Management & prevention of type 2 diabetes

Measuring progress towards achieving HbA_{1c} goals in diabetes care

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In this brilliant discussion and analysis paper (summarised on right), the authors consider the difference between practical guidelines and performance measures in glycaemic control as measured by HbA_{1c}. It is written from a US perspective but is completely relevant for the UK; the authors discuss three questions, look at the evidence and come to some interesting conclusions.

The first question asks if the generalisation of an HbA_{1c} threshold measure of less than 7% for all people with diabetes is justified by current available evidence and concordant with nationally recognised guidelines. The authors state that nationally-developed guidelines emphasise the need to individualise HbA_{1c} targets based on age, life expectancy, comorbid conditions, patient preference and medication-related adverse events and conclude that a performance measure of less than 7% for all adults with diabetes is not concordant with existing guidelines.

The second question asks whether or not achieving and maintaining an HbA_{1c} threshold of less than 7% is sufficiently attainable by health care systems and by clinicians to justify its use for public accountability. The authors found that the extent to which optimal target levels can be achieved in clinical trials and with structured quality improvements should give pause to the face validity of using optimal values for the purpose of public reporting.

Finally, the paper questions whether or not there are other approaches to measuring glycaemic control that can accurately assess the benefit to population health, compare plans for public reporting and inform quality improvement. It is concluded that a continuous and weighted measure that assesses progress towards achieving an optimal HbA_{1c}, rather than any specific threshold, is a more precise assessment of individual clinical benefit and achieved improvement in population health.

This view would be endorsed by many in the UK. Wouldn't it be wonderful if the Quality and Outcomes Framework developed such a measure to assess glycaemic control?

DIABETES CARE

Vildagliptin has similar effects to rosiglitazone

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

1 In a double-blind, randomised, active-controlled, parallel-group multicentre study, people with type 2 diabetes received either vildagliptin or rosiglitazone for 24 weeks in order to compare the efficacy and tolerability of the treatments.

2 Vildagliptin was administered at 100mg/day in equally divided doses (n=519), while rosiglitazone was administered in a single dose of 8mg (n=267).

3 HbA_{1c} was significantly reduced in both groups (1.1±0.1% for vildagliptin and 1.3±0.1% for rosiglitazone; $P<0.001$ for both) and the occurrence of adverse effects was almost equal (61.4% versus 64.0%, respectively).

4 Rosiglitazone reduced fasting plasma glucose by 2.3mmol/l compared with 1.3mmol/l for vildagliptin ($P<0.001$)

5 The rosiglitazone-treated group had significantly increased body weight (1.6±0.3kg; $P<0.001$) while vildagliptin did not have a significant effect.

6 Compared with rosiglitazone, vildagliptin significantly decreased triglycerides and total and LDL-cholesterol but increased HDL-cholesterol to a lesser extent.

7 The authors concluded that vildagliptin has a similar glycaemic effect to rosiglitazone but without weight gain.

Rosenstock J, Baron MA, Dejager S et al (2007) Comparison of vildagliptin and rosiglitazone monotherapy in patients with type 2 diabetes: a 24-week, double-blind, randomized trial. *Diabetes Care* **30**: 217–23

JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION

HbA_{1c} improvements better than threshold targets

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

1 Practice guidelines for HbA_{1c} may not apply directly to performance measures and, as a result, organisations in the US disagree on the threshold measure.

2 An HbA_{1c} >9% is widely accepted to denote poor glycaemic control, but a uniform threshold value would enable quality-of-care comparisons between different populations and plans.

3 A performance measure of <7% for all adults with diabetes is not optimal since the incidence of associated complications prevented by improving glycaemic control decreases as baseline HbA_{1c} is reduced.

4 The lifetime benefit of a decrease from 7.9 to 7.0% is much greater when an individual is diagnosed at a younger age.

5 Quality-improvement strategies have been shown to benefit people with lower HbA_{1c} much less than those >8%. This is especially true of individuals with hypoglycaemia or a longer duration of diabetes.

6 Factors such as differences in prescription coverage and economic status (which affect medication choice), age, life expectancy and comorbid conditions have an impact on the extent to which glycaemic control can be achieved.

7 There is demand for approaches that measure HbA_{1c} that can assess the population-wide health benefit, compare health care plans and inform quality improvement. Thus, assessing progress towards an optimal HbA_{1c} target rather than threshold control is more likely to benefit individuals.

