Electronic health records: Nothing new, but now we have evidence for their benefit in diabetes care

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Showing that using electronic health records – rather than paper records – improves the quality of diabetes care would be, for general practice-based readers of *Diabetes Digest*, a statement of the "blindingly obvious".

Computers began to be used in general practice in the UK for prescribing and to record details of consultations well over 20 years ago. Payments based on the Quality and Outcomes Framework (QOF) introduced in the 2004 GP contract rely on automatic data extraction from clinical computer systems, thus ensuring that virtually all the practices in the UK have been fully computerised since the start of the 21st century.

I began my career as a GP in the era of paper records and was involved with medical audit. I well remember the difficulties of trying to do audit on paper records, and of the time spent filling out audit sheets. With electronic systems, audits can be carried out automatically and take only a few seconds. Data can then be anonoymised and aggregated, enabling practices to compare their performance with others. Local, regional and national statistics can also be generated. After using computers routinely for record keeping, I doubt if there is anyone working in general practice in the UK who would want to return to paper records. However, skeptics could still say, "is there research evidence of the benefits of electronic records in diabetes care"? The article by Cebul et al (2011; summarised alongside) provides this evidence.

The study was carried out in the USA where not all primary care practices are yet computerised. It looked at data from 27 207 adults with diabetes in 46 practices, some of which had electronic health records (EHRs) and others paper records. After adjustment for covariates, EHR sites were associated with significantly higher achievement of care and outcome standards and greater improvement of diabetes care. It is interesting to note that the achievement of care and intermediate outcome standards used in this study are very similar to the diabetes clinical indicators of the QOF in the UK!

The challenge of this article for those working in secondary care, and who are still using paper records, is how much further improvement in diabetes care could be generated by moving to EHR? The problems of trying to introduce EHR to UK hospitals through the NHS IT project "Connecting for Health" are well known. However, the experience of general practice and evidence from this article suggest that it needs to be done to help improve diabetes care.

DIABETIC MEDICINE

Sustained glycaemic control achieved with structured education

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

1 This study assessed whether improvements in glycaemic control following the PREPARE (Pre-diabetes Risk Education and Physical Activity Recommendation and Encouragement) structured education programme were sustained at 2 years.

2 Overweight or obese individuals (n=98) with impaired glucose tolerance were randomised to advice leaflet, 3-hour structured education promoting physical activity, or 3-hour structured education with pedometer use.

3 Seventy-three people (age, 65±8 years, BMI, 29.3±4.8 kg/m^2, south Asian ethnicity, 21%) were included for analysis.

4 Compared with the control group, a statistically significant reduction in 2-hour glucose of –1.6 mmol/L (–0.4 to –2.7) was observed in the education plus pedometer group.

5 It was concluded that improvements in glycaemic control following structured education with pedometer use were sustained at 24 months.

Yates T, Davies MJ, Sehmi S et al (2011) The Pre-diabetes Risk Education and Physical Activity Recommendation and Encouragement (PREPARE) programme study: are improvements in glucose regulation sustained at 2 years? *Diabet Med* **28**: 1268–71

N ENGL J MED

Electronic records may improve quality of diabetes care

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

1 To assess the value of electronic health records (EHRs) versus traditional paper records, the authors of this study compared achievement of, and improvement in, quality standards for diabetes at practices using EHRs with those at practices using paper records.

2 Differences between EHR-based and paper-based practices with regard to achievement of standards for diabetes care and outcomes were calculated using generalised estimating equations.

3 Data were reported for 27 207 adults with diabetes at 46 practices between July 2009 and June 2010 (38% were safety-net practices).

4 EHR practices achieved 35.1 percentage points higher composite standards for diabetes care (after adjusting for covariates) than paper-based practices (P<0.001); achievement of composite standards for outcomes was 15.2 percentage points higher (P=0.005).

5 EHR practices were associated with higher achievement in eight of nine component standards. Greater improvement in care (difference of 10.2 percentage points in annual improvement; P<0.001) and outcomes (difference of 4.1 percentage points in annual improvement; P=0.02) was also recorded at these practices.

6 EHR practices were associated with significantly higher achievement of care and outcome standards and greater improvement in diabetes care across all insurance types.

7 The authors concluded that EHRs may improve the quality of care across insurance types.

Cebul RD, Love TE, Jain AK, Hebert CJ (2011) Electronic health records and quality of diabetes care. *N Engl J Med* **365**: 825–33

DIABETES, OBESITY AND METABOLISM

Efficacy of triple oral polypill for people with T2D

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

1 This study compared the efficacy of a fixed-dose triple oral diabetes polypill (1 or 2 mg glimepiride, 500 mg sustained-release metformin, and 15 mg pioglitazone [GMP] administered once-daily with human insulin 70/30 mix) and 500 mg sustained-release metformin administered twice-daily (Met) in insulin-naïve people with T2D.

2 Participants (n=101) with suboptimal glycaemic control (HbA_{1c} level >64 mmol/mol [>8.0%]) on a combination of glimepiride and metformin were randomised to GMP or Met regimens for 12 weeks.

