Trends and Variations in General Medical Services Indicators for Diabetes: Analysis of QRESEARCH Data

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1 EXECUTIVE SUMMARY

This report has two main objectives:

1. To determine the inter-practice variation in achievement of 18 indicators for diabetes care using the nGMS measures on the 1 April 2004.

2. To report on the pattern of usage of the newly introduced exception codes

The key findings are:

- As in our last report (Report 15) the inter-practice variation in apparent diabetes prevalence is wide; some of this may be a reflection of real differences in population prevalence; some due to case finding; and some due to recording quality.

- Traditionally recorded items measures of clinical status in diabetes – body mass index, smoking, blood pressure, glycosylated haemoglobin, creatinine, cholesterol – show a high level of overall recording and a low inter-practice variation, albeit with a few low recording outliers.

- Some measures of clinical status have been less frequently recorded in coded form. These include retinal screening, checking of foot pulses, neuropathy testing, microalbuminuria testing, and the inter-practice variation is very wide.

- Exemption codes have been recently introduced and by 1st April 2004, when the data in this analysis was extracted from the practices, were infrequently recorded.

- Activity codes, such as smoking cessation advice and flu vaccination, are often well recorded, but the variation in practice recording rates is wide.

- Measures of clinical control reflect the patterns that we might expect from other work. Overall half of all eligible patients have a last glycosylated haemoglobin of 7.5% or lower (indicator 6), however the variation between individual GP practices for this indicator is large with an inter quartile range of 43-57%. The percentage of eligible patients with a last glycosylated haemoglobin of 10% or lower (indicator 7) increases to 85% with a much smaller inter quartile range between individual GP

practices. Overall nearly 60% of eligible patients have a BP under 145/85 (indicator 12), however when you look at the variation in this indicator between GP practices it is large (IR 51-66). Cholesterol levels were as expected (indicator 16 and 17), 61% of eligible patients had a cholesterol level of 5mmol/l or less, with a practice median of 62%.

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2 OBJECTIVES

This report has two main objectives:

1. To determine the inter-practice variation in achievement of 18 indicators for diabetes care using the nGMS measures on the 1 April 2004.

2. To report on the pattern of usage of the newly introduced exception codes.

3 METHOD

3.1 Version of database used

The 4th national version of the QRESEARCH database was used for this analysis. This database, which contains data until 1 August 2004 has been described in detail in "Report 14 (October 2004)".

3.2 Practice inclusion criteria

To be included in the analyses, practice had to have EMIS installed before 1 April 2004 and to have data transferred up to 1 April 2004 to ensure that the data were complete.

3.3 Patient inclusion criteria

In order to be included in the analysis, patients had to be over 16 years old and be registered on the 1 April 2004.

3.4 Case definition for diabetes mellitus

Prevalent cases of diabetes mellitus were defined by the presence of a C10% code in their record prior to the end of the analysis period. No distinction has been made between type one and type two diabetes for this report. Patients on treatment with insulin or hypoglycaemics who do not have a diagnosis of diabetes have not been included in order to make this analysis consistent with the nGMS criteria.

3.5 Definition of the quality indicators

We used the "New GMS Contract QOF Implementation Dataset and Business Rules – Diabetes Mellitus Indicator set" (Version 50 release date 27 September 2005). It is important to note that this rule set contains updated lists of Read codes. Some of current

Read codes were not in existence or possibly not in general use during the data analysis period covered by this report. This is likely to apply most to the 'exception codes' which exempt certain patient groups from analysis.

4 RESULTS

4.1 Study population

The date for the analyses was the 1 April 2004. There were 457 practices from the QRESEARCH database (4th version) that had complete data up to 1 April 2004 and therefore met our inclusion criteria.

Overall, there were 2.7 million patients aged over 16 registered on 1 April 2004 with the 457 practices. There were 100,964 patients with a diagnostic read code for diabetes and of these 55% were male and 45% were female; 55% of all patients were aged 65 or older.

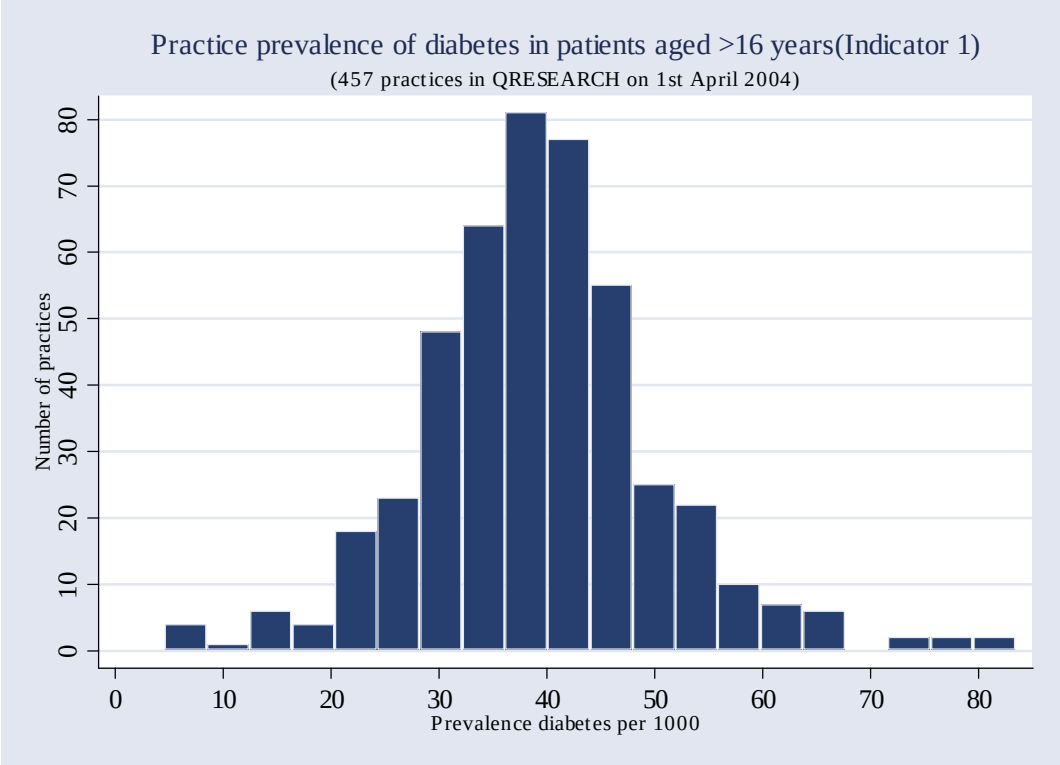
4.2 Notes on exclusions

In general patients are excluded from the denominator for each indicator if they were newly registered with the practice (i.e. registered within the preceding 3 months) or if they were newly diagnosed with diabetes (i.e. diagnosed within the preceding three months) or if they have a Read code including an exception to diabetes reporting code within the previous 15 months. However, if the patients happen to have the required measurement then they could appear in the numerator. There are also some exclusions specific to different indicators. This means that the eligible population for each indicator varies. Also, patients might have more than one exclusion criteria. A summary of the individual exclusions is shown in table 1 (appendix). The results for each of the indicators are presented graphically in the next section. The accompanying table is table 2 (appendix).

4.3 Diabetes indicator 1: % able with a register

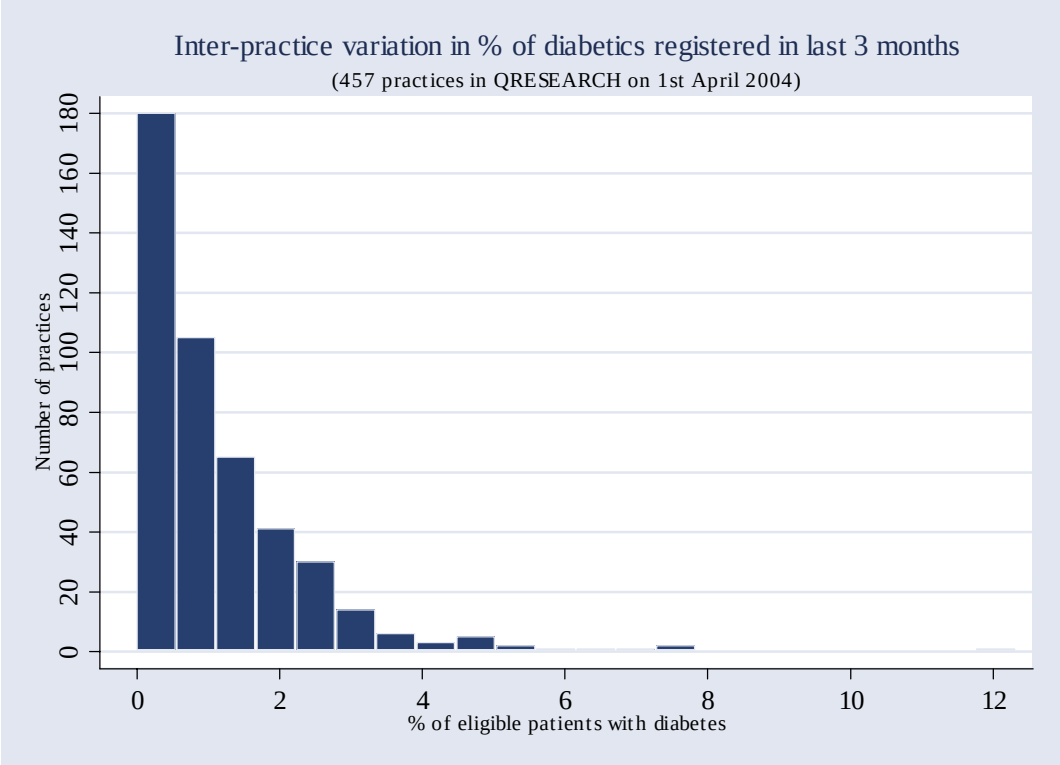
Indication DM1: The practice can produce a register of patients with diabetes mellitus. No numerator or denominator is required.
Specific exclusions: None – all practices are eligible for inclusion in this indicator.

All practices were able to identify some patients with diabetes and were therefore able to satisfy diabetes indicator one. The median prevalence was 39 per 1,000 patients (inter-quartile range 33 to 53 per 1000). This is higher than the rate reported in "Report 15" since the population is restricted to patients over 16 years of age rather than a true population prevalence. The graph shows the inter-practice variation in prevalence of diabetes in patients over 16 years old.



