National trends in the treatment of type 2 diabetes mellitus, 1994–2007

Roger Gadsby, GP and Associate Clinical Professor, Warwick Medical School, University of Warwick

This paper by Alexander et al (summarised alongside) uses a large and nationally representative survey of physician office visits in the USA, the National Disease and Therapeutic Index, to analyse medications prescribed between 1994 and 2007 for people aged ≥35 years with type 2 diabetes. It makes fascinating reading. On the basis that much of much of what happens in the USA will happen in the UK between 3 and 5 years later, it gives an insight into what UK prescribing could be like in 2010–2012.

The paper quotes a prevalence of diabetes in the USA of 4% in 2000, and an annual economic burden of diabetes of $132 billion. The main changes in diabetes treatment noted since 1994 include:

- Increased numbers of total annual visits for diabetes.
- Increased use of oral therapies until the early 2000s with a subsequent shift back toward insulin with the advent of analogue short-acting and long-acting preparations. The analogue short-acting insulins (and combinations with them) have increased in use, from accounting for 2% of treatment visits in 2001 to 7% in 2007. The analogue long-acting insulins have increased from 2% in 2001 to 12% in 2007. The most common individual insulins in 2007 were insulin glargine and insulin lispro.
- Rapid growth of metformin and glitazones in the late 1990s (metformin only became available in the USA in 1995).
- Rapid early growth of incretin mimetics and dipeptidyl peptidase-4 inhibitors in the past 2 years. Exenatide accounted for 3% of treatment visits in 2006, rising to 4% in 2007. Sitagliptin, introduced in October 2006, increased to 10% of treatment visits by the fourth quarter of 2007.
- A continuous decrease in sulphonylurea use.
- Increasing use of both combination products and multiple products per patient.
- Substantially increased aggregate drug expenditures and price per prescription.

In 2007, the most frequently used therapies (quoted as per cent of treatment visits) were metformin (54%), sulphonylureas (34%), glitazones (28%), insulin (28%), sitagliptin (10%) and exenatide (4%).

The aggregate drug expenditure for diabetes increased by 87% from $6.7 billion in 2001 to $12.5 billion in 2007, with a mean price of a diabetes drug prescription increasing from $56 in 2001 to $76 in 2007.

AMERICAN HEART JOURNAL

The NAVIGATOR trial

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

1 Impaired glucose tolerance (IGT) is a risk factor for developing type 2 diabetes and cardiovascular disease (CVD).

2 The NAVIGATOR (Nateglinide And Valsartan in Impaired Glucose Tolerance Outcomes Research) trial investigates whether treatment with nateglinide or valsartan will reduce progression to diabetes and cardiovascular events in people with IGT who have established CVD, or are at high risk of CVD.

3 A total of 9518 individuals were randomised to receive one of four treatments; 9306 were included in the final analysis.

4 Treatments were: nateglinide with valsartan, nateglinide with valsartan–placebo, nateglinide–placebo with valsartan, or nateglinide–placebo with valsartan–placebo.

5 This trial will address both the relationship between the metabolic abnormalities in IGT and diabetes and the later development of CVD.

Califf RM et al (2008) Prevention of diabetes and CVD in patients with impaired glucose tolerance: rationale and design of the Nateglinide And Valsartan in Impaired Glucose Tolerance Outcomes Research (NAVIGATOR) Trial. *Am Heart J* **156**:623–32

ARCHIVES OF INTERNAL MEDICINE

Trends in treatment of type 2 diabetes, 1994–2007

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

1 Data from the National Disease and Therapeutic Index between 1994 and 2007 were analysed to describe recent trends in pharmacological glycaemic treatments for people with type 2 diabetes.

2 The sample comprises approximately 3500 office-based physicians selected from master lists through a random stratified sample by specialty and geographical region.

3 Shifts since 1994 included: increased use of oral therapies in the early 2000s, shifting back toward insulin with the advent of short- and long-acting insulins; growth of metformin and glitazone use in the late 1990s; growth of use of incretin mimetics and dipeptidyl peptidase-4 inhibitors in the past 2 years; continuous decrease in use of sulphonylurea; increasing use of combination and multiple products per patient; increased aggregate drug expenditure and price per prescription.

4 The estimated number of patient visits for treated diabetes increased from 25 million in 1994 to 36 million in 2007.

5 The mean number of diabetes medications per treated patient increased from 1.14 in 1994 to 1.63 in 2007.

6 Costs and complexity of diabetes treatments have increased, along with an increasing population. This raises concerns regarding whether these costly treatments are balanced with improved patient outcomes.

