ABCD
Autumn Meeting
Hotel Russell, London
10th & 11th November 2011

POSTERS

1 Does HbA1c have a role as a diagnostic tool in gestational diabetes mellitus (GDM)?

Anthony A Fryer, Ann Shelley-Hitchin, Christopher Duff, Ellen Hodgson, Karen Stirling, Fahmy WF Hanna.
University Hospital of North Staffordshire.

Background: The diagnosis of GDM is established using the oral glucose tolerance test (OGTT). Whilst NICE guidance recommends that the postpartum glycaemic status is to be assessed with the fasting plasma glucose (FPG), many clinicians still endorse the OGTT to ensure that patients with impaired glucose tolerance are not missed, given the high risk for future development of diabetes. Furthermore, HbA1c has been recently promoted as a diagnostic tool for diabetes.

Aim: Given the uncertainty regarding the role of HbA1c in the management of GDM, we aimed to evaluate: a) whether HbA1c offers additional benefit to the FPG in the post partum setting and, b) whether HbA1c (and/or FPG) would provide a screening tool to minimize the need for OGTT for diagnosing GDM, given the patient inconvenience, cost implications and need for fasting prior to the test.

Methods: This cohort included 337 women with confirmed GDM, together with 281 high risk women with negative antenatal OGTT, managed at the University Hospital of North Staffordshire between January 1999 and March 2007. We calculated the diagnostic accuracy of both FPG and HbA1c against both antenatal and post-partum OGTT. Cut-offs were based either on those described in guidance or derived from logistic regression models.

Results:
A) Postpartum: FPG determined the glycaemic status with 95.9% accuracy, whilst the HbA1c was inferior (76.2%).
B) Antenatal: FPG at the WHO-endorsed cut-offs of 6/7 mmol/L correlated with the OGTT with 62% accuracy. Utilising the previously-published lower value of 4.8 mmol/L did not enhance the accuracy (65.4%). HbA1c, using rule in/out values of 6%/6.5%, 5.2%/7.5% and 5.2%/6% performed similarly with accuracy of 55.9%, 62.6% and 51.2% respectively. Multinomial frequency distributions using a combination of both FPG and HbA1c (both with a

cut off of 5) allowed development of a tool with rule-out and rule-in accuracies of 78.9% and 78.2% respectively.

Conclusions:

- HbA1c is inferior to FPG in the determination of postpartum glycaemic status. HbA1c use for screening in this setting is not recommended.
- Neither FPG nor HbA1c alone yielded satisfactory accuracy to rule out GDM and minimise the need for OGTT.
- Combination of both FPG and HbA1c was the most accurate test for screening GDM, offering potential to reduce the need for OGTT.

2 Impact of expansion of the Diabetes InPatient Prospective Service (DIPPS), Portsmouth into orthopaedic stream.

Dr Rajesh Rajendran, Amanda Morecombe, Dr Partha Kar.
Queen Alexandra Hospital, Portsmouth.

Background:

Further to the success of the DIPPS project in 2009-2010, the Diabetes team successfully argued for a Consultant Nurse post to be replaced post-retirement with an inpatient diabetes nurse specialist (DNS) to provide proactive daily support on the trauma and orthopaedic wards, with input from the diabetes consultants.

Aim:

To analyse the impact of DIPPS project on the length of stay of non-electively admitted adult diabetes (type 1 and 2) patients on the trauma and orthopaedic wards.

Method:

We obtained the length of stay (LOS) data for all adult non-electively admitted patients with and without diabetes from 01/04/2010 to 30/06/2010 (before DNS employed) and from 01/04/2011 to 30/06/2011 (after DNS employed) on the trauma and orthopaedic wards.

Results:

In 2010, the mean LOS for patients without diabetes was 9.46 days (n=763) versus 17.03 days (n=78) in diabetes patients. In 2011, the mean LOS for patients without diabetes was 9.35 days (n=789) versus 14.45 days (n=91) in diabetes patients,with a mean reduction of 2.58 bed days.

