Management & prevention of type 2 diabetes

Pay-for-performance schemes: Do they help or hinder diabetes care in England?

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Pay-per-performance schemes are being introduced in a number of health systems throughout the world, and the UK Quality and Outcomes Framework (QOF) is the most well developed. Information about its effects is, therefore, of worldwide interest. The paper by Vaghela et al (summarised alongside) reports data from the first 4 years of QOF diabetes data.

The paper uses diabetes data from practices that had more than 750 registered patients, or more than 500 patients per partner. Data were analysed from around 8250 practices per year, which is around 98% of all practices. The paper reports results as median practice-specific proportions for: (a) HbA_{1c} ≤7.5% (≤58 mmol/mol); (b) blood pressure ≤145/85 mmHg; and (c) total cholesterol ≤5 mmol/L, and also reports levels of exclusion. The summary results are shown in *Box 1*.

> ***"The introduction of pay-for-performance may be one factor contributing to increased achievement of targets and reducing problems of low performance."***

The data show increasing target achievements in the first 3 years of the QOF, with a levelling off from 2006–7 to 2007–8. Levels of exclusion are similar for each year.

The authors also looked at low performing practices, defining them as low performing if they achieved less than the 25th centile for the HbA_{1c} target across all practices in 2006/7. There were 57% of practices thus classified as low performing in 2004, 47.4% in 2005/6, 25% in 2006/7 and 26% in 2007/8. There were more low performing practices in London than other areas in each year.

The authors conclude that the introduction of pay-for-performance may be one factor contributing to increased achievement of targets and reducing problems of low performance.

Table 1. Percentage of Quality and Outcomes Framework targets met since 2004 by practices in England.

Year	HbA_{1c}	Blood pressure	Cholesterol	Exclusions
2004–5	59.1	70.9	72.6	9.4
2005–6	61.7	75.7	79.8	10.0
2006–7	67.6	79.6	83.7	9.9
2007–8	66.7	80.2	83.6	8.7

DIABETES CARE

Pay-for-performance may contribute to better performance and achievement of targets

Readability	✓✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓✓✓

1 The authors aimed to evaluate trends in the achievement of diabetes targets following the introduction of the Quality and Outcomes Framework (QOF) in 2004, and to determine whether it has improved poorly performing practices.

2 Data were collated for 2004–8 from independent family practices in England: 8423 practices in 2004–5, 8264 in 2005–6, 8192 in 2006–7, and 8255 in 2007–8, which is approximately 98% of all practices.

3 For each of the practices, the proportion of people with diabetes under their care with an HbA_{1c} ≤7.5% (≤58 mmol/mol), blood pressure ≤145/85 mmHg, and total cholesterol ≤5 mmol/L was determined.

4 The proportion of people achieving the HbA_{1c} target increased from 59.1% in 2004–5 to 66.7% in 2007–8; the proportion reaching the blood pressure target increased from 70.9% in 2004–5 to 80.2% in 2007–8; and those achieving the cholesterol target increased from 72.6% in 2004–5 to 83.6% in 2007–8.

5 Of all practices in 2004–5, 57% were classified as low-performing. In 2007–8, this was reduced to 26%.

6 The authors concluded that pay-for-performance may be a contributing factor to the increased proportion of targets achieved and improved performance. However, they remind us that the QOF is designed to audit, and does not indicate good or best practice.

Vaghela P, Ashworth M, Schofield P, Gulliford MC (2009) Population intermediate outcomes of diabetes under pay-for-performance incentives in England from 2004 to 2008. *Diabetes Care* **32**: 427–9

DIABETES, OBESITY & METABOLISM

A switch from insulin to pioglitazone may be beneficial

Readability	✓✓✓✓
Applicability to practice	✓✓✓
WOW! factor	✓✓✓✓

1 The authors of this study hypothesised that converting people with type 2 diabetes on insulin who still had some residual beta-cell function onto pioglitazone would not impair blood glucose control.

2 Ninety-eight individuals with type 2 diabetes who had not received previous treatment with a thiazolidinedione were switched from insulin therapy to pioglitazone plus glimepiride for 6 months.

3 During the study, 23 people dropped out due to increasing HbA_{1c} levels and other reasons, and 75 completed with no adverse effects on their glycaemic control.

