Andrea Ruscitto, Stewart W Mercer, Daniel Morales and Bruce Guthrie

Accounting for multimorbidity in pay for performance:

a modelling study using UK Quality and Outcomes Framework data

Abstract

Background
The UK Quality and Outcomes Framework (QOF) offers financial incentives to deliver high-quality care for individual diseases, but the single-disease focus takes no account of multimorbidity.

Aim
To examine variation in QOF payments for two indicators incentivised in ≥1 disease domain.

Design and setting
Modelling study using cross-sectional data from 314 general practices in Scotland.

Method
Maximum payments that practices could receive under existing financial incentives were calculated for blood pressure (BP) control and influenza immunisation according to the number of coexisting clinical conditions. Payments were recalculated assuming a single new indicator.

Results
Payment varied by condition (£4.71–£11.08 for one BP control and £2.09–£5.78 for one influenza immunisation). Practices earned more for delivering the same action in patients with multimorbidity: in patients with 2, 3, and ≥4 conditions mean payments were £13.95, £21.92, and £29.72 for BP control, and £7.48, £11.21, and £15.14 for influenza immunisation, respectively. Practices in deprived areas had more multiple incentivised patients. When recalculated so that each incentivised action was only paid for once, all practices received less for BP control: affluent practices received more and deprived practices received less for influenza immunisation.

Conclusion
For patients with single conditions, existing QOF payment methods have more than twofold variation in payment for delivering the same process. Multiple payments were common in patients with multimorbidity. A payment method is required that ensures fairness of rewards while maintaining adequate funding for practices based on actual workload.

Keywords
comorbidity; general practice; multimorbidity; pay for performance; primary care; reimbursement, incentive.

INTRODUCTION

Pay-for-performance (P4P) programmes offer financial incentives to improve care quality. However, worldwide, these usually focus on the care of single diseases and do not take account of multimorbidity; this risks duplication and inefficiency if the same element of care attracts multiple incentives.[1]

The UK Quality and Outcomes Framework (QOF) is a P4P programme that incentivises a large number of process, intermediate outcome, and treatment indicators[2] for clinical conditions chosen on the basis of their being common and of public health importance.[3] Although the number of indicators in the QOF have reduced significantly in the last 2 years, it remains the single largest healthcare P4P programme in the world. Examples of care incentivised by the QOF include: processes such as the delivery of diabetic foot screening; intermediate outcomes, such as control of blood pressure (BP); and delivery of treatments, such as influenza immunisations.

The QOF is non-competitive in that all practices can receive maximum payment provided they deliver the specified care. Payment is made based on a sliding scale of performance on each indicator above a minimum threshold, weighted by the number of patients with a condition within each practice (Box 1).

However, complex payment systems may have unintended effects, which are only recognised after implementation. For the QOF, this included an initial failure to recognise that the revised capitation system introduced in 2004 would result in most practices losing income, which led to the very rapid introduction of the minimum practice income guarantee to protect historical income (which is only just being unwound more than 10 years later).[4]

The original QOF payment system also tried to protect the income of practices with a low prevalence of disease but, as a result, perversely paid more to larger practices than their smaller counterparts with the same level of quality; this systematically diverted resources from practices serving deprived populations to those serving the affluent.[5] Modelling of payment system effects can, therefore, be helpful in avoiding unintended perverse consequences, including how P4P influences equity and the inverse care law, as well as overall quality of care.[6,7]

The QOF is primarily designed on a single-disease basis, despite many patients having multimorbidity.[1] From a payment system perspective, this has two implications:

- the incentives for delivering the same care may be different for different conditions; and
- as multimorbidity is common and the same care may be incentivised for multiple conditions, in some patients a single clinical action may attract multiple payments.

A Ruscitto, medical student; **D Morales**, PhD, Discovery fellow; **B Guthrie**, PhD, professor of primary care medicine, University of Dundee, Dundee; **SW Mercer**, PhD, professor of primary care, University of Glasgow, Glasgow.

