Statistical modelling

Removal effect on monitoring and treatment levels
The goal of the modelling was to estimate the practice mean level of performance expected for each removed indicator had that indicator not been removed, focusing on the final time point (2011/12). Therefore, we aimed to derive short-term or long-term predictions for indicators removed in April 2011 or 2006 respectively. The models took account of a number of predictive factors: (i) practice levels of performance on the removed indicator in the years prior to removal; (ii) performance prior to and during the year being predicted on unremoved indicators for the same process for other disease conditions and on different selected process indicators for the same condition (selected because of similarity in processes, similarity in performance levels, and ability to successfully model in the database); and (iii) a range of practice characteristics, including the condition prevalence rate, practice patient list size, deprivation quintile and region. The observed scores on a removed indicator in the years subsequent to removal were excluded from the model for that indicator. To assess the validity of both short- and long-term predictions we performed various sensitivity analyses under different modelling assumptions in unremoved indicators, in which predictions would be expected to closely match observations. Although the short-term predictions were fairly stable across various modelling assumptions and specifications, the results for the long-term models were extremely sensitive to modelling assumptions. Thus, we do not present any long-term predictions and indicators removed in April 2006 are investigated through a comparison of 2005/6 and 2011/12 levels for these indicators only.

Indicators removed in April 2011
To quantify the short-term effect of removal for each indicator we performed three regression analyses. For this we first grouped the indicators according to the process involved: blood pressure measurement (CHD5, DM11, Stroke5), cholesterol measurement (CHD7, DM16) and blood glucose measurement (DM5). The grouping of indicators by process allowed withdrawn indicators to act as predictors of one-another in the blood pressure and cholesterol models. In all models we also included non-withdrawn indicators for identical processes in other disease domains as additional predictors (main document Figure 1 & Table 2).
To make better informed decisions about details of the modelling approach, we further compared various model specifications. In particular, we examined different assumptions regarding the prior trend in performance scores across years; as either linear or categorical; and the inclusion of more covariate indicators (different processes that were not removed within the same disease domain). We tested their performance on the existing dataset but only using indicators that were not removed or time points prior to removal. Overall, model predictions were closest to observed scores when year was treated as linear and restricted to a maximum of three time points prior to removal and interacted with indicators.

Practice was modelled as a random-effect (intercept) to account for the nested structure of the data, but we also included random-effects for year at the practice level (coefficients for year varied by practice). Modelling was undertaken using the xtmixed command in Stata. From the regression model for each removed indicator, for each practice we obtained a prediction of the indicator’s value and its standard error for each financial year subsequent to the indicator’s removal. These predicted values (controlled for other indicators scores, practice characteristics, pre-removal scores and year effects and accounting for both fixed and random model effects) represent our best estimates of the scores that would have been attained if the indicator had not been removed. To compare these predictions with the actual observed scores we employed meta-analysis methods. Within each indicator and year we subtracted each practice prediction from the observed practice score to calculate a ‘practice effect’, with a standard error estimated using the standard errors of the prediction and of the observed score, and meta-analysed across all practices using a bootstrapped version of the DerSimonian-Laird random-effects model.

Indicators removed in April 2006
To investigate the long-term effect of removal we performed two additional regression analyses in which we compared 2005/6 (final year of inclusion) to 2011/12 (final available time point) levels in: influenza immunisation for asthma patients (Asthma7); lithium measurement for psychosis patients (MH3). These less sophisticated (but also less assumptive) analyses did not account for pre-removal trends or covariate indicators (main document Figure 1 & Table 2). However, they were controlled for the practice
characteristics discussed above, while the nested structure of the data was accounted through a random-effect for practices.

**Removal effects on 'linked' intermediate outcomes**

For each of the removed monitoring indicators that had a corresponding intermediate outcome indicator, we applied similar approaches to the above to assess the impact of removal on that outcome. For the short-term effect, we analysed three regression models, with the outcomes grouped by type: blood pressure control (CHD6, DM12/30, Stroke6), cholesterol control (CHD8, DM17) and blood glucose in diabetes (DM6/20/23/26). To obtain predicted levels of performance for these outcomes unaffected by actual scores, we discounted all data for them subsequent to removal of the relevant monitoring indicator. For these analyses, only two control outcome indicators were available (BP5 for blood pressure and Stroke8 for cholesterol control) and no within condition covariate indicators were modelled (main document Figure 1 & Table 2). In the absence of any covariate indicators for blood glucose control, the year by indicator interaction term in these models was redundant. The long-term effect was assessed through a single regression model, in which we compared lithium levels in the therapeutic range (MH5/18) in 2005/6 and 2011/12.

**References**

1. Stata Statistical software for Windows [program]. 12.1 version, 2011.
2. Kontopantelis E, Reeves D. metaan: Random-effects meta-analysis. *Stata J* 2010;10:395-407.
3. Kontopantelis E, Springate DA, Reeves D. A Re-Analysis of the Cochrane Library Data: The Dangers of Unobserved Heterogeneity in Meta-Analyses. *Plos One* 2013;8:1-14.
## Table A1: All considered indicators and their changes over time