4 The authors concluded that, once further studies have been undertaken, individuals on insulin therapy may benefit from switching to pioglitazone as it is cheaper, more convenient, and may confer cardiovascular benefits.

Hohberg C, Pfützner A, Forst T et al (2009) Successful switch from insulin therapy to treatment with pioglitazone in type 2 diabetes patients with residual beta-cell function: results from the PioSwitch study. *Diabetes Obes Metab* **11**: 464–71

DIABETES, OBESITY & METABOLISM

Metformin XL associated with increased adherence

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓✓

1 This study aimed to look at whether metformin XL (glucophage SR) is better tolerated than the standard immediate release (IR) metformin, and if people with diabetes are able to adhere to the therapy more successfully.

2 The study comprised 137 people with type 2 diabetes taking metformin XL and 10 772 people taking metformin IR.

3 Overall, adherence was higher in the XL group (80%) compared with the IR group (72%).

4 The authors were unable to state the reason for the increased adherence in metformin XL compared with metformin IR due to the size of the study, but do believe that metformin XL should be considered for those people with type 2 diabetes who are intolerant to metformin IR.

Donnelly LA, Morris AD, Pearson ER (2009) Adherence in patients transferred from immediate release metformin to a sustained release formulation: a population-based study. *Diabetes Obes Metab* **11**: 338–42

DIABETES, OBESITY & METABOLISM

When glitazones or sulphonylurea are added to metformin

Readability	✓✓✓
Applicability to practice	✓✓✓
WOW! factor	✓✓

1 The authors aimed to establish how effective the addition of a sulphonylurea or thiazolidinedione (TZD) to metformin therapy is by looking at changes in HbA_{1c} levels, and the reasons behind the choice of these additions.

2 The study used data from clinical records in Finland, France, Spain, Germany, Norway, Poland and the UK.

3 Results gave similar outcomes for each addition. Adding sulphonylurea to metformin reduced HbA_{1c} by 0.8% (8.7 mmol/mol) and adding a TZD reduced HbA_{1c} by 0.9% (9.8 mmol/mol).

4 The choice of additions also gave the authors their expected result – that they were based on age, weight, treatment for weight reduction, HbA_{1c} level and type of physician.

Stagardt T, Yin DD, Alexander CM (2009) Treatment choice and effectiveness of adding sulphonylurea or glitazones to metformin for the treatment of type 2 diabetes mellitus. *Diabetes Obes Metab* **11**: 491–97

DIABETES, OBESITY & METABOLISM

Vildagliptin plus metformin superior to monotherapy in reducing HbA_{1c} levels

Readability	✓✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓

1 This study aimed to compare the safety and efficacy metformin and vildagliptin combination therapy with the respective monotherapies in people with type 2 diabetes who had not received either agent previously.

2 The authors used a 24-week, randomised, double-blind, active-controlled study and enrolled 1179 individuals to investigate the effects of the therapies on HbA_{1c}.

3 Participants were randomised to receive vildagliptin plus high-dose metformin combination therapy (50 mg + 1000 mg twice-daily [*n*=295, Group 1]), vildagliptin plus low-dose metformin combination therapy (50 mg + 500 mg twice-daily [*n*=290, Group 2]), vildagliptin monotherapy (50 mg twice-daily [*n*=300, Group 3]) or high-dose metformin monotherapy (1000 mg twice-daily [*n*=294, Group 4]).

4 Change in HbA_{1c} level from baseline was –1.8% (0.06%), –1.6% (0.06%), –1.1% (0.06%) and –1.4% (0.06%) in Group 1, Group 2, Group 3 and Group 4, respectively.

5 The between-group difference was greater within Group 1 ($P<0.001$ vs. both monotherapies) and Group 2 ($P<0.001$ and $P=0.004$, vs. vildagliptin and metformin monotherapies, respectively).

6 Combination therapies appear to have a superior efficacy to monotherapy with a comparable overall tolerability profile.

Bosi E, Dotta F, Jia Y, Goodman M (2009) Vildagliptin plus metformin combination therapy provides superior glycaemic control to individual monotherapy in treatment-naive patients with type 2 diabetes mellitus. *Diabetes Obes Metab* **11**: 506–15

"Individuals on insulin therapy may benefit from switching to pioglitazone as it is cheaper, more convenient, and may confer cardiovascular benefits."