Pogach L, Engelgau M, Aron D (2007) Measuring progress toward achieving hemoglobin A1c goals in diabetes care: pass/fail or partial credit. *Journal of the American Medical Association* **297**:520–3

ANNALS OF FAMILY MEDICINE

Measuring continuity of care in diabetes

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

1 A 19-item measure of experienced continuity of care for type 2 diabetes (ECC-DM) was developed.

2 Interview data with four continuity sub-domains were used. These were: longitudinal; flexible; relational; and team and cross-boundary continuity.

3 ECC-DM scores were assessed in 193 people with type 2 diabetes and compared with clinician organisational characteristics.

4 The mean EEC-DM score, with a potential range of 0–100, was 62.1 (SD: 16.0; range: 46–78). Scores varied significantly between practices ($P=0.001$).

5 Average inter-item correlation was 0.343 and Cronbach's α was 0.908.

6 Hospital clinic care led to lower continuity of care than when care came in part from the GP surgery (difference: 13.7; 95% CI: 8.2–19.2; $P=0.001$).

7 If the GP surgery had a designated lead for diabetes, ECC-DM scores improved ($P=0.003$).

8 The authors conclude that patient-centred outcomes of diabetes care could be evaluated using the continuity of care measure.

Gulliford MC, Naithani S, Morgan M (2007) Measuring continuity of care in diabetes mellitus: an experience-based measure. *Annals of Family Medicine* **4**: 548–55

ANNALS OF FAMILY MEDICINE

Better outcomes with chronic care model

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

1 This study assessed the relationship between HbA_{1c} in people with diabetes and use of elements of the chronic care model (CCM).

2 In 30 primary care practices, 90 clinicians completed a questionnaire about their use of CCM elements. A five-point scale allowed the clinician to choose between the following options: never, rarely, occasionally, usually or always.

3 People with diabetes (n=886) also reported on the care they had received.

4 A clinical care composite score was calculated using assessments of blood pressure, lipids, microalbumin and HbA_{1c}; foot examinations; and dilated retinal examinations.

5 A behavioural care composite score was also computed using patient-reported support from their clinician in obtaining nutrition education and setting self-management goals.

6 Use of CCM elements was significantly associated with lower HbA_{1c} ($P=0.002$) and the ratio of total cholesterol to HDL cholesterol also reduced with CCM use ($P=0.02$).

7 Use of CCM was associated with the behavioural composite score ($P=0.001$) and, to a small but insignificant degree, with the clinical care composite score ($P=0.07$).

8 CCM elements are easily incorporated into practice and result in better diabetes care outcomes.

Nutting PA, Dickinson WP, Dickinson LM et al (2007) Use of chronic care model elements is associated with higher-quality care for diabetes. *Annals of Family Medicine* **5**: 14–20

DIABETIC MEDICINE

Being overweight can triple risk of type 2 diabetes

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

1 This study assessed the relationship between BMI and development of type 2 diabetes.

2 People without diabetes (45–64 years old) were enrolled from the Renfrew/Paisley general population study (6927 men and 8227 women) and the Collaborative occupational study (3993 men).

3 The incidence of type 2 diabetes development was measured and related to BMI at screening.

4 The obese group (BMI ≥30 kg/m^2) had the highest odds ratios for developing diabetes, followed by overweight people (BMI 25–29.9 kg/m^2). Normal-weight individuals (BMI 18.5–24.9 kg/m^2) were the least at risk.

5 The age-adjusted odds ratios were 2.73 (95% CI: 2.05, 3.64) for overweight and 7.26 (95% CI: 5.26, 10.04) for obese men from the Renfrew/Paisley study.

6 If no other factors were related to BMI in its association with the development of diabetes, approximately 60% of cases could have been avoided if people had been of normal weight.

7 With an increase in recent years in the percentage of the population who are overweight, this will have a significant impact on the diabetes-associated burden.

Hart CL et al (2007) How many cases of Type 2 diabetes mellitus are due to being overweight in middle age? Evidence from the Midspan prospective cohort studies using mention of diabetes mellitus on hospital discharge or death records. *Diabetic Medicine* **24**: 73–80

BMJ

Pharmacological and lifestyle interventions in preventing type 2 diabetes

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

1 This systematic review and meta-analysis aimed to measure the effectiveness of drug administration and lifestyle change in people with IGT in delaying or preventing type 2 diabetes.