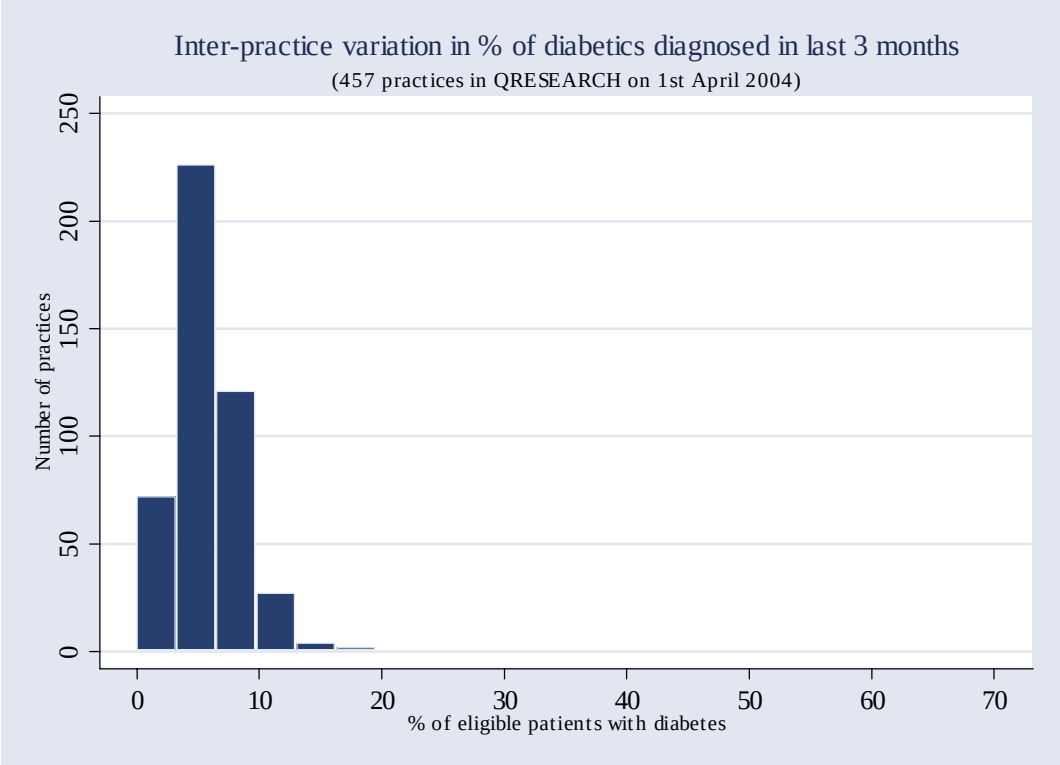
6.4 Patients registered within the last three months (exemption code)

Overall there were 991 cases (1% of eligible patients) where a patient had an exemption code of registering in the last 3 months. The next chart shows the variation between GP practices in the percentage of diabetics who first registered with the practice in the preceding three months. As shown in table 1 (appendix), the median value for GP practices was 0.8% with an inter quartile range of IQR 0% to 1.6%.



6.5 Patients diagnosed within the last three months (exemption code)

Overall 6% of all patients with diabetes had a code recorded in the preceding 3 months. This is more than twice the number of real new cases we would expect for this population over a three month period and is very likely to reflect an effort by practices to get this disease registered ready for the start of the new GMS contract. The graph below shows the inter practice variation in percentage of all diabetics who were diagnosed in last 3 months.

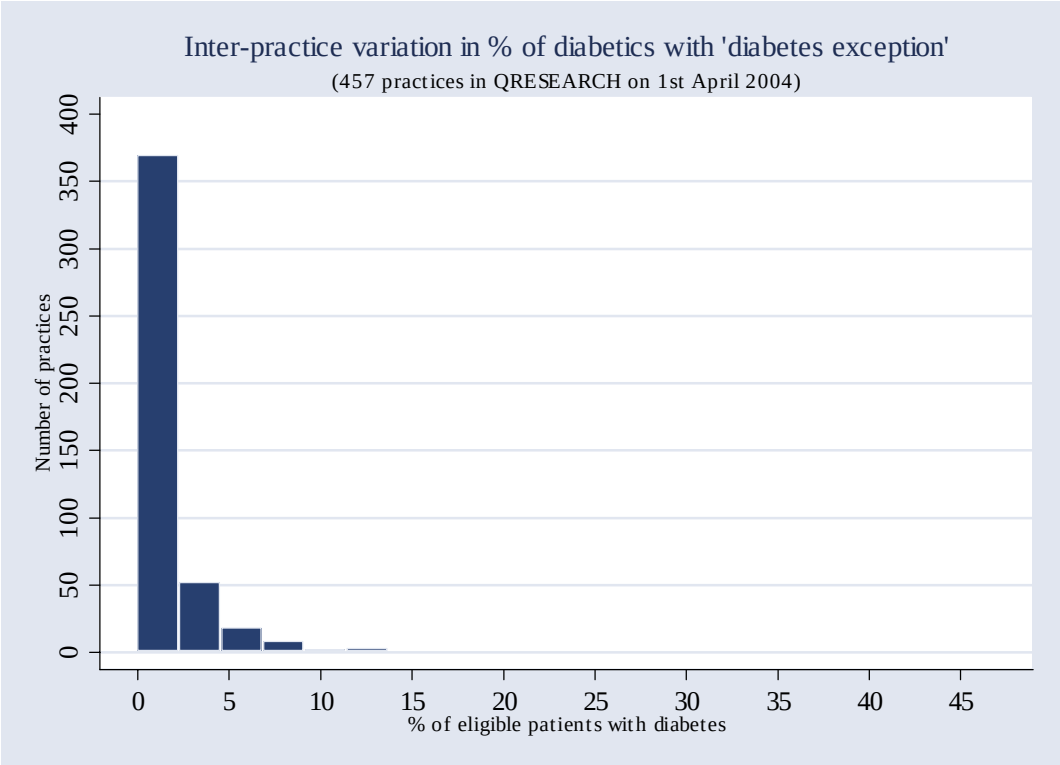


6.6 Patients with ‘diabetes resolved’ (exemption code)

Overall there were just 16 patients (0.02%) with a diabetes resolved code. This is probably because the code is new. However its use should be rare because diabetes generally doesn’t resolve unless its pregnancy related, there is a substantial loss of weight, or it is associated with an acute stress reaction [which shouldn’t really prompt a diagnosis anyway]. Most uses of this code are likely to be for those misdiagnosed or incorrectly recorded.

6.7 Patients with ‘Diabetes exception code’

There were 1,392 (1.4% of all patients with diabetes) who had a diabetes exception reporting code recorded. The graph below shows the inter practice variation of the use of the diabetes exception code.

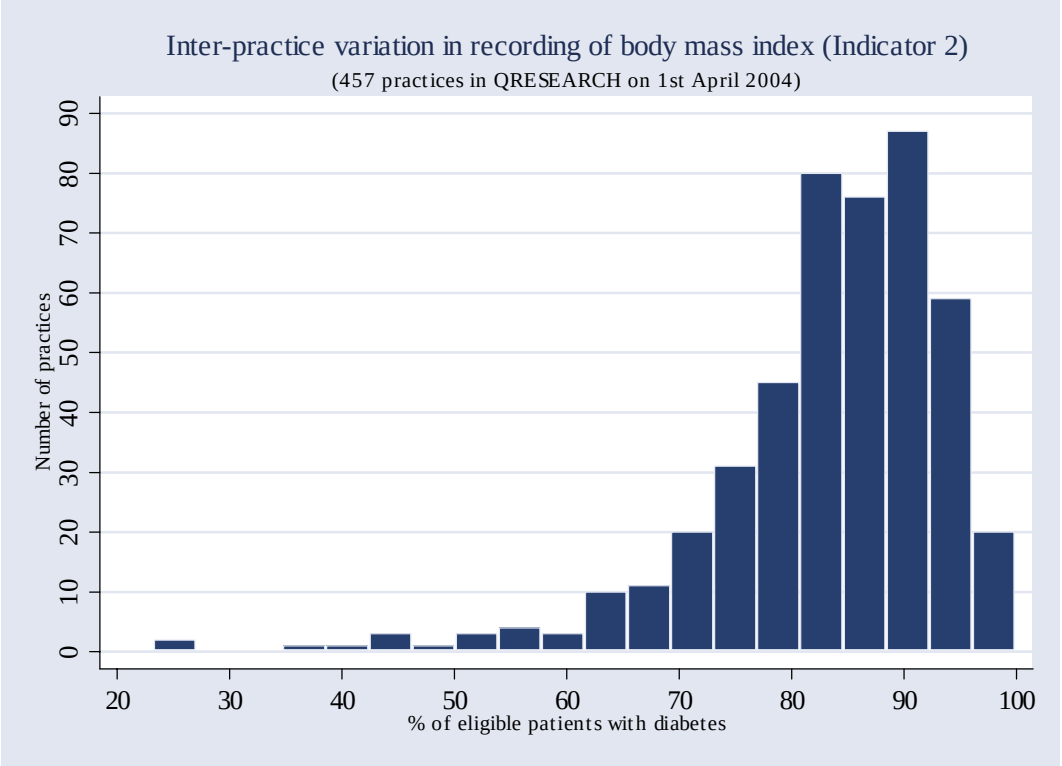


6.8 Diabetes Indicator 2: with body mass index recorded

Indicator DM2: The percentage of patients with diabetes whose notes record body mass index in the previous 15 months.
Exclusions: General exclusions apply. No indicator specific exclusions.

The next charts show the practice variation of recording of body mass index. Recording rates in GP practices are reasonably high (median 85%, IQR 79% to 91%) and the range is reasonably narrow apart from a handful of practices with particularly low rates.

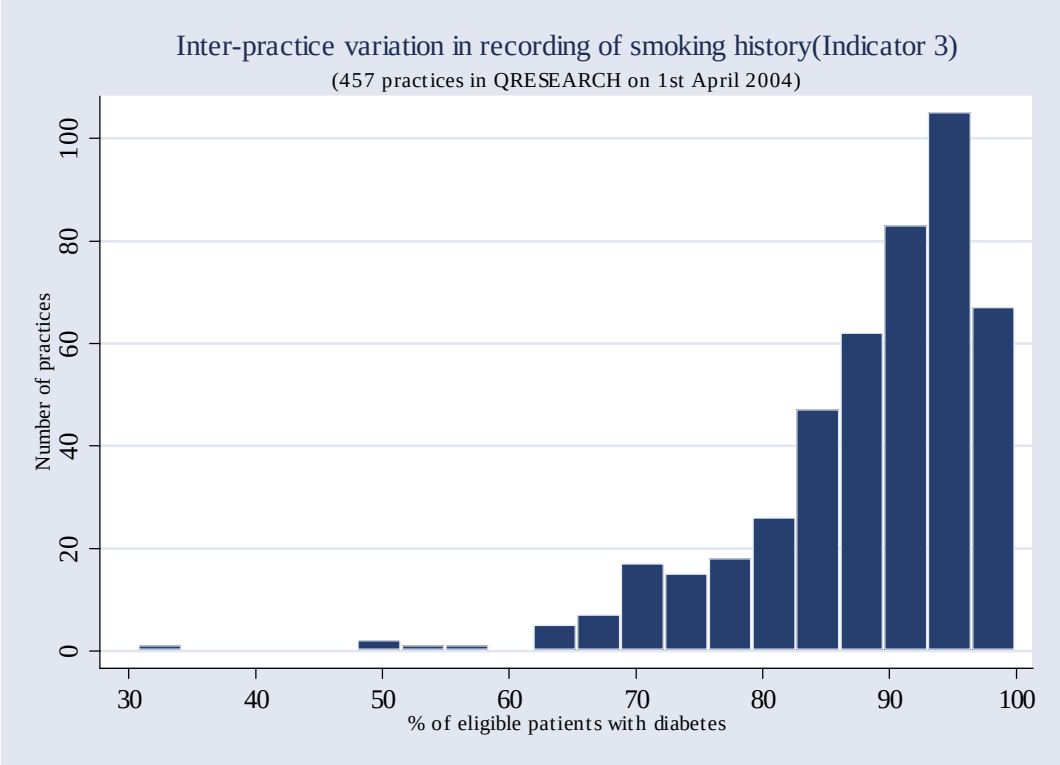
Overall, 2.6% of patients were excluded from the denominator for this indicator based on general exclusion criteria (ie recent registration, diagnosis, 'diabetes resolved' or general exception).