INTERNATIONAL JOURNAL OF CLINICAL PRACTICE

Self-monitoring of blood glucose exceeds guidelines

Readability	✓✓✓✓
Applicability to practice	✓✓✓
WOW! factor	✓✓✓

1 The authors of this analysis looked at the usage and cost of self-monitoring of blood glucose (SMBG) in people with type 2 diabetes.

2 Individuals with type 2 diabetes are recommended to carry out limited SMBG alongside metformin, a thiazolidinedione, or both, diet and exercise.

3 Results of the analysis show that the mean cost of SMBG is £73.64 per patient per year. This, however, could be reduced to a mean of £62.06 if all people with diabetes were given an identified treatment type.

4 Individual costs range from £9.63 for people with diabetes treated by diet alone, to £37.87 for those on triple therapy, and went up to five times higher for people with diabetes using insulin therapy.

5 This difference in costs highlights the need for further research into the level of SMBG required for people with type 2 diabetes.

Belsey JD, Pittard JB, Rao S et al (2009) Self blood glucose monitoring in type 2 diabetes: a financial impact analysis based on UK primary care. *Int J Clin Pract* **63**: 439–48

DIABETES CARE

People with type 2 diabetes may have a higher risk of acute pancreatitis

Readability	✓✓✓✓
Applicability to practice	✓✓✓
WOW! factor	✓✓✓✓

1 This study compared the risk of acute pancreatitis and biliary disease in individuals with type 2 diabetes against those without the condition.

2 Participants aged 18 and over were studied for at least 12 months. The authors matched them by age and sex, with 337 067 people with type 2 diabetes and 337 067 without.

3 The results show that people with type 2 diabetes were almost three times as likely to develop pancreatitis and almost twice as likely to develop biliary disease as people without the condition. It was also found that younger people with type 2 diabetes (<45 years of age) had the highest risk of developing pancreatitis.

4 The data seem to show that individuals with type 2 diabetes have an increased risk of contracting pancreatitis and biliary disease.

Noel RA, Braun DK, Patterson RE et al (2009) Increased risk of acute pancreatitis and biliary disease observed in patients with type 2 diabetes: a retrospective cohort study *Diabetes Care* **32**: 834–8

DIABETIC MEDICINE

Liraglutide added to glimepiride is beneficial

Readability	✓✓✓✓
Applicability to practice	✓✓✓
WOW! factor	✓✓✓

1 The authors of this study aimed to compared the effects of combining liraglutide, rosiglitazone or placebo with glimepiride on glycaemic control, body weight and safety in people with type 2 diabetes.

2 There were 1041 people with type 2 diabetes enrolled in the study, who were randomised to receive glimepiride plus either liraglutide 0.6, 1.2 or 1.8 mg/day, rosiglitazone 4 mg/day or placebo.

3 The results showed that liraglutide produced greater reductions in HbA_{1c} from baseline, compared with placebo ($P<0.0001$) or rosiglitazone ($P<0.0001$) when added to glimepiride.

4 The authors concluded that liraglutide added to glimepiride is well-tolerated and provides benefits to both glycaemic control and weight in people with type 2 diabetes.

Marre M, Shaw J, Brändle M et al (2009) Liraglutide, a once-daily human GLP-1 analogue, added to a sulphonylurea over 26 weeks produces greater improvements in glycaemic and weight control compared with adding rosiglitazone or placebo in subjects with Type 2 diabetes (LEAD-1 SU). *Diabet Med* **26**: 268–78

"In Japanese individuals with impaired glucose tolerance, voglibose offers a reduction in the likelihood of developing type 2 diabetes."

BRITISH MEDICAL JOURNAL

10-year diabetes risk predicted by QDScore

Readability	✓✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓✓✓

1 The authors of this study describe the validation of their risk prediction engine for evaluating 10-year risk of developing diabetes.

2 Data routinely QResearch-collected from 355 general practices in England and Wales were used to develop the QDscore. The score was validated using data from 176 practices, with diagnosis of diabetes the main outcome.

3 A range of factors are used in the model: ethnicity, age, sex, BMI, smoking status, family history of diabetes, deprivation, hypertension, CVD and use of corticosteroids.

4 The risk of developing type 2 diabetes was 4- to 5-fold between different ethnic groups, with people of Caucasian origin at the lowest risk.

5 The QDScore is the first risk calculator to estimate the 10-year risk of developing diabetes on the basis of a prospective cohort study, including both social deprivation and ethnicity. The model can be used in clinic, and does not require laboratory testing.

