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1. Degludec improves minor, severe & nocturnal hypoglycaemia in Type 1 diabetes: Association of British Clinical Diabetologists (ABCD) nationwide degludec audit

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The ABCD nationwide degludec audit currently includes 351 people who switched to insulin degludec from another basal insulin. Hypoglycaemia was cited as the reason for starting degludec in 164(47%) of whom 110(67%) had Type 1(T1DM) and 54(33%) had Type 2(T2DM) diabetes. We had reported comparative rates of minor, severe and nocturnal hypoglycaemia in 42(38%), 28(25%) and 32(29%) respectively of the 110 T1DM and in 49(91%), 24(44%) and 30(56%) respectively of the 54 T2DM patients. We asked patients whether they thought degludec gave them a lower, similar or higher rate of hypoglycaemia compared to the other basal insulin.

28 (67%), 14 (33%) and 0 (0%) T1DM and 13 (27%), 34 (69%) and 2 (4%) T2DM patients cited a lower, similar or higher rate respectively of minor hypoglycaemia with degludec (T1DM: $p<0.0001$; T2DM: NS). 16 (57%), 12 (43%) and 0 (0%) T1DM and 2 (8%), 22 (92%) and 0 (0%) T2DM patients cited a lower, similar or higher rate respectively of severe hypoglycaemic with degludec (T1DM: $p<0.01$; T2DM: NS). 21 (66%), 11 (34%) and 0 (0%) T1DM and 9 (30%), 21 (70%) and 0 (0%) T2DM patients cited a lower, similar or higher rate respectively of nocturnal hypoglycaemia with degludec (T1DM: $p<0.001$; T2DM: NS).

The data suggest that patients with T1DM who swap to degludec from another basal insulin due to problems with hypoglycaemia will experience a lower rate of hypoglycaemia on degludec. At present the same result does not hold for T2DM, but the numbers are small. For minor and severe hypoglycaemia there is a trend towards improvement which may become significant with larger numbers in the audit. The noticeable difference in reporting of improvement in hypoglycaemia in T1DM compared to T2DM makes it less likely that the effect seen in the T1DM patients is wholly explained by regression to the mean.

2. Mortality, morbidity, weight and metabolic outcomes 15 years after very low calorie diet therapy in 325 persons

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Introduction: Very low calorie complete meal replacement (VLCD) to induce rapid weight loss in obesity and type 2 diabetes is successful short term. Longer term follow is needed. **Aims**: To audit outcome 10 to 18 years after administration of a VLCD programme in South Devon, UK. **Methods**: Four general practice data bases were interrogated for subjects coded for Lipotrim VLCD use in the 1990's. Final anthropometric, biochemical and outcome results were extracted from practice records. Death and vascular disease outcomes were recorded from practice and hospital records, Minap and stroke data-bases. **Results**: Of 351 patients 325 had engaged in the programme for at least one month. 79.1% were female, age 47.8+/-12. 8 years, BMI 36.1+/-6.8Kg/m2and 13.5% had type 2 diabetes. At follow up after 15+/- 4 years weight had changed from 97.9+/-19 at baseline to 100+/-20.8Kg. None with diabetes at baseline remained in remission. Fifty new cases of type 2 diabetes and 11 of impaired fasting glucose developed during follow up. Forty subjects died, 19 from ischaemic heart disease (8 with baseline diabetes), 10 from cancer, 5 from renal failure and two from stroke. In a linear regression models only initial BMI was related to subsequent development of glucose intolerance (P=0.0048). **Conclusions**: Rapid weight loss achieved by VLCD does not result in long term maintenance of weight loss, lasting remission of type2 diabetes or prevention of later glucose intolerance. The high rate of fatal myocardial infarction in the diabetic subjects is an additional cause for concern..

3. The Glycaemic Response to Dapagliflozin according to Intensity of Background Diabetes Treatment or Duration of Type 2 Diabetes: the Association of British Clinical Diabetologists Nationwide Dapagliflozin Audit

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Introduction

Our nationwide audits of GLP-1 receptor agonists revealed they were less effective in patients with more advanced type 2 diabetes. We investigated whether the glycaemic response to dapagliflozin would differ according to the intensity of background diabetes treatment or duration of disease.