| Indicator name | CPRD definition | Type       | QOF year* | QOF name | QOF definition                                                                                                                                                        | Lt† | Ut† | P† |
|----------------|-----------------|------------|-----------|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----|
| Asthma5        | % patients with Asthma who smoke & offered smoking cessation advice in last 15m | Treatment  | 1-2       | Asthma5  | The percentage of patients with asthma who smoke, and whose notes contain a record that smoking cessation advice has been offered within last 15 months          | 25  | 70  |  6 |
|                |                 |            | 3-4       | Smoking2 | The percentage of patients with any or any combination of the following conditions: coronary heart disease, stroke or TIA, hypertension, diabetes, COPD or asthma who smoke whose notes contain a record that smoking cessation advice or referral to a specialist service, where available, has been offered within the previous 15 months | 40  | 90  | 35 |
|                |                 |            | 5         | Smoking4 | The percentage of patients with any or any combination of the following conditions: coronary heart disease, stroke or TIA, hypertension, diabetes, COPD, CKD, asthma, schizophrenia, bipolar affective disorder or other psychoses who smoke whose notes contain a record that smoking cessation advice or referral to a specialist service, where available, has been offered within the previous 15 months | 40  | 90  | 35 |
|                |                 |            | 6-7       |          |                                                                                                                                                                         | 40  | 90  | 30 |
|                |                 |            | 8         |          |                                                                                                                                                                         | 40  | 90  | 30 |
| Asthma7‡       | % patients aged 16+ with asthma who had influenza immunisation in preceding 1Sep-31Mar | Treatment  | 1-2       | Asthma7  | The percentage of patients age 16 years and over with asthma who have had influenza immunisation in the preceding 1 September to 31 March                             | 25  | 70  | 12 |
| Asthma2/8      | not used / not measurable                     | Monitoring | 1-2       |          | The percentage of patients aged eight and over diagnosed as having asthma from 1 April 2003 where the diagnosis has been confirmed by spirometry or peak flow measurement | 25  | 70  | 15 |
|                |                 |            | 3-4       |          | The percentage of patients aged eight and over diagnosed as having asthma from 1 April 2006 with measures of variability or reversibility                               | 40  | 80  | 15 |
| Indicator name | CPRD definition | Type       | QOF year* | QOF name | QOF definition                                                                 | Lt† | Ut† | P† |
|----------------|----------------|------------|-----------|----------|--------------------------------------------------------------------------------|------|-----|----|
| BP4            | % patients with HT whose notes have a record of blood pressure in the previous 15m | Monitoring | 1-2       | BP4      | The percentage of patients with hypertension in which there is a record of the blood pressure in the past 9 months | 25   | 90  | 20 |
|                | 3-4            |            |           |          |                                                                                   | 40   | 90  | 20 |
|                | 5              |            |           |          |                                                                                   | 40   | 90  | 20 |
|                | 6-7            |            |           |          |                                                                                   | 40   | 90  | 18 |
|                | 8              |            |           |          |                                                                                   | 40   | 90  | 16 |
| BP5            | % patients with HT, with last blood pressure reading (15m) is 150/90 or less | Outcome   | 1-2       | BP5      | The percentage of patients with hypertension in whom the last blood pressure (measured in last 9 months) is 150/90 or less | 25   | 70  | 56 |
|                | 3-4            |            |           |          |                                                                                   | 40   | 70  | 57 |
|                | 5              |            |           |          |                                                                                   | 40   | 70  | 57 |
|                | 6-7            |            |           |          |                                                                                   | 40   | 70  | 57 |
|                | 8              |            |           |          |                                                                                   | 40   | 70  | 57 |
| CHD2/13        | % patients with newly diagnosed angina, referred for exercise/specialist assessment | Monitoring | 1-2       | CHD2     | The percentage of patients with newly diagnosed angina (diagnosed after 01/04/03) who are referred for exercise testing and/or specialist assessment | 25   | 90  | 7  |
|                | 3-4            |            |           |          |                                                                                   | 40   | 90  | 7  |
|                | 5              |            |           |          |                                                                                   | 40   | 90  | 7  |
|                | 6-7            |            |           |          |                                                                                   | 40   | 90  | 7  |
|                | 8              |            |           |          |                                                                                   | 40   | 90  | 7  |
| CHD5§          | % patients with CHD whose notes have a record of blood pressure in previous 15m | Monitoring | 1-2       | CHD5     | The percentage of patients with coronary heart disease whose notes have a record of blood pressure in the previous 15 months | 25   | 90  | 7  |
|                | 3-4            |            |           |          |                                                                                   | 40   | 90  | 7  |
|                | 5              |            |           |          |                                                                                   | 40   | 90  | 7  |
|                | 6-7            |            |           |          |                                                                                   | 40   | 90  | 7  |
| Indicator name       | CPRD definition                                                                 | Type   | QOF year* | QOF name | QOF definition                                                                                                                                                                                                                                                                                                                                 | Lt† | Ut† | P† |
|---------------------|----------------------------------------------------------------------------------|--------|-----------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----|
| CHD6                | % patients with CHD, with last blood pressure reading (15m) is 150/90 or less   | Outcome| 1-2       | CHD6     | The percentage of patients with coronary heart disease, in whom the last blood pressure reading (measured in the last 15 months) is 150/90 or less                                                                                                                                                                                                 | 25  | 70  | 19 |
|                     |                                                                                 |        | 3-4       |          |                                                                                                                                                                                                                                                                                                                                                   | 40  | 70  | 19 |
|                     |                                                                                 |        | 5         |          |                                                                                                                                                                                                                                                                                                                                                   | 40  | 70  | 19 |
|                     |                                                                                 |        | 6-7       |          |                                                                                                                                                                                                                                                                                                                                                   | 40  | 70  | 17 |
|                     |                                                                                 |        | 8         |          |                                                                                                                                                                                                                                                                                                                                                   | 40  | 70  | 17 |
| CHD7§               | % patients with CHD whose notes have a record of total cholesterol in previous 15m | Monitoring| 1-2     | CHD7     | The percentage of patients with coronary heart disease whose notes have a record of total cholesterol in the previous 15 months                                                                                                                                                                                                                   | 25  | 90  | 7  |
|                     |                                                                                 |        | 3-4       |          |                                                                                                                                                                                                                                                                                                                                                   | 40  | 90  | 7  |
|                     |                                                                                 |        | 5         |          |                                                                                                                                                                                                                                                                                                                                                   | 40  | 90  | 7  |
|                     |                                                                                 |        | 6-7       |          |                                                                                                                                                                                                                                                                                                                                                   | 40  | 90  | 7  |
| CHD8                | % patients with CHD with last measured total cholesterol (15m) <= 5 mmol/l       | Outcome| 1-2       | CHD8     | The percentage of patients with coronary heart disease whose last measured total cholesterol (measured in the last 15 months) is 5 mmol/l or less                                                                                                                                                     | 25  | 60  | 16 |
|                     |                                                                                 |        | 3-4       |          |                                                                                                                                                                                                                                                                                                                                                   | 40  | 70  | 17 |
|                     |                                                                                 |        | 5         |          |                                                                                                                                                                                                                                                                                                                                                   | 40  | 70  | 17 |
|                     |                                                                                 |        | 6-7       |          |                                                                                                                                                                                                                                                                                                                                                   | 40  | 70  | 17 |
|                     |                                                                                 |        | 8         |          |                                                                                                                                                                                                                                                                                                                                                   | 40  | 70  | 17 |
| CHD12               | % patients with CHD with a record of influenza vaccination in preceding 1Sep-31Mar| Treatment| 1-2      | CHD12    | The percentage of patients with coronary heart disease who have a record of influenza vaccination in the preceding 1 September to 31 March                                                                                                                                                                                          | 25  | 85  | 7  |
|                     |                                                                                 |        | 3-4       |          |                                                                                                                                                                                                                                                                                                                                                   | 40  | 90  | 7  |
|                     |                                                                                 |        | 5         |          |                                                                                                                                                                                                                                                                                                                                                   | 40  | 90  | 7  |
|                     |                                                                                 |        | 6-7       |          |                                                                                                                                                                                                                                                                                                                                                   | 40  | 90  | 7  |
|                     |                                                                                 |        | 8         |          |                                                                                                                                                                                                                                                                                                                                                   | 40  | 90  | 7  |
| COPD2               | not used / not measurable                                                       | Monitoring| 1-2     | COPD2    | The percentage of patients where diagnosis has been confirmed by spirometry including reversibility testing for newly diagnosed patients w.e.f. 01/04/03                                                                                                                                              | 25  | 90  | 5  |
| COPD3/9/12/15       | not used / not measurable                                                       | Monitoring| 1-2     | COPD3    | The percentage of all patients with COPD where diagnosis has been confirmed by spirometry including                                                                                                                                                                                                                                       | 25  | 90  | 5  |
| Indicator name | CPRD definition | Type       | QOF year* | QOF name | QOF definition                                                                 | Lt † | Ut † | P † |
|----------------|----------------|------------|-----------|----------|--------------------------------------------------------------------------------|------|------|-----|
| COPD8          | % patients with COPD with a record of influenza vaccination in preceding 1Sep-31Mar | Treatment  | 1-2       | COPD8    | The percentage of patients with COPD who have had influenza immunisation in the preceding 1 September to 31 March | 25   | 85   | 6   |
|                |                |            | 3-4       | COPD9    |                                                                                   | 40   | 80   | 10  |
|                |                |            | 5         | COPD12   | The percentage of all patients with COPD diagnosed after 1st April 2008 in whom the diagnosis has been confirmed by post bronchodilator spirometry | 40   | 80   | 5   |
|                |                |            | 6-7       | COPD15   | The percentage of all patients with COPD diagnosed after 1 April 2011 in whom the diagnosis had been confirmed by post bronchodilator spirometry | 40   | 80   | 5   |
|                |                |            | 8         | COPD15   |                                                                                   | 40   | 80   | 5   |
| DM2            | % patients with DM, whose notes record BMI in the previous 15 months | Monitoring | 1-2       | DM2      | The percentage of patients with diabetes whose notes record BMI in the previous 15 months | 25   | 90   | 3   |
|                |                |            | 3-4       | DM2      |                                                                                   | 40   | 90   | 3   |
|                |                |            | 5         | DM2      |                                                                                   | 40   | 90   | 3   |
|                |                |            | 6-7       | DM2      |                                                                                   | 40   | 90   | 3   |
|                |                |            | 8         | DM2      |                                                                                   | 40   | 90   | 3   |
| DM5§           | % patients with DM who have a record of HbA1c or equivalent in last 15m | Monitoring | 1-2       | DM5      | The percentage of diabetic patients who have a record of HbA1c or equivalent in the previous 15 months | 25   | 90   | 3   |
|                |                |            | 3-4       | DM5      |                                                                                   | 40   | 90   | 3   |
|                |                |            | 5         | DM5      |                                                                                   | 40   | 90   | 3   |
|                |                |            | 6-7       | DM5      |                                                                                   | 40   | 90   | 3   |
| DM6/20/23/26   | % patients with DM in whom last HbA1C<=7.5 (or equivalent) in last 15m | Outcome  | 1-2       | DM6      | The percentage of patients with diabetes in whom the last HbA1C is 7.4 or less (or equivalent test / reference range depending on local laboratory) in last 15 months | 25   | 50   | 16  |
| Indicator name | CPRD definition | Type     | QOF year* | QOF name | QOF definition                                                                                                                                                                                                 | Lt† | Ut† | P† |
|----------------|----------------|----------|-----------|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----|
| DM11§          | % patients with DM whose notes have a record of blood pressure in previous 15m | Monitoring | 1-2       | DM11     | The percentage of patients with diabetes who have a record of the blood pressure in the past 15 months                                                                                                         | 25  | 90  | 3  |
|                |                |          | 3-4       | DM11     |                                                                                                                                                                                                                                                                          | 40  | 90  | 3  |
|                |                |          | 5         | DM11     |                                                                                                                                                                                                                                                                          | 40  | 90  | 3  |
|                |                |          | 6-7       | DM11     |                                                                                                                                                                                                                                                                          | 40  | 90  | 3  |
| DM12/30        | % patients with DM, with last blood pressure reading (15m) is 145/85 or less | Outcome   | 1-2       | DM12     | The percentage of patients with diabetes in whom the last blood pressure is 145/85 or less                                                                                                                   | 25  | 55  | 17 |
|                |                |          | 3-4       | DM12     |                                                                                                                                                                                                                                                                          | 40  | 60  | 18 |
|                |                |          | 5         | DM12     |                                                                                                                                                                                                                                                                          | 40  | 60  | 18 |
|                |                |          | 6-7       | DM12     |                                                                                                                                                                                                                                                                          | 40  | 60  | 18 |
|                |                |          | 8         | DM30     | The percentage of patients with diabetes in whom the last blood pressure is 150/90 or less                                                                                                                    | 40  | 71  | 8  |
| DM14/22        | % patients with DM, with record of serum creatinine testing in previous 15m | Monitoring | 1-2       | DM14     | The percentage of patients with diabetes who have a record of serum creatinine testing in the previous 15 months                                                                                              | 25  | 90  | 3  |
|                |                |          | 3-4       | DM22     | The percentage of patients with diabetes who have a record of estimated glomerular filtration rate (eGFR) or                                                                                                                                                            | 40  | 90  | 3  |
| Indicator name | CPRD definition                                                                 | Type     | QOF year* | QOF name | QOF definition                                                                 | Lt† | Ut† | P† |
|----------------|---------------------------------------------------------------------------------|----------|-----------|----------|---------------------------------------------------------------------------------|-----|-----|----|
| DM16§          | % patients with DM whose notes have a record of total cholesterol in previous 15m | Monitoring | 1-2       | DM16     | The percentage of patients with diabetes who have a record of total cholesterol in the previous 15 months | 25  | 90  | 3  |
|                |                                                                                  |          |           |          |                                                                                 |     |     |    |
| DM17           | % patients with DM whose last measured total cholesterol (15m) <= 5 mmol/l       | Outcome  | 1-2       | DM17     | The percentage of patients with diabetes whose last measured total cholesterol within previous 15 months is 5 or less | 25  | 60  | 6  |
|                |                                                                                  |          |           |          |                                                                                 |     |     |    |
| DM18           | % patients with DM with a record of influenza vaccination in preceding 1Sep-31Mar | Treatment | 1-2       | DM18     | The percentage of patients with diabetes who have had influenza immunisation in the preceding 1 September to 31 March | 25  | 85  | 3  |
| Epilepsy2/6    | % patients aged 18+ on drug treatment for epilepsy with a record of seizure frequency in last 15m | Monitoring | 1-2       | EPI2     | The percentage of patients age 16 and over on drug treatment for epilepsy who have a record of seizure frequency in the previous 15 months | 25  | 90  | 4  |
|                |                                                                                  |          |           |          |                                                                                 |     |     |    |
|                |                                                                                  |          |           |          |                                                                                 |     |     |    |

