Diabetes: The lifelong journey

A report from the *5th National Conference of the Primary Care Diabetes Society*, which took place on 20–21 November 2009 at the Hilton Birmingham Metropole, Birmingham. The gold sponsor of the event was Novo Nordisk. This meeting report was generated independently by the publisher and conference speakers, with whom editorial control rests.

This conference, organised by the Primary Care Diabetes Society in association with *Diabetes & Primary Care*, aimed to improve the care of people with diabetes by promoting learning and interaction between healthcare professionals from across the primary care team. Talks focused on the journey that people with diabetes take throughout their life, starting with diagnosis and pre-conception advice, through to care of older people with diabetes. Masterclasses provided a forum for sharing experiences and best-practice advice. This document presents a summary of the conference.

Martin Hadley-Brown (GP, Thetford, Norfolk, and Chair of the PCDS) warmly welcomed delegates and hoped that they would "enjoy not only the fascinating programme, but also the opportunity to chat among friends and colleagues about a subject of which we all have a care and enthusiasm".

Are you sure it's type 2 diabetes? Why classification matters

Andrew Hattersley (Professor of Molecular Medicine, Exeter)

"This is a topic which gets universally ignored," Professor Hattersley began, "because healthcare professionals are experts in the treatment, but not in the diagnosis, of diabetes". Indeed, NICE (2008; 2009) provides guidelines on the treatment of type 1 and type 2 diabetes, with little clarification on how to diagnose the condition.

Perhaps the Quality and Outcomes Framework (QOF) is now what practitioners refer to, commented Professor Hatterlsey. However, there are only indicators for type 1 and type 2 diabetes – some people have other types of diabetes and will not fit in to this system. To deliver individualised treatment, practitioners therefore need to move away from target-driven care and protocols and develop a place for the "unknown" classification until the diagnosis is certain.

The distinction between different types of diabetes is becoming more difficult as more traditional boundaries are blurred, commented Professor Hattersley. For example, more people with type 1 diabetes are overweight, and type 2 diabetes is now being diagnosed in childhood.

"The hardest time to make a diagnosis, is at diagnosis," Professor Hattersley said, encouraging practitioners to wait until they have a clear diagnostic test result. He went on to describe newer methods of diagnosis, including urinary c-peptide, which is more convenient because the c-peptide is preserved in the urine for up to 3 days, enabling the hospital to do the test rather than sending the sample to a remote laboratory. For more information see: www.diabetesgenes.org.

Pre-conception or the fertile years – type 2 diabetes

Aresh Anwar (Consultant Physician, Coventry)

Dr Anwar opened his talk by looking at the treatment of women with diabetes in 1823. A case report documented a pregnant woman with an insatiable thirst and 2 pounds of sugar in her urine. Her baby did not survive and the report states that the baby was "of such robust and healthy character that you would have thought Hercules had begotten".

In 1989, the St Vincent declaration set the target that within 5 years, women with diabetes should have the same chances of achieving a successful pregnancy as those without the condition (Diabetes Care and Research in Europe, 1990).

But what about today? A report published by the Confidential Enquiry into Maternal and Child Health (CEMACH, 2007) showed that babies of women with type 2 diabetes are 4.7 times more likely to be stillborn and twice as likely to have a major congenital malformation. Dr Anwar appealed to the audience to help secondary care because these figures show that the target set by the St Vincent declaration is far from being achieved – even 20 years after it was set.

Improved pregnancy outcomes can, however, be achieved by ensuring that women improve their HbA_{1c} level before pregnancy and maintain it below 7% (53 mmol/mol) during pregnancy (CEMACH, 2007). Dr Anwar pointed out, however, that this requires a planned pregnancy, commenting that "these only seem to happen in the minds of healthcare professionals!" Many pregnancies are unplanned and there is a need to provide better advice to avoid this scenario at pre-conception clinics and routine check-ups.

Dr Anwar recommended increasing the dose of folic acid if other risk factors are present, and addressing all other complications of diabetes with appropriate medication, as well as striving for good glycaemic control.