Methods

Data was obtained from an audit database analysing the use of dapagliflozin in clinical practice in the UK. Between October 2014 and December 2015, 57 centres submitted data on 1720 patients. For

this analysis, patients were stratified for receipt to none, one, two or three background diabetes therapies (oral therapies or GLP-1 receptor agonists), or insulin, or for diabetes duration of 0-5, 6-10, or >10 years. Changes in HbA_{1c} at 26 weeks of treatment were compared across groups after adjusting for baseline HbA_{1c} and renal function.

Results

There were 718 patients with the relevant data analysed. Mean (±SD) baseline HbA_{1c} and BMI were 9.6±1.4% and 33.4±17.5 kg/m^2 with 22.0% of patients on GLP-1 receptor agonists and 38.4% on insulin. Patients on no background therapy (n=32), one drug therapy (n=139), two therapies (n=173), three therapies (n=98) and insulin (n=276) achieved adjusted mean HbA_{1c} changes (±SEM) of -0.9 ± 0.2%, -1.1 ± 0.1%, -1.2 ± 0.1%, -1.2 ± 0.1% and -0.9 ± 0.1%, respectively (p=0.021 for effect of treatment group). Patients on insulin achieved lower HbA_{1c} reduction compared with patients on two therapies (difference [95%CI]; 0.3% [0.03,0.61], p=0.024). Adjusted mean HbA_{1c} changes were -1.1 ± 0.1% for patients with diabetes duration 0-5 years (n=183), -1.1 ± 0.1% for 6-10 years (n=161) and -1.0 ± 0.1% for >10 years (n=268) (p=0.47 for effect of diabetes duration).

Conclusion

Dapagliflozin should be considered comparably as effective in patients with more advanced type 2 diabetes. This is in keeping with its mechanism of action being independent of beta cell function.

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4. Will empagliflozin reduce mortality in the real world?

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The EMPA-REG OUTCOME trial was designed as a non-inferiority randomised placebo-controlled trial to investigate cardiovascular outcomes and mortality with empagliflozin in a type 2 diabetes population at high risk of cardiovascular disease. However the trial demonstrates a significant reduction in all-cause mortality in the treatment group. Despite an inclusive approach to patient selection, extrapolation of results to clinical practice should be undertaken cautiously.

We performed a retrospective database analysis of a representative sample of 34,278 people with type 2 diabetes in England to compare the characteristics of the trial population with that of real world SGLT2 users with high cardiovascular risk. Data was extracted from the Royal College of General Practitioners Research and Surveillance Centre (RCGP RSC) database.

Only 16.0% (120/752) of people prescribed SGLT2 inhibitors in the real world had similar cardiovascular risk to people included in the trial. Of these a similar proportion were female (26.7%) compared to the trial (28.8%; p=0.606). Mean ages were also similar; 62.1 and 63.1 years (p=0.208). However, the real world cohort had a higher initial BMI (34.2 vs 30.6 kgm-2; p>0.0001) and initial HbA_{1c} (8.9% vs 8.1%; p>0.0001).

Only a small proportion of real world users of SGLT2 inhibitors have similar cardiovascular risk to people included in the EMPA-REG OUTCOME trial and have a higher baseline BMI and HbA_{1c}. Whilst the trial results should encourage confidence in the use of empagliflozin in people with high cardiovascular risk, real world monitoring is required to ensure the described benefits translate into clinical practice.

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5. Improved clinical outcomes after embedding structured education for type 1 diabetes without additional manpower resource

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Introduction

Specialist type 1 diabetes services are not configured for the delivery of structured group programmes within the existing traditional format. There is a widely held belief that such education cannot be delivered without additional specialised staff resource. I describe the evolution of DAFNE (Dose Adjustment For Normal Eating) across multiple sites without any increase in specialist diabetes staff resource.

Method and results

We reorganised our job plans to deliver all aspects of DAFNE, replacing some 1:1 diabetes follow-up sessions. Colleagues followed suit at neighbouring hospitals and with managerial support we became a single DAFNE centre. Without additional manpower resource we have a sustainable programme of DAFNE course delivery across the largest Scottish Health Board. Data now show improvement in mean HbA_{1c} for the type 1 clinic population at the initial site, not just those who have completed DAFNE, with an increase in the proportion <58mmol/mol and reduction in those >75mmol/mol. The skills learnt by patients have reduced the need for 1:1 attention, with reductions in severe hypoglycaemia of 61%, reduced DKA admissions by 50% and reduction in mean HbA_{1c} of 4.9mmol/mol, in keeping with the published literature.