serum creatinine testing in the previous 15 months
| Indicator name          | CPRD definition                                      | Type          | QOF year* | QOF name | QOF definition                                                                 | Lt† | Ut† | P† |
|------------------------|------------------------------------------------------|---------------|-----------|----------|--------------------------------------------------------------------------------|-----|-----|----|
| Epilepsy3/7§           | Not used / not measurable                            | Monitoring    | 1-2       | EPI3     | The percentage of patients age 16 and over on drug treatment for epilepsy who have a record of medication review in the previous 15 months | 25  | 90  | 4  |
|                        |                                                      |               | 3-4       | EPI7     | The percentage of patients age 18 and over on drug treatment for epilepsy who have a record of medication review involving the patient and/or carer in the previous 15 months | 40  | 90  | 4  |
| MH3†                   | % patients on lithium therapy with a record of lithium levels checked in last 6m | Monitoring    | 1-2       | MH3      | The percentage of patients on lithium therapy with a record of lithium levels checked within the previous 6 months | 25  | 90  | 3  |
| MH4/17                 | % patients on lithium therapy with a record of serum creatinine and TSH in last 15m | Monitoring    | 1-2       | MH4      | The percentage of patients on lithium therapy with a record of serum creatinine and TSH in the preceding 15 months | 25  | 90  | 3  |
| MH5/18                 | % patients on lithium therapy with a record of lithium levels in therapeutic range in last 6m | Treatment     | 1-2       | MH5      | The percentage of patients on lithium therapy with a record of lithium levels in the therapeutic range within the previous 6 months | 25  | 70  | 5  |
|                        |                                                      |               | 3-4       | MH17     | The percentage of patients on lithium therapy with a record of serum creatinine and TSH in the preceding 9 months | 40  | 90  | 1  |
|                        |                                                      |               | 5         | MH18     | The percentage of patients on lithium therapy with a record of lithium levels in the therapeutic range within the preceding 4 months | 40  | 90  | 2  |
| Indicator name | CPRD definition | Type | QOF year* | QOF name | QOF definition                                                                                                                                 | Lt† | Ut† | P† |
|----------------|----------------|------|-----------|----------|------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----|
| MH7            | not used / not measurable | Monitoring | 3-4 | MH7 | The percentage of patients with schizophrenia, bipolar affective disorder and other psychoses who do not attend the practice for their annual review who are identified and followed up by the practice team within 14 days of non-attendance | 40  | 90  | 3  |
|                |                 |      |           |          |                                                                                                                                                  | 5   |     |    |
| Stroke5§       | % patients with Stroke whose notes have a record of blood pressure in previous 15m | Monitoring | 1-2 | Stroke5 | The percentage of patients with TIA or stroke who have a record of blood pressure in the notes in the preceding 15 months | 25  | 90  | 2  |
|                |                 |      |           |          |                                                                                                                                                  | 3-4 |     |    |
| Stroke6        | % patients with Stroke, with last blood pressure reading (15m) is 150/90 or less | Outcome | 1-2 | Stroke6 | The percentage of patients with a history of TIA or stroke in whom the last blood pressure reading (measured in the last 15 months) is 150/90 or less | 25  | 70  | 5  |
|                |                 |      |           |          |                                                                                                                                                  | 3-4 |     |    |
| Stroke7        | % patients with Stroke, whose notes have a record of total cholesterol in last 15m | Monitoring | 1-2 | Stroke7 | The percentage of patients with TIA or stroke who have a record of total cholesterol in the last 15 months | 25  | 90  | 2  |
|                |                 |      |           |          |                                                                                                                                                  | 3-4 |     |    |
| Stroke8        | % patients with Stroke whose last measured total cholesterol (15m) <= 5 mmol/l | Outcome | 1-2 | Stroke8 | The percentage of patients with TIA or stroke whose last measured total cholesterol (measured in the last 15 months) is 5 mmol/l or less | 25  | 60  | 5  |
|                |                 |      |           |          |                                                                                                                                                  | 3-4 |     |    |
|                |                 |      |           |          |                                                                                                                                                  | 5   |     |    |
| Indicator name | CPRD definition | Type       | QOF year* | QOF name | QOF definition                                                                 | Lt† | Ut† | P† |
|---------------|----------------|------------|-----------|----------|-------------------------------------------------------------------------------|-----|-----|----|
| Stroke10      | % patients with Stroke with a record of influenza vaccination in preceding 1Sep-31Mar | Treatment  | 1-2       | Stroke10 | The percentage of patients with TIA or stroke who have had influenza immunisation in the preceding 1 September to 31 March | 25  | 85  | 2  |
|               |                |            | 3-4       |          |                                               | 40  | 85  | 2  |
|               |                |            | 5         |          |                                               | 40  | 85  | 2  |
|               |                |            | 6-7       |          |                                               | 40  | 85  | 2  |
|               |                |            | 8         |          |                                               | 40  | 85  | 2  |

