

## **Gestational Diabetes Mellitus: NICE for the US? A comparison of ADA and ACOG guidelines with the UK NICE guidelines**

Running head: GDM and NICE

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*Objective:* To compare recent US and United Kingdom (UK) guidelines on gestational diabetes (GDM)

*Research Design and Methods:* The guidelines from the American Diabetes Association, American College of Obstetrics and Gynecology and the National Institute of Health and Clinical Excellence (NICE) in the UK were collated and compared using a general inductive approach

*Results:* There are substantial differences in recommendations between the UK and US guidelines. Of particular note are the reduced sensitivity of the early and later antenatal and postnatal screening and diagnostic criteria. NICE undertook a cost effectiveness analysis using lower prevalence estimates and limited outcomes and still showed screening for GDM to be cost-effective.

*Conclusions:* The latest NICE recommendations appear to reduce access to proven, cost-effective management of GDM, an issue relevant in the current US health policy debate.

In an age of increasing patient empowerment, the diagnosis of gestational diabetes mellitus (GDM) provides a woman with the knowledge that her baby has an increased chance of complications before, during and after birth (including an increased chance of obesity and/or diabetes in the future); that she herself has an increased chance of future diabetes and that future pregnancies are more likely to be complicated by diabetes (gestational or otherwise) (1). Such knowledge could be harmful if there were no opportunity to reduce these risks. However, there is now good evidence that obstetric and neonatal complications are less with intensive management (2) and that future diabetes can be delayed and possibly avoided (3). There is even evidence that postnatal depression may be less after diagnosis and management of GDM than among untreated women (2). To further the recent debate on screening and detection of GDM (4,5) we have compared the different approaches to the detection and management of GDM recommended by the American Diabetes Association (ADA) (6), American College of Obstetrics and Gynecology (ACOG) (7) and the National Institute of Health and Clinical Excellence (NICE) in the United Kingdom (8).

NICE is funded wholly by the UK Government to provide “national guidance on promoting good health and preventing and treating ill health”. NICE assessments are multidisciplinary and include both research and health economic considerations, the latter giving a National Health Service, rather than societal, perspective. The NICE clinical guidelines for Diabetes in Pregnancy (8) were initially published in March 2008, revised in July 2008 and a brief critique was published in September 2008 (9).

## METHOD

The guidelines from the 3 organisations were collated and compared using a general inductive approach. Each guideline category has been treated as a “theme”.

## RESULTS

Table 1 compares the NICE, ADA and ACOG guidelines for Diabetes in Pregnancy (6-8). There are substantial differences in recommendations between the UK and US guidelines in most categories.

Unlike NICE, the ADA and ACOG guidelines do not include a cost-effectiveness component. NICE used a single cost effectiveness model addressing screening, diagnosis and treatment: the model was used to direct the guideline recommendations. Using the data from ACHOIS (2), NICE demonstrated that the screening, diagnosis and treatment of GDM are cost-effective.

## DISCUSSION

This comparison of NICE, ADA and ACOG guidelines has identified a number of key areas where the recommendations are markedly divergent. Of particular importance are:

**Screening:** The recent point-counterpoint (4,5) comprehensively debated whether screening for GDM should be selective (ie using risk factors) or universal (ie using blood tests). There was general agreement on the risk factors of importance, while the latter addressed the broader issues of complexity and long term benefits,. NICE recommendations exclude several risk factors, including some shown to be cost-effective. The NICE cost effectiveness analysis substantially understated the benefits of screening, since the basic decision tree structure omitted many avoidable downstream costs including some maternal morbidity (eg pre-eclampsia), neonatal morbidity (eg hypoglycaemia), long term maternal morbidity (eg preventable complications by

earlier diabetes diagnosis and intervention) and long term offspring risk (eg fetal morbidity if undiagnosed diabetes in a subsequent pregnancy; possibly future obesity and diabetes (10)).

The cost effectiveness analysis acknowledged that a large number of assumptions were made “owing to data limitations and methodological complexity” and that there was potential for underestimating the true costs and effects (by using a cohort excluding those with worse glucose control (2)). The published modeling showed that “universal screening” becomes more cost effective as the disease prevalence increases and used a sensitivity analysis with prevalence estimates of GDM ranging from 2-5%: actual GDM prevalence is now running at least 5 – 8% (1).