2 The meta-analysis was conducted on randomised controlled trials from Medline, Embase and the Cochrane Library up to July 2006.

3 In total, 17 trials were included, assessing 8084 people with type 2 diabetes. For this paper, IGT was defined as a plasma glucose reading of 7.8–11.1 mmol/l 2 hours after a 75g glucose load.

4 The pooled hazard ratios were 0.51 (95% CI: 0.44–0.60) for lifestyle interventions versus standard advice, 0.70 (95% CI: 0.62–0.79) for oral diabetes medications versus control, 0.44 (95% CI: 0.28–0.69) for orlistat versus control and 0.32 (95% CI: 0.03–3.07) for the 'jiangtang bushen recipe' (a herbal remedy) versus standard diabetes advice.

5 These figures were used to calculate numbers needed to treat (NNT) for benefit and harm.

6 These results found an NNT for benefit of 6.4 for lifestyle, 10.8 for oral diabetes drugs, 5.4 for orlistat and 4.0 for 'jiangtang bushen recipe'.

7 Lifestyle intervention showed a significant decrease in hazard ratios ($P=0.029$); oral diabetes drugs did not ($P=0.482$).

8 This meta-analysis demonstrates that the rate of type 2 diabetes progression in people with IGT can be halved. Lifestyle changes appear to be at least as effective as pharmacological intervention.

Gillies CL, Abrams KR, Lambert PC et al (2007) Pharmacological and lifestyle interventions to prevent or delay type 2 diabetes in people with impaired glucose tolerance: systematic review and meta-analysis. *BMJ* **334**: 299–302

DIABETES CARE

Glyburide related to hypoglycaemia

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

1 Of the sulphonylureas used to treat type 2 diabetes, glyburide is the most common. However, it is possible that there are side effects associated with its pharmacodynamics. The authors hypothesised that these would include hypoglycaemia and cardiovascular events.

2 This study investigated the incidence of adverse events following glyburide treatment compared with other secretagogues or insulin.

3 An online search was conducted for parallel, randomised, controlled trials conducted between 1966 and 2005 from six web-based clinical trial registers to be included in a meta-analysis.

4 The search identified 21 relevant articles, from which data were extracted on participant characteristics, interventions, outcomes and validity.

5 Outcomes were hypoglycaemia, glycaemic control, cardiovascular events, body weight and death.

6 There was a 52% greater risk of hypoglycaemia associated with glyburide compared with other secretagogues and an 83% greater risk compared with other sulphonylureas.

7 Compared with sulphonylureas, glyburide did not increase cardiovascular events or end-of-trial weight.

8 Limitations of the study included sub-optimal reporting of original trials. In addition, many studies did not report major hypoglycaemia and in some cases, loss of follow up exceeded 20%.

Gangji AS, Cukierman T, Gerstein HC et al (2007) A systematic review and meta-analysis of hypoglycemia and cardiovascular events: a comparison of glyburide with other secretagogues and with insulin. *Diabetes Care* **30**: 389–94

DIABETIC MEDICINE

Financial costs of peripheral neuropathy and diabetes

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

1 The authors aimed to assess diabetic peripheral neuropathy (DPN) symptom severity and its association with the use of health care resources.

2 A postal survey, which included demography, quality of life (as measured by the EQ-5D and SF-36 questionnaires) and symptoms of neuropathy (the NTSS-6 and QOL-DN) was conducted.

3 In total, 1298 people with diabetes responded; a response rate of 32%. The mean NTSS-6-SA score for people with DPN was 6.16 versus 3.19 in those without ($P<0.001$).

4 No correlation was found between the severity of neuropathy symptoms and diabetes duration, but severity was associated with increased mean HbA_{1c} ($P=0.023$) and BMI values ($P<0.001$).

5 General linear modelling demonstrated that an increase of 1 point on the NTSS-6-SA predicts a 6% rise in primary and secondary care costs.

6 The authors conclude that health care resource use, and therefore care costs, increase as a result of more serious DPN symptoms.

Currie CJ, Poole CD, Woehl A et al (2007) The financial costs of healthcare treatment for people with Type 1 or Type 2 diabetes in the UK with particular reference to differing severity of peripheral neuropathy. *Diabetic Medicine* **24**: 187–94

'Healthcare resource use, and therefore care costs, increase as a result of more serious diabetic peripheral neuropathy symptoms.'