* QOF year 1 corresponds to 2004/5, 2 to 2005/6 and so on, up to year 8 (2010/11).
† Lt: Lower threshold; Ut: Upper threshold; P: points indicator is worth (1 point≈£126). Also, where is the practice reported achievement (excluding exception reported patients) under the Quality and Outcomes Framework.
‡ Indicator removed in QOF year 3 (April 2006)
§ Indicator removed in QOF year 8 (April 2011)
### Table A2: Mean practice prevalence scores (standard deviation), for the two sensitivity datasets

|                          | 2004/5   | 2005/6   | 2006/7   | 2007/8   | 2008/9   | 2009/10  | 2010/11  | 2011/12  |
|--------------------------|----------|----------|----------|----------|----------|----------|----------|----------|
| **All available and up to standard CPRD practices across whole time period – sensitivity analysis 1** |          |          |          |          |          |          |          |          |
| Asthma                   | 5.73(1.30)| 5.67(1.28)| 5.58(1.22)| 5.44(1.23)| 5.44(1.25)| 5.38(1.25)| 5.14(1.24)| 4.87(1.21)|
| Hypertension             | 11.36(2.63)| 11.71(2.77)| 12.00(2.86)| 12.13(2.92)| 12.25(2.95)| 12.27(2.98)| 12.27(2.99)| 12.23(3.02)|
| CHD                      | 3.51(1.25)| 3.43(1.22)| 3.35(1.16)| 3.26(1.13)| 3.17(1.10)| 3.08(1.06)| 2.99(1.04)| 2.92(1.01)|
| COPD                     | 1.09(0.61)| 1.16(0.63)| 1.22(0.65)| 1.27(0.67)| 1.30(0.68)| 1.34(0.70)| 1.38(0.72)| 1.42(0.73)|
| Diabetes*                | 3.13(0.77)| 3.30(0.83)| 3.45(0.86)| 3.57(0.90)| 3.71(0.94)| 3.86(0.99)| 4.00(1.05)| 4.12(1.10)|
| Epilepsy†                | 0.58(0.19)| 0.59(0.18)| 0.59(0.18)| 0.58(0.19)| 0.58(0.19)| 0.55(0.18)| 0.55(0.18)| 0.55(0.19)|
| Mental Health (lithium therapy only) | 0.12(0.06)| 0.12(0.06)| 0.11(0.06)| 0.11(0.06)| 0.10(0.06)| 0.10(0.06)| 0.10(0.06)| 0.10(0.06)|
| Stroke                   | 1.64(0.51)| 1.65(0.50)| 1.66(0.50)| 1.66(0.49)| 1.65(0.48)| 1.65(0.49)| 1.66(0.48)| 1.66(0.49)|
| Number of practices      | 452      | 452      | 452      | 452      | 452      | 452      | 452      | 452      |

|                          |          |          |          |          |          |          |          |          |
| **Sample of 50 more representative CPRD practices in terms of list size from sensitivity 1 – sensitivity analysis 2** |          |          |          |          |          |          |          |          |
| Asthma                   | 5.91(1.40)| 5.90(1.35)| 5.86(1.37)| 5.69(1.36)| 5.66(1.36)| 5.58(1.32)| 5.32(1.29)| 5.02(1.26)|
| Hypertension             | 11.95(2.64)| 12.36(2.72)| 12.59(2.87)| 12.71(2.98)| 12.81(2.95)| 12.81(2.88)| 12.75(2.78)| 12.71(2.76)|
| CHD                      | 3.60(1.13)| 3.56(1.13)| 3.44(1.07)| 3.36(1.04)| 3.28(1.02)| 3.17(0.98)| 3.07(0.96)| 3.00(0.94)|
| COPD                     | 1.10(0.56)| 1.16(0.57)| 1.22(0.61)| 1.29(0.64)| 1.34(0.69)| 1.39(0.74)| 1.47(0.79)| 1.52(0.83)|
| Diabetes*                | 3.40(0.80)| 3.60(0.83)| 3.75(0.83)| 3.87(0.85)| 4.00(0.86)| 4.13(0.89)| 4.27(0.93)| 4.36(0.97)|
| Epilepsy†                | 0.61(0.25)| 0.61(0.24)| 0.61(0.26)| 0.60(0.26)| 0.59(0.27)| 0.57(0.24)| 0.56(0.22)| 0.56(0.23)|
| Mental Health (lithium therapy only) | 0.12(0.06)| 0.11(0.06)| 0.11(0.05)| 0.11(0.05)| 0.10(0.04)| 0.09(0.04)| 0.10(0.05)| 0.10(0.05)|
| Stroke                   | 1.64(0.50)| 1.64(0.50)| 1.67(0.51)| 1.67(0.51)| 1.66(0.49)| 1.67(0.48)| 1.68(0.45)| 1.67(0.48)|
| Number of practices      | 50       | 50       | 50       | 50       | 50       | 50       | 50       | 50       |

* For patients aged 17 or over
† For patients aged 18 or over
Table A3: Observed mean (SD) practice indicator scores (percentage achievement rates) over time, by group (sensitivity analysis 1: practices contributing for the whole time period)

