Variation in HbA1c prescription for patients with diabetes in French general practice: an observational study prior to the implementation of a P4P programme

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Background: Prior to a large diffusion of a pay-for-performance programme (P4P) in primary care in France, it seemed of particular interest to identify, the doctors not performing optimally who could be the main target of this programme. Based on the example of HbA1c prescription for patients with diabetes, this study examined the impact of general practitioner’s (GPs) characteristics on the variation of a P4P indicator for diabetes care, i.e. the percentage of patients undergoing three or four HbA1c tests during one year. Methods: We used a large database from the national health insurance fund for salaried workers in Brittany to select a cohort of patients with diabetes who had been attended to by their doctors for 1 year. In all, 2545 GPs attending to 41 453 patients with diabetes were included. A two-level hierarchical logistic model was used to analyse the data. Results: Thirty-six per cent (SD = 22.3) of patients with diabetes underwent three or four HbA1c tests during the year (the target objective was 65% in a patient list). There was a large variability between GPs, even after adjusting for patient characteristics. Doctors who were female, young, working in a group practice, participating in quality-control groups, and who had a lower patient load prescribed the three or four recommended tests more often. Discussion: The results indicate a target group of doctors which require attention. There is still room to improve the quality of care for patients with diabetes in general practice, notably by encouraging doctors to train better and practice in groups.

Introduction

In recent years pay-for-performance (P4P) programmes for general practitioners (GPs) have increased substantially in numerous countries, as has the recognition of significant variations in the quality of health care. These programmes use performance incentives, including cash payments and public reports, to motivate clinicians, health practitioner groups and health care systems to achieve specific health care quality goals.¹ In France, an experimental programme of voluntary participation by GPs, a ‘Contract for Improving Individual Practices’ (CAPI: ‘contrat d’amélioration des pratiques individuelles’) is being implemented.² This is a contract between the participating GP and the French national insurance plan (l’assurance maladie); in the programme, each practitioner receives an annual premium if he attains fixed objectives, particularly for the prescription rate of certain medications or tests to monitor chronic ailments. For the insurance plan, the development of this results-based payment system could lead to a diversification of remuneration practices for French GPs, which is currently dominated by payment per act, a system that is ex post facto judged to be inflationary.³

Diabetes is one of the disease areas within the clinical domain of the CAPI. Diabetes is among the leading chronic diseases in developed countries. Ensuring that patients with diabetes receive evidence-based care to control disease and reduce the risk of complications is a significant challenge; much evidence exists of the gap between optimal care and the actual care patients receive.⁴ Many patients with diabetes are now managed solely or mainly in primary care. Since it is recommended internationally and by the Haute Autorité de Santé (French National Authority for Health), the level of glycated haemoglobin (HbA1c) in patients suffering from diabetes must be tested three or four times a year.⁵ There is good evidence that the risk of cardiovascular complications of diabetes can be reduced by careful control of blood glucose.⁶ The CAPI’s targeted objective has been established at 65%; no matter whether HbA1c is prescribed by the GP or other specialists, 65% of patients with diabetes in a patient list must be followed according to this recommendation, considering that the GP is responsible for treating and following the diabetes.

There is already an important body of research, particularly in the USA and the UK, studying the impact of P4P on the quality of health care. Surprisingly, there is little rigorous evidence to support or refute use of these programmes.⁷ Prior to a large diffusion of the CAPI in France, it seemed of particular interest, because we had the opportunity to access a large database from the health insurance fund, to identify the doctors not performing optimally who could be the main target of this programme.⁸ The objective of the present study was to assess, just before the P4P programme was to be implemented, the variability of HbA1c prescription rate between doctors and, depending on patient characteristics, to examine the impact of GP characteristics on the variation of the P4P indicator.