Hippisley-Cox J, Coupland C, Robson J et al (2009) Predicting risk of type 2 diabetes in England and Wales: prospective derivation and validation of QDScore. *BMJ* **338**: b880

DIABETIC MEDICINE

Side-effects predict adherence

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓✓

1 This study examined the relative importance of oral glucose-lowering medications and to estimate the likely effect of side-effects and effectiveness on medication adherence in people with type 2 diabetes (204 in the UK, 203 in the US).

2 A discrete-choice method was used to determine the effect on adherence, with participants choosing their preferred option in pairs of treatment profiles, each defined by glycaemic improvements, frequency of side-effects and cardiovascular (CV) risk.

3 Glycaemic control was the most important feature to participants, followed by CV risk and weight gain.

4 The authors concluded that, while glycaemic control is important, weight gain and CV risk are significant predictors of medication non-adherence – associated risks and side-effects do influence patients' treatment choices.

Hauber AB, Mohamed AF, Johnson FR, Falvey H (2009) Treatment preferences and medication adherence of people with Type 2 diabetes using oral glucose-lowering agents. *Diabet Med* **26**: 416–24

DIABETES OBESITY & METABOLISM

Start with once-daily basal insulin

Readability	✓✓✓
Applicability to practice	✓✓✓
WOW! factor	✓✓

1 The authors of this Dutch meta-analysis searched Medline and EMBASE to identify randomised controlled trials (RCTs) on insulin therapy in adults with type 2 diabetes between 1 January 2000 and 1 April 2008.

2 This search identified 116 RCTs, 78 of which met the inclusion criteria. These covered all insulin regimens, in combination with, and without, oral antidiabetes drugs (OADs).

3 Continuing metformin and/or sulphonylurea after initiation of long-acting basal insulin gave better glycaemic control with less insulin requirement, less weight gain and less hypoglycaemia, especially in comparison with neutral protamine Hagedorn insulin.

4 The authors recommended a once-daily basal insulin regimen added to OAD therapy as a starting point, with all further steps being taken in discussion with the individual.

van Avendonk MJ, Rutten GE (2009) Insulin therapy in type 2 diabetes: what is the evidence? *Diabetes Obes Metab* **11**: 415–32

LANCET

Voglibose reduces incidence of type 2 diabetes in Japanese people with impaired glucose tolerance

Readability	✓✓✓
Applicability to practice	✓
WOW! factor	✓✓

1 The authors on this study attempted to ascertain whether the alpha-glucosidase inhibitor voglibose could prevent the development of type 2 diabetes in Japanese individuals previously diagnosed with impaired glucose tolerance.

2 People who were eating a "standard" diet and taking regular exercise and had one or more risk factor for type 2 diabetes were randomly assigned to oral voglibose 0.2 mg three times a day (n=897) or placebo (n=883).

3 Therapy with voglibose or placebo was continued until participants reached the primary endpoint of developing type 2 diabetes or the secondary endpoint of reaching normoglycaemia, or for a minimum of 3 years, subject to the findings of an interim analysis.

4 The results indicated that treatment with voglibose conferred a lower risk of progression to type 2 diabetes than placebo (P=0.0014). Also, more people in the voglibose group achieved normoglycaemia than those in the placebo group (P<0.0001).

5 There were similar numbers of adverse events in the two groups: 85% in the placebo group compared with 90% in the voglibose group.

6 The authors concluded that in Japanese individuals with impaired glucose tolerance, voglibose offers a reduction in the likelihood of developing type 2 diabetes.

Kawamori R, Tajima N, Iwamoto Y et al (2009) Voglibose for prevention of type 2 diabetes mellitus: a randomised, double-blind trial in Japanese individuals with impaired glucose tolerance. *Lancet* **373**: 1607–14

JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION

Some hypoglycaemic episodes increase risk of dementia

Readability	✓✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓

1 Previously, only the effect that acute hypoglycaemia has on cognitive impairment in children with type 1 diabetes has been researched, so the authors of this study sought to look at the effect of hypoglycaemia in older people with type 2 diabetes, and whether dementia may be an outcome.

2 The records of 16 667 people with type 2 diabetes and a mean age of 65 years were studied between 1980 and 2007 for hypoglycaemic events. Dementia risk was also looked at in those with no prior diagnosis of dementia, mild cognitive impairment or general memory complaints.