Conclusion

DAFNE education can be provided by service redesign without additional staff resource. Our experience suggests DAFNE provides a core of consistency underpinning the type 1 diabetes pathway from diagnosis. Uniform use of language and self-management philosophy with consistent treatment targets might generate benefits and improve outcomes in the whole population, not just in people who have completed DAFNE training.

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6. Ward-based management of abnormal glucose levels with a multi-disciplinary team approach

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In response to serious incident reporting at the Trust, the diabetes and patient safety teams at the Royal Free Hospital developed pathways to help identify and manage patients with hyperglycaemia and hypoglycaemia. A quality improvement approach was undertaken with input from diabetes specialist team, patient safety team, PAART

(patient at risk and resuscitation team), pharmacy, dietetic and biochemistry staff.

Audit data demonstrated high numbers of patients with hyperglycaemia and variation in management. This pilot work commenced in January 2015 includes colour-coded capillary blood glucose charts allowing clearer identification of abnormal results. We have an electronic glucose server and have developed simple alerts directly from glucometers facilitating staff to escalate patients for early review.

Glycaemic management followed a clear pathway for treating patients with abnormal glucose levels. Those with significant sustained hyperglycaemia, capillary blood glucose above 20 mmol/L required assessment by ward staff within 30 minutes. Further management was determined in part by patient clinical stability. The pathway ensured early review of medication as well as diet. Our main aim was controlling glucose levels within six hours of commencing the treatment pathway and efficacy was also assessed.

Hypoglycaemia management was categorised into mild-moderate and severe. We have a clear protocol reviewing insulin, administration of rapid-acting carbohydrates, or 10% dextrose or glucagon for severe cases. The aim was to raise blood glucose levels to target within 30 minutes.

We have demonstrated ward-based protocols together with staff engagement can improve quality of care of in-patients with diabetes mellitus alongside traditional educational methods.

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7. Which insulin regimens are used in patients newly-diagnosed with Type 1 diabetes? Results of an electronic survey of healthcare professionals in the UK and Ireland

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Background and Aims
In light of the new NICE Type 1 diabetes (T1DM) guidelines, we wished to explore current practice in choice of insulin regimens for adults with newly-diagnosed T1DM amongst healthcare professionals (HCPs) in the UK and Ireland, to identify if there is consensus about what should be used and the factors that influence clinicians' choice of regimen.

Methods
An on-line questionnaire using Survey Monkey, distributed via ABCD, DAFNE, DMEG and Diabetes Education Network emailing lists, open for 1 month (October 2015).

Results
227 surveys completed, 77(34%) doctors; 87(38%) DSNs; 59(26%) dietitians; 4(2%) unspecified. 177(78%) from NHS secondary care; 41(18%) NHS primary care; 9(4%) non-NHS. 113 individually listed cities, towns or regions represented, from Shetland to Taunton; Galway to Yarmouth.

92(41%) ranked 'evidence' as the primary influencing factor; with 'personal experience' and 'protocol' being ranked second and third respectively. Amongst those ranking evidence first, the treatment of choice for newly-diagnosed is analogues in a multiple dose injection (MDI) regimen using once-daily basal (50% doctors; 45% DSNs; 48% dietitians). NICE-recommended analogue MDI with twice-daily basal was chosen by only 34(15%) of the overall cohort, all of these stating local availability of a structured education programme (97% DAFNE). 21(9%) choose a simpler regimen at diagnosis (1-2 injections/day of either analogue basal or pre-mix).

Conclusion
There is variation in choice of insulin regimen, perhaps reflecting a dearth of research data from this patient group. HCPs should be encouraged to audit and publish data on their newly-diagnosed T1DM patients.

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8. Blood glucose and Insulin Management of Mothers with pre existing diabetes (Type 1 and Type 2 DM) and Gestatational diabetes during delivery

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Introduction: Our current guidelines recommends insulin sliding scale if the blood glucose levels are more than 7mmols in early labour with the aims to keep between 4-7mmols during delivery to reduce the risk of neonatal hypoglycaemia.

Methods: 51 mothers (with pre existing and gestational diabetes) had delivered during July 2014 to June 2015. We have collected data from case and computer notes, to see whether they all had appropriate delivery plan , their blood glucose control, insulin management, method of delivery and incidence of neonatal hypoglycaemic episodes.