6.9 Diabetes Indicator 3: % with smoking history recorded

Indicator DM3: The percentage of patients with diabetes in whom there is a record of smoking status in the previous 15 months except those who have never smoked where smoking status should be recorded at least once since diagnosis.
Exclusions: General exclusions apply. No indicator specific exclusions.

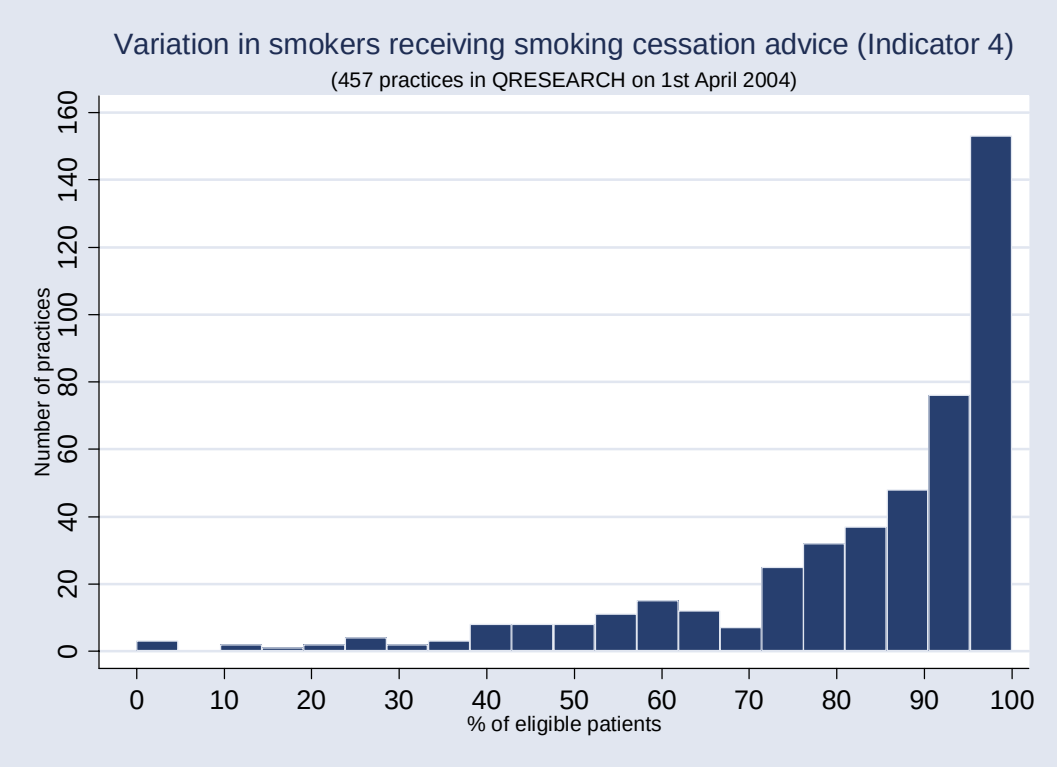
The next chart shows the inter-practice variation in smoking history recorded in the last 15 months. Overall rates were high with 89% of eligible patients with a smoking history recorded. The median rate for individual GP practices was 91% (IQR 85% to 95%) and apart from a few real outliers, the variation was relatively narrow.



6.10 Diabetes Indicator 4: % of smokers receiving smoking cessation advice

DM4 Indicator: The percentage of patients with diabetes who smoke and whose notes contain a record that smoking cessation advice has been offered in the last 15 months.
Specific exclusions: This indicator just applies to smokers. The general exclusions apply.

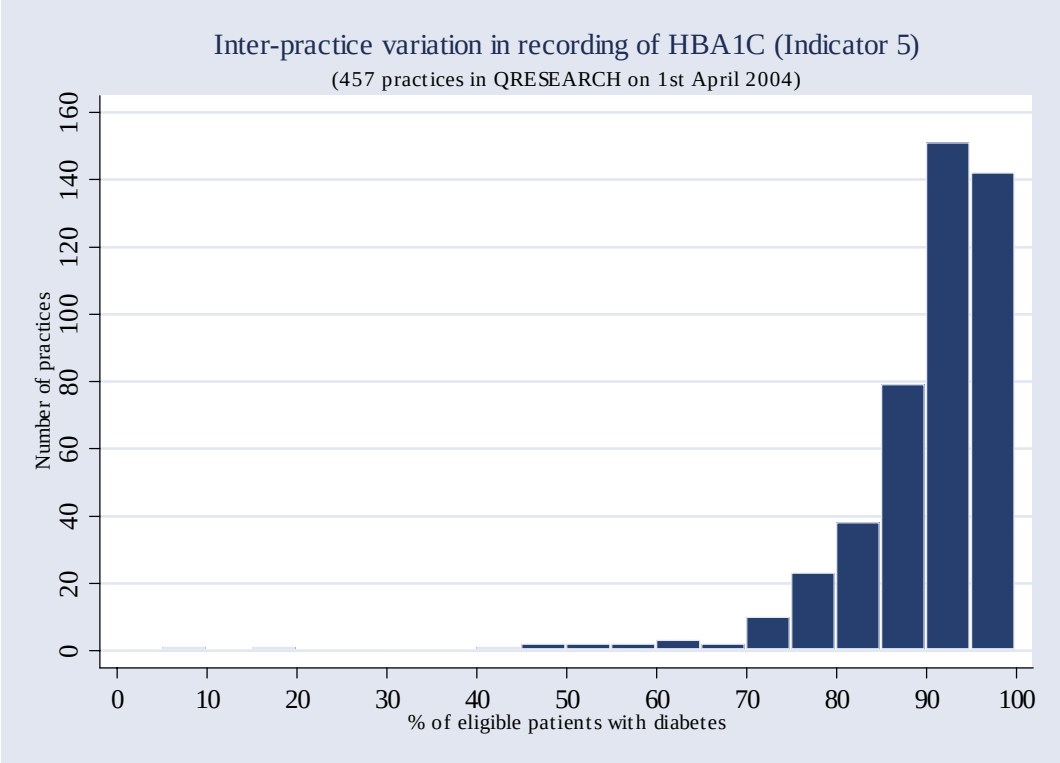
The median % of smokers with smoking cessation advice recorded was high at 91% but there was much more variation between practices for this indicator.



6.11 Diabetes Indicator 5: % with glycosylated haemoglobin recorded

DM indicator 5: The percentage of diabetic patients who have a record of HBA1C or equivalent in the previous 15 months.
Exclusions: General exclusions apply.

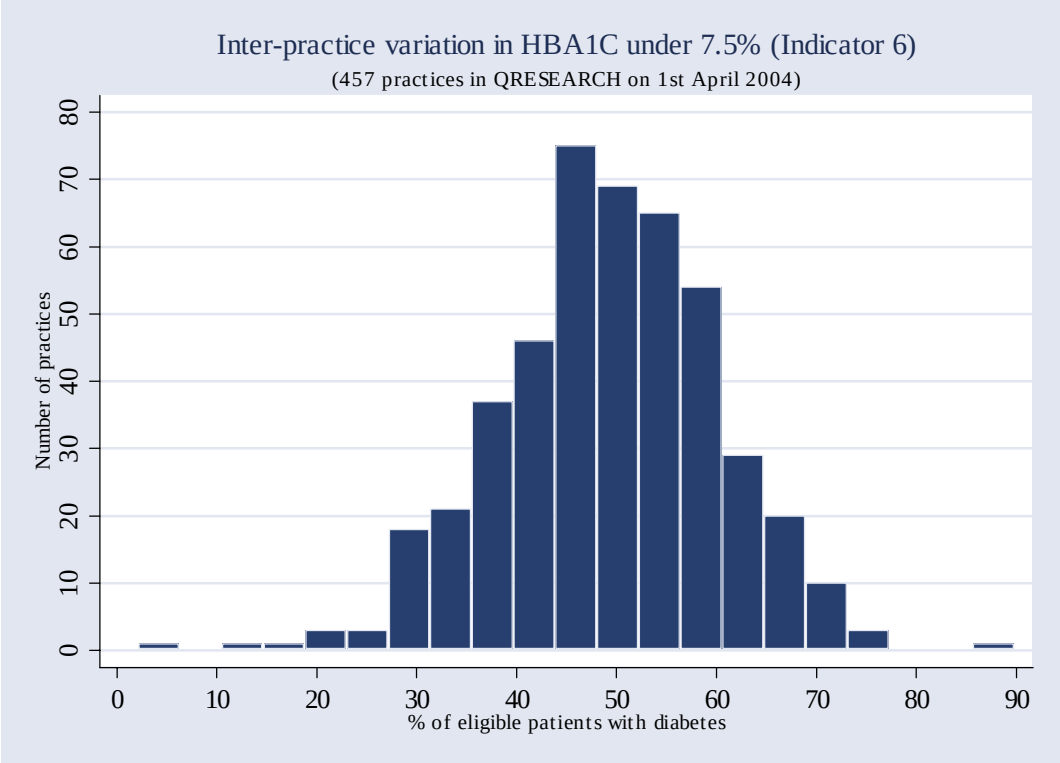
The median practice % for HBA1C recording was 92% and the inter-quartile range reasonably narrow (IQR 87% to 96%).



6.12 Diabetes Indicator 6: % with glycosylated haemoglobin under 7.5%

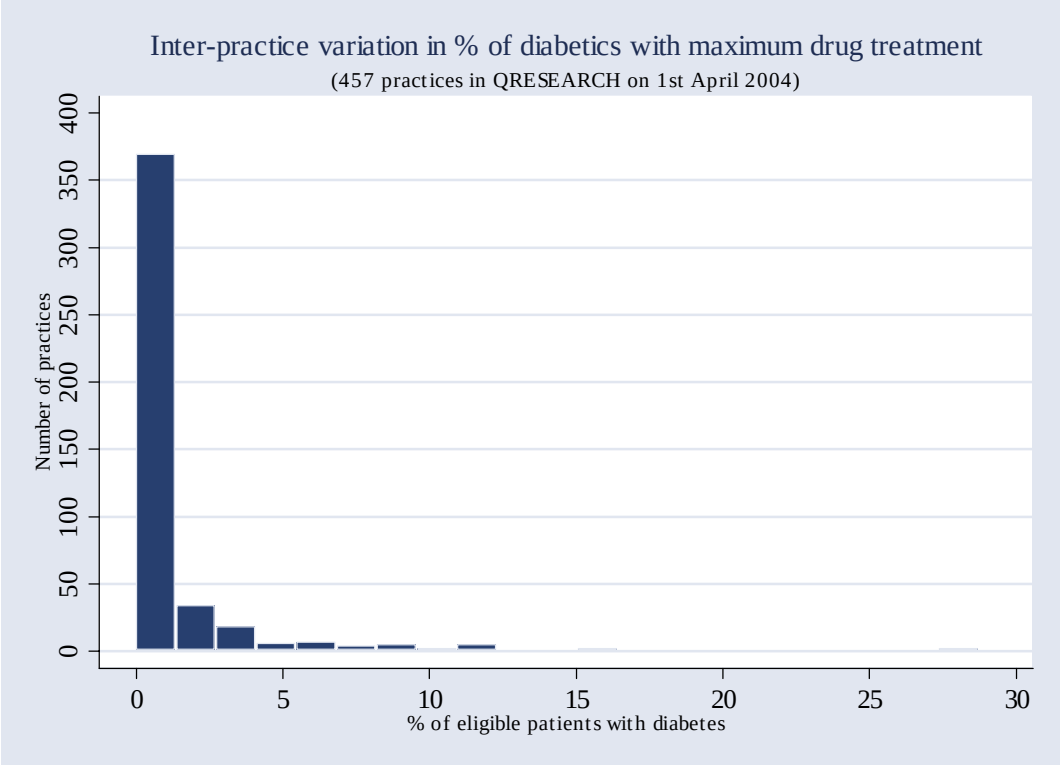
DM indicator 6: The percentage of patients in whom the last HBA1C is 7.4 or less (or equivalent test/reference range) in the last 15 months.
Specific exclusions: Patients with a Read code for maximum tolerated hypoglycaemic drug treatment.