We then analysed patients who stayed between 3 to 60 days (to exclude variations in LOS)In 2010 the mean LOS for patients without diabetes was 12.78 days (n=443) versus 16.82 days (n=61) in diabetes patients. In 2011 the mean LOS for patients without diabetes was 12.43 days (n=467) versus 15.44 days (n=66) in diabetes patients- thus a reduction by 1.38 days

Conclusion:

1. There is a significant difference in LOS between diabetes and non-diabetes patients on orthopaedic wards
2. There is an improvement of LOS pre and post intervention by the diabetes specialist team
3. It strengthens the argument for further expansion of the DIPPS project within the hospital, along with justifying the presence of the specialist team on the orthopaedic wards.

3 Metformin therapy and asssessment for vitamin B12 deficiency: is it necessary?

S A Qureshi, Ann Ainsworth, P H Winocour.
West Middlesex Hospital.

Metformin therapy in type 2 diabetes mellitus (T2DM) has been recognised as a cause of vitamin B12 deficiency for at least 40 years, but routine measurement is not currently advocated in clinical guidelines. Assessment might be of particular relevance in T2DM complicated by peripheral neuropathy.

This service review examined whether serum vitamin B12 levels were measured in patients with high dose (>2g/day) and long-term (four years) metformin treatment, in particular among those with peripheral neuropathy. We also evaluated the effectiveness of vitamin B12 replacement when levels were low.

Of 283 patients on high dose metformin for more than four years only, 70 (25%) had vitamin B12 levels checked. All of these 70 cases had peripheral neuropathy. Vitamin B12 deficiency (<150pg/ml) was recorded in 23 (33%). Where vitamin B12 levels were deficient,replacement vitamin B12 was documented in only two (2.9%) patients and improvement in neuropathic symptoms post treatment were documented in only four (5.7%) patients.

Conclusion: vitamin B12 levels were measured infrequently in T2DM, in particular among those with peripheral neuropathy. Levels were frequently low when assessed among T2DM patients with peripheral neuropathy. A record that vitamin B12 therapy was initiated was only made in a small number of cases, so the impact on peripheral neuropathy was unclear.

Recommendations: all patients with T2DM on long-term treatment with high dose metformin should be assessed for vitamin B12 deficiency, particularly if complicated by peripheral neuropathy, and then considered for parenteral vitamin B12 replacement if deficient.

4a Factors associated with HbA1c and weight changes at 6 months in the Association of British Clinical Diabetologists (ABCD) nationwide exenatide and liraglutide audit.

CE Walton (1), REJ Ryder (2), ML Cull (2), AP Mills (2), KY Thong (2), on behalf of the ABCD nationwide exenatide and liraglutide audit contributors.
(1) Diabetes, Hull Royal Infirmary; (2) Diabetes, City Hospital,Birmingham.

Background and aims: Treatment with GLP-1 agonists in type 2 diabetes has the advantage of weight loss but they are not effective in every patient. Factors that help predict response to treatment is needed. ABCD conducted two nationwide audits on exenatide and liraglutide based on real clinical practice.

Materials and methods: Patients from both audits were pooled together for analyses. Univariate followed by multivariate analyses were performed to assess for factors that were associated with HbA1c and weight change after GLP-1 agonist treatment. Latest HbA1c and weight changes by 6 months were used as continuous response variables and were assessed against other continuous variables of baseline HbA1c, weight, weight or HbA1c change, patient age, diabetes duration, total insulin dose (logarithm-transformed) and insulin dose reduction. Categorical variables assessed were gender, ethnicity (Caucasian/South Asian/Afro-Caribbean), oral hypoglycaemic agent change (stopped or reduced/unchanged/started or increased) and insulin use (yes/no). To avoid limiting the multivariate analyses to only insulin patients, two models were assessed each for HbA1c and weight change, the first with all significant

univariate variables and with the variable insulin use, the second with total insulin dose and insulin dose reduction.