Address for correspondence
Bruce Guthrie, Population Health Sciences Division, University of Dundee, Mackenzie Building, Kirsty Semple Way, Dundee DD2 4BF, UK.

E-mail: b.guthrie@dundee.ac.uk

Submitted: 23 December 2015; **Editor's response:** 27 January 2016; **final acceptance:** 9 February 2016.

How this fits in

Pay-for-performance systems like the Quality and Outcomes Framework (QOF) reward high-quality care with financial incentives, but are usually designed around individual diseases not multimorbidity. Several QOF indicators, including blood pressure control and influenza immunisation, cross disease domains, thereby potentially leading to multiple payments for delivering the same action in some patients. There is significant payment variation for the same incentivised action in patients with different conditions, and multiple payments lead to even greater variation for the same clinical action in patients with multimorbidity. Recalculations based on a clinical action only being paid for once resulted in funding being diverted from deprived to more affluent practices. This indicates that a fairer payment method is needed but it must maintain adequate funding based on actual workload. Payment systems need careful modelling before implementation to ensure they deliver their intended aims and minimise unintended negative consequences.

This second problem was recognised with indicators relating to smoking soon after the QOF's implementation. In 2004–2005 and 2005–2006, six disease domains contained an indicator for recording smoking status and offering smoking cessation advice, meaning practices could effectively be paid six times for recording smoking status once. From 2006–2007, a single smoking domain was created, whereby a single payment was received for recording the smoking status or for giving smoking cessation advice to a person with specified conditions, irrespective of the number of relevant conditions they had; the same number of points was allocated as for the total of the individual disease domains.[8,9]

This study examines the consequences of multimorbidity for the QOF payment system by examining QOF indicators for BP control and influenza immunisation, which are incentivised for multiple clinical conditions

Box 1. The Quality and Outcomes Framework payment system

Each indicator has a number of allocated points, which are agreed in negotiations between NHS Employers and the British Medical Association, representing the government and GPs, respectively. The rationale for the allocation of a particular point to an indicator is not explicit as it is agreed in confidential negotiations, but it is presumed to reflect both perceived workload and likely population health benefit.

Points have a monetary value. In 2014–2015 this was officially calculated as: £152.96 * (practice register/practice list size) * (national mean list size/national mean register size) * (practice list size/national mean list size). This equates to: £152.96 * (practice register/national mean register size). A practice with an average-sized register, therefore, earns £152.96 per point, and the value of points varies linearly with how many patients with a particular condition the practice has (that is, the more patients, the greater the value of a point to match higher workload).

Practices earn points on a sliding scale between minimum and maximum thresholds of performance, which vary by indicator:

- process indicators: minimum 40–57%, maximum 90–96%;
- intermediate outcomes: minimum 40–60%, maximum 75–93%; and
- treatment indicators: minimum 40–60%, maximum 65–100%.

HYP006: the percentage of patients with hypertension in whom the last blood pressure reading (measured in the preceding 12 months) is ≤150/90 mmHg has a minimum threshold of 45% and a maximum threshold of 85%.

As such, a practice with performance of ≤45% earns nothing, whereas one with a performance of ≥85% earns maximum payment. The range between maximum and minimum is 40 points, so a practice with 60% performance would receive 15/40ths of the points and, therefore, 15/40ths of the available reward (15 percentage points above minimum threshold/[maximum minus minimum threshold]).

METHOD

A modelling study was performed using routine general practice electronic data from 2007 for patients aged ≥20 years registered with 314 general practices in Scotland.[1] Two groups of QOF indicators used in 2014–2015,[10] which are the same across multiple disease domains, were examined (Table 1):

- BP controlled to ≤150/90 mmHg; and
- influenza immunisation.