Half of all eligible patients had a HBA1C reading of 7.5% or under (IQR 43% to 57%).



Maximum Tolerated Hypoglycaemic Exemption Code

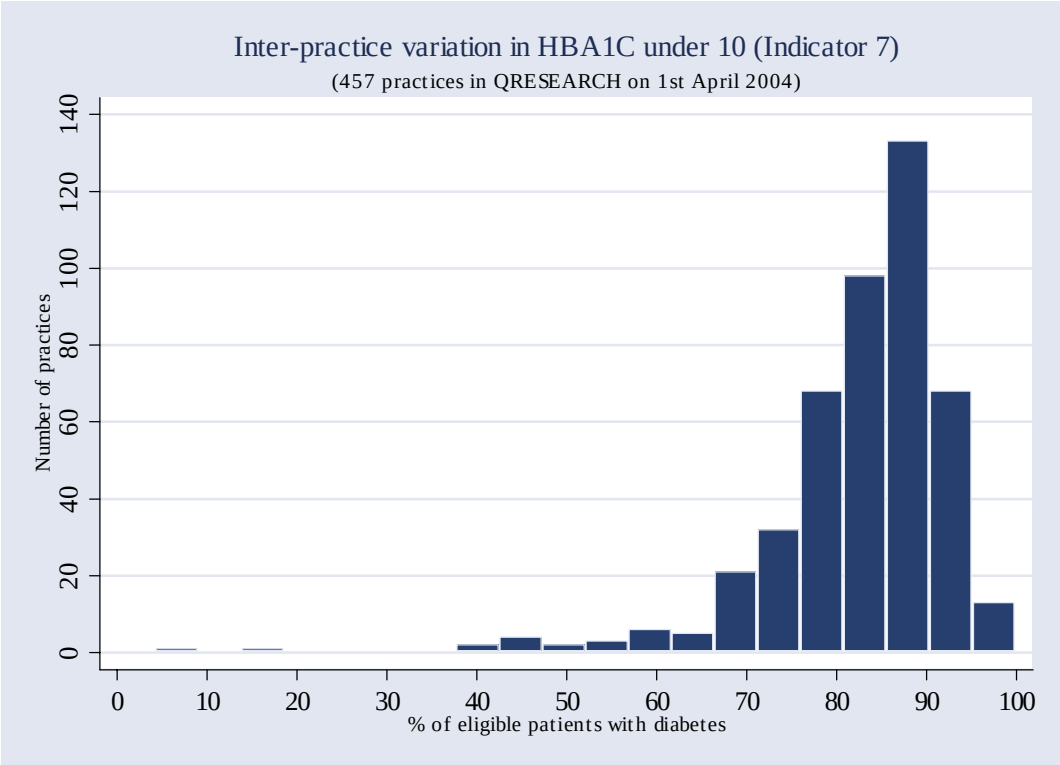
1% of all patients had a code indicating use of maximum tolerated hypoglycaemic treatment. This is a code (recently introduced) entered by the practice; it is not derived from drugs used and their dose in the prescribing record.



6.13 Diabetes Indicator 7: % with glycosylated haemoglobin under 10%

Indicator DM7: The percentage of patients with diabetes in whom the last HBA1C is 10 or less in last 15 months.
Exclusions: Same as for DM6.

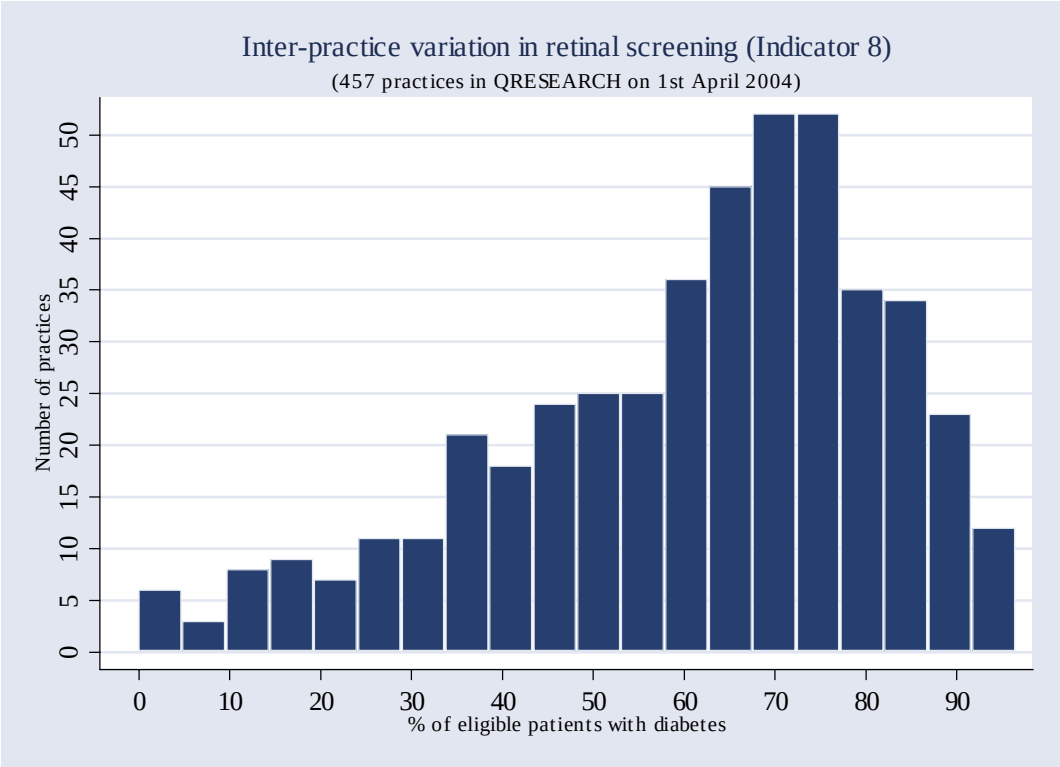
As expected, levels of achievement were high for this indicator than for indicator 6. The median practice % for this indicator was 85% (IQR 79% to 89%) showing an overall good achievement rate.



6.14 Diabetes Indicator 8: % with retinal screening

DM indicator 8: The percentage of patients with diabetes who have a record of retinal screening in the pervious 15 months.
Specific exclusions: Patients with a Read code for exclusion from retinal screening recorded.

Achievement for retinal screening was much lower (median practice rate 65%) than the level achieved for some of the other indicators. There was a wide inter-practice variation (IQR 47 to 76%).



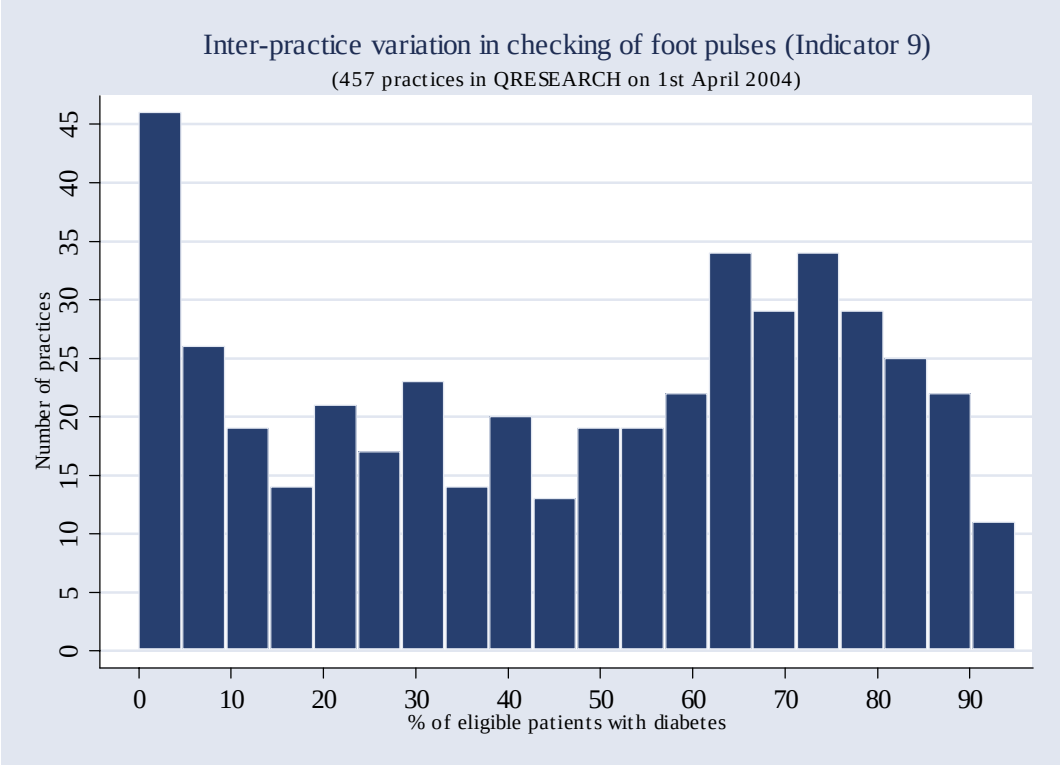
Retinal Screening Exemptions

Overall, just 13 patients (0.01% of all patients with diabetes) had a retinal screening exception code it is important to remember that this code was only very recently introduced and hence use of this code is likely to rise over time.

6.15 Diabetes Indicator 9: % with foot pulses checked

Indicator DM9: The percentage of patients with diabetes with a record of presence or absence of peripheral pulses in the previous 15 months.
Specific exclusions: Patients with a Read code indicating exception from recording of peripheral pulses.