3 The primary outcome was change in HbA_{1c} level; secondary outcomes were changes in fasting plasma and postprandial plasma glucose levels, the achievement an HbA_{1c} reduction by >1%, changes in lipid profile, C-peptide, body weight, physician assessments of efficacy and patient-reported tolerability.

4 A non-significant difference in HbA_{1c} reduction was observed with GMP therapy compared with Met therapy (–1.33 vs –0.83%; P=0.059).

5 Achievement of an HbA_{1c} reduction greater than 1.0% was significantly higher in the GMP group than the Met group (72.5 vs 22%; P=0.0001).

6 Weight gain was greater with IM but this was not significant. Investigator assessment of efficacy was significantly better with GMP (P=0.001), as was patient-reported tolerability (P=0.0001).

7 The authors concluded there was a trend towards a lower HbA_{1c} with the triple oral diabetes polypill and that significantly more people taking it obtained an HbA_{1c} level <53 mmol/mol (<7%).

Bell DS, Dharmalingam M, Kumar S, Sawakhande RB (2011) Triple oral fixed-dose diabetes polypill versus insulin plus metformin efficacy demonstration study in the treatment of advanced type 2 diabetes (TrIED study-II). *Diabetes Obes Metab* **13**: 800–5

THE DIABETES EDUCATOR

CV risk reduction with pharmacist-led shared appointments

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

1 The authors assessed whether a pharmacist-led shared medical appointments programme (VA MEDIC-E [Veterans Affairs Multidisciplinary Education and Diabetes Intervention for Cardiac Risk Reduction – Extended for 6 Months]) could facilitate multiple CV risk reduction in people with T2D.

2 Participants were randomised to VA MEDIC-E (n=50) or standard care (n=49). VA MEDIC-E comprised four weekly group sessions followed by five monthly "booster" group sessions.

3 Significant improvements were observed at 6 months in the VA MEDIC-E group for exercise, foot care, and goal achievement of HbA_{1C}, LDL-cholesterol, and blood pressure, but not in the control arm.

4 VA MEDIC-E was concluded to be an efficacious collaborative care approach to managing T2D and reducing CV risk.

Cohen LB, Taveira TH, Khatana SA et al (2011) Pharmacist-led shared medical appointments for multiple cardiovascular risk reduction in patients with type 2 diabetes. *Diabetes Educ* **37**: 801–12

CANADIAN MEDICAL ASSOCIATION JOURNAL

Second-line SU is cost-effective in T2D

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

1 This analysis used the UKPDS outcomes model to determine the benefits and cost-effectiveness of second-line treatment options for people with T2D with sub-optimal glycaemic control on metformin monotherapy.

2 Sulphonylureas (SUs), when added to metformin, yielded the most favourable cost-effectiveness estimate: incremental cost of $12 757 per quality-adjusted life-year gained, relative to continued metformin monotherapy.

3 Compared with SUs, treatment with other oral agents had unfavourable cost-effectiveness estimates.

4 The addition of SU to metformin was concluded to represent the most cost-effective second-line therapy.

Klarenbach S, Cameron C, Singh S, Ur E (2011) Cost-effectiveness of second-line antihyperglycemic therapy in patients with type 2 diabetes mellitus inadequately controlled on metformin. *CMAJ* **183**: E1213–20

DIABETES OBESITY AND METABOLISM

Vildagliptin: Efficacy and tolerability in RI

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

1 This randomised 24-week trial assessed tolerability and efficacy of vildagliptin (vilda; 50 mg once-daily) added to current therapy, in 515 people with T2D and moderate or severe renal impairment (RI).

2 Some 165 and 129 people with moderate RI and 124 and 97 with severe RI were randomised to vilda or placebo therapy, respectively.

3 Compared with baseline, the between-treatment difference in mean HbA_{1c} change was –0.5±0.1% in moderate RI and –0.6±0.1% in severe RI (P<0.0001 for both).

4 The proportion of adverse events (AEs) in moderate RI in the vilda and placebo groups were: AE (68 vs 73%), severe AE (9 vs 9%), AE leading to discontinuation (3 vs 5%), death (1 vs 1%). Severe RI: AEs (73 vs 74%), severe AEs (19 vs 21%), AEs to discontinuation (9 vs 6%), death (2 vs 4%).

5 The authors concluded that vilda was well tolerated and was associated with a significant reduction in HbA_{1c} level.

Lukashevich V et al (2011) Safety and efficacy of vildagliptin versus placebo in patients with type 2 diabetes and moderate or severe renal impairment: a prospective 24-week randomized placebo-controlled trial. *Diabetes Obes Metab* **13**: 947–54

"There was a trend towards a lower HbA_{1c} with the triple oral diabetes polypill and that significantly more people taking it obtained an HbA_{1c} level <53 mmol/mol (<7%)."

"Dapagliflozin added to glimepiride in people with poorly controlled T2D was found to improve HbA_{1c} level, reduce weight and was generally well tolerated."