|                              | 2004 /5 | 2005 /6 | 2006 /7 | 2007 /8 | 2008 /9 | 2009 /10 | 2010 /11 | 2011 /12 |
|------------------------------|---------|---------|---------|---------|---------|----------|----------|----------|
| **Influenza immunisation**   |         |         |         |         |         |          |          |          |
| Asthma7*                    | 78.6    | 79.0    | 78.7    | 78.8    | 78.4    | 78.5     | 79.2     | 78.9     |
|                             | (6.6)   | (6.4)   | (6.4)   | (6.7)   | (6.7)   | (6.4)    | (6.3)    | (6.3)    |
| CHD12                       | 90.9    | 91.1    | 91.2    | 91.1    | 90.9    | 90.7     | 90.3     | 89.6     |
|                             | (4.6)   | (4.4)   | (4.4)   | (4.4)   | (4.4)   | (4.4)    | (4.4)    | (4.5)    |
| COPD8                       | 92.5    | 92.7    | 92.7    | 92.5    | 92.4    | 92.1     | 91.3     | 90.2     |
|                             | (4.7)   | (4.3)   | (4.3)   | (4.2)   | (4.2)   | (4.4)    | (4.4)    | (4.5)    |
| DM18                        | 90.5    | 90.6    | 90.4    | 90.1    | 89.9    | 89.4     | 88.7     | 87.3     |
|                             | (4.7)   | (4.1)   | (4.1)   | (4.2)   | (4.2)   | (4.1)    | (4.1)    | (4.2)    |
| Stroke10                    | 88.8    | 89.1    | 89.0    | 88.8    | 88.5    | 88.2     | 87.6     | 86.6     |
|                             | (4.6)   | (4.5)   | (4.5)   | (4.5)   | (4.6)   | (4.9)    | (4.9)    | (4.9)    |
| **Blood pressure**          |         |         |         |         |         |          |          |          |
| CHD5†                       | 93.9    | 94.2    | 94.3    | 94.3    | 94.1    | 94.0     | 94.2     | 94.0     |
|                             | (4.8)   | (3.9)   | (3.9)   | (3.9)   | (3.9)   | (4.0)    | (3.8)    | (3.9)    |
| DM11†                       | 94.2    | 94.6    | 94.5    | 94.3    | 94.2    | 94.2     | 94.4     | 94.5     |
|                             | (4.1)   | (3.1)   | (3.0)   | (3.0)   | (3.0)   | (3.0)    | (2.9)    | (2.9)    |
| Stroke5†                    | 91.6    | 92.2    | 92.5    | 92.8    | 92.6    | 92.6     | 92.7     | 92.4     |
|                             | (5.1)   | (6.2)   | (4.3)   | (4.1)   | (4.1)   | (4.2)    | (4.3)    | (4.5)    |
| BP4                         | 88.8    | 90.1    | 90.4    | 90.1    | 89.5    | 89.5     | 89.7     | 89.7     |
|                             | (4.9)   | (5.7)   | (3.8)   | (3.5)   | (3.6)   | (3.4)    | (3.5)    | (3.4)    |
| CHD6                        | 84.7    | 86.2    | 88.1    | 88.6    | 89.1    | 89.5     | 89.8     | 90.5     |
|                             | (6.7)   | (5.5)   | (5.2)   | (4.9)   | (4.9)   | (4.8)    | (4.6)    | (4.4)    |
| DM12/30                     | 68.5    | 70.7    | 74.3    | 75.1    | 76.0    | 76.6     | 77.7     | 78.3     |
|                             | (9.8)   | (9.1)   | (8.4)   | (8.4)   | (8.3)   | (8.1)    | (7.7)    | (7.3)    |
| Stroke6                     | 82.0    | 83.9    | 86.2    | 86.8    | 87.4    | 88.0     | 88.7     | 89.0     |
|                             | (7.4)   | (6.4)   | (5.8)   | (5.6)   | (5.4)   | (5.5)    | (5.0)    | (4.9)    |
| BP5                         | 75.0    | 77.8    | 80.2    | 81.2    | 82.0    | 82.8     | 83.6     | 84.6     |
|                             | (8.5)   | (7.1)   | (6.4)   | (6.2)   | (6.0)   | (5.9)    | (5.9)    | (5.4)    |
| **Cholesterol**             |         |         |         |         |         |          |          |          |
| CHD7†                       | 85.7    | 87.7    | 88.5    | 88.5    | 88.4    | 88.4     | 88.5     | 87.1     |
|                             | (9.0)   | (7.6)   | (6.2)   | (6.2)   | (6.2)   | (6.0)    | (5.8)    | (6.6)    |
| DM16†                       | 90.0    | 91.1    | 91.4    | 91.2    | 91.3    | 91.3     | 91.5     | 91.4     |
|                             | (6.0)   | (5.7)   | (3.9)   | (3.7)   | (3.8)   | (3.5)    | (3.5)    | (3.6)    |
| Stroke7                     | 78.2    | 82.3    | 84.1    | 84.9    | 84.8    | 85.2     | 85.4     | 85.5     |
|                             | (10.7)  | (9.9)   | (7.6)   | (6.9)   | (6.7)   | (6.8)    | (7.0)    | (6.8)    |
| CHD8                        | 78.7    | 82.6    | 84.9    | 85.4    | 85.0    | 84.9     | 84.9     | 84.5     |
|                             | (7.9)   | (6.1)   | (5.4)   | (4.8)   | (4.9)   | (4.9)    | (4.7)    | (4.7)    |
| DM17                        | 78.7    | 83.2    | 85.3    | 85.6    | 85.2    | 84.9     | 84.5     | 83.7     |
|                             | (8.3)   | (6.0)   | (5.2)   | (4.9)   | (4.7)   | (4.6)    | (4.5)    | (4.6)    |
| Stroke8                     | 72.6    | 77.8    | 81.0    | 81.6    | 81.5    | 81.5     | 81.5     | 81.2     |
|                             | (8.3)   | (7.5)   | (6.4)   | (5.9)   | (6.1)   | (5.7)    | (5.3)    | (5.4)    |
| **Glycaemic control**       |         |         |         |         |         |          |          |          |
| DM5†                        | 90.7    | 91.4    | 91.4    | 91.4    | 91.5    | 91.9     | 92.2     | 92.5     |
|                             | (5.6)   | (5.5)   | (3.9)   | (3.7)   | (3.7)   | (3.5)    | (3.4)    | (3.4)    |
| DM6/20/23/26                | 64.9    | 66.5    | 68.9    | 68.8    | 69.3    | 70.8     | 71.5     | 70.5     |
| Condition | Description | 2004/5 | 2005/6 | 2006/7 | 2007/8 | 2008/9 | 2009/10 | 2010/11 | 2011/12 |
|-----------|-------------|--------|--------|--------|--------|--------|--------|--------|--------|
| HbA1c ≤7.5‡ | | (9.7) | (9.1) | (8.8) | (8.8) | (8.3) | (7.2) | (6.9) | (7.1) |
| Lithium therapy | | | | | | | | | |
| MH3* | Patients on lithium therapy with a record of lithium levels | 89.5 (14.1) | 91.0 (13.6) | 91.6 (11.5) | 91.4 (12.1) | 92.1 (12.5) | 92.3 (10.4) | 92.2 (11.2) | 92.6 (12.3) |
| MH5/18 | Patients on lithium therapy with lithium levels in therapeutic range | 86.0 (23.8) | 87.3 (21.2) | 88.5 (20.8) | 90.5 (17.4) | 91.1 (17.2) | 90.5 (18.0) | 90.1 (18.2) | 90.1 (17.4) |
| Within condition covariate indicators | | | | | | | | | |
| Asthma5 (Smoking2/4) | Patients with asthma who smoke offered smoking cessation advice | 63.8 (10.5) | 66.1 (10.0) | 71.4 (8.9) | 73.2 (8.5) | 76.4 (8.6) | 78.9 (8.0) | 88.4 (6.6) | 89.2 (5.4) |
| CHD2/13 | Patients with newly diagnosed angina, referred for specialist assessment | 62.4 (17.9) | 70.5 (17.0) | 75.1 (15.1) | 76.6 (15.3) | 79.2 (14.4) | 81.5 (14.4) | 80.5 (15.0) | 80.3 (15.2) |
| BP2 (Smoking1/3) | Patients with hypertension with record of smoking status | 76.1 (14.5) | 75.6 (14.1) | 75.0 (13.8) | 74.5 (13.5) | 73.8 (13.3) | 73.3 (13.1) | 72.6 (13.0) | 72.0 (12.8) |
| DM2 | Patients with diabetes with record of body mass index | 88.7 (6.8) | 89.9 (4.7) | 90.4 (4.5) | 90.1 (4.4) | 89.9 (4.5) | 89.6 (4.6) | 89.7 (4.4) | 90.3 (4.2) |
| DM14/22 | Patients with diabetes, with record of serum creatinine | 90.5 (6.1) | 91.8 (5.6) | 92.1 (4.0) | 91.9 (4.1) | 92.1 (5.0) | 91.9 (6.4) | 92.6 (6.0) | 92.8 (5.3) |
| MH4/17 | Patients on lithium therapy with a record of serum creatinine and thyroid stimulating hormone | 88.5 (16.7) | 92.7 (11.4) | 92.8 (11.5) | 93.9 (9.6) | 94.5 (9.7) | 95.1 (7.7) | 94.5 (9.7) | 95.8 (8.7) |
| Epilepsy2/6 | Patients on drug treatment for epilepsy with record of seizure frequency | 88.6 (11.0) | 89.9 (6.6) | 89.9 (7.1) | 89.9 (7.2) | 90.1 (6.5) | 89.2 (6.9) | 89.5 (7.4) | 89.9 (8.4) |