Methods

Settings and participants

Our study used a database of workers reimbursed by the French national health insurance fund for salaried workers
is a proxy for patients' socioeconomic level because this coverage is
also considered whether the patient benefited from Universal
Care. The database also includes information regarding the charac-
teristics of prescribing doctors. In France, National Health Insurance
(‘l’assurance maladie’) is mandatory; all salaried workers are registered
with the CNAMTS. Since 2006, all those affiliated with the CNAMTS
are required to select a referral doctor (médecin traitant), most often
a doctor specializing in general medicine, to access other specialists
or hospital treatments. Establishing this gate-keeping system has not
changed the status of French GPs, who are still principally paid by
the act whether practicing alone or in a group practice. All consult-
ations, scans and biological tests, including HbA1c tests, reimbursed
by the CNAMTS are recorded in this database and are potentially
retrievable using the ‘Common Classification of Medical Acts’
(Classification Commune des Actes Médicaux) and the
‘Nomenclature of Acts of Biological Medicine’ (Nomenclature des
Actes de Biologie Médicale) terms. Prescribed and reimbursed med-
ications can be identified by their Anatomical Therapeutic Chemical
(HTC) codes.

Our research was approved on 4 May 2009 by a representative of
the French Data Protection Authority (Commission Nationale
Informatique et Libertés) at the CNAMTS regional directorate for
medical services.

Patients were included in the study if they had been prescribed at
least one oral anti-diabetic drug and/or insulin during the last
quarter of 2007, at least one in 2008 and at least one during the
first quarter of 2009 and were registered with a referral doctor in
2008. Oral anti-diabetic drugs and insulin were included in the A10
medication class in the ATC classification system. We excluded
patients whose doctors initiated, modified or ceased their activity
in 2008. Doctors included in the study were the diabetic patients’
referral doctors.

**Study variables**

The doctor variables examined in this study included age (≤40 years/
40–54 years/≥55 years), gender (male/female), type of practice
(single doctor/group practice), participation in quality-control
group (yes/no) and total number of patients registered with the
GP (including patients affiliated with funds other than CNAMTS)
(≤1375/>1375). It is noteworthy that working in group practice
meant that doctors could work with one or more other specialists
(in general practice or whatever) in the same surgery and/or with one
or more other health care professionals (such as nurses, physiother-
apists, etc.) in multidisciplinary care teams (maison de santé
pluri-disciplinaire). We should also specify that participating in a
quality-control group enabled GPs from the same geographical
area to meet regularly, to discuss their practice and the problems
they encounter and thus to break out of their isolation, to develop
new forms of relationships and to form a professional group.

Due to their potential impact on doctor practices, the following patient variables were used as adjustment factors: age
(<65, 65–75, >75 years), gender (male/female), hospitalization in
2008 (non-hospitalized/hospitalized in endocrinology/hospitalized
in other units), the number of vascular comorbidities (0/1/>2) and
the number of visits to the referral GP in 2008 (≤5, >5). We also
considered whether the patient benefited from Universal Medical Coverage (Couverture Médicale Universelle: CMU), which is
a proxy for patients’ socioeconomic level because this coverage is
for low-income beneficiaries (yes/no).

**Statistical analyses**

The variables were descriptively analysed. The dependent variable
was whether or not a diabetic patient had three or four HbA1c
tests during the year (‘1’ if the patient had 3 or 4 tests and ‘0’
otherwise). The prescription for HbA1c tests can be identified in
the database by the code 1577 of the Nomenclature of Acts of
Biological Medicine. For each doctor, the mean of this variable
corresponded to the percentage of patients with diabetes in his/her
patient list who were prescribed a HbA1c test three or four times a
year (called ‘diab’). The analysis was based on a multilevel approach
using HLM software.

Three models were specified. The first, the empty model, was
designed to investigate whether there was a significant difference
between doctors, with respect to the prescription of HbA1c tests.
The second model allowed a between-doctor comparison of these
prescriptions adjusted for the patient characteristics. The third
model was designed to measure the impact of GP characteristics.
The estimation method used was ‘penalized quasi-likelihood,’ which
took overdispersion into account. The total variance of the
dependant variable was considered in the measure of the
intra-class correlation to be composed of the variance of the inter-
cepts at the GP level, as well as the level-one residual variance for the
logistic model. The variables available at the two levels were
retained and included in the model.

A Hosmer–Lemeshow test with a grouping strategy based on per-
centiles of the estimated probabilities was performed and the area
under the Receiver Operating Characteristic (ROC) curve was
calculated to evaluate the goodness-of-fit of the model.