The 2014–2015 QOF indicators were applied to patients with ≥1 incentivised condition — coronary heart disease (CHD), hypertension, peripheral arterial disease (PAD), stroke and transient ischaemic attack (stroke/TIA), diabetes, and chronic obstructive pulmonary disease (COPD) — all of which were defined using the same sets of Read codes as the QOF. The maximum payment a practice could receive under the existing payment formula was calculated, assuming practices just achieved the maximum payment threshold and that each point was worth an average of £152.96; adjustment for practice register size was undertaken using the formula described in Box 1.[11]

Based on the conditions that patients actually had, the expected payment per patient to whom incentivised care was delivered was calculated by adding together payments for delivering BP control or influenza immunisation across all the conditions they had. This allows for a comparison of payments across different single conditions (for example, controlling the BP of someone with CHD compared with that of someone with diabetes) and across different patterns of multimorbidity.

For each practice, the mean payment per patient, assuming maximum threshold performance on all indicators, was calculated for controlling BP or giving influenza immunisation based on the actual patterns of morbidity in each practice. Finally, payments were recalculated assuming that a single new indicator was created for each

Table 1. Influenza immunisation and blood pressure control indicators common across Quality and Outcomes Framework disease domains in 2014–2015

Indicator name (QOF identifier)	Indicator wording	Point allocation	Threshold
CHD002	The percentage of patients with CHD in whom the last BP reading (measured in the preceding 12 months) is ≤150/90 mmHg	17	53–93
HYP006	The percentage of patients with hypertension in whom the last BP reading (measured in the preceding 12 months) is ≤150/90 mmHg	20	45–80
PAD002	The percentage of patients with PAD in whom the last BP reading (measured in the preceding 12 months) is ≤150/90 mmHg	2	40–90
STIA003	The percentage of patients with a history of stroke or TIA in whom the last BP reading (measured in the preceding 12 months) is ≤150/90 mmHg	5	40–75
DM002[a]	The percentage of patients with diabetes, on the register, in whom the last BP reading (measured in the preceding 12 months) is ≤150/90 mmHg	8	53–93
CHD007	The percentage of patients with CHD who have had influenza immunisation in the preceding 1 August to 31 March	7	56–96
STIA009	The percentage of patients with stroke or TIA who have had influenza immunisation in the preceding 1 August to 31 March	5	40–95
DM017	The percentage of patients with diabetes, on the register, who have had influenza immunisation in the preceding 1 August to 31 March	3	55–95
COPD007	The percentage of patients with COPD who have had influenza immunisation in the preceding 1 August to 31 March	6	57–97

[a]There is a further QOF indicator additionally incentivising tighter BP control in patients with diabetes mellitus.
BP = blood pressure. CHD = coronary heart disease. COPD = chronic obstructive pulmonary disease.
PAD = peripheral arterial disease. QOF = Quality and Outcomes Framework. TIA = transient ischaemic attack.

of the two sets of indicators (for example, a single BP controlled ≤150/90 mmHg in patients with ≥1 of CHD, hypertension, PAD, stroke/TIA, and diabetes), assuming that the same total number of points were allocated to the new indicator. The most conservative thresholds from the individual indicators were used (highest minimum and highest maximum), matching the process used to create the single smoking domain across diseases in 2006. The impact on payment was examined for practices in 10 equal groups (deciles) of practice deprivation measured using the mean of the Carstairs score of each patient's postcode.[12]

Data analysis was undertaken using IBM's PASW software (version 21).

RESULTS

A total of 1 381 559 permanently registered patients aged ≥20 years from 314 general practices were identified (mean age 49 years, 51.0% female), of whom 343 766 (24.9%) had ≥1 condition applicable to the selected QOF indicators. Of these, 226 406 (65.9%) had one of the specified QOF conditions whereas 117 360 (34.1%) had ≥2 and, therefore, attracted multiple payments for a single incentivised action (Table 2).