**Detecting undiagnosed Type 2 diabetes:** Women with undiagnosed Type 2 diabetes are significantly more prone to have babies with malformations and may have established diabetes complications (eg nephropathy, retinopathy) requiring close follow up to ensure prompt restoration of normoglycemia. NICE recommendations delay the time to testing and ignore important criteria (eg strong family history). Given the often asymptomatic nature of Type 2 diabetes and its potential to cause severe pregnancy complications, we consider that testing should be undertaken early in those at high risk, ideally as part of the first antenatal contact.

**Post natal testing:** The NICE dependence on FPG screening without performing an OGTT has been shown to reduce the sensitivity of identifying post-partum diabetes and IGT by 38-60% (11-12). In another study, 83% of those with IGT and 56% of those with diabetes would have been missed (13). The follow up of women with past GDM is becoming increasingly important, with their

excess risk of progression to Type 2 diabetes (1) and the secular trend for a shortening of time between GDM and the development of diabetes (14). Many of these women would have been diagnosed at OGTT on the 2 hour glucose alone, avoiding the risk of undiagnosed diabetes at the next pregnancy (should one occur). Moreover, without an OGTT, IGT can not be identified. This is particularly important given clear evidence that progression to subsequent diabetes can be reduced by over 50% (3).

Amongst increasingly empowered, knowledgeable and “internet savvy” patients, clinicians run the risk of having their management undermined by conflicting guidelines, making the implementation of clinical care substantially harder and more time consuming. The NICE guidelines are a relatively new addition to the scene, but appear to be the most minimalist in relation to screening and post-natal follow up (1). Fortunately, the completion of the Hyperglycemia and Adverse Pregnancy Outcomes (HAPO) study (15) now provides a large observational cohort which is being used to redefine diagnostic criteria for GDM in relation to adverse outcomes.

In conclusion, the comparison between NICE, ADA and ACOG guidelines has demonstrated significant differences in recommendations for the screening, diagnosis and management of GDM. Cost-effective management is a major issue in the debate on health care reform in the United States: the current NICE recommendations appear to reduce access to proven, cost-effective GDM management.

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Table 1 Comparison between NICE, ADA and ACOG guidelines for gestational diabetes

Item	ADA	ACOG	NICE
Who should be screened for GDM	Women at high risk of GDM should undergo GTT as soon as feasible. If found not to have GDM at initial screening, they should be retested between 24 and 28 weeks. Women of average risk should have testing undertaken at 24–28 weeks. Low-risk status requires no glucose testing.	Because only 10% of the population would be exempt from screening using the selective method, the ACOG suggests that screening all pregnant women (universal screening) may be a more practical approach.	BMI 30+ kg/m <sup>2</sup> , previous baby 4.5+kg, previous GDM, 1 <sup>st</sup> degree relative with diabetes, South Asian, black Caribbean, Middle Eastern Not included: age, other high risk ethnic groups, past impaired glucose tolerance (IGT), polycystic ovarian syndrome
What women should be told about screening and testing for GDM	Although uncomplicated GDM with less severe fasting hyperglycemia has not been associated with increased perinatal mortality, GDM of any severity increases the risk of fetal macrosomia.	Women with GDM are more likely to develop hypertensive disorders than women with out GDM. GDM increases the risk of fetal macrosomia In addition; women with GDM have an increased risk of developing diabetes later in life.	Most women respond to diet/exercise; some (10-20%) need other agents; if GDM is not detected, there is a small risk of birth complications such as shoulder dystocia; GDM may lead to more interventions
How screening for GDM should occur	Women with high risk of GDM, GTT as soon as feasible. If they are found not to have GDM at that initial screening, they should be retested between 24 and 28 weeks of gestation. Women of average risk should have testing undertaken at 24–28 weeks of gestation. Low-risk status requires no glucose testing.	Universal screening by 2-step method. It involves an initial test after administration of 50 g of glucose one -hour test followed by an GTT to confirm the diagnosis for patients with an abnormal initial result	75g 2 hour OGTT at 16-18 weeks if prior GDM; 24-28 weeks if risk factors.
Criteria for GDM	100 g glucose: Plasma glucose level: (2 or more time points need to elevated)  Fasting, > 5.3mmol/L 1-hour, > 10.0mmol/L;  2-hour, > 8.6mmol/L; (only 2h if 75 g of glucose used) 3-hour, > 7.8mmol/L	100g glucose Plasma glucose level: (2 or more time points need to elevated) Fasting >5.3mmol/L; 1-hour, > 10.0mmol/L; 2-hour, > 8.6mmol/L; 3-hour, > 7.8mmol/L	75g glucose Plasma glucose level: (1 or more time points need to elevated)  Fasting 7.0 mmol/l; 2 hour 7.8 mmol/l
Screening for undiagnosed T2DM	High risk of GDM should undergo GTT as soon as feasible	The diagnosis of diabetes recommended in the first half of	Early testing of blood glucose or OGTT for women with a history of