**Results**

A total of 41 453 patients treated by 2545 GPs were included in
this study. Patients’ and doctors’ characteristics are summarized in
table 1. The mean diab per doctor was 35.8% (SD = 22.3). Table 2
presents the mean diab (SD) according to doctors’ characteristics.
Table 3 presents the percentage of patients having three or four
HbA1c tests per year according to patients’ characteristics.

The estimations of the logit specification introduced in Equation
1 are reported in table 4. In the patient model, older patients, patients who did not benefit
from CMU, patients who had not been hospitalized and patients
who had more than five visits during the course of the year were
significantly more likely to be prescribed HbA1c as recommended.
There were strong interactions between the number of vascular
comorbidities and the number of visits to the referral GP. More
patients had comorbidities, more they were followed as recom-
ined, but only when the number of visits to the referral GP
was higher than five per year.

Between-doctor variability: after controlling for patient character-
istics, the probability for a GP to prescribe at least three or four
HbA1c per year was 33.6% with a range of 9%/–77.1%.

The doctor model integrated the variables observed at
the doctor level into the explanation of the between-doctor variability
of prescription of HbA1c tests. We observed, after adjusting for
patient characteristics, that female doctors, doctors who were
younger, working in a group practice, participating in quality-
control groups and who had a number of patients registered
≤1375 (third quartile) more often prescribed the three or four rec-
ommends tests. Although significantly decreased in the doctor
model, the between-doctor residual variance remains significant.
The value of the Hosmer–Lemeshow goodness-of-fit was 6.49 and
the corresponding P-value was 0.59. The area under the ROC curve
was 0.58.

**Discussion**

These study results on medical practice variation (MPV) are of
particular interest when analysed from the perspective of imple-
menting a P4P programme. They show a great variability between
practices without a complete explanation neither with patient
characteristics nor GP characteristics. They demonstrate that there is still room to improve further the quality of care for patients with diabetes in general practice and to intervene by encouraging doctors to better train and/or practice in group.

**Weaknesses of our study**

The main limitations of our research are related to shortcomings in the health insurance databases. Firstly, part of the medical activities performed still eludes this information system, particularly in regard to patients with diabetes who are not yet receiving oral anti-diabetic treatment or insulin. These patients hence were absent from our data. It is, however, reasonable to hypothesize that they represent a small percentage relative to those in the database. Nevertheless, it may limit the generalizability of the findings. Secondly, this database only includes HbA1c tests presented for reimbursement, which does not accurately reflect the activities of practitioners since patients are not necessarily compliant. This can lead to an under-estimation of the number of tests prescribed. We cannot assess to what extent this phenomenon exists for patients with diabetes in this database. Finally, while this might have influenced the delivery of care, we did not have access to patients’ socioeconomic status (educational or income levels). Nevertheless, until now, these databases were one of the only sources of large-scale medico-economic data in France, and their role implies that there is relatively little missing data. Moreover, these same data are used today to calculate P4P indicators. Another limitation of the study, which is not related to shortcomings in the database, is linked to the fact that the study focuses on only one P4P indicator for only one disease area (diabetes care). This limits the scope of our results to diabetes care. However, our discussion on monetary incentives in combination with P4P might be applicable to other domains of care.

**Comparisons with other studies**

Our results were, most of the time, consistent with those already published. We found that younger GPs prescribed the tests more often. This result goes along with those of Choudhry et al. who systematically reviewed data relating experience and age to physician performance across different medical specialties and found that 70% of studies demonstrated a negative association between length of time in practice and several measures of good physician performance. There are many possible explanations for these findings, and perhaps most plausible, write the researchers, is that doctors’ ‘toolkits’ are created during training and may not be updated regularly. Older physicians seem less likely to adopt newly proven therapies and may be less receptive to new standards of care.
Concerning the effect of gender on the performance of care, Bensing et al.\textsuperscript{17} showed that besides the expected differences in female-specific problems, there is a clear GP-gender effect in the presence of ‘social’ and ‘metabolic’ problems in the female GP’s consultations in general practice. More recently, Kim et al.\textsuperscript{18} showed that patients of female physicians were slightly more likely to have their lipid and HbA1c levels measured over 12 months than patients of male physicians. It is also what we found in our study.