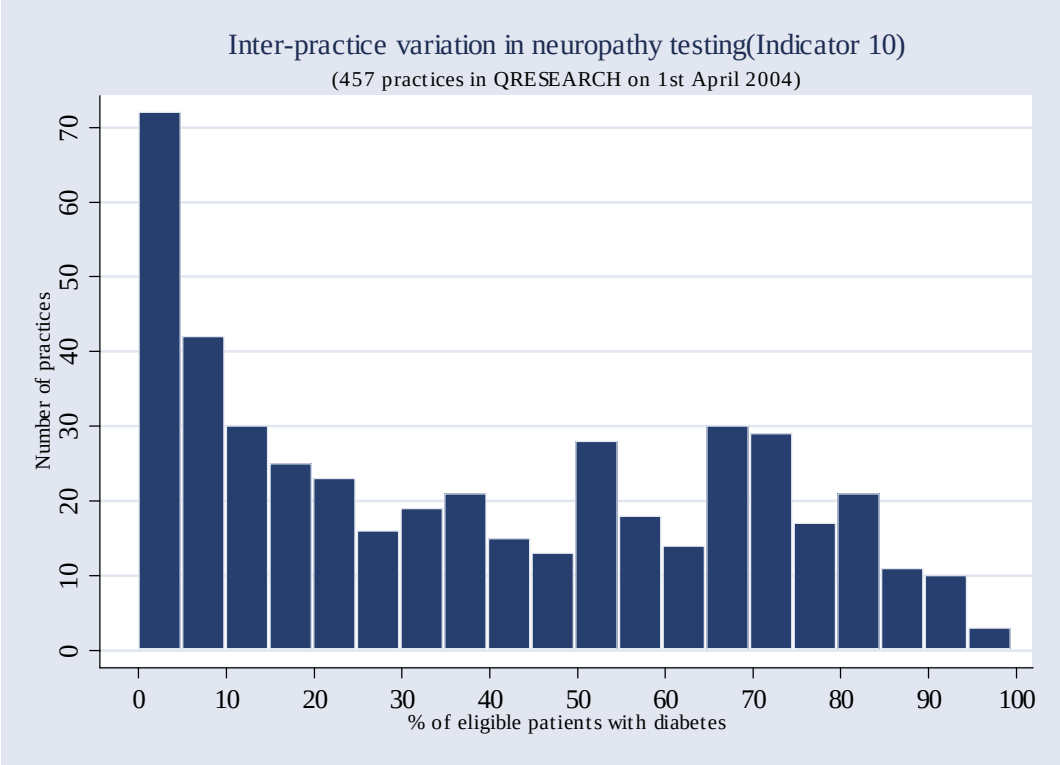
Recording of foot pulses was low with a median practice rate of 52% and a large inter-practice variation of 20% to 72%. We expect that this variation will narrow and the overall rate rise fairly quickly now that a standard code list is available. We think that these checks are probably being done but not recorded on computer. Just two patients had the exception code for this indicator recorded [this is a very recent code] and we have not therefore plotted this.



6.16 Diabetes Indicator 10: % with neuropathy testing

DM indicator 10: The percentage of patients with diabetes with a record of neuropathy testing in the previous 15 months.
Specific exclusions: Patients with a Read code indicating exception from neuropathy testing.

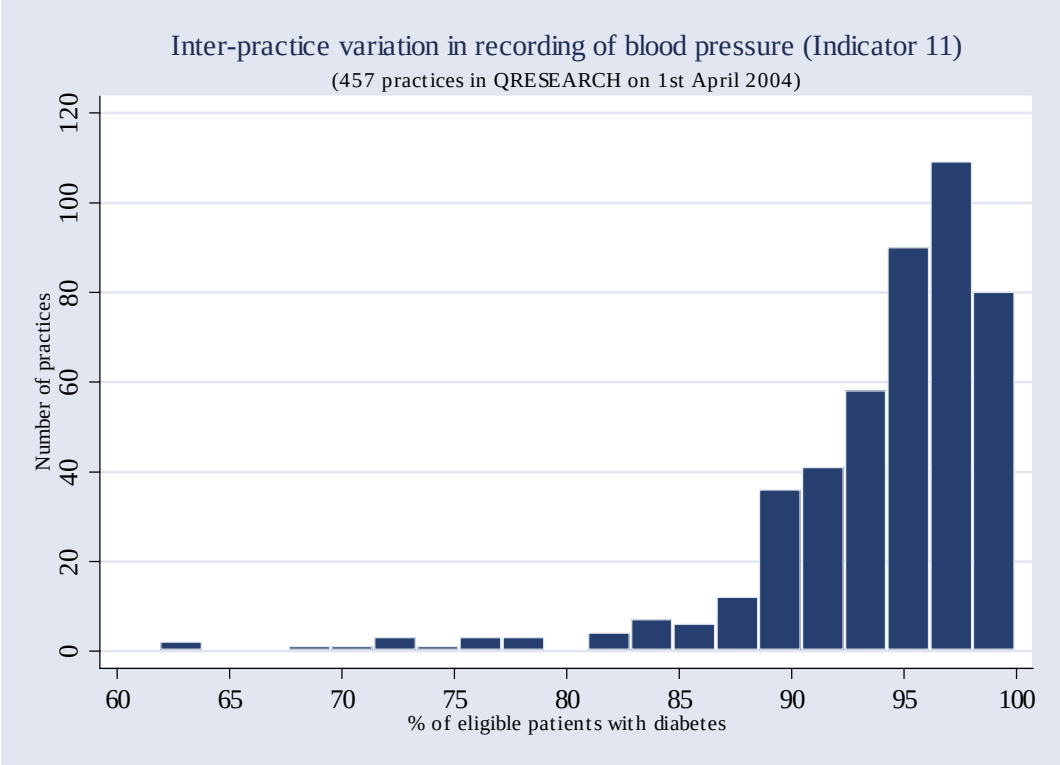
Rates for neuropathy testing were even lower than for foot pulses with a median practice rate of 35% and an enormous variation (IQR 10% to 66%). More than 100 practices had rates of 10% or less for this indicator. We predict this will rise quickly over the next year with the standardization of codes and inclusion of this in the contract.



6.17 Diabetes Indicator 11: % with a blood pressure recorded

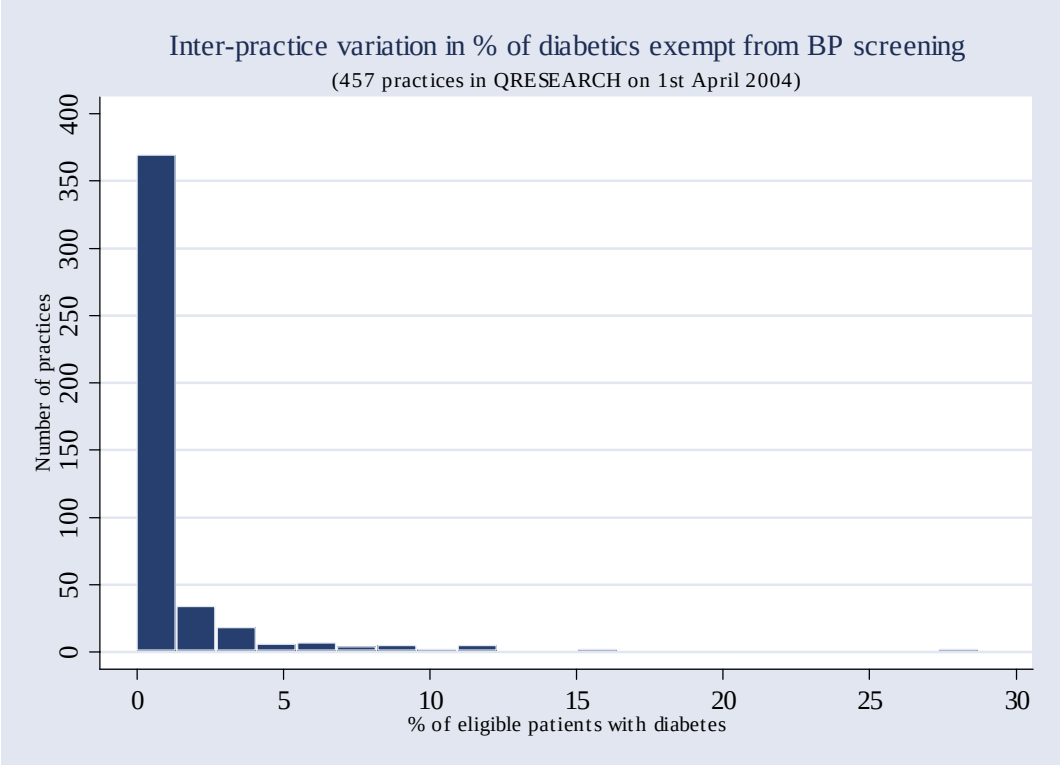
Indicator DM11: The percentage of patients with diabetes who have a record of blood pressure in the past 15 months.
Specific exclusions: Patients with a Read code for exception from blood pressure recording.

Rates for blood pressure recording are the highest of all the indicators as expected, 94% of all eligible patients. Inter practice variation was relatively small with a narrow interquartile range of 92% to 98% and a practice median of 95%. It is notable, however, that the tail to the left of the graph shows quite a few practices with low rates even for this indicator.



Exemption from BP screening

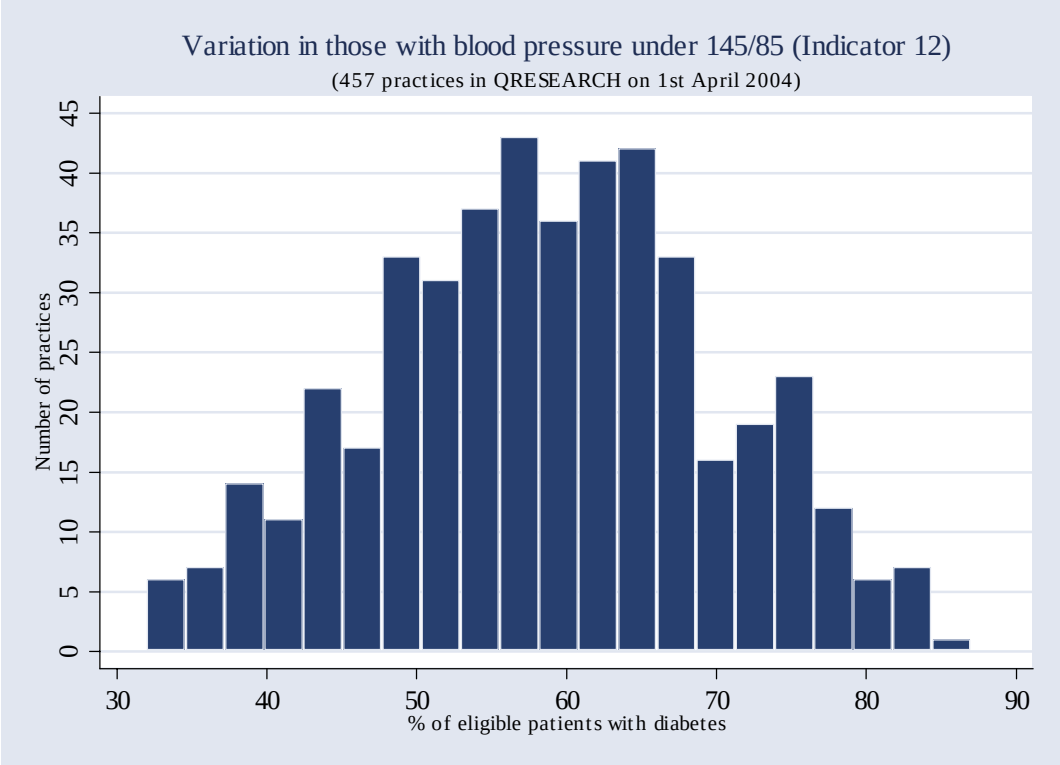
The next graph shows the percentage of patients with a blood pressure exception code. There were 1,068 patients (1% of all patients with diabetes) with this code recorded, however there were a handful of practices where the exemption code was used in excess of 10% of eligible patients.



6.18 Diabetes Indicator 12: % with a BP under 145 and 85 mmhg

Indicator DM 12: The percentage of patients with diabetes in whom the last blood press is 145/85 or less.
Specific exclusions: Patients with a Read code indicating maximal anti-hypertensive treatment.