Payment per indicator

Table 2 shows the value of achieving each indicator in patients with different conditions. For delivering controlled BP, payment varied 2.4-fold from £4.71 in a patient with PAD alone to £11.08 in a patient with CHD alone. The value of a single influenza immunisation varied 2.8-fold from £2.09 in a patient with diabetes alone to £5.78 in a patient with COPD alone. As patients with multimorbidity attract multiple payments, even greater variation is seen

Table 2. Mean payment per patient, by condition

Pattern of morbidity	Patient eligible for each indicator, *n* (%)[a]	Mean payment per patient for maximum achievement, £[b] (range)[c]
Blood pressure control		
1 condition		
Coronary heart disease	28 002 (8.8)	11.08
Peripheral arterial disease	7397 (2.3)	4.71
Stroke/transient ischaemic attack	8957 (2.8)	9.02
Diabetes	25 458 (8.0)	5.70
Hypertension	145 618 (45.9)	5.26
Any 2 conditions	76 917 (24.2)	13.95 (range 9.97–20.09)[c]
Any 3 conditions	20 853 (6.6)	21.92 (range 15.67–25.79)[c]
Any ≥4 conditions	4303 (1.4)	29.72 (range 24.68–35.76)[c]
Influenza immunisation		
1 condition		
Coronary heart disease	48 954 (25.0)	4.42
Stroke/transient ischaemic attack	19 647 (10.0)	2.85
Diabetes	49 517 (25.2)	2.09
COPD	35 881 (18.3)	5.78
Any 2 conditions	35 833 (18.3)	7.48 (range 4.94–10.20)[c]
Any 3 conditions	5899 (3.0)	11.21 (range 9.36–13.04)[c]
Any 4 conditions	475 (0.2)	15.14[d]

[a]n = 317 505 eligible for blood pressure control indicators; n = 196 206 eligible for influenza immunisation. [b]For patients with 1 condition, payment is the same for every patient; for patients with multiple conditions, payment depends on which ones (≥2) they have. As such, the number shown is the mean for all patients with 2 conditions, and the range is minimum to maximum payment depending on which 2 conditions the patient has. This is the same for higher numbers of conditions. [c]Range of mean payment per patient for different combinations of condition. [d]Patients with all four conditions all receive the same payment, so no range is shown.

across the whole population: for BP control, payment varied from £4.71 in someone who only had peripheral artery disease to £35.77 in someone with all five incentivised conditions; for influenza immunisation payment varied from £2.09 in someone who only has diabetes to £15.14 in someone with all four incentivised conditions.

Impact of a revised system

Reflecting the higher prevalence of multimorbidity in deprived areas,[1] the mean payment per patient for BP control under the current system increased with deprivation, from £9.06 in the most affluent decile to £9.89 in the most deprived decile; for influenza immunisation this increased from £4.37 to £5.01 (Table 3). However, there was considerable variation between individual practices with different levels of deprivation and, because multimorbidity also increases with age, there were also differences resulting from the age structure of the population. For example, the most affluent practices received mean payments per patient for BP control ranging from £8.37 to £10.07, compared with the least affluent practices, which received payments ranging from £8.94 to £10.85.

Table 3 shows the effect of using the same payment system as that used for QOF smoking indicators, in which each incentivised action is only paid for once. Control of BP in one patient would lead to a single maximum expected payment of £8.66. Although there are 'winners' and 'losers' across the distribution, on average, practices in every decile of deprivation would receive less reward for the same work under the revised system, with a gradient of increasing loss from affluent (–4.2%) to deprived (–12.2%).

Influenza immunisation would be rewarded with a single maximum expected payment of £4.66; affluent practices would, on average, be paid more under a single indicator system (+7.2%), whereas the most deprived would be paid less (–6.5%).