Results: 9020 patients with 5407 and 5245 follow-up HbA1c and weight results were analysed. Univariate analyses showed HbA1c reduction being correlated with higher baseline HbA1c and inversely with baseline weight, weight reduction, diabetes duration, TZD reduction, insulin use, higher insulin dose reduction (all p<0.001) and higher daily insulin dose (p=0.012). Univariate analyses for weight reduction showed correlation with higher baseline weight, age and diabetes duration, TZD reduction, insulin use and higher insulin dose reduction, and inversely with baseline HbA1c, HbA1c reduction and South Asian or Afro-Caribbean ethnicity (all p<0.001).
Table 1 shows the results of stepwise regressions analyses. The HbA1c change model had 3982 patients with values of baseline HbA1c and weight, weight change, diabetes duration, TZD reduction and insulin use. The weight change model had 3089 patients with values of HbA1c change, baseline weight and HbA1c, ethnicity, age, diabetes duration, TZD reduction and insulin use. The models accounted for 22.0% and 9.5% of the variance of HbA1c change and weight change respectively.
Conclusions: Besides intuitive factors that affect HbA1c and weight outcomes, insulin-treated patients were found to have less HbA1c reduction but more weight reduction after treatment with GLP-1agonists. Higher total daily insulin dose and longer diabetes duration were also associated with poorer HbA1c reduction.

Table 1: Stepwise regression analyses of factors influencing HbA1c and Weight changes among patients treated with exenatide and liraglutide

	HbA1c reduction, stepwise regression among 3982 patients		Weight reduction, stepwise regression in 3089 patients	
Factor	Adjusted T-value	Adjusted p-value	Adjusted T-value	Adjusted p-value
Baseline HbA1c	30.44	<0.001	-5.94	<0.001
Baseline Weight	-3.79	<0.001	13.29	<0.001
HbA1c change	-	-	-	NS
Weight change	-	NS	-	-
Age	-	-	2.06	0.040
Diabetes duration	-4.16	<0.001	3.25	0.001
Ethnicity	-	-	-	NS
TZD reduction	-7.96	<0.001	7.02	<0.001
Insulin use	-10.02	<0.001	7.06	<0.001
	Stepwise regression among 1134 patients		Stepwise regression among 1002 patients	
Total insulin dose (log)	-3.6	<0.001	-	NS
Insulin dose reduction	-3.5	<0.001	9.21	<0.001

4b The Association of British Clinical Diabetologists (ABCD) nationwide exenatide and liraglutide audits.

REJ Ryder (1), K Y Thong (1), Melissa L Cull (1), Andrew P Mills (1), Chris Walton (2), ABCD nationwide liaraglutide audit contributors.

(1) Diabetes, Endocrinology & Lipids Metabolism, City Hospital, Birmingham; (2) Diabetes, Hull Royal Infirmary.

Background and aims:
To compare use and efficacy of exenatide and liraglutide in two large scale nationwide audits of real clinical practice.

Materials and methods:
Exenatide/liraglutide audits respectively: 128/64 centres across UK submitted anonymised data on 6717/3010 patients during 2007-2009/2009-2010. Previous exenatide users were excluded from liraglutide analysis leaving 2303 patients.

Results:
Baseline characteristics of patients are shown in Table 1. All data expressed as exenatide/liraglutide. At 6 months, mean (SE) HbA1c reduction were 0.75(0.04) v 0.93(0.07)% (difference, p=0.040) among 3166 patients. Weight reduction were 6.5(0.1) v 3.7(0.2) kg (difference, p<0.001) among 2790 patients. All HbA1c and weight changes from baseline were significant (p<0.001). Exenatide/liraglutide data for cholesterol reduction were 0.16(0.03)/0.14(0.05) mmol/L, triglycerides reduction were 0.14(0.06)/0.26(0.10) mmol/L and systolic blood pressure reduction were 3.6(0.6)/4.6(0.9) mmHg. These were significant from baseline (at least p<0.05). There was no change in diastolic blood pressure in the exenatide audit but with liraglutide this fell by 1.2(0.5) mmHg (p=0.023). Baseline treatment use(discontinuation) was sulphonylurea 49.5/42.8(6.5/5.3)%, thiazolidinedione 27.1/20.5(13.4/7.5)%, DPP4 inhibitor 2.2/10.9(1.4/9.3)%, insulin 33.9/39(8.1/2.6)%.