3 By study end, one or more episodes of hypoglycaemia had been diagnosed in 1465 people (8.8%) and dementia had been diagnosed in 1822 individuals (11%); 250 had been diagnosed with both.

4 When compared with people without hypoglycaemia, the increase in risk of dementia rose together with the increase in occurrences of hypoglycaemia with fully adjusted hazard ratios (HR): for one episode (HR 1.26; 95% confidence interval [CI] 1.10–1.49; for two episodes (HR 1.80; 95% CI 1.37–2.36); and for three or more episodes (HR 1.94; 95% CI 1.42–2.64).

5 The study found that severe hypoglycaemic episodes in older people with type 2 diabetes are associated with a higher risk of dementia. However, it is not yet known if minor hypoglycaemic episodes have a similar effect.

Whitmer RA, Karter AJ, Yaffe K et al (2009) Hypoglycemic episodes and risk of dementia in older patients with type 2 diabetes mellitus. *J Am Med Assoc* **301**: 1565–72

DIABETES CARE

High-carbohydrate–low-fat diets worsen insulin resistance

Readability	✓✓✓✓
Applicability to practice	✓✓✓
WOW! factor	✓✓✓

1 This meta-analysis examined the effect of replacing dietary fat with carbohydrate on blood glucose and lipids in people with type 2 diabetes.

2 The authors identified 19 studies involving high-fat–low-carbohydrate (HFLC) or low-fat–high-carbohydrate (LFHC) diets prescribed to people with diabetes. This equated to 306 individuals, with similar energy and protein intake.

3 The LFHC diet significantly increased fasting insulin and triglycerides by 8% (P=0.02) and 13% (P<0.001), respectively, and lowered HDL-cholesterol by 6% (P<0.001) compared with the HFLC diet.

4 Replacing dietary fat with carbohydrate appears to have a detrimental effect on insulin resistance as well as lipid parameters.

Kodama S, Saito K, Tanaka S et al (2009) Influence of fat and carbohydrate proportions on the metabolic profile in patients with type 2 diabetes: a meta-analysis. *Diabetes Care* **32**: 959–65

DIABETES CARE

Exenatide improves beta-cell function

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓✓

1 The authors of this study investigated the effects of 52 weeks of treatment with either exenatide or insulin glargine on measures of beta-cell function, glycaemic control and body weight.

2 Of 69 people with type 2 diabetes treated with metformin, 36 were assigned to receive exenatide, and 33 to receive insulin glargine. Beta-cell function was measured at week 0, week 52 and following 4 weeks of no drug use.

3 After 52 weeks, beta-cell function improved 2.46-fold in the exenatide group compared with the insulin glargine group (P<0.0001). This improvement disappeared after the 4-week no drug period.

4 Exenatide reduced body weight compared with insulin glargine (P<0.0001); there was a similar reduction in HbA_{1c} in both groups. These improvements disappeared 12 weeks following cessation of therapy.

5 The authors concluded that exenatide improves beta-cell function, but that ongoing treatment is needed to provide benefits with either agent.

Bunck MC, Diamant M, Cornér A et al (2009) One-year treatment with exenatide improves beta-cell function, compared with insulin glargine, in metformin-treated type 2 diabetic patients: a randomized, controlled trial. *Diabetes Care* **32**: 762–8

DIABETES CARE

Waist circumference predicts obstructive sleep apnoea

Readability	✓✓✓
Applicability to practice	✓✓✓
WOW! factor	✓✓

1 This study aimed to investigate the risk factors for the presence and severity of obstructive sleep apnoea (OSA) in obese people with type 2 diabetes.

2 The authors recruited 306 obese individuals with type 2 diabetes, who underwent an overnight polysomnography.

3 In total, 30.5% of the participants had moderate OSA and 22.6% had severe OSA, which was most likely in individuals with a higher BMI (P=0.03); waist circumference was also significantly linked to occurrence of OSA.

4 Physicians should be aware that obese individuals with type 2 diabetes are likely to suffer from OSA.

Foster GD, Sanders MH, Millman R et al (2009) Obstructive sleep apnea among obese patients with type 2 diabetes. *Diabetes Care* **32**: 1017–19

"Replacing dietary fat with carbohydrate appears to have a detrimental effect on insulin resistance as well as lipid parameters."