ANN INTERN MED

Lifestyle factors reduce risk of T2D

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

1 This study examined how lifestyle risk factors relate to the risk of diabetes in men (n=114 996) and women (n=92 483) aged 50–71 years using a survey in 1995–6 and again in 2004–6. Low-risk groups were formed by dichotomising each lifestyle factor.

2 Some 11 031 men and 6969 women developed diabetes. For each additional lifestyle factor in the low-risk group, the odds for diabetes were 31% lower in men and 39% lower in women.

3 Men and women whose diet score, physical activity level, smoking status, and alcohol use were all in the low-risk group had odds ratios for diabetes of 0.61 and 0.43, respectively.

4 The authors concluded that combined lifestyle factors are associated with a reduction in risk of T2D.

Reis JP, Loria CM, Sorlie PD et al (2011) Lifestyle factors and risk for new-onset diabetes: a population-based cohort study. *Ann Intern Med* **155**: 292–9

ARCH INTERN MED

Team-based care improves cholesterol management in T2D

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

1 This 2-year, prospective. cluster randomised trial aimed to evaluate the impact of remote team-based care on LDL-cholesterol (LDL-C) levels in 6963 people with diabetes.

2 Achievement of target LDL-C levels was more likely to occur in the intervention arm compared with controls (78 vs 50%; P=0.003).

3 Mean LDL-cholesterol levels were 12 mg/dL lower in the intervention arm compared with controls (P<0.001).

4 The rate of LDL-C testing was significantly higher in the intervention arm compared with controls. Participants in the intervention arm were also 15% more likely to receive a prescription for a lipid-lowering medication (P=0.008).

5 It was concluded that team-based care resulted in improved LDL-C levels and goal attainment.

Pape GA, Hunt JS, Butler KL et al (2011) Team-based care approach to cholesterol management in diabetes mellitus: two-year cluster randomized controlled trial. *Arch Intern Med* **171**: 1480–6

DIABETES OBESITY AND METABOLISM

Glycaemic control improved with dapagliflozin plus SU

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

1 This randomised trial evaluated the efficacy, safety and tolerability of dapagliflozin (dapa) added to glimepiride in people with poorly controlled T2D.

2 Participants (n=597) were randomised to placebo or dapa (2.5, 5 or 10 mg/day) added to glimepiride 4 mg/day for 24 weeks.

3 Mean changes in HbA_{1c} from baseline to 24 weeks for placebo versus dapa 2.5/5/10 mg were –0.13 versus –0.58, –0.63, –0.82%, respectively (all P<0.0001). Body weight and fasting plasma glucose levels were –0.72, –1.18, –1.56, –2.26 kg and –0.11, –0.93, –1.18, –1.58 mmol/L, respectively.

4 Serious adverse events for placebo versus dapa were 4.8 versus 6.0–7.1%; hypoglycaemic events 4.8 versus 7.1–7.9%; events suggestive of genital infection 0.7 versus 3.9–6.6%; and events suggestive of urinary tract infection 6.2 versus 3.9–6.9%.

5 Dapa added to glimepiride in people with poorly controlled T2D was found to improve HbA_{1c} level, reduce weight and was generally well tolerated.

Strojek K, Yoon KH, Hruba V et al (2011) Effect of dapagliflozin in patients with type 2 diabetes who have inadequate glycaemic control with glimepiride: a randomized, 24-week, double-blind, placebo-controlled trial. *Diabetes Obes Metab* **13**: 928–38

LANCET NEUROLOGY

Effect of intensive glycaemic control on brain structure

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

1 Risk of cognitive impairment and brain atrophy is increased in people with T2D. The MIND (Memory in Diabetes) study, as part of the ACCORD (Action to Control Cardiovascular Risk in Diabetes) trial, therefore compared the effect of intensive versus standard glycaemic control on cognitive function (CF) and brain volume (BV).

2 Data from participants of ACCORD (aged 55–80 years, T2D, HbA_{1c} level >58 mmol/mol [>7.5%]), who were randomised to intensive or standard therapy were analysed. CF was assessed using Digit Symbol Substitution Test (DSST) scores; BV was assessed using magnetic resonance imaging (MRI).

3 In total, 2977 people (mean age, 62.5 years) from ACCORD were enrolled. The primary CF analysis was of participants with 20- or 40-month DSST) scores (intensive group, n=1378; standard group, n=1416).

4 An MRI was taken in 614 participants at baseline; of these, 230 from the intensive group and 273 from the standard group were included in the 40-month analysis.

5 No significant treatment difference was observed in mean 40-month DSST scores (0.32; P=0.2997). A greater mean BV was observed in the intensive group than the standard group (4.62; P=0.0007).

6 Although significant differences in BV favoured intensive therapy, CF outcomes were no different. The authors concluded that findings do not support the use of intensive therapy to reduce the adverse effects of diabetes on the brain.

Launer LJ, Miller ME, Williamson JD et al (2011) Effects of intensive glucose lowering on brain structure and function in people with type 2 diabetes (ACCORD MIND): a randomised open-label substudy. *Lancet Neurol* **10**: 969–77