Alexander GC, Sehgal NL, Moloney RM, Stafford RS (2008) National trends in treatment of type 2 diabetes mellitus, 1994-2007. *Arch Intern Med* **168**: 2088–94

ANNALS OF INTERNAL MEDICINE

Comparing neutral protamine lispro and insulin glargine

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

1 The use of long-acting insulin at bedtime is a common approach to improving glycaemic control when type 2 diabetes is poorly controlled with oral agents.

2 This study compared the addition of bedtime neutral protamine lispro (NPL) – an intermediate-acting insulin with similar pharmacokinetics to neutral protamine Hagedorn – with insulin glargine, in people with poor glycaemic control.

3 The sample comprised 116 adults receiving stable doses of metformin plus sulphonylurea for more than 90 days, with HbA_{1c} 7.5–10% and fasting plasma glucose levels ≥6.7 mmol/L (≥120 mg/dL).

4 A dose of 10 IU NPL or insulin glargine was injected subcutaneously at bedtime with weekly dose titrations to target fasting glucose levels less than 5.6 mmol/L (<100 mg/dL). The dose of oral agents remained stable.

5 Primary outcome was given as change in HbA_{1c} from baseline to week 36; secondary outcomes were the proportion of people achieving HbA_{1c} <7%, self-reported hypoglycaemic events, insulin dose, self-monitored glucose level, and body weight.

6 Results showed similar improvement in HbA_{1c} levels in both groups (reductions of 1.83% and 1.89% for NPL and glargine, respectively); secondary outcomes did not differ between groups. The incidence of hypoglycaemia was similar in the two groups but sample size limited the ability to make a definite safety assessment.

Esposito K, C Tiotola M, Maiorino MI et al (2008) Addition of neutral protamine lispro insulin or insulin glargine to oral type 2 diabetes regimens for patients with suboptimal glycemic control: a randomized trial. *Ann Intern Med* **149**:531–9

BMC HEALTH SERVICES RESEARCH

Professional support for self-management

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

1 This qualitative study explored the perceptions of people with type 2 diabetes about their self-management strategies and how relationships with health professionals may support these.

2 Fifty-two people with type 2 diabetes were recruited into four focus groups: two in English, one in Turkish and one in Arabic.

3 Three contextually linked categories were identified: emotional context of self-management, dominant approaches to self-management and support from health professionals; culture seemed to be an important influence.

4 The authors conclude that the pursuit of improved health outcomes may involve professionals finding a balance between supporting self-management as well as helping to remove the emotional constructs surrounding diabetes.

Furler J, Walker C, Blackberry I (2008) The emotional context of self-management in chronic illness: A qualitative study of the role of health professional support in the self-management of type 2 diabetes. *BMC Health Serv Res* **17**: 214

BMJ

Prevention of type 2 diabetes in a British Bangladeshi community

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

1 This qualitative study aimed to understand the beliefs and attitudes, religious teachings and professional perceptions of diabetes prevention in a British Bangladeshi community.

2 Seventeen focus groups were run in three phases: Bangladeshi people without diabetes, religious leaders and scholars, and healthcare professionals.

3 Poor knowledge regarding diabetes was not the main barrier to healthy lifestyle choices.

4 There was a strong desire to comply with Islamic cultural norms, particularly relating to modesty.

5 Religious leaders and their teachings may have an important part to play in supporting health promotion.

Grace C, Begum R, Subhani S et al (2008) Prevention of type 2 diabetes in British Bangladeshis: qualitative study of community, religious, and professional perspectives. *BMJ* **337**: a1931

CLINICAL ENDOCRINOLOGY

Gastric volume and satiation in type 2 diabetes

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

1 Glucagon-like peptide-1 (GLP-1) inhibits gastric emptying and caloric intake.

2 This study investigated whether inhibition of dipeptidyl peptidase-4 (DPP-4) alters gastric volume and satiation in people with type 2 diabetes.

3 Fourteen participants received vildagliptin or placebo for 10 days.

4 On day 7, fasting and post-meal gastric volumes were measured; on day 8, a liquid meal was consumed to measure satiation; on day 10, the volume of ingested water required to achieve satiation was measured.

5 Results showed that DDP-4 inhibition with vildagliptin does not influence satiation or gastric volume in people with type 2 diabetes.

Vella A, Bock G, Giesler PD et al (2008) The effect of dipeptidyl peptidase-4 inhibition on gastric volume, satiation and enteroendocrine secretion in type 2 diabetes: a double-blind, placebo-controlled crossover study. *Clin Endocrinol (Oxf)* **69**: 737–44

"... vildagliptin does not alter satiation or gastric volume in people with type 2 diabetes."