Results: 40 mothers had Gestational Diabetes, 5 had Type 2 diabetes and 6 mothers had Type 1 diabetes. 86% patient had appropriate plan in notes before admitted for delivery. Only 41% of mothers had complete hourly monitoring of blood glucose during labour.

Insulin infusion was commenced in 8 mothers as the blood glucose levels were between 7.1 to 13.8mmols in early labour.

5 mothers who has had blood glucose levels of between 7 to 9.1mmols were not appropriately started on Insulin infusion; 4/;5 of these babies had hypoglycemia. 3 babies out of 8 mothers who had Insulin infusion developed hypoglycaemia.

Neonatal hypoglycaemia was noted in 47% (24 /51) babies (43 % of babies from mothers with Gestational Diabetes, 50% of T1DM and 80% of T2DM mothers). But only 6 /24 babies had severe hypoglycaemia.

16/24 babies who has had neonatal hypoglycaemia were delivered by caesarean section.

Conclusion: Poor adherence to current guidelines in management of blood glucose levels during delivery. We are planning to do arrange education session for delivery ward team and to re audit.

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9. Comparison between the WHO 2013 criteria against the WHO 1999 criteria in diagnosing Gestational Diabetes Mellitus; A Follow-up Cohort study

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Background
Previously, we demonstrated that the application of WHO 2013 criteria for diagnosing GDM did not result in a significant difference in the total GDM case load, when compared to the WHO 1999 criteria. That was a case-control study of high-risk women screened for GDM (1998-2007).

Aim
We aimed to validate our findings in a more recent cohort of women screened for GDM (2010-2013).

Methods
The cohort comprised 6930 women at high risk of GDM, with the confirmed cases managed at the University Hospital of North Midlands. We calculated the proportion of cases defined as GDM by the WHO 1999 vs. WHO 2013 criteria and the agreement between the two in diagnosing GDM.

Results
- Compared to the 1999 criteria, the 2013 criteria identified more cases (13.7% vs. 9.7%, P<0.001)
- Those positive by both criteria had a median HbA_{1c} of 38.0 mmol/mol (with 29.2% having HbA_{1c} > 42 mmol/mol)
- Those positive by 2013 criteria but negative by 1999 criteria had a median HbA_{1c} of 37.0 mmol/mol (with 13.2% having HbA_{1c} > 42 mmol/mol)
- Those positive by 1999 criteria but negative by 2013 criteria had a median HbA1c of 35.9 mmol/mol (with 7.4% having HbA_{1c} > 42 mmol/mol)
- Those negative by both criteria had a median HbA_{1c} of 33.3 mmol/mol (with 2.0% having HbA_{1c} > 42 mmol/mol)

Conclusion
In this cohort study, whilst the 2013 criteria detects more GDM cases, still some of those classified negative will have an abnormal HbA1c and therefore are likely to be missed.

10. Asymptomatic euglycemic diabetic ketoacidosis in a patient with gestational diabetes mellitus

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Background: Diabetic ketoacidosis (DKA) is a medical emergency characterized by hyperglycemia, ketonemia and metabolic high anion-gap acidosis,[1] affecting 3% of pregnant women with diabetes mellitus (DM).[2] DKA in pregnancy which occurs mostly in patients with type 1 DM and infrequently with type 2 and gestational diabetes mellitus (GDM), carries a perinatal mortality of 35% with previously reported maternal mortality of 15%.[3,4] We describe an unusual case of asymptomatic euglycemic DKA in a patient with diet-controlled GDM.

Case: A 32-year-old primigravida with 30-weeks gestation, diagnosed with GDM a week ago with oral glucose tolerance test results of 5.5 and 9.3 fasting and 2-hour respectively, presented to clinic. Her physical examination was unremarkable with capillary blood glucose (CBG) of 7.3 but she had 2+ ketones on urine dip which prompted a blood ketone (BK) check which was 0.6. Although asymptomatic, she was asked to eat and drink but her BK remained 0.6 after 2 hours with CBG of 6.5. Her arterial blood gas showed pH 7.277, lactate 0.4, bicarbonate 18.6 with her BK 1.9 and CBG of 7.8. All other blood tests were unremarkable including HbA_{1c} of 5.6% with no precipitating factor for DKA identified. She was successfully treated with intravenous fluids and insulin sliding scale.

Conclusion: DKA may develop quite rapidly in state of pregnancy,[5] even with near normal blood glucose levels, and requires early identification and prompt treatment.

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