Optimising management of the middle years: Ensuring a metabolic legacy

Miles Fisher (Clinical Director, Glasgow)

Dr Fisher clarified where the phrase "metabolic legacy" originates from and the evidence supporting it. The DCCT/EDIC (Diabetes Control and Complications Trial/Epidemiology of Diabetes Interventions and Complications; DCCT/EDIC Study Research Group, 2005) study continued to follow-up participants of the DCCT study for an average of 17 years per participant. These were people with type 1 diabetes who received either intensive or standard treatment during the study period and were then followed-up to see whether significant between-group differences emerged.

"In the group that had previously received intensive treatment there was a statistically significant reduction in cardiovascular (CV) outcomes," said Dr Fisher. In fact, this group experienced a 42% reduction in CV disease at the end of the follow-up period compared with the conventional treatment group. The authors of the study referred to this effect as "metabolic memory" because the pathophysiological mechanisms responsible for the effect were unclear.

Another study that demonstrated a similar effect was the UKPDS (UK Prospective Diabetes Study; Holman et al, 2008), which conducted post-trial monitoring for 10 years in people with type 2 diabetes. In the group that had received intensive treatment with insulin or sulphonylureas, a significant reduction in myocardial infarction (MI) accrued over the follow-up period compared with conventional treatment. Because MI is a common cause of death among people with diabetes, Dr Fisher said "by significantly reducing MIs you are significantly reducing all-cause mortality – essentially, you are saving lives".

Results from the ADVANCE (Action in Diabetes and Vascular Disease: Preterax and Diamicron Modified Release Controlled Evaluation; ADVANCE Collaborative Group, 2008) study showed that slow and steady titration of treatments to a target HbA_{1c} of <6.5% (<48 mmol/mol) is well-tolerated, has few side-effects and considerable microvascular benefit.

Conversely, the ACCORD (Action to Control Cardiovascular Risk in Diabetes; ACCORD Study Group et al, 2008) study attempted to aggressively lower HbA_{1c} levels, which resulted in harm to people with CV disease or CV risk, as well as side-effects, including hypoglcycaemia and weight gain. "This method of treatment is not the way forward" warned Dr Fisher.

Appraising the evidence for aggressive treatment later in life

Colin Kenny (GP, Dromore, Northern Ireland)

The definition of later life is "someone too young to be old and too old to be young" said Dr Kenny. His key message was to "treat the person in front of you with the care and respect their generation deserves".

Dr Kenny highlighted a dilemma that family doctors experience with some people over the age of 60 – that some QOF indicators must be achieved to maintain the practice, but that this process threatens the person's autonomy.

John F Kennedy once said: "the greatest enemy of truth is often not a lie – deliberate, contrived and dishonest – but a myth – persistent, persuasive and unrealistic." Diabetes care for those in later life is loaded with myths. The first one Dr Kenny dispelled was that the onset of diabetes in later life is a mild illness.

Many people in later life already have complications at presentation. Dr Kenny summarised guidance from the British Geriatric Society (2009) by saying that "age modifications are not be required in the management of older people with diabetes".

The second myth is that diabetes and Alzheimer's disease co-exist but are not related. "Diabetes is associated with an increased risk of dementia" (Leibson et al, 1997) said Dr Kenny, so impaired cognitive function and depression should be considered in older people with diabetes who are not managing to control their glycaemia.

Myth three was that obesity is a problem in later life. However, a poor diet can lead to malnutrition, which may be worse than obesity, and Dr Kenny did not recommend weight loss for those in later life since it is associated with a greater mortality and morbidity risk (Allison et al, 1999).

Dr Kenny also emphasised that there are good evidence-based guidelines for older people with diabetes (European Diabetes Working Party for Older People, 2004) and stressed the need to ensure that people are taking their medication. He suggested using pill boxes, or reducing the number of injections and tablets. This may improve these individual's diabetes, as they will be taking their medication as prescribed.