		pregnancy using 50-g, 1 hour screening test	GDM and/or IGT (18-20 weeks)
Targets for blood glucose control	Fasting whole blood glucose $\leq 5.3$ mmol/l 1-h postprandial whole blood glucose $\leq 7.8$ mmol/l 2-h postprandial whole blood glucose $\leq 6.7$ mmol/l	Plasma glucose level: Fasting, $\leq 5.3$ mmol/l 1-hour postprandial, $\leq 7.2$	Fasting 3.5-5.9 mmol/l 1 hour postprandial $< 7.8$ mmol/l. No HbA1c 2 <sup>nd</sup> /3 <sup>rd</sup> trimester
GDM antenatal management	All women with GDM should receive nutritional counseling. BMI $> 30$ kg/m <sup>2</sup> , a 30–33% calorie restriction to $\sim 25$ kcal/kg actual weight per day. Selection of pregnancies for insulin therapy can be based on measures of maternal glycaemia with or without assessment of fetal growth characteristics. Inadequate information to recommend oral hypoglycaemic agents	Nutritional intervention in women with GDM should be designed to achieve normal glucose levels to avoid ketosis. Hypoglycaemic therapy supported by ACOG: further studies recommended for glyburide. Insulin therapy based on measures of maternal glycaemia based on fasting, 1 and 2 hours postprandial	Low GI Diet, calorie restriction if BMI $27+$ kg/m <sup>2</sup> , moderate exercise, hypoglycaemic therapy (including metformin) after 1-2 weeks if lifestyle insufficient or Abdominal circumference $> 70^{\text{th}}$ centile at diagnosis
GDM intrapartum management	Delivery during the 38th week is recommended unless obstetric considerations dictate otherwise. Prolongation of gestation past 38 weeks increases the risk of fetal macrosomia without reducing cesarean rates	The timing of delivery in GDM remains relatively open. If estimated fetal weight of 4,500 g or more, cesarean delivery may be considered.	Induce/elective caesarean after 38 weeks if normally grown fetus; glucose monitoring hourly-target 4-7 mmol/l if higher-intravenous dextrose/insulin
GDM postpartum management	All patients with prior GDM should be educated regarding lifestyle modifications, including maintenance of normal body weight. Patients should be advised to seek medical attention if they develop symptoms of hyperglycaemia	Individuals at increased risk of T2DM (i.e obesity, increase age at the diagnosis of GDM) Should be counseled regarding diet, exercise, and weight reduction or maintenance to delay or prevent T2DM	Women should have blood glucose tested before discharge, be reminded of symptoms of hyperglycaemia, offered lifestyle advice and advised of risk of GDM in future pregnancy
GDM postnatal testing	If glucose levels are normal post-partum, reassessment of glycaemia should be undertaken at a minimum of 3-year intervals. Women with IFG or IGT in the postpartum period should be tested for diabetes annually	All women with GDM be screened at 6-12 weeks postpartum, either fasting blood glucose or 75 g GTT. If GTT/FBG normal assess every 3 years. Consider metformin in IFG and IGT.	FBG at 6 weeks (but not an OGTT) and annually thereafter