Conclusion:
These very large audits reveal the effectiveness of these agents in much heavier and more poorly controlled patients than those studied in clinical trials. Patients achieved greater HbA1c reduction but lesser weight reduction in the liraglutide audit as compared with the exenatide audit. However, there were lesser insulin and TZD discontinuation but greater DPPIV inhibitor discontinuation in the liraglutide audit. Contributors might have learnt from the previous use of exenatide to avoid over-reduction of diabetes treatment when initiating liraglutide

Table 1: Baseline characteristics of patients in the ABCD nationwide exenatide and liraglutide audit

	Exenatide	Liraglutide	p-value
n	6717	2303	
Male (%)	54.9	54.1	0.491
Caucasian (%)	84.4	90.4	<0.001
Age (yrs)	54.9 (10.6)	55.4 (11.2)	0.033
Diabetes duration (yrs)	8 (5-13)	9 (5-13)	0.424
HbA1c (%)	9.47 (1.69)	9.32 (1.72)	0.001
Weight (kg)	113.8 (23.4)	111.1 (23.0)	<0.001
BMI (kg/m^2)	39.8 (8.0)	39.1 (7.5)	<0.001
Single oral therapy (%)	21.6	12.0	<0.001
Dual oral therapy (%)	27.6	28.1	0.709
≥3 oral therapy (%)	6.5	17.9	<0.001
On insulin (%)	33.9	39.8	<0.001

Results quoted as mean (SD) and median diabetes duration (inter-quartile range)

5 Using turning technologies "turning point" to assess FY1 doctors confidence and ability when recognising correct/incorrect insulin regimens.

Dr K S Higgins.
Leicester Royal Infirmary.

"Turning Point" software is an interactive response system which allows trainees to respond to questions in an anonymous manner.

There is National concern regarding the safe use of insulin. Thirty FY1 doctors were questioned regarding whether they had completed a Safe Use of Insulin e-learning module, their confidence in prescribing insulin and undergraduate training/exposure to inpatient diabetes.
Trainees were shown 8 insulin regimes and asked to comment if appropriate.
They then had 30 min presentation on the safe use of insulin. They were re-presented with the 8 insulin regimes and the question was repeated - Do you feel confident reviewing/prescribing insulin doses? Yes or No

Results - 28% had not undertaken an e-learning module. 42% had undertaken an undergraduate attachment in Diabetes and 91% said their undergraduate training in Inpatient Diabetes was unsatisfactory. Despite 72% having undertaken e-learning 100% of the FY1 doctors did not feel confident reviewing/prescribing insulin.
Before the presentation 11-67% FY1 doctors identified appropriate regimes. This increased to 52-86% following the presentation.
When asked again whether they felt confident prescribing/reviewing insulin doses 55% responded Yes.
Comments: "Excellent presentation method, very good way of testing our knowledge, need more insulin teaching at Leicester Medical school !!!, more of this!"

Summary
Turning Point provided an anonymous, "safe" method of assessment.
Undergraduate training – most FY1 doctors said undergraduate training did not prepare them for managing inpatients with diabetes. This is not surprising as <50% underwent an undergraduate diabetes attachment. In Leicester up to 25% of inpatients have diabetes. We need to look closely at how Inpatient Diabetes Care is taught within the Undergraduate Curriculum. There should be learning module on Inpatient Diabetes which can be applied in any speciality.
E-learning – 28% of this group had not completed e-learning. Of 72% completing the module none were confident managing insulin.

We need to review our teaching materials and look at pre-requisites to gaining not only confidence but competence in insulin management. We need an approach that uses e-learning (accessible), face to face teaching in a "safe" environment and practical application. Trainees should be reflective and they should discuss cases with the diabetes team. They should gather evidence of competence within their portfolios. The task we face is how we can support all our junior doctors in gaining the knowledge, skills and confidence to use insulin competently and safely.

6 Primary biliary cirrhosis presenting with profound hypercholesterolaemia requiring plasmapheresis.

Wong ML (1), Raghavan R (2), Hedger N (3), Ellis RD (4), Meeking DR (4), Albon L A(4).
(1) Royal Bournemouth Hospital; (2) Musgrove Park Hospital Taunton; (3) St Richards Hospital, Chichester; (4) Queen Alexandra Hospital, Portsmouth.