DISCUSSION

Summary

This study shows that, for patients with single conditions, the QOF payment system has greater than a twofold variation in payment for delivering the same process or outcome, and multiple payments for a single action are made in one-fifth of patients incentivised for influenza immunisation

Table 3. Mean payment per patient, by affluence

Decile of deprivation (practices, *n*)[a]	Patients with >1 incentivised condition, %[b]	Mean payment per patient with current system (5th–95th percentile)[b]	Revised mean payment system per patient, £[c]	Mean % difference between and current existing payment system (5th–95th percentile range)[b]
Blood pressure				
1 (affluent) (31)	30.5	9.06 (8.37 to 10.07)	8.66	–4.2 (–13.9 to 3.5)
2 (32)	31.1	9.11 (8.00 to 10.65)	8.66	–4.4 (–18.6 to 8.5)
3 (31)	30.7	9.25 (7.69 to 10.42)	8.66	–5.8 (–16.9 to 14.4)
4 (31)	30.4	9.06 (8.16 to 9.99)	8.66	–4.2 (–13.3 to 6.1)
5 (31)	31.3	9.25 (8.37 to 10.22)	8.66	–6.2 (–15.2 to 3.4)
6 (31)	32.7	9.48 (8.38 to 10.27)	8.66	–8.4 (–15.7 to 3.3)
7 (31)	33.2	9.61 (8.56 to 10.77)	8.66	–9.7 (–19.6 to 1.2)
8 (31)	32.6	9.51 (8.65 to 10.76)	8.66	–8.7 (–19.2 to 0.2)
9 (31)	33.1	9.58 (8.84 to 10.37)	8.66	–9.4 (–16.5 to –2.0)
10 (deprived) (31)	35.3	9.89 (8.94 to 10.85)	8.66	–12.2 (–20.2 to –3.1)
Influenza immunisation				
1 (affluent) (31)	24.2	4.37 (3.70 to 5.09)	4.66	7.2 (–8.4 to 26.0)
2 (32)	24.9	4.40 (3.34 to 5.29)	4.66	7.6 (–11.8 to 44.2)
3 (31)	25.3	4.61 (4.15 to 5.53)	4.66	1.6 (–15.8 to 12.2)
4 (31)	25.2	4.51 (3.91 to 5.27)	4.66	4.0 (–11.5 to 19.4)
5 (31)	26.0	4.65 (4.08 to 5.65)	4.66	1.0 (–17.4 to 14.2)
6 (31)	28.1	4.60 (3.96 to 5.11)	4.66	1.7 (–8.8 to 17.7)
7 (31)	27.1	4.68 (4.25 to 5.52)	4.66	0.1 (–15.4 to 9.7)
8 (31)	29.1	4.80 (4.34 to 5.56)	4.66	–2.4 (–16.1 to 7.5)
9 (31)	30.2	4.77 (4.13 to 5.51)	4.66	–1.8 (–15.4 to 13.3)
10 (deprived) (31)	33.5	5.01 (4.35 to 5.59)	4.66	–6.5 (–16.7 to 7.1)

[a]311/314 practices with complete deprivation data included. [b]5th–95th percentile range: this is the range of payments within which 90% of practices lie (rather than a confidence interval around the mean). [c]Under the revised system, the payment for a process or outcome is the same in every patient.

and one-third of those incentivised for BP control. Double payment in patients with multimorbidity was recognised as an issue in 2006 when smoking indicators were combined across multiple conditions; if similar changes were implemented to BP control and influenza immunisation, more affluent practices would be favoured. However, considerable inter-practice variation in impact within the same strata of affluence or deprivation exists, reflecting that the age structure of the population being served is also important.

For influenza immunisation, the most affluent practices would experience an average 7.2% rise in payments and the most deprived a 6.5% fall, assuming maximum quality. For BP control, practices in every decile of deprivation lose, on average; this was because the calculation assumed the new single indicator had the same payment thresholds as the current indicator, with the highest maximum threshold, meaning that, on average, more care has to be delivered to earn the same number of points.

Although thresholds for any new combined indicator could be set so that, on average, 'winners' balanced 'losers', the observed pattern that deprived practices would lose more, on average, would still hold.