Endocrine conundrums

Simon Page (Consultant Physician and Endocrinologist, Nottingham)

Endocrine disease includes conditions such as: acromegaly, Addison's disease, Cushing's syndrome, glucagonoma, phaeochromocytoma, hyperthyroidism, somatostatinoma, and aldosteronoma (Conn's syndrome), although some are rarer than others.

Dr Page began by pointing out that 50% of people with acromegaly are not aware that they have the condition, so it is a diagnosis that is often missed. Dr Page recalled a case of one woman who had been referred to him to improve her glycaemic control. It came to light that she had acromegaly, and after an operation on her pituitary gland she no longer needed insulin to treat her diabetes.

"An insulin-like growth factor-1 (IGF-1) test is a very useful screening test in primary care if you suspect somebody has acromegaly," said Dr Page, "but the gold standard diagnostic test is the 75 g glucose tolerance test, plus clinical features and pituitary imaging". Treatment involves surgical removal of the pituitary adenoma, with, in some people, postoperative radiotherapy or drug treatment using the somatostatin analogues or the growth hormone receptor antagonist pegvisomant.

"Cushing's syndrome is most commonly caused by a pituitary adenoma secreting adrenocorticotropic hormone that overstimulates the adrenal glands to produce too much cortisol", Dr Page explained. To test for Cushing's syndrome in primary care, Newell-Price et al (2006) recommended testing three urine samples over 24 hours for elevated urinary free cortisol, or giving a dexamethasone tablet at 10 pm one evening and testing for a blood cortisol level over 50 nmol/L at 9 am the following morning.

Dr Page urged delegates to look out for hypopituitarism, coeliac disease and gastroparesis as contributers to hypoglycaemia.

A link between type 1 diabetes and autoimmune thyroid disease has been identified. Jaeger et al (2001) found that about 1 in 5 participants newly diagnosed with type 1 diabetes had evidence of autoimmunity to their thyroid and to their gastric mucosa. "This points to an underlying aggregation of conditions that we need to look out for and perhaps screen for in people with type 1 diabetes", said Dr Page.

Interactive masterclasses

On the first day of the conference, a series of eight interactive masterclasses were available. Delegates chose to attend the two sessions that were of most interest to them.

Using ICT to support people with diabetes

Roy Harper, Consultant Physician and Endocrinologist, Ulster

Dr Harper discussed plans to establish a large-scale remote diabetes telemonitoring system in Northern Ireland and demonstrated a voice recognition feedback system from his mobile phone.

The system requests your blood glucose level (which is then forwarded on to the diabetes team) and provides feedback as to whether it is within the correct range or not. Dr Harper hopes that the Northern Irish model will provide much needed evidence on the effectiveness of telemonitoring.

Obesity treatment: What works, when and for whom?

Mike Lean, Consultant Physician, Glasgow

Weight loss of 5–10 kg, achievable by many methods and by most people, is enough to prevent over half of all future incident type 2 diabetes (even if there is some regain) and improves all features of the metabolic syndrome.

Better strategies and guidelines are needed for severe and complicated obesity, with more appropriate funding streams and QOF incentives. National guidelines recommend bariatric surgery for people with type 2 diabetes and a BMI over 35 kg/m^2.

Managing the residential care population

Fiona Kirkland, Consultant Nurse Diabetes, South Staffordshire PCT

Poor knowledge of diabetes management in care homes, together with a lack of support for staff, can lead to poor quality diabetes care.

Often, the working day in a care home is centred on the achievement of tasks, large medication rounds and residents receiving insulin at the wrong time for the anticipated therapeutic effect.

Fiona discussed common-sense solutions to overcome these difficulties in this workshop, such as on-site diabetes education for all care home staff.

Injectables: Practicalities of injections and needles

Debbie Hicks, Consultant Nurse – Diabetes, Enfield PCT

In this workshop, Debbie stressed that reuse of needles should not be recommended and used some case studies to illustrate why.