Presentation
A 39 year old lady presented with profound hypercholesterolaemia of 83mmol/l, triglycerides 16.3mmol/l (NR 0.6-1.5) before developing symptoms consistent with primary biliary cirrhosis (PBC) and biochemical cholestasis: alkaline phosphatase(ALP) 1589iu/l (NR30-95), aspartate aminotransferase(AST) 220iu/l (NR12-40) and bilirubin 58micromol/l (NR3-20).
Her anti-smooth muscle and anti-mitochondrial antibodies were moderately positive. Liver biopsy showed florid inflammatory activity and moderate fibrosis consistent with primary biliary cirrhosis.

Management
She required urgent plasmapheresis due to risk of hyperviscosity syndrome. Ursodeoxycholic acid and cholestyramine were commenced. Her lipid levels and liver function tests progressively improved with regular plasmapheresis. Low dose statin was introduced eighteen months later. She stopped regular plasmapheresis after three years. Six years from presentation, she remains well with stable lipids (TC 5.6) and LFTs (ALP 205, AST32).

Discussion
PBC causes chronic cholestasis and destruction of intrahepatic bile ducts. Patients with PBC often have marked secondary hypercholesterolaemia. As hepatic injury progresses, LDL receptors in the liver are progressively lost, resulting in failure to clear LDL cholesterol. Paradoxically, patients with PBC and hypercholesterolaemia are probably not at increased risk of atherosclerosis although larger studies are required.
Plasmapheresis is used as treatment for severe hypercholesterolaemia and other autoimmune conditions. In our case, it eliminates LDL-cholesterol, lowers viscosity and removes other unknown pruritogenic substances leading to improvement of symptoms. It probably has an immune-corrective action by its removal of autoantibodies.

7 Post natal blood sugar assessment of patients with gestational Diabetes Mellitus.

Dr N M Hewapathirana, Dr P Mansell.
Dept of Diabetes & Endocrinology, QMC, Nottingham University Hospitals Trust.

Introduction: In our unit, as in many centres in the UK, post natal assessment of women with Gestational Diabetes Mellitus (GDM) is undertaken using an oral Glucose Tolerance Test (GTT) at 6 weeks post partum and then annual fasting plasma blood glucose (FBG). The American Diabetes Association also recommend reclassification of maternal glycemic status by a GTT at least 6 weeks after delivery. By contrast, the current NICE guidelines (CG 63 March 2008) recommend simply a FBG at the 6-week postnatal check, then annually. The objective of this audit was to see whether doing a GTT identifies more women with abnormal glucose levels than does the FBG alone.

Methodology: A retrospective case study of 50 patients with GDM who underwent 6 weeks post natal GTT.

Results: Of the 50 cases that underwent GTT, 1 had a FBG of 6.3 mmol/l and a 2hr value of 11.6 (Type 2 Diabetes Mellitus – T2DM). 1 had a raised FBG of 8.2 (T2DM). Total 2 cases of Type 2 DM. (4%).
3 other women (6%) had 2 hr blood glucose values of 8.5, 9.5, and 9.7 indicating Impaired Glucose Tolerance (IGT).

Discussion: GDM constitutes a risk factor for Type 2 diabetes. Measuring FBG is simple whereas GTT is more expensive, time consuming . Although NICE recommends FBG at 6 weeks as a screening tool, this audit showed that using FBG alone may miss cases of diabetes and IGT patients in whom we could further enhance education and health measures. A bigger study may highlight the significance of these numbers.

8 EXENATIDE can achieve significant weight loss in steroid induced diabetes.

Dr Hisham Nizar.
Chelsea & Westminster Hospital.

Exenatide is now commonly used in diabetes for both improving glycaemic control and aiding weight reduction. We present a case where exenatide has contributed to significant weight loss and resolution of steroid induced diabetes.

A 44 year old man was diagnosed with sarcoidosis in 2003 following an acute presentation of uveitis secondary to sarcoidosis. By September 2006 he also had progressive respiratory disease requiring long term prednisolone (dose between 20-30mg for over 1 year) with additional pulses of methylprednisolone. Steroid induced diabetes was diagnosed in June 2007 and he was referred to secondary care for help with poor glycaemic control. At this point he weighed 116.5kg with a BMI 35 and was using prednisolone 20mg. His medications were metformin 500mg three times a day and gliclazide 80mg twice daily. HbA1c was elevated at 8.6%.