Strengths and limitations

P4P is usually designed around single-disease indicators, even though multimorbidity is common; to the authors' knowledge, however, no other study has examined the implications of multimorbidity for P4P payment system design. Strengths of this study include the large representative dataset[1] with estimates of multimorbidity based on the same sets of Read codes as the QOF.

To allow for consistent comparison, the modelling assumes that all practices achieve maximum payment, but the implications for individual practices would, of course, also depend on their actual level of performance.

Although the multimorbidity data used were taken from 2007 and the indicator definitions and thresholds used are those relating to 2014–2015, the patterns of multimorbidity are not expected to have changed significantly in this time or to have affected the conclusions reached.

Comparison with existing literature

Designers of payment systems like the QOF internationally need to decide whether incentive payments are primarily intended to:

- reward practices equally by workload for delivering incentivised care (implying

the same payment for each process or outcome delivered, although the authors believe this should be weighted by factors affecting workload such as deprivation); or

- reflect expected benefit, as outlined by Ashworth *et al*[13] (implying that payment should vary by condition).

The latter is explicit in the National Institute for Health and Care Excellence's indicator development process, which recommends that indicators and maximum and minimum thresholds are based on evidence of effectiveness and cost-effectiveness.[14] However, actual indicator point allocations are made by the contract negotiators — namely, the British Medical Association and NHS Employers — and it is unclear how they make these decisions. In either case, a clear lesson is that payment systems are complex and their introduction or revision should, ideally, be based on clarity about the purpose of the financial incentive; in addition, careful modelling of the impact of incentives including on inequalities should be carried out before the system is implemented.[5,15]

Implications for research and practice

Payment systems can have a number of different, and potentially contradictory, aims. The QOF, along with other P4P systems, is intended to incentivise the delivery of high-quality care, but there is ambiguity regarding whether the size of the payment made for any particular indicator is to compensate for the work required to deliver it or is set to reflect the value of the expected outcomes of delivering the incentivised care. Of note is that, quite often, the amount of work and the value of the expected outcomes are not easy to define when creating the payment system.

From a 'compensating for workload' perspective, the current payment system is perverse because a single clinical action attracts very different payments, depending on multimorbidity. From a 'value of expected outcomes' perspective, differential payment for the same clinical action makes theoretical sense because, for example, BP control in patients with vascular disease or diabetes would be expected to prevent more future vascular disease and deaths than in patients who only have hypertension. It is also possible — although, to the authors' knowledge, unproven — that patients with multimorbidity could derive greater benefit from BP control or influenza immunisation than those with single diseases. However, it seems unlikely that patients with, for example, all four conditions incentivised for influenza immunisation get seven times the benefit of those who have diabetes alone (£15.14 per flu vaccination delivered versus £2.09).

It can also be argued that paying more for patients with multimorbidity effectively pays more to practices serving the most deprived patients, which recognises the greater difficulty of delivering structured care in this context. From that perspective, a fixed payment for delivering a single clinical action fails to reflect variations in the work required to deliver incentivised care — thereby perpetuating the inverse care law and health inequalities.[6,7] Designing payment systems is, therefore, never going to be straightforward.

New QOF indicators are tested in pilot practices before implementation.[2] A change to the current system could be similarly piloted in practices across the country to establish its effectiveness; it is important to consider the impact on equity and the inverse care law,[2] especially at a time when health inequalities are set to broaden.[16]

Given likely major revisions to the QOF over the next few years, including growing divergence across the four UK countries, review of the payment system as well as changes to indicators are suggested to ensure it continues to support high-quality care and mitigate the inverse care law. More generally, all new payment systems, including weighted capitation formulas, need careful modelling prior to implementation to ensure they deliver their intended consequences and avoid the kind of unintended consequences seen in previous iterations of the QOF.[4,5]

Funding

This analysis was carried out as a vacation studentship for Andrea Ruscitto, internally funded by the University of Dundee. The dataset used was created as part of a programme of work funded by the Chief Scientist Office of the Scottish Government Health Directorates (Applied Research Programme Grant ARPG/07/1), and was provided by the Primary Care Clinical Informatics Unit at the University of Aberdeen. The views in this publication are not necessarily those of the University of Aberdeen, its agents, or employees.