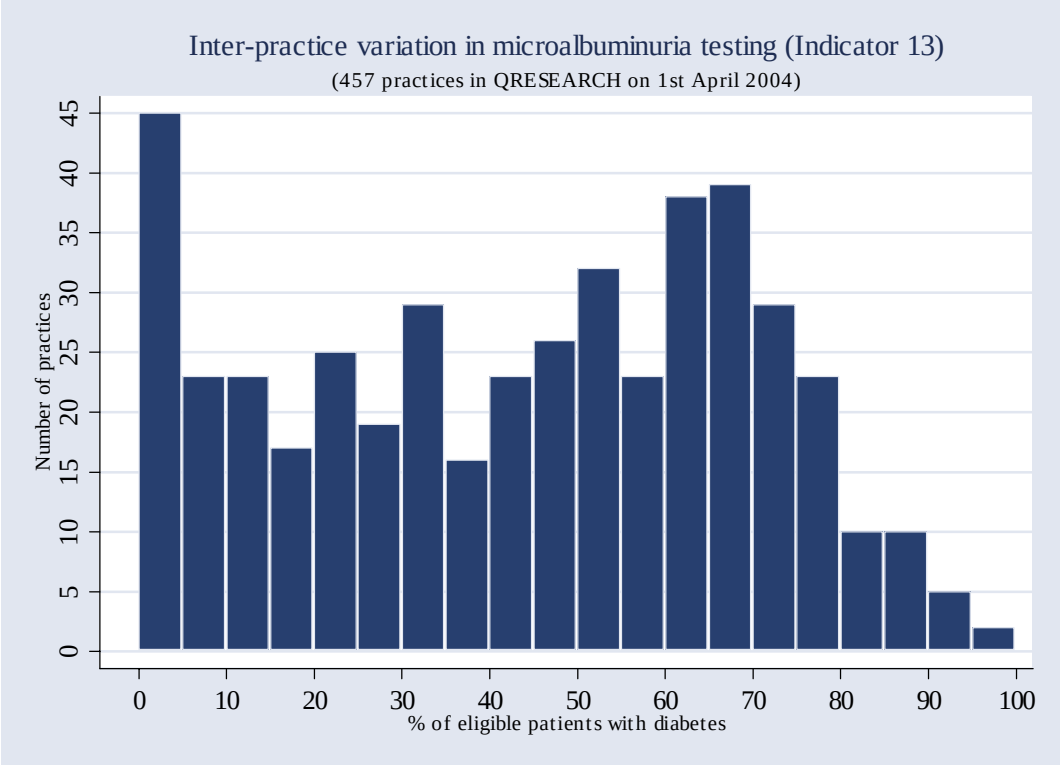
Overall 58% of eligible patients had a blood pressure recording of under 145 and 85 mm Hg. The median practice rate for this indicator was 59% with a substantial level of variation between practices (IQR 51% to 66%).



6.19 Diabetes Indicator 13: % with testing for microalbuminuria

Indicator DM13: The percentage of patients with diabetes who have a record of microalbuminuria in the previous 15 months.
Specific exclusions: Patients with a Read code for proteinuria.

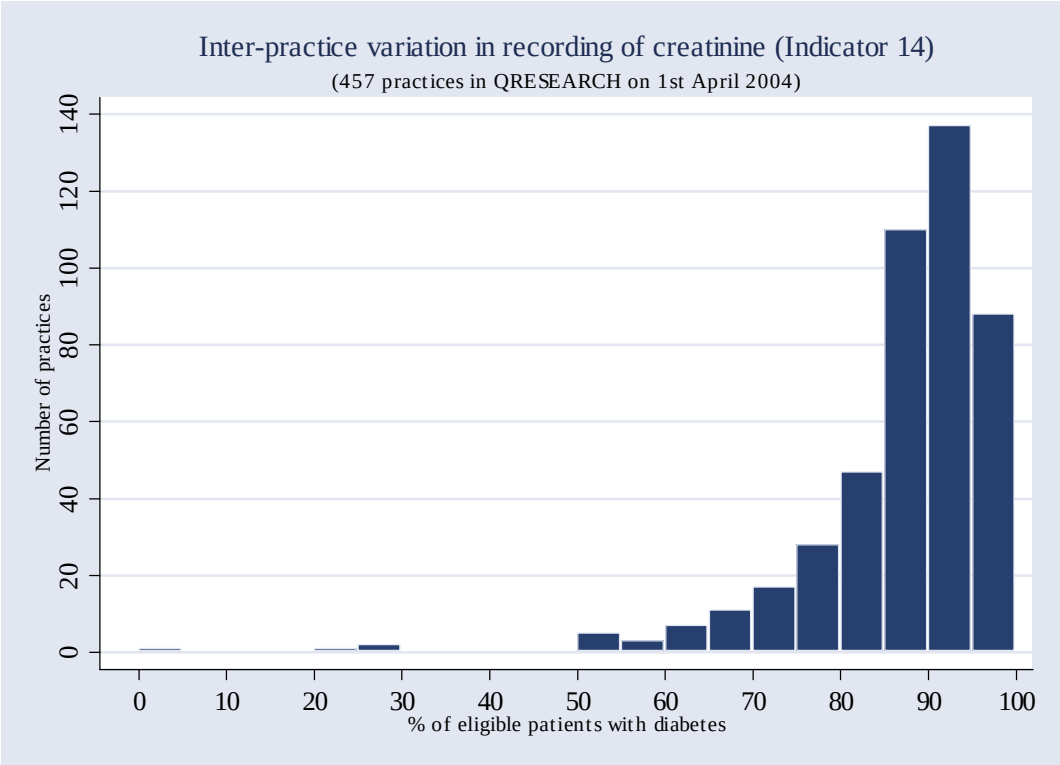
Testing rates for microalbuminuria were disappointingly low, 43% of all eligible patients with a median practice rate 47% and large practice variation (IQR 21% to 65%). Approximately 10% of all practices had exceedingly low rates of less than 5% with the test recorded. This could reflect low recording for this indicator or a genuine low testing rate and we cannot distinguish this from these data.



6.20 Diabetes Indicator 14: % with creatinine recorded

Indicator DM14: The percentage of patients with diabetes who have a record of creatinine testing in the previous 15 months.
Specific exclusions: None

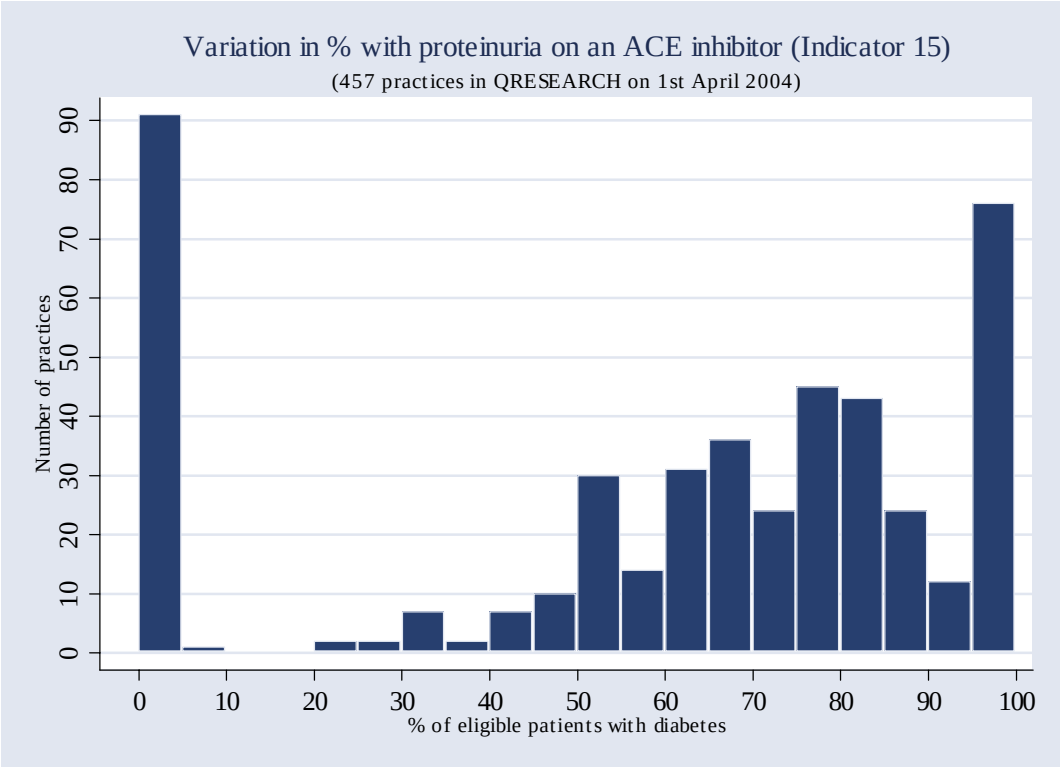
In contrast to indicator 13, rates for creatinine testing were reassuringly high, 88% of all eligible patients. The practice median for this indicator was 90% (IQR 85% to 94%). This is important as testing for creatinine can help identify patients with early renal failure in whom more intensive management may prevent complications.



6.21 Diabetes Indicator 15: % with proteinuria or microalbuminuria on an ACE inhibitor

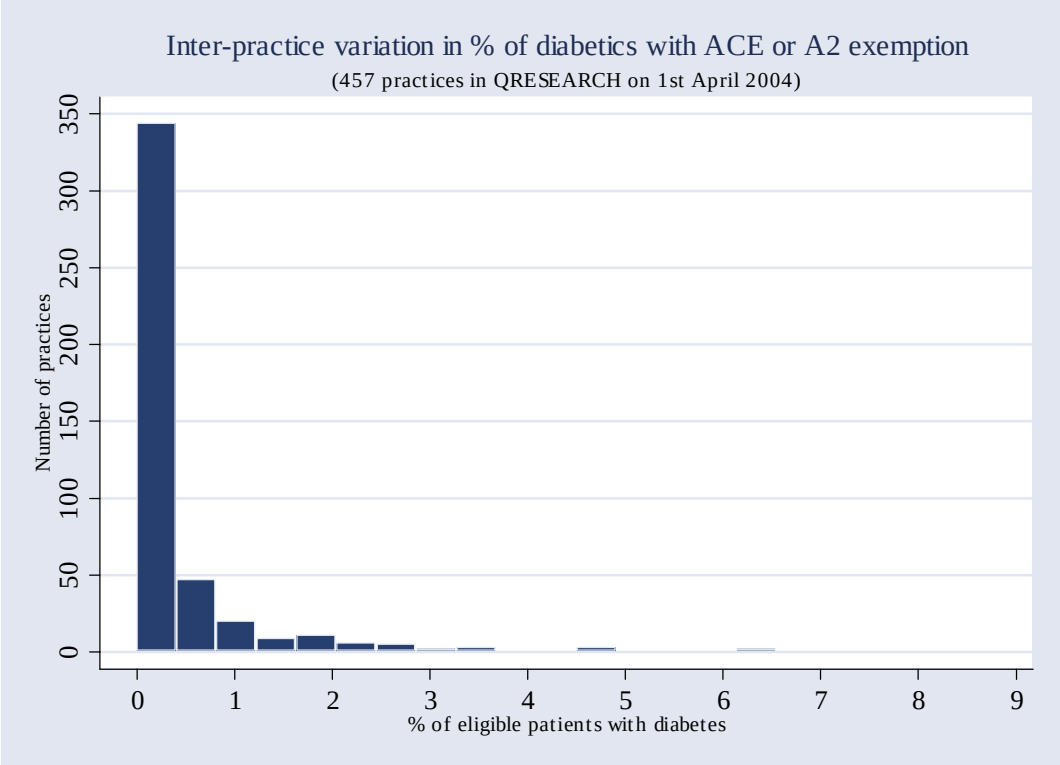
> **Indicator DM15**: The percentage of patients with diabetes with proteinuria or microalbuminuria who are treated with ACE inhibitor (or A2 antagonists).
> **Specific exclusions**: Patients with a Read code indicating contra-indications to ACE inhibitor or A2 antagonists (persisting or expiring).