We found a negative significant association between the number of patients registered with the GP and glycemic control. Without any clear explanation why, our results were not consistent with those of Holmboe et al.\textsuperscript{19} They found that Medicare fee-for-service patients with diabetes cared for by physicians with greater numbers of diabetic Medicare patients in their practice were more likely to receive important diabetes processes of care. However, our results were closer to those of Millett et al.\textsuperscript{20} who found that the performance of small practices was broadly similar to larger practices in achievement of intermediate outcome targets for HbA1c, blood pressure and cholesterol.

Finally, doctors who worked in a group practice and who participated in quality-control groups more often prescribed the three or four recommended tests. These results were consistent with those of a systematic review of controlled trials evaluating the effectiveness of interventions targeted at health care professionals and aimed at improving the process of care or patient outcomes for patients with diabetes in primary care, outpatient and community settings.\textsuperscript{21} In the studies in which the interventions were targeted at health care professionals only, postgraduate education combined with local consensus procedures, reminders, audit and/or feedback improved the provision of diabetes care in all studies that did not demonstrate a good standard of care at baseline. In the studies in which multidisciplinary teams were implemented in combination with arrangements for follow-up and patient education, glycemic control and cholesterol improved significantly. Very recently in France, a case-control study that used HbA1c tests as an indicator of quality of care in general practice was performed to compare the effectiveness and costs of experimental teamwork involving doctors and nurses working together to the usual model of doctors working in a single-doctor practice. After 11 months of follow-up, the authors concluded that working in a team was more cost-effective.\textsuperscript{22}

### Table 2. Comparison of the mean percentage of patients with diabetes in doctors’ patient lists having three or four HbA1C tests per year according to doctors’ characteristics

<table>
<thead>
<tr>
<th>Doctors’ characteristics</th>
<th>Percentage of patients with three or four HbA1C tests per year [mean (SD)]</th>
<th>P-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>40.3 (24.5)</td>
<td>&lt;10^-4</td>
</tr>
<tr>
<td>Male</td>
<td>34.3 (21.3)</td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;40</td>
<td>43.4 (24.5)</td>
<td>&lt;10^-4</td>
</tr>
<tr>
<td>40–54</td>
<td>35.3 (21.8)</td>
<td></td>
</tr>
<tr>
<td>≥55</td>
<td>30.1 (19.5)</td>
<td></td>
</tr>
<tr>
<td>Group practice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>37.2 (21.5)</td>
<td>&lt;10^-3</td>
</tr>
<tr>
<td>No</td>
<td>33.8 (23.1)</td>
<td></td>
</tr>
<tr>
<td>Participation in a quality-control group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>39.9 (21.4)</td>
<td>&lt;10^-4</td>
</tr>
<tr>
<td>No</td>
<td>34.9 (22.3)</td>
<td></td>
</tr>
<tr>
<td>Patient list (patients)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;1375</td>
<td>33.9 (19.9)</td>
<td>10^-2</td>
</tr>
<tr>
<td>≤1375</td>
<td>36.3 (22.9)</td>
<td></td>
</tr>
</tbody>
</table>

*Fisher test.

### Table 3. Comparison of the distribution of patients with diabetes on whether or not they had three or four HbA1C tests per year according to patients’ characteristics

<table>
<thead>
<tr>
<th>Patient characteristics</th>
<th>Having three or four HbA1C tests per year</th>
<th>Having less or more than three or four HbA1C tests per year</th>
<th>P-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>7786</td>
<td>14 198</td>
<td>0.0125</td>
</tr>
<tr>
<td>Female</td>
<td>7125</td>
<td>12 344</td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;65</td>
<td>6180</td>
<td>12 365</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>65–74</td>
<td>4615</td>
<td>7338</td>
<td></td>
</tr>
<tr>
<td>≥75</td>
<td>4116</td>
<td>6839</td>
<td></td>
</tr>
<tr>
<td>Beneficiary of the CMU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>274</td>
<td>661</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>No</td>
<td>14 637</td>
<td>25 881</td>
<td></td>
</tr>
<tr>
<td>Associated vascular co-morbidities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>11 138</td>
<td>20 296</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>2952</td>
<td>51 85</td>
<td>0.2411</td>
</tr>
<tr>
<td>≥2</td>
<td>641</td>
<td>1061</td>
<td></td>
</tr>
<tr>
<td>Hospitalization:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not hospitalized</td>
<td>12 279</td>
<td>21 410</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Hospitalized in an endocrinology unit</td>
<td>600</td>
<td>13 44</td>
<td></td>
</tr>
<tr>
<td>Hospitalized in another unit</td>
<td>2032</td>
<td>37 88</td>
<td></td>
</tr>
<tr>
<td>Number of visits to the referral GP during the year 2008</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Five visits or less</td>
<td>3924</td>
<td>8 785</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>More than five visits</td>
<td>10 950</td>
<td>17 629</td>
<td></td>
</tr>
</tbody>
</table>