* removed in April 2006 (italics denote post-incentivisation rates).
† removed in April 2011 (italics denote post-incentivisation rates).
‡ The required value for the HbA1c control indicator changed over time: 7.4% in 2004/5 and 2005/6; 7.5% in 2006/7 to 2008/9; 7.0% in 2009/10 and 2010/11; 7.5% in 2011/12 and 2012/13. For consistency, 7.5% was set as the target for glycaemic control.
| Table A4: Observed mean (SD) practice indicator scores (percentage achievement rates) over time, by group (sensitivity analysis 2: 50 more representative practices in terms of list-size from sensitivity 1) |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                 | 2004 /5         | 2005 /6         | 2006 /7         | 2007 /8         | 2008 /9         | 2009 /10        | 2010 /11        | 2011 /12        |
| **Influenza immunisation** |                 |                 |                 |                 |                 |                 |                 |                 |
| Asthma7*        | 80.3 (7.5)      | 80.7 (7.8)      | 80.1 (7.8)      | 80.4 (8.1)      | 79.9 (7.6)      | 79.8 (7.2)      | 80.6 (6.9)      | 80.0 (7.1)      |
| CHD12           | 91.6 (4.2)      | 92.0 (3.9)      | 92.1 (3.8)      | 91.8 (4.1)      | 92.0 (4.1)      | 91.7 (4.3)      | 91.6 (4.3)      | 90.8 (4.5)      |
| COPD8           | 93.6 (5.4)      | 93.9 (5.3)      | 93.9 (4.9)      | 93.6 (4.6)      | 93.5 (4.7)      | 92.7 (4.5)      | 92.1 (4.3)      | 91.2 (4.5)      |
| DM18            | 91.5 (4.2)      | 91.4 (4.2)      | 91.3 (4.1)      | 91.2 (4.0)      | 91.1 (4.0)      | 90.3 (4.3)      | 89.2 (4.5)      | 87.7 (4.7)      |
| Stroke10        | 90.6 (4.9)      | 91.0 (4.4)      | 90.8 (4.5)      | 90.6 (4.6)      | 90.0 (4.9)      | 89.8 (5.0)      | 89.2 (4.9)      | 88.1 (5.0)      |
| **Blood pressure** |                 |                 |                 |                 |                 |                 |                 |                 |
| CHD5†           | 94.5 (4.8)      | 95.0 (4.1)      | 94.8 (4.1)      | 95.1 (4.1)      | 95.0 (4.2)      | 94.9 (4.0)      | 95.2 (3.8)      | 94.9 (4.0)      |
| DM11†           | 95.2 (3.5)      | 95.1 (3.4)      | 95.6 (2.7)      | 95.1 (2.7)      | 95.3 (2.7)      | 95.1 (3.1)      | 95.4 (2.9)      | 95.2 (3.0)      |
| Stroke5†        | 92.6 (6.9)      | 94.3 (4.9)      | 93.9 (4.4)      | 94.2 (3.7)      | 93.9 (3.8)      | 93.6 (3.7)      | 94.1 (3.4)      | 94.1 (4.5)      |
| BP4             | 89.1 (6.4)      | 90.8 (5.2)      | 91.5 (3.9)      | 90.8 (4.0)      | 90.2 (4.6)      | 90.2 (3.8)      | 90.6 (3.7)      | 90.1 (3.6)      |
| CHD6            | 86.2 (6.3)      | 87.1 (6.0)      | 88.8 (5.7)      | 90.2 (5.6)      | 89.8 (5.8)      | 90.2 (6.0)      | 90.9 (4.9)      | 91.6 (5.1)      |
| DM12/30         | 69.6 (8.0)      | 70.8 (8.7)      | 75.6 (8.5)      | 77.7 (8.9)      | 78.2 (7.8)      | 78.2 (9.0)      | 79.4 (7.7)      | 80.8 (8.0)      |
| Stroke6         | 82.9 (7.2)      | 84.5 (6.9)      | 88.0 (5.6)      | 88.7 (6.0)      | 89.0 (6.7)      | 89.9 (5.9)      | 89.9 (5.8)      | 90.9 (5.1)      |
| BP5             | 76.3 (9.0)      | 78.8 (7.0)      | 82.0 (6.7)      | 83.4 (6.8)      | 83.4 (6.5)      | 84.0 (6.4)      | 84.8 (6.3)      | 85.8 (5.7)      |
| **Cholesterol** |                 |                 |                 |                 |                 |                 |                 |                 |
| CHD7†           | 85.5 (12.7)     | 87.2 (13.7)     | 88.9 (7.4)      | 89.5 (6.2)      | 89.5 (6.2)      | 89.4 (6.0)      | 89.4 (6.0)      | 87.5 (6.7)      |
| DM16†           | 90.3 (8.9)      | 90.7 (13.2)     | 92.6 (5.0)      | 92.6 (3.4)      | 93.0 (3.8)      | 93.0 (3.8)      | 93.0 (3.8)      | 92.6 (4.0)      |
| Stroke7         | 78.4 (14.5)     | 82.9 (14.4)     | 85.9 (8.0)      | 86.9 (7.3)      | 86.9 (6.1)      | 87.0 (6.9)      | 87.9 (6.9)      | 87.5 (6.9)      |
| CHD8            | 78.2 (9.0)      | 82.6 (7.3)      | 85.1 (5.9)      | 85.8 (5.0)      | 85.0 (5.7)      | 85.6 (5.4)      | 85.0 (4.9)      | 84.8 (5.0)      |
| DM17            | 79.8 (8.7)      | 85.3 (6.2)      | 86.8 (5.4)      | 86.0 (5.3)      | 86.2 (4.6)      | 85.9 (4.5)      | 85.6 (4.0)      | 85.1 (4.1)      |
| Stroke8         | 73.9 (9.7)      | 79.7 (7.6)      | 82.3 (6.6)      | 82.7 (5.4)      | 82.1 (6.8)      | 81.8 (5.7)      | 81.7 (5.0)      | 82.1 (5.4)      |
| **Glycaemic control** |             |                 |                 |                 |                 |                 |                 |                 |
| DM5†            | 91.1            | 90.8            | 92.4            | 92.8            | 93.0            | 93.1            | 93.6            | 93.7            |
| Record of HbA1c | 2004 /5 | 2005 /6 | 2006 /7 | 2007 /8 | 2008 /9 | 2009 /10 | 2010 /11 | 2011 /12 |
|----------------|--------|--------|--------|--------|--------|--------|--------|--------|
| DM6/20/23/26   |        |        |        |        |        |        |        |        |
| Patients with diabetes, last HbA1c ≤7.5‡ | 65.7 (11.4) | 66.6 (11.1) | 69.7 (10.3) | 70.1 (9.6) | 70.9 (8.1) | 71.6 (7.7) | 72.4 (7.8) | 69.8 (8.7) |

| Lithium therapy |
|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|
| MH3*            |        |        |        |        |        |        |        |        |
| Patients on lithium therapy with a record of lithium levels | 87.6 (18.0) | 88.9 (16.9) | 92.3 (9.0) | 92.8 (10.5) | 93.2 (12.8) | 92.2 (12.8) | 92.7 (12.4) | 92.3 (12.5) |
| MH5/18          |        |        |        |        |        |        |        |        |
| Patients on lithium therapy with lithium levels in therapeutic range | 80.5 (33.5) | 88.9 (19.4) | 87.6 (21.9) | 88.8 (21.9) | 87.9 (25.5) | 87.6 (27.8) | 87.5 (24.9) | 88.4 (22.3) |

| Within condition covariate indicators |
|--------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Asthma5 (Smoking2/4)                  |        |        |        |        |        |        |        |        |
| Patients with asthma who smoke offered smoking cessation advice | 65.0 (13.3) | 68.8 (12.5) | 72.8 (10.4) | 74.3 (9.5) | 77.5 (8.7) | 79.4 (8.9) | 88.8 (7.0) | 90.0 (6.3) |
| CHD2/13                                |        |        |        |        |        |        |        |        |
| Patients with newly diagnosed angina, referred for specialist assessment | 61.6 (18.8) | 73.6 (17.8) | 76.1 (15.9) | 78.6 (20.8) | 80.6 (16.4) | 84.5 (15.0) | 80.5 (18.4) | 80.4 (14.5) |
| BP2 (Smoking1/3)                      |        |        |        |        |        |        |        |        |
| Patients with hypertension with record of smoking status | 71.7 (16.6) | 71.3 (16.4) | 70.8 (16.1) | 70.4 (15.9) | 69.8 (15.7) | 69.2 (15.4) | 68.6 (15.3) | 68.1 (15.2) |
| DM2                                    |        |        |        |        |        |        |        |        |
| Patients with diabetes with record of body mass index | 90.3 (5.4) | 91.3 (5.0) | 92.1 (4.1) | 91.6 (4.3) | 92.1 (4.8) | 91.3 (5.0) | 91.6 (4.5) | 91.7 (3.7) |
| DM14/22                                |        |        |        |        |        |        |        |        |
| Patients with diabetes, with record of serum creatinine | 90.6 (8.7) | 91.2 (13.1) | 93.2 (4.5) | 93.2 (3.0) | 93.8 (3.2) | 93.5 (3.3) | 94.0 (3.3) | 94.0 (3.4) |
| MH4/17                                 |        |        |        |        |        |        |        |        |
| Patients on lithium therapy with a record of serum creatinine and thyroid stimulating hormone | 84.9 (22.8) | 95.1 (10.0) | 92.6 (17.0) | 95.6 (9.2) | 96.4 (6.4) | 95.3 (8.6) | 97.2 (5.6) | 95.4 (10.2) |
| Epilepsy2/6                            |        |        |        |        |        |        |        |        |
| Patients on drug treatment for epilepsy with record of seizure frequency | 88.4 (12.4) | 89.9 (6.9) | 91.8 (7.3) | 91.0 (7.1) | 90.7 (7.3) | 90.8 (6.7) | 90.8 (8.7) | 89.2 (7.7) |