This is a highly specific indicator in which patients have to be tested in order to be eligible for inclusion in the denominator. Since the rates of testing are low, then it is not surprising that there were only 6,742 patients eligible for this indicator. The true number of patients with either proteinuria or microalbuminuria is likely to be much higher since the screening rate is low. Of the 6,742 eligible patients 70% had the test. The median practice rate for the indicator was good at 68% (IQR 45% to 85%). It is noticeable from the graph that 90 practices had <10% of patients on the appropriate treatment and just under 80% of practices had extremely good rates in excess of 95%. This suggests that targeted education regarding screening for proteinuria and its treatment are needed to help ensure that appropriate levels of care are delivered across all practices.



ACE or A2 antagonists exemptions

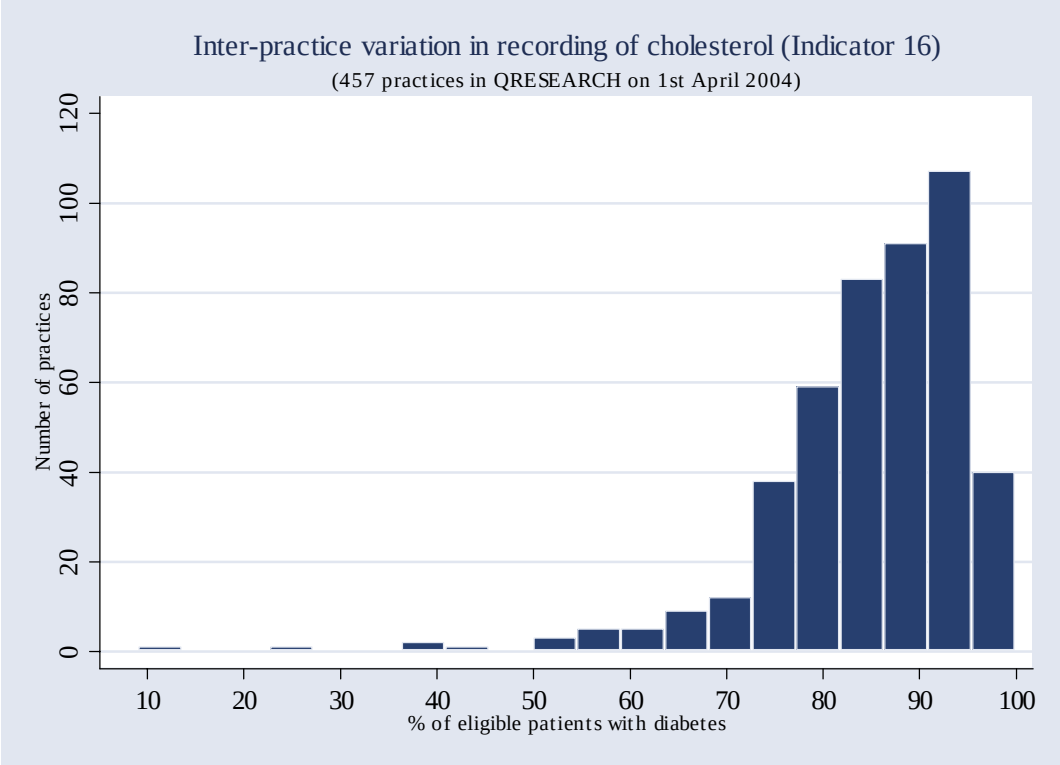
The following graph shows the low usage of codes for exception reporting for this indicator only 390 patients (0.4% of all patients with diabetes) had this code reported. Again, these codes are relatively new and their usage is likely to increase [ACE inhibitors in particular can have a lot of side effects and so patients may well be intolerant].



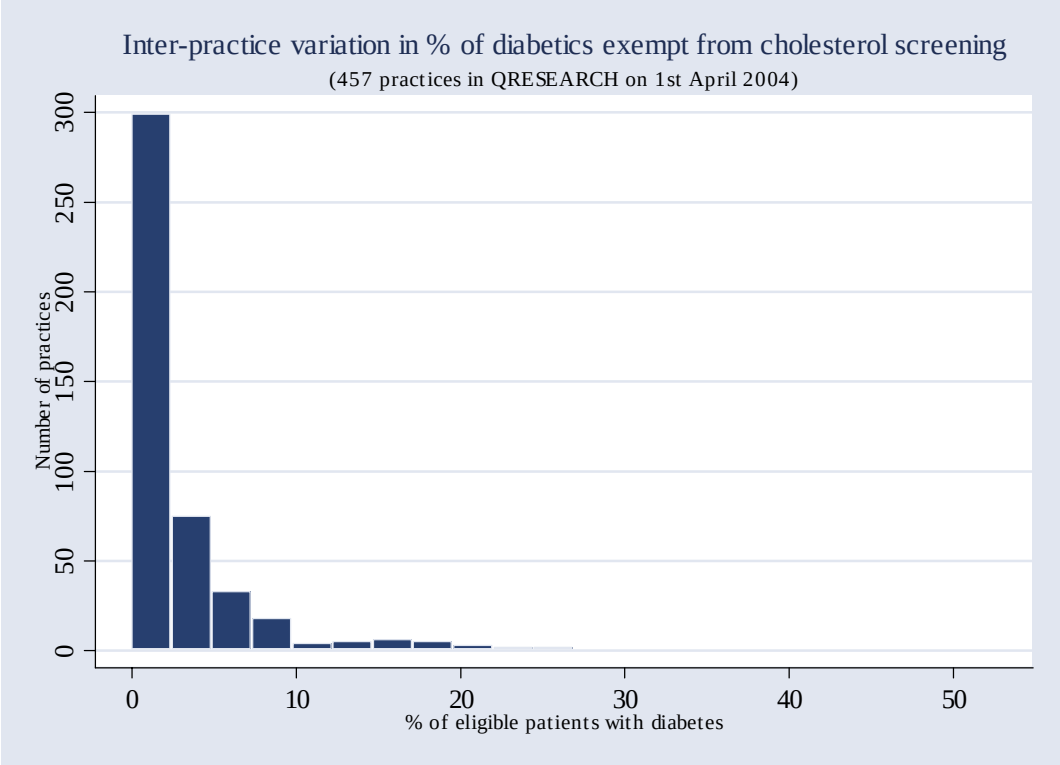
6.22 Diabetes Indicator 16: % with cholesterol recorded

Indicator DM16: The percentage of patients with diabetes who have a record of cholesterol testing in the previous 15 months.
Specific exclusions: Patients with a Read code for exception from cholesterol testing.

Cholesterol recording rates were good with a practice median rate of 87% (IQR 81% to 92%) and the spread across practices is shown below, 3% of all patients with diabetes had a cholesterol exception code however.



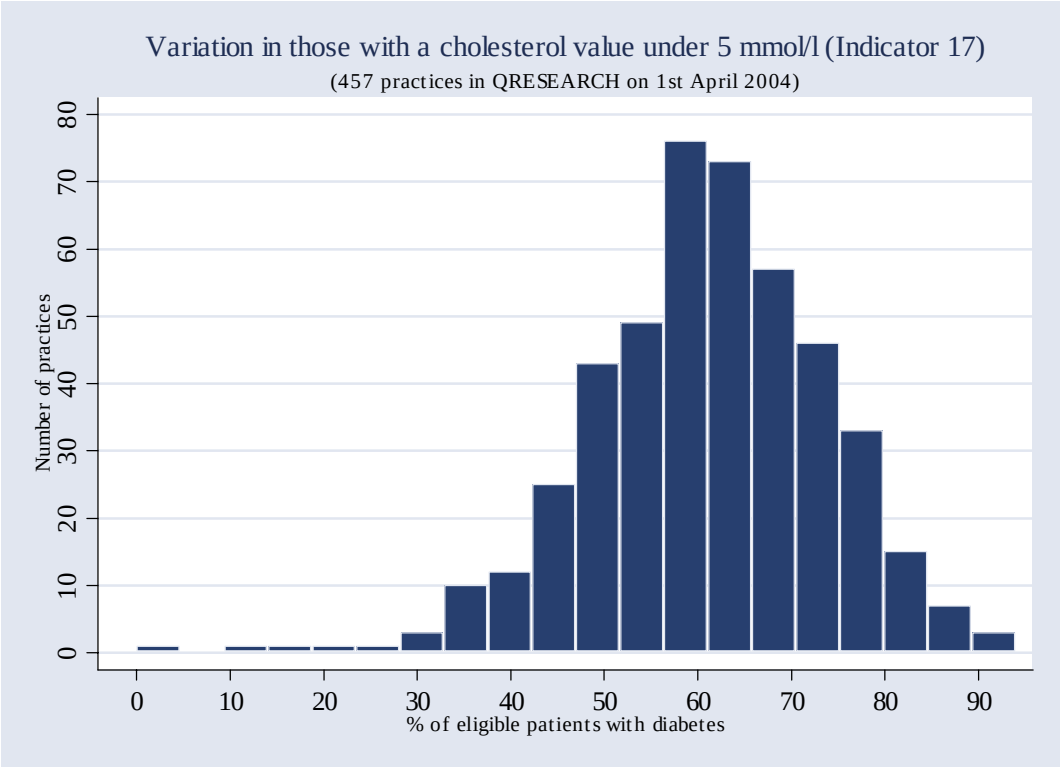
Cholesterol exemption



6.23 Diabetes Indicator 17 cholesterol under 5mmol/l

Indicator DM17: The percentage of patients with diabetes whose last measured cholesterol within the previous 15 months is 5 mmol/l or less.
Specific exclusions: Patients with a Read code for exception from cholesterol testing.

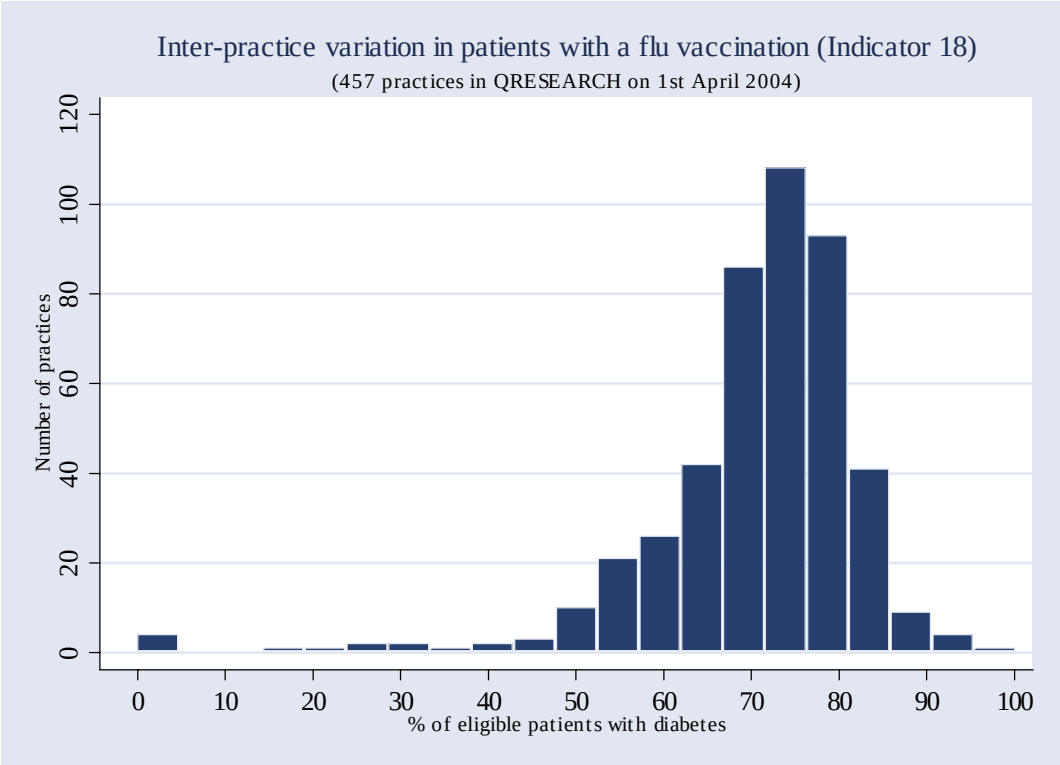
The median practice rate for this having a serum cholesterol under 5 mmol/l was 62% (IQR 53% to 70%) which is similar to other published data[1].