*Chi-squared test.

### Non-monetary incentives in combination with P4P

Thus, returning to the question of P4P, we aimed to identify a target group of doctors which require attention; the doctors not performing optimally, who could change their follow-up of diabetic patients if their reimbursement were changed.\textsuperscript{23,24} It has been shown that English family practices attained high levels of achievement in the first year of the new P4P contract and that achievement was higher in practices with doctors under the age of 50 years and in smaller practices.\textsuperscript{25,26} Our data show that doctors practicing alone were not performing optimally. Although we believe...
that caution is needed if we want to draw conclusions from the studies undertaken in the UK to predict the chances of P4P in France, their results lead to the hope that the P4P might be successful in France in this target group of doctors practicing alone. In terms of doctors’ ages, the conclusions that we could draw are different. In our study, doctors over the age of 50 years were not performing optimally. Since they are less sensitive to P4P, less in quality-control groups strengthens the idea that they could benefit from incentives other than financial ones. Of course, these doctors’ characteristics only explain a small part of doctors’ performance, but they must be important in providing practitioners with the skills and experience. Henceforth, the question of doctors’ motivations to commit themselves becomes essential.

Intrinsic motivation refers to engaging in an activity for no reason other than the enjoyment and satisfaction of the activity itself. Numerous research studies outside the scope of this article have recently broached this theme. Intrinsic motivations may be especially relevant in social services, particularly in teaching and health care, both of which have been traditionally described as vocations. It is probably only after focusing on these questions, specifically in the field of health care, that one will find the information needed to answer the question of the success of these P4P programmes.

Acknowledgements

We would like to warmly thank the Caisse Nationale d’Assurance Maladie in Brittany, which trusted us by allowing access to its databases and encouraged us in achieving this research. We would also like to thank the Prosperie group including P Boisnault, Y Bourguet, T Cartier, P Clerc, D Duhot, C Franc, N Krucien, P Le Fur, M Le Vaillant, J Mousques, M Naïdich, N Pelletier-Fleury, O Saint Lary and P Szidon for their useful contribution in the discussion of the study results. This study has been orally presented at the 3rd Joint European Public Health Conference 2010, Amsterdam, 10–13 November 2010.

Conflicts of interest: None declared.