* removed in April 2006 (italics denote post-incentivisation rates).
† removed in April 2011 (italics denote post-incentivisation rates).
‡ The required value for the HbA1c regulation indicator changed over time: 7.4% in 2004/5 and 2005/6; 7.5% in 2006/7 to 2008/9; 7.0% in 2009/10 and 2010/11; 7.5% in 2011/12 and 2012/13. For consistency, 7.5% was set as the target for glycaemic regulation.
Table A5: Short-term effects – mean back-transformed observed and predicted scores and their difference (95% confidence interval) for sensitivity analysis 1 (practices contributing data across all years, logit transformed scores)**†

| Removed indicators‡ | 2008/9   | 2009/10  | 2010/11  | 2011/12  |
|----------------------|----------|----------|----------|----------|
| CHD5                 | Obs(pred) | 95.1(95.0)| 94.9(95.0)| 95.1(95.1)| 95.0(95.1)|
| Difference (95% CI)  | -0.11    | (-0.31 to 0.09) | (-0.14 to 0.27) | (-0.27 to 0.19) |
| DM11                 | Obs(pred) | 95.0(94.9)| 94.9(95.0)| 95.1(95.1)| 95.2(95.2)|
| Difference (95% CI)  | 0.04     | (-0.11 to 0.20) | (-0.12 to 0.07) | (-0.13 to 0.16) |
| Stroke5              | Obs(pred) | 93.6(93.6)| 93.6(93.6)| 93.7(93.7)| 93.6(93.8)|
| Difference (95% CI)  | -0.05    | (-0.18 to 0.25) | (-0.28 to 0.18) | (-0.19 to 0.26) | (-0.46 to 0.05) |
| CHD7                 | Obs(pred) | 89.5(89.5)| 89.5(89.5)| 89.6(89.5)| 88.4(89.6)|
| Difference (95% CI)  | 0.02     | (-0.32 to 0.37) | (-0.36 to 0.33) | (-0.30 to 0.36) | (-1.53 to -0.74) |
| DM16                 | Obs(pred) | 92.1(92.0)| 92.0(92.1)| 92.3(92.2)| 92.2(92.3)|
| Difference (95% CI)  | 0.05     | (-0.14 to 0.23) | (-0.26 to 0.06) | (-0.12 to 0.23) | (-0.34 to 0.02) |
| DM5                  | Obs(pred) | 92.2(92.2)| 92.6(92.6)| 92.9(92.9)| 93.2(93.2)|
| Difference (95% CI)  | 0.01     | (-0.17 to 0.20) | (-0.18 to 0.15) | (-0.15 to 0.17) | (-0.22 to 0.13) |
| Linked outcome indicators§ | | | | | |
| CHD6                 | Obs(pred) | 90.1(90.1)| 90.6(90.5)| 90.8(90.8)| 91.4(91.1)|
| Difference (95% CI)  | -0.06    | (-0.31 to 0.20) | (-0.12 to 0.35) | (-0.28 to 0.18) | (-0.01 to 0.52) |
| DM12/30              | Obs(pred) | 77.0(76.9)| 77.7(77.8)| 78.7(78.7)| 79.3(79.5)|
| Difference (95% CI)  | 0.06     | (-0.38 to 0.52) | (-0.55 to 0.27) | (-0.37 to 0.49) | (-0.71 to 0.23) |
| Stroke6              | Obs(pred) | 88.5(88.5)| 89.2(89.1)| 89.7(89.7)| 90.0(90.3)|
| Difference (95% CI)  | -0.02    | (-0.32 to 0.29) | (-0.25 to 0.36) | (-0.31 to 0.28) | (-0.63 to -0.01) |
| CHD8                 | Obs(pred) | 85.7(85.6)| 85.6(85.6)| 85.6(85.6)| 85.2(85.5)|
| Difference (95% CI)  | -0.2     | (-0.26 to 0.29) | (-0.29 to 0.27) | (-0.26 to 0.30) | (-0.65 to -0.03) |
| DM17                 | Obs(pred) | 85.9(85.9)| 85.5(85.5)| 85.1(85.1)| 84.3(84.7)|
| Difference (95% CI)  | -0.03    | (-0.30 to 0.24) | (-0.19 to 0.32) | (-0.29 to 0.24) | (-0.73 to -0.10) |
| DM6/20/23/26         | Obs(pred) | 69.7(69.9)| 71.3(71.0)| 72.1(72.2)| 71.1(73.3)|
| Difference (95% CI)  | -0.15    | (-0.63 to 0.34) | (0.003 to 0.53) | (-0.41 to 0.16) | (-2.22 to -1.84) |

* Pre-removal time points used in the modelling in red font and post-removal time points in italics; predictions are not provided pre-removal time points not used in the modelling.
† For indicators where denominators are small and 100% scores are prevalent, there can be discrepancies between true and back-transformed scores due to the empirical logit (i.e. a score at 100% is back-transformed to a lower score).
‡ Asthma7 and MH3 removed in April 2006, all other indicators in April 2011.
§ Post removal period for linked outcome indicator MHS/18 is 2006/7 onwards; for all other linked indicators, only 2011/12.
### Table A6: Short-term effects – mean back-transformed observed and predicted scores and their difference (95% confidence interval) for sensitivity analysis 2 (50 more representative practices contributing data across all years, logit transformed scores)**†

| Removed indicators‡ | 2008/9   | 2009/10  | 2010/11  | 2011/12  |
|---------------------|----------|----------|----------|----------|
| CHD5 Obs(pred)      | 96.3(96.2)| 95.8(96.0)| 96.0(95.9)| 95.9(95.8)|
| Difference (95% CI) | 0.10     | -0.23    | 0.12     | 0.14     |
| DM11 Obs(pred)      | 95.9(95.8)| 95.8(95.9)| 96.1(96.0)| 96.0(96.1)|
| Difference (95% CI) | 0.07     | -0.11    | 0.11     | -0.08    |
| Stroke5 Obs(pred)   | 95.0(94.8)| 94.4(94.9)| 95.0(94.8)| 95.5(94.9)|
| Difference (95% CI) | 0.19     | -0.43    | 0.19     | 0.58     |
| CHD7 Obs(pred)      | 91.1(91.1)| 90.8(90.8)| 90.5(90.4)| 89.2(90.1)|
| Difference (95% CI) | 0.002    | 0.03     | -0.93    | 0.002    |
| DM16 Obs(pred)      | 93.9(93.7)| 93.4(93.7)| 93.9(93.7)| 93.6(93.7)|
| Difference (95% CI) | 0.12     | -0.33    | -0.06    | -0.54    |
| DM5 Obs(pred)       | 93.6(93.6)| 93.9(94.0)| 94.3(94.3)| 94.5(94.6)|
| Difference (95% CI) | 0.01     | -0.06    | -0.06    | 0.01     |