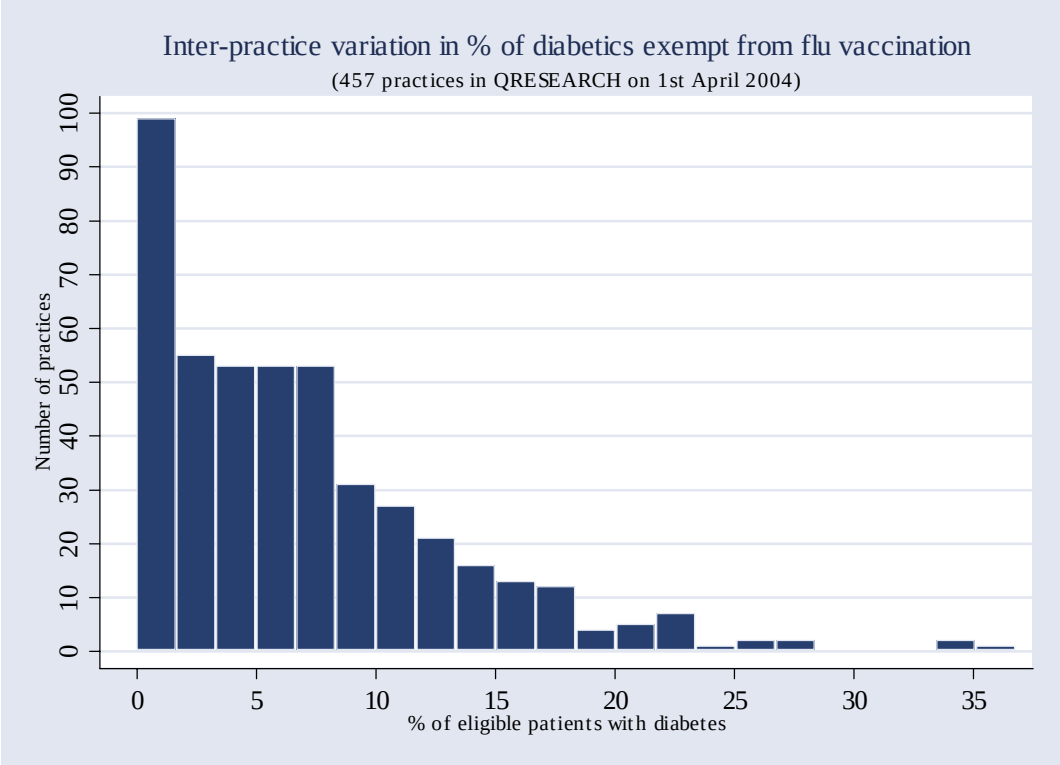


6.24 Diabetes Indicator 18: % with flu vaccination done

Indicator DM18: The percentage of patients with diabetes who have a record of influenza vaccination in the preceding 1st Sept to 31st March.
Specific exclusions: Patients with a Read code indicating exception from influenza vaccination.

Overall 70% of eligible patients had a flu vaccination done. The median practice rate for flu vaccination was 73% (IQR 67% to 78%), 7% of all patients with diabetes had a flu exception code and the inter-practice variation in the percentage of patients with such a code is shown on the following page.





5 DISCUSSION

The prevalence of diabetes in our study is higher than that in other primary care studies[2]. This might be because our data are very recent and the population prevalence of diabetes is increasing; or case finding is improving. However it might be due to improvements in data quality. These issues were more fully explored in our previous report (Report 15) although the reported overall prevalence is higher in this report (Report 15 is based on all ages; this one on those people aged over 16 years). The inter-practice variation in prevalence is reasonably narrow and lends credibility to the findings that follow.

We found a large variation between practices in the recording of almost all of the indicators. Our study design does not allow us to determine whether this is due to variation in the quality of care or differences in the completeness of data entry though the electronic record tends to be more complete than the paper record[3].

Some clinical measures have been emphasised in guidelines and audits for many years, and they have been traditionally included in data entry screens (templates or sophies). Some are included in the clinical electronic record from laboratories (lab links) and thus, for them, there are fewer missing items. These include glycosylated haemoglobin, blood pressure, body mass index, creatinine and cholesterol, with smoking habit, and they are well recorded with relatively narrow inter-practice variation.

Other clinical measures have been emphasised for recording relatively recently and these have traditionally, if done, been recorded as free-text or not at all. They tend to have a high rate of negative results, and this often leads to poor apparent recording when only positive findings are entered. Further, they are clinical items that are not included in the automatic entry of data into the electronic record from laboratory links. These include retinal screening, foot pulses, assessment for neuropathy, and microalbuminuria checking. We expect these to improve, and for the inter-practice variation to narrow, through the introduction of the Quality and Outcomes Framework of the new GMS contract.

The actual levels of clinical control found here reflect known expected levels and are, in our view, encouraging. The targets included in guidelines and the new GMS contract are demanding, and the fact that half of these patients have a last glycosylated haemoglobin of 7.5% or less and 85% have levels of 10% or less is – without being grounds for complacency – gratifying. The level of target blood pressure has only recently been reduced from 160/90 to 145/85, yet 60% of patients achieve this target already. Equally cholesterol levels shown here are much as expected, with over 60% achieving the target.

Apart from flu vaccination and cholesterol exception, we thought that the overall use of exception codes was low. This measure is unreliable, though, as many of the codes had only just been created at the time of the study and so it will be important to monitor trends in their use over time.

These data, reported at the very start of the new GMS contract, will be of interest to practices as they plan their delivery strategies and to health service planners responsible for monitoring and remuneration. The large variation between practices in levels of outcomes achieved was expected although the overall values achieved were lower than expected indicating the huge amount of work needed to provide optimum care for all patients.

6 REFERENCES

1. Hippisley-Cox J, Cater R, Pringle M, Coupland C. A cross-sectional survey of the effectiveness of lipid lowering drugs in lowering serum cholesterol in 17 general practices:how well do they work? *BMJ* 2003;326:689-694.
2. Newnham A, Ryan R, Khunti K, Majeed A. Prevalence of diagnosed diabetes mellitus in general practice in England and Wales. *Health Statistics Quarterly* 2002;14:5-13.
3. Hippisley-Cox J, Pringle M, Cater R, Wynn A, Hammersley V, Coupland C, et al. Electronic record in primary care - regression or progression? Cross-sectional survey. *BMJ* 2003;326:1439-1443.

7 APPENDIX

Table 1: Use of exception codes in patients with diabetes and the associated median and inter quartile range for rates in individual practices.

	total number with code	overall % of 100,964	Practice median rate %	25th percentile	75th percentile
% registered in last 3 months	991	0.98	0.78	0.00	1.59
% diagnosed in last 3 months	6,138	6.08	5.67	3.98	7.35
% with diabetes resolved codes	16	0.02	0.00	0.00	0.00
% with diabetes exception codes	1,392	1.38	0.34	0.00	1.68
% with max drug treatment codes	1,068	1.06	0.00	0.00	1.03
% with retinal screening exemption codes	13	0.01	0.00	0.00	0.00
% with foot pulses exception codes	2	0.00	0.00	0.00	0.00
% with blood pressure exception codes	1,068	1.06	0.00	0.00	1.03
% with ACE or A2 exception codes	390	0.39	0.00	0.00	0.38
% with cholesterol exception codes	3,092	3.06	1.30	0.00	3.57
% with flu vaccination exception codes	6,876	6.81	5.81	2.08	9.91

*There is a code for maximum blood pressure treatment which was used in the business rule set for diabetes indicator 12. However, at the time of extraction, we didn't save this variable at practice level as and so haven't reported on it in this analysis. It can be done again if this is a priority.

Table 2: Total number (%) of patients eligible for and achieving each diabetes indicator across all 457 practices on 1st April 2004.

	Total patients with indicator (numerator)	Total number of patients eligible for indicator (denominator)*	% of eligible patients who achieve indicator	% of all diabetics excluded from indicator (ie. % of 100,964)
DM2 BMI recorded	82,523	98,384	83.9	2.6
DM3 smoking history recorded	88,600	99,622	88.9	1.3
DM4 smoker received advice	11,144	13,256	84.1	86.9
DM5 HBA1C recorded	87,536	97,065	90.2	3.9
DM6 HBA1C under 7.5	47,044	95,211	49.4	5.7
DM7 HBA1C under 10	80,004	96,424	83.0	4.5
DM8 retinal screening done	58,309	95,165	61.3	5.7
DM9 pulses checked	44,723	95,001	47.1	5.9
DM10 neuropathy test done	35,925	94,806	37.9	6.1
DM11blood pressure recorded	94,286	99,870	94.4	1.1
DM12 BP under 145 and 85 mm Hg	56,381	96,511	58.4	4.4
DM13 microalbuminuria testing done	41,158	94,774	43.4	6.1
DM14 creatinine recorded	87,332	98,871	88.3	2.1
DM15 on ACE and Prot or micro	4,718	6,742	70.0	93.3
DM16 cholesterol recorded	83,786	98,173	85.3	2.8
DM17 cholesterol under 5mmol/l	57,844	94,880	61.0	6.0
DM18 flu vaccination done	67,572	96,587	70.0	4.3

* patients can have more than one exclusion criteria

Table 3: Practice medians and inter quartile ranges) of percentages of patients meeting each indicator for diabetes on 1st April 2004 in the 457 practices contributing to the QRESEARCH database (version 4).

	Practice median % of eligible patients with indicator recorded	25th percentage	75th percentile
DM2 BMI recorded	85.3	79.1	90.7
DM3 smoking history recorded	91.0	84.8	95.1
DM4 smoker received advice	90.5	77.1	97.4
DM5 HBA1C recorded	92.4	87.1	95.6
DM6 HBA1C under 7.5	49.7	42.9	56.7
DM7 HBA1C under 10	85.0	78.7	88.9
DM8 retinal screening done	64.7	47.1	76.1
DM9 pulses checked	51.6	20.4	72.4
DM10 neuropathy test done	35.2	10.2	66.1
DM11 blood pressure recorded	95.4	92.1	97.7
DM12 BP under 145 and 85 mm Hg	58.8	50.8	66.2
DM13 microalbuminuria testing done	47.1	20.8	65.3
DM14 creatinine recorded	89.8	84.5	94.2
DM15 on ACE and Prot or micro	68.7	45.2	84.6
DM16 cholesterol recorded	87.3	80.5	92.3
DM17 cholesterol under 5mmol/l	61.7	53.1	69.5
DM18 flu vaccination done	72.8	66.7	77.8