**Table 4** Multilevel model of the probability of having three or four HbA1c tests during the year

<table>
<thead>
<tr>
<th>Explanatory variables</th>
<th>Empty model</th>
<th>Patient model</th>
<th>Patient/doctor model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coeff. (SE)</td>
<td>P-value</td>
<td>Coeff. (SE)</td>
</tr>
<tr>
<td><strong>Fixed effects</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>−0.62 (0.02)</td>
<td>****</td>
<td>−0.93 (0.03)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>−0.50 (0.07)</td>
</tr>
<tr>
<td>Patient-level (n=41,453)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (ref.: &lt;65 years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>65–74 years</td>
<td>0.19 (0.03)</td>
<td>****</td>
<td>0.20 (0.03)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.11 (0.03)</td>
</tr>
<tr>
<td>Sex (ref.: female)</td>
<td></td>
<td></td>
<td>0.11 (0.03)</td>
</tr>
<tr>
<td></td>
<td>−0.01 (0.02)</td>
<td></td>
<td>−0.01 (0.02)</td>
</tr>
<tr>
<td>Beneficiary of CMU (ref.: no)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>−0.31 (0.08)</td>
<td>****</td>
<td>−0.32 (0.08)</td>
</tr>
<tr>
<td>Hospitalization (ref.: none)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In endocrinology</td>
<td>−0.23 (0.06)</td>
<td>****</td>
<td>−0.24 (0.06)</td>
</tr>
<tr>
<td>In other unit</td>
<td>−0.12 (0.03)</td>
<td>****</td>
<td>−0.12 (0.03)</td>
</tr>
<tr>
<td>Interaction comorbidities* number of visits (ref.: no co-morbidity = 0 at number of visits ≤5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comorbidity = 0</td>
<td></td>
<td></td>
<td>0.39 (0.03)</td>
</tr>
<tr>
<td>—Nb visits ≥5</td>
<td></td>
<td></td>
<td>0.39 (0.03)</td>
</tr>
<tr>
<td>Comorbidity = 1</td>
<td></td>
<td></td>
<td>−0.03 (0.06)</td>
</tr>
<tr>
<td>—Nb visits ≤5</td>
<td></td>
<td></td>
<td>−0.04 (0.06)</td>
</tr>
<tr>
<td>—Nb visits &gt;5</td>
<td>0.33 (0.04)</td>
<td>****</td>
<td>0.33 (0.04)</td>
</tr>
<tr>
<td>Comorbidities ≥2</td>
<td></td>
<td></td>
<td>−0.14 (0.12)</td>
</tr>
<tr>
<td>—Nb visits ≤5</td>
<td></td>
<td></td>
<td>−0.14 (0.12)</td>
</tr>
<tr>
<td>—Nb visits &gt;5</td>
<td>0.43 (0.06)</td>
<td>****</td>
<td>0.43 (0.06)</td>
</tr>
<tr>
<td>Doctor level (n=2545)</td>
<td></td>
<td></td>
<td>0.20 (0.05)</td>
</tr>
<tr>
<td>Sex (ref.: female)</td>
<td></td>
<td></td>
<td>−0.34 (0.05)</td>
</tr>
<tr>
<td>Age (ref.: &lt;40 years)</td>
<td></td>
<td></td>
<td>−0.57 (0.06)</td>
</tr>
<tr>
<td>40–54</td>
<td></td>
<td></td>
<td>−0.57 (0.06)</td>
</tr>
<tr>
<td>≥65</td>
<td></td>
<td></td>
<td>0.09 (0.04)</td>
</tr>
<tr>
<td>Group practice (ref.: no)</td>
<td></td>
<td></td>
<td>0.21 (0.05)</td>
</tr>
<tr>
<td>Participation in a quality-control group (ref.: no)</td>
<td></td>
<td></td>
<td>−0.11 (0.04)</td>
</tr>
<tr>
<td>Patient list (quartiles) (ref.: &lt;Q1–Q3)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Random effects</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variance components</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doctor level</td>
<td>0.57 (0.76)</td>
<td>****</td>
<td>0.59 (0.77)</td>
</tr>
<tr>
<td>Intra-class correlation coefficient</td>
<td>0.15</td>
<td>****</td>
<td>0.15</td>
</tr>
</tbody>
</table>

****P<0.001; ***P<0.01; **P<0.05; *P<0.1.
Key points

- There is little rigorous evidence to support or refute the use of pay for performance (P4P) incentive in the UK and United States. Prior to the implementation of a primary care P4P programme in France, it seemed of particular interest to identify the GPs who could be the target of this programme.
- We showed that much remains to be done to improve the quality of diabetes care in general practice since only 36% (±22.3) of patients with diabetes in the GP patient list underwent three or four HbA1c tests during the year (target objective of the P4P programme is 65%).
- We observed, after adjusting for patient characteristics, that female doctors, doctors who were younger, working in a group practice, participating in quality-control groups, and who had a number of patients registered ≤1375 (third quartile) more often prescribed the three or four recommended tests.
- The results indicate a target group of doctors that require attention and suggest there is still room to improve the quality of care for patients with diabetes in general practice, notably by encouraging doctors to train better and/or practice in groups.

References

26 Tahranii AA, McCarthy M, Godson J, et al. Impact of practice size on delivery of diabetes care before and after the Quality and Outcomes Framework implementa-