Ethical approval

The NHS National Research Ethics Service had previously approved the anonymous use of the data for research purposes so individual ethics approval was not required.

Provenance

Freely submitted; externally peer reviewed.

Competing interests

The authors have declared no competing interests.

Discuss this article

Contribute and read comments about this article: **bjgp.org/letters**

REFERENCES

1. Barnett K, Mercer SW, Norbury M, *et al.* Epidemiology of multimorbidity and implications for health care, research, and medical education: a cross-sectional study. *Lancet* 2012; **380(9836):** 37–43.
2. Lester H, Campbell S. Developing Quality and Outcomes Framework (QOF) indicators and the concept of 'QOFability'. *Qual Prim Care* 2010; **18(2):** 103–109.
3. Roland M. Linking physicians' pay to the quality of care — a major experiment in the United Kingdom. *N Engl J Med* 2004; **351(14):** 1448–1454.
4. Chisholm J, Farrar M. *Joint letter on the Minimum Practice Income Guarantee (MPIG).* London: British Medical Association and NHS Confederation, 2003.
5. Guthrie B, McLean G, Sutton M. Workload and reward in the Quality and Outcomes Framework of the 2004 general practice contract. *Br J Gen Pract* 2006; **56(532):** 836–841.
6. Mercer SW, Guthrie B, Furler J, *et al.* Multimorbidity and the inverse care law in primary care. *BMJ* 2012; **344:** e4152.
7. Mercer SW, Watt GC. The inverse care law: clinical primary care encounters in deprived and affluent areas of Scotland. *Ann Fam Med* 2007; **5(6):** 503–510.
8. NHS Employers, British Medical Association. *Revisions to the GMS contract 2006/07: delivering investment in general practice.* 2006. http://www.nhsemployers.org/~/media/Employers/Documents/Primary%20care%20contracts/QOF/2006-07/Revisions%20to%20the%20GMS%20contract%200607%20-%20Delivering%20investments%20in%20general%20practice.pdf (accessed 2 Jun 2016).
9. Department of Health. *Quality and Outcomes Framework (QOF): guidance updated August 2004.* London: DH, 2004.
10. NHS Employers. *2014/15 General Medical Services (GMS) contract Quality and Outcomes Framework (QOF): guidance for GMS contract 2014/15.* 2014. http://www.nhsemployers.org/~/media/Employers/Documents/Primary%20care%20contracts/QOF/2014-15/2014-15%20General%20Medical%20Services%20contract%20-%20%20Quality%20and%20Outcomes%20Framework%20Guidance.pdf (accessed 2 Jun 2016).
11. Department of Health. *General Medical Services statement of financial entitlements directions 2013.* London: DH, 2013. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/213225/GMS-Statement-of-Financial-Entitlements-2013.pdf (accessed 6 Jun 2016)
12. Carstairs V, Morris R. Deprivation and health in Scotland. *Health Bull (Edinb)* 1990; **48(4):** 162–175.
13. Ashworth M, Schofield P, Doran T, *et al.* The Public Health Impact score: a new measure of public health effectiveness for general practices in England. *Br J Gen Pract* 2013; DOI: 10.3399/bjgp13X665260.
14. National Institute for Health and Care Excellence. *Health and Social Care Directorate: indicators process guide.* Manchester: NICE, 2014.
15. Friedberg MW, Safran DG, Coltin K, *et al.* Paying for performance in primary care: potential impact on practices and disparities. *Health Aff (Millwood)* 2010; **29(5):** 926–932.
16. Reeves A, Basu S, McKee M, *et al.* Austere or not? UK coalition government budgets and health inequalities. *J R Soc Med* 2013; **106(11):** 432–436.