In January 2008 to help weight reduction and optimise glycaemic control he was commenced on exenatide 5ug twice daily. He weighed 126kg and HbA1c was 8.1%. This resulted in dramatic weight loss. By April 2010 he weighed 91.5kg. Exenatide was stopped and 4 months later he remained the same weight despite taking prednisolone 5mg, azathioprine 50mg, and metformin 1g twice daily. Hba1C was 5.6%.c All diabetes medication was stopped and an OGTT

performed in November 2010 showed resolution of the diabetes to Impaired Glucose Tolerance.

This suggests exenatide may be a particularly useful therapeutic agent in steroid induced diabetes.

9 Management of hyperglycaemia in acute myocardial infarction (MI) in diabetic patients.

Williams H, Gallen IW, Brain HPS.
Buckinghamshire Healthcare, Wycombe Hospital.

Background: Evidence is conflicting regarding the optimum management of hyperglycaemia in acute MI, however hypo- and hyperglycaemia are associated with adverse outcomes. Local guidelines recommend the routine use of insulin sliding scale for the first 24 hours, with subsequent referral to the Diabetes Team for consideration of s/c insulin treatment.

Aims: To audit clinical practice against trust guidelines, and to evaluate blood glucose control achieved in patients with diabetes presenting with MI.

Methods: Retrospective analysis of patients who were admitted over a 6 month period and coded as diabetes and acute MI.

Results: Insulin sliding scales were used in a minority of patients (8 / 36). They were used more frequently in patients presenting with STEMI (4 / 7) than NSTEMI (4 / 29), and more frequently in patients presenting with a high admission blood glucose (14.8 mmol/l vs 9.8 mmol/l). Blood glucose control for the first 24 hours of admission was not significantly different whether a sliding was used or not (8.3 vs 8.9 mmol/l). A minority of patients were referred to the diabetes team (8 / 36), and no patients were newly commenced on s/c insulin.

Conclusions: Adherence to Trust guidelines was poor. Prescription of a sliding scale in the first 24 hours had no impact on glycaemic control. In view of this and conflicting evidence from clinical trials our guidelines were rewritten recommending good glycaemic control in the first 24 hours and the 3 months following MI but not necessarily requiring a sliding scale or s/c insulin.

10 The development of a hyperglycaemia management pathway to safely reduce hospital admissions.

Roselle Herring, Claire Pengilley, Helen Hopkins, Beverley Tuthill, Sue Davidson.
Royal Surrey County Hospital.

Background
Hyperglycaemia is a common acute medical presentation. Our aim was to introduce a hyperglycaemia management pathway as an admission avoidance initiative. We report on the first phase, the evaluation of clinical practice.

Method
All patients presenting to the medical assessment unit (MAU) with a blood glucose meter reading >11.1 were identified. 11.1 was based on the World Health Organisation diagnostic criteria for diabetes. Data was collected on acute assessment, diagnosis, management and

follow-up arrangements. Key assessment requirements included a plasma glucose, urinary ketones and urea and electrolytes

Results

72 patients were identified over 159 days. Concerns about hyperglycaemia assessment led to an interim analysis. 56% of patients had urinary ketone analysis and 42% had a plasma glucose result. Nursing staff and medical staff were re-educated on trust assessment recommendations. Urinary ketone analysis increased to 62%.

All patients were admitted for a minimum of one night. 63% were started on an insulin infusion. 17 patients had a new or previous diagnosis of type 1 diabetes and 55 type 2 diabetes. Hyperglycaemia was the primary admitting diagnosis in 32 patients.

Retrospective analysis of 29 patients (40%) showed admission may have been safely avoided in 24% of cases when following the hyperglycaemia management pathway. Patients with type 2 diabetes had the greatest discharge potential.

Conclusion

Hyperglycaemia assessment is essential in providing information for safe discharge. To improve current standards, blood ketone monitoring has been introduced. We have entered the second phase; introduction of the hyperglycaemia management pathway and are prospectively evaluating admission avoidance