)	6.726 (6.713 to 6.740)	7.316 (7.298 to 7.335)
Opioids prescription (per 100 patients)	3.273 (3.265 to 3.282)	3.241 (3.229 to 3.253)	3.306 (3.293 to 3.318)	4.306 (4.285 to 4.328)
Benzodiazepine -anxiolytics prescription (per 100 patients)	0.917 (0.914 to 0.919)	0.920 (0.916 to 0.924)	0.913 (0.910 to 0.917)	1.151 (1.145 to 1.158)
Benzodiazepine -hypnotics prescription (per 100 patients)	1.311 (1.308 to 1.315)	1.333 (1.328 to 1.338)	1.289 (1.284 to 1.294)	1.673 (1.664 to 1.682)
GP workforce (per 10,000 patients)	6.126 (6.112 to 6.139)	6.429 (6.412 to 6.446)	5.822 (5.802 to 5.842)	5.835 (5.805 to 5.864)

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		Model without adjustment for practice characteristics			Model with adjustment for practice characteristics		
		Coefficient	95% CI		Coefficient	95% CI	
			Lower	Upper		Lower	Upper
2015/16 QP		**-0.172**	-0.176	-0.168	**-0.166**	-0.170	-0.162
Months since QP		0.014	0.013	0.014	0.014	0.030	0.014
Season	Winter	Ref	Ref	Ref	Ref	Ref	Ref
	Spring	-0.040	-0.043	-0.038	-0.044	-0.046	-0.041
	Summer	-0.153	-0.156	-0.150	-0.139	-0.142	-0.136
	Autumn	-0.132	-0.135	-0.129	-0.119	-0.121	-0.116
Comorbidities	Respiratory disease	-	-	-	0.021	0.018	0.024
	Diabetes prevalence %	-	-	-	0.028	0.026	0.030
Benzodiazepine anxiolytics prescription		-	-	-	0.123	0.118	0.127
Benzodiazepine hypnotics prescription		-	-	-	0.160	0.157	0.164
GP head count per 10,000 patients (spline terms)	GPHC1 (< 4.91)	-	-	-	0.013	0.011	0.015
	GPHC2 (> 4.91 but <9.81)	-	-	-	-0.008	-0.010	-0.006
	GPHC3 (>9.81 but <14.72)	-	-	-	0.07	0.002	0.011
	GPHC4 (>14.972)	-	-	-	-0.006	-0.021	0.008