Education is key to ensure that people with diabetes are using the correct injection technique. Healthcare professionals should routinely check injection sites, technique and appropriate needle length.

In lean adults and children, the pinch technique should be used to avoid intramuscular injections even when using short needles. Make sure the sharps disposal in your local area is clear to your patients.

Insulin regimens

Jill Hill, Diabetes Nurse Consultant, Birmingham; Francesca Arundel, Diabetes Specialist Nurse, Chichester; Gwen Hall, Diabetes Specialist Nurse in Primary Care, Haslemere

This workshop debated the best option of initiation of insulin for a person with type 2 diabetes on maximum oral antidiabetes medication.

Three regimen choices were discussed: basal only, mixed insulin and prandial only.

To make the right decision, many factors need to be considered: the individual's weight, HbA_{1c} level, normal food intake, and blood glucose patterns, as well as considering the wishes and lifestyle of the individual.

Neuropathy and feet

Neil Baker, Diabetes Research Podiatrist, Ipswich

Peripheral nerve damage and dysfunction is reported to be present at initial diagnosis in up to 50% of individuals with type 2 diabetes (Young et al, 1993).

Peripheral neuropathy is highly associated with foot ulceration and lower extremity amputations. One key part of annual foot screening focuses on identifying sensory loss associated with ulcer risk.

Symptomatic neuropathy is also relatively common but often overlooked, and although it is not directly linked with foot ulceration, can have a significant impact on quality of life.

"I know it's their diabetes, but...!"

Judith Carpenter, Accredited Motivational Interviewing Practitioner, Ashbourne

Motivational interviewing has evolved as a method of encouraging behaviour change, orginating from the field of addiction in the 1980s.

This workshop gave delegates the chance to practise some basic motivational interviewing techniques, and experience the challenges of the professional–patient consultation first-hand through role play.

Enhancing motivation and encouraging change is a complex task and people deserve a sensitive response to behaviour change.

Renal disease and eGFR

Aresh Anwar, Diabetologist, Coventry; Andrew Stein, Consultant Physician, Coventry

Renal disease is a significant complication of diabetes, yet tests to diagnose or monitor this condition are unnecessarily complicated. There is debate surrounding the use of tests and measures of renal function.

The methods of calculating the glomerular filtration rate (GFR) are different depending on the individual's ethnicity and can be significantly altered depending on body mass.

To correctly appreciate the result of GFR it is important to understand which method the lab is using to calculate the GFR.

Hypoglycaemia revisited

Brian Frier (Consultant Physician and Professor of Diabetes, Edinburgh)

The benefit of tight glycaemic control and intensive therapy in type 2 diabetes is clear – the risk of long-term complications is reduced (Stratton et al, 2000), as is the risk of death from CV disease (Gaede et al, 2003). However, the DCCT (DCCT Research Group, 1993) has shown that a lower HbA_{1c} level is associated with an increased risk of hypoglycaemia in people with type 1 diabetes. This is a problem that is not only faced by people with type 1 diabetes – Wright et al (2006) found that in people with type 2 diabetes, a decrease in HbA_{1c} level increased the prevalence of hypoglycaemia.

Data published by the UK Hypoglycaemia Study Group (2007) reported the prevalence of severe hypoglycaemia in people with type 2 diabetes treated with sulphonylureas as 7%, which was the same prevalence as people with type 2 diabetes who had been treated with insulin for less than 2 years. "But the longer they were on insulin," said Professor Frier, "the greater the prevalence of hypoglycaemia. This rate (7%) is not minor, it has serious implications in terms of morbidity".

The risk factors for severe hypoglycaemia are, in type 1, the duration of diabetes, and in type 2, the duration of treatment with insulin. The other risk factors – strict glycaemic control, impaired awareness of hypoglycaemia and history of previous severe hypoglycaemia – occur in both types of diabetes.