| Linked outcome indicators§ | 2008/9   | 2009/10  | 2010/11  | 2011/12  |
|-----------------------------|----------|----------|----------|----------|
| CHD6 Obs(pred)              | 91.2(91.3)| 91.8(91.8)| 92.1(92.2)| 93.0(92.6)|
| Difference (95% CI)         | -0.09    | -0.003   | -0.09    | 0.35     |
| DM12/30 Obs(pred)           | 79.2(78.9)| 79.5(79.7)| 80.6(80.3)| 82.2(81.2)|
| Difference (95% CI)         | 0.29     | -0.26    | 0.33     | 1.01     |
| Stroke6 Obs(pred)           | 90.5(90.5)| 91.2(91.1)| 91.4(91.5)| 92.2(91.9)|
| Difference (95% CI)         | -0.002   | 0.17     | -0.13    | 0.35     |
| CHD8 Obs(pred)              | 86.1(86.3)| 86.5(86.1)| 85.7(85.9)| 85.5(85.7)|
| Difference (95% CI)         | -0.16    | 0.39     | -0.18    | -0.15    |
| DM17 Obs(pred)              | 87.0(87.0)| 86.6(86.6)| 86.1(86.1)| 85.6(85.7)|
| Difference (95% CI)         | -0.05    | 0.01     | -0.003   | -0.15    |
| DM6/20/23/26 Obs(pred)      | 71.7(71.7)| 72.3(72.5)| 73.2(73.1)| 70.5(73.9)|
| Difference (95% CI)         | 0.003    | -0.14    | 0.08     | -3.41    |

* Pre-removal time points used in the modelling in red font and post-removal time points in italics; predictions are not provided pre-removal time points not used in the modelling.
† For indicators where denominators are small and 100% scores are prevalent, there can be discrepancies between true and back-transformed scores due to the empirical logit (i.e. a score at 100% is back-transformed to a lower score).
‡ Asthma7 and MH3 removed in April 2006, all other indicators in April 2011.
§ Post removal period for linked outcome indicator MHS/18 is 2006/7 onwards; for all other linked indicators, only 2011/12.
Table A7: Short-term effects – mean observed and predicted scores and their difference (95% confidence interval) for sensitivity analysis 3 (practices used in main analyses, untransformed scores)**†

|                     | 2008/9   | 2009/10  | 2010/11  | 2011/12  |
|---------------------|----------|----------|----------|----------|
| Removed indicators‡ |          |          |          |          |
| CHD5                | Obs(pred) | 93.9(93.8) | 93.8(93.9) | 94.1(94.0) | 93.9(94.0) |
| Difference (95% CI) | 0.07     | -0.14    | 0.08     | -0.09    |
| DM11                | Obs(pred) | 94.1(94.1) | 94.0(94.1) | 94.3(94.2) | 94.3(94.3) |
| Difference (95% CI) | 0.04     | -0.07    | 0.04     | 0.05     |
| Stroke5             | Obs(pred) | 92.5(92.5) | 92.5(92.6) | 92.7(92.7) | 92.4(92.7) |
| Difference (95% CI) | 0.02     | -0.03    | 0.02     | -0.25    |
| CHD7                | Obs(pred) | 88.1(88.1) | 88.1(88.2) | 88.3(88.3) | 87.0(88.4) |
| Difference (95% CI) | 0.03     | -0.06    | 0.04     | -1.38    |
| DM16                | Obs(pred) | 91.1(91.0) | 91.1(91.2) | 91.4(91.4) | 91.2(91.5) |
| Difference (95% CI) | 0.02     | -0.04    | 0.02     | -0.26    |
| DM5                 | Obs(pred) | 91.3(91.2) | 91.6(91.6) | 92.1(92.1) | 92.2(92.5) |
| Difference (95% CI) | 0.02     | -0.03    | 0.02     | -0.21    |
| Linked outcome indicators§ |
| CHD6                | Obs(pred) | 89.1(89.1) | 89.5(89.5) | 90.0(90.0) | 90.5(90.2) |
| Difference (95% CI) | 0.01     | -0.03    | 0.03     | 0.21     |
| DM12/30             | Obs(pred) | 75.8(75.7) | 76.5(76.7) | 77.8(77.7) | 78.2(78.5) |
| Difference (95% CI) | 0.09     | -0.19    | 0.10     | -0.29    |
| Stroke6             | Obs(pred) | 87.4(87.4) | 88.1(88.1) | 88.8(88.8) | 89.0(89.3) |
| Difference (95% CI) | -0.01    | 0.03     | -0.01    | -0.31    |
| CHD8                | Obs(pred) | 84.8(84.7) | 84.7(84.7) | 84.8(84.7) | 84.4(84.7) |
| Difference (95% CI) | 0.04     | -0.05    | 0.04     | -0.32    |
| DM17                | Obs(pred) | 85.1(85.2) | 84.9(84.8) | 84.5(84.5) | 83.6(84.1) |
| Difference (95% CI) | -0.03    | 0.04     | -0.01    | -0.50    |
| DM6/20/23/26        | Obs(pred) | 69.5(69.6) | 70.7(70.5) | 71.4(71.5) | 70.4(72.8) |
| Difference (95% CI) | -0.11    | 0.21     | -0.11    | -0.20    |

* Pre-removal time points used in the modelling in red font and post-removal time points in italics; predictions are not provided pre-removal time points not used in the modelling.
† For indicators where denominators are small and 100% scores are prevalent, there can be discrepancies between true and back-transformed scores due to the empirical logit (i.e. a score at 100% is back-transformed to a lower score).
‡ Asthma7 and MH3 removed in April 2006, all other indicators in April 2011.
§ Post removal period for linked outcome indicator MHS/18 is 2006/7 onwards; for all other linked indicators, only 2011/12.
Table A8: Long-term effects – scores for 2005/6 and 2011/12 and their difference (95% confidence interval), for all four analyses

| Analysis | Measure | Indicator |
|----------|---------|-----------|
|          |         | Asthma7   | MH3    | MH5/18 |
| **Main** | Back-transformed observed mean (sd) 2005/6 | 78.2 (6.8) | 87.1 (11.4) | 84.0 (17.3) |
|          | Back-transformed observed mean (sd) 2011/12 | 78.1 (6.5) | 87.1 (10.1) | 85.0 (15.4) |
|          | Adjusted back-transformed mean difference (CI), 2011/12 minus 2005/6† | -0.70 (-1.01 to -0.39) | 0.65 (-0.11 to 1.46) | 0.63 (-0.38 to 1.72) |
| **Sensitivity 1†** | Back-transformed observed mean (sd) 2005/6 | 79.0 (6.4) | 87.2 (11.0) | 83.4 (18.3) |
|          | Back-transformed observed mean (sd) 2011/12 | 78.9 (6.3) | 88.2 (10.0) | 85.5 (15.1) |
|          | Adjusted back-transformed mean difference (CI), 2011/12 minus 2005/6† | -0.75 (-1.08 to -0.42) | 0.70 (-0.09 to 1.55) | 0.95 (-0.15 to 2.15) |
| **Sensitivity 2‡** | Back-transformed observed mean (sd) 2005/6 | 80.7 (7.8) | 84.2 (15.2) | 84.3 (14.7) |
|          | Back-transformed observed mean (sd) 2011/12 | 80.0 (7.1) | 86.1 (10.2) | 82.8 (18.4) |
|          | Adjusted back-transformed mean difference (CI), 2011/12 minus 2005/6† | -1.05 (-2.08 to 0.03) | 0.94 (-1.56 to 3.95) | -1.34 (-4.13 to 2.13) |
| **Sensitivity 3ǁ** | Observed mean 2005/6 | 78.2 (6.8) | 91.1 (14.0) | 87.9 (20.4) |
|          | Observed mean 2011/12 | 78.8 (6.5) | 92.5 (12.4) | 89.6 (18.0) |
|          | Adjusted* mean difference (CI), 2011/12 minus 2005/6 | -0.56 (-0.84 to -0.28) | 1.45 (0.02 to 2.88) | 1.63 (-0.17 to 3.42) |

* practices contributing data within each year, logit transformed scores
† obtained from regression analyses controlled for available practice characteristics: condition prevalence rate, practice patient list size, deprivation quintile and region
‡ practices contributing data across all years, logit transformed scores
§ 50 more representative practices contributing data across all years, logit transformed scores
ǁ practices used in main analyses, untransformed scores