Treatment with a sulphonylurea is known to increase the risk of hypoglycaemia, but Professor Frier warned that the highest risk of severe events is within the first month of treatment (Bodmer et al, 2008). In addition, he said, "paradoxically, it is much more common for hypoglycaemia to occur when people are taking low doses, because they are much more sensitive to the drug at this stage".

Hypoglycaemia can be misinterpreted and misdiagnosed in older people because the symptoms are different from younger people. Neurological disturbances, such as incoordination, ataxia and slurred speech are symptomatic of hypoglycaemia and are often diagnosed as cerebral vascular disease.

Most hypoglycaemia in people with type 2 diabetes is not treated in hospital, but in the community by GPs or ambulance staff. The East Anglia Ambulance Service's *Hypoglycaemia Audit Report* (Oosterom, 2007) revealed that 82% of type 2 diabetes-related ambulance call-outs were because of hypoglycaemia, and 55% of people had not received any education about hypoglycaemia in the preceding year.

Hypoglycaemia can impair cognitive function in the short-term (in terms of memory and attention, concentration, rapid decision-making and hand–eye coordination), but there is evidence that the brain can also be affected in the long-term. Permanent changes can occur in blood flow in the brain in people with type 1 diabetes with recurrent severe hypoglycaemia and with impaired awareness (MacLeod et al, 1994).

Hypoglycaemia can also affect the heart, increasing the susceptibility of people with diabetes to cardiac arrhythmias. The ACCORD study used aggressive treatment to rapidly decrease the HbA_{1c} level of one half of the participants. This approach greatly increased the number of hypoglycaemic episodes experienced, and when the study was stopped, more participants had died from cardiac events in the intensively treated group compared with the control group (ACCORD Study Group et al, 2008). Although the cause of the increased mortality could not be proven "it seems very likely that it was hypoglycaemia related", said Professor Frier.

Hot topics – Diabetes research update

Neil Munro (GP, Surrey, and Associate Specialist in Diabetes, Chelsea and Westminster Hospital, London)

A very hot topic this year has been increased cancer risk in people with diabetes, and Dr Munro explained that obesity is associated with an increased incidence of cancer (Renehan et al, 2008), so many of the type 2 diabetes population are already at risk.

With regard to insulin and cancer risk, Dr Munro said "we know that cancer cells express IGF-1, and when insulin is in excessive amounts or the person is highly insulin resistant, insulin binds to the IGF-1 receptors and stimulates potential neoplastic growth". Dr Munro went on, "this might partially explain why an obese, hyperinsulinaemic, hyperglycaemic person has an increased risk of cancer".

New drug preparations are about to become available, such as a weekly dose of exenatide, which has a coating called "poly D, L lactic-co-glycolic acid" that allows gradual drug delivery at a controlled rate (Tracy et al, 1999). Other long-acting glucagon-like peptide-1 receptor agonists in the pipeline include albiglutide, taspoglutide, and lixisenatide.

Moving on to dipeptidyl peptidase-4 (DPP-4) inhibitors, three are now available (sitagliptin, vildagliptin and saxagliptin) and more are working through the approval process. DPP-4 inhibitors "seem to have a very positive effect on cardiomyocytes", said Dr Munro, and a large study called TECOS (Trial Evaluating Cardiovascular Outcomes with Sitagliptin) will report on this in 2015.

One emerging therapy is based on sodium glucose co-transporter inhibitors. By blocking the action of the sodium glucose transporter-2 (SGLT-2), these agents can regulate blood glucose by inhibiting the reabsorption of glucose in the kidney, thereby increasing the excretion of glucose, resulting in glycosuria. Dapagliflozin is an SGLT-2 inhibitor in phase three trials.

In addition to drug therapies, new and improved technologies are emerging. Dr Munro mentioned nanosensors that can be injected under the skin like a tattoo that fluoresce under infrared light when glucose levels are high, and devices like the patch pump – an insulin pump that holds a reservoir of insulin and a cannula in a "patch" that is worn on the skin, which wirelessly transmits to a handheld device used to control doses and log data. ■

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