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## The Challenge to Deliver Cost Effective Care for Patients with Gestational Diabetes Mellitus

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### Abstract

The global rise in obesity and gestational weight gain, along with recent trials demonstrating improved pregnancy and neonatal outcomes associated with the treatment of mild hyperglycaemia, have resulted in a clinical challenge to deliver cost effective healthcare to manage the epidemic of Gestational Diabetes Mellitus (GDM). Whilst clinicians now have clear criteria by which to diagnose GDM, and the glycaemic targets to achieve, less clear are the pathways to achieve these outcomes in a cost effective manner. The value of using allied health providers such as dieticians compared to less trained patient educators, the effectiveness of individualised versus group dietician counselling, the role of antenatal investigations such as CTG and ultrasound, the degree of monitoring of maternal blood sugar level, the type of medications to complement dietary therapy, along with policies on delivery and postnatal care, all need to be refined through studies or audits. Having identified the problem and established diagnostic and treatment targets, the next challenge is to provide evidence-based, cost-effective care.

**Keywords:** Gestational diabetes mellitus; Gestational weight gain; Pregnancy; Cost effective; Public health

### Mini-review

The rising tide of global obesity and diabetes has seen Gestational Diabetes Mellitus (GDM) assume increasing public health significance. More than a third of pregnant women in the developed world present for care with a body mass index consistent with overweight or obesity [1-3]. Many pregnant women also have gestational weight gain in excess of Institute of Medicine recommendations [1-4]. These changes have seen global rates of GDM soar.

Until recently, the diagnosis and management of GDM was based upon expert opinion. Following publication of the Hypoglycaemia and Adverse Pregnancy Outcomes (HAPO) trial in 2008, it became possible to conduct trials and evaluate clinical service against outcomes that could be directly linked to pregnancy hyperglycaemia [5].

The HAPO trial of 23,316 women documented clear associations between hyperglycaemia at 24-28 weeks gestation and adverse maternal and neonatal outcomes [5]. Results revealed a continuum across which glycaemia levels were associated with adverse outcomes. In the absence of a categorical cut off, the International Association of Diabetes and Pregnancy Study Groups (IADPSG) panel recommended the diagnostic criteria should be blood sugar levels that were associated with an odds ratio of 1.75 for producing adverse outcomes compared to mean glucose levels [6].

Whilst no trial has specifically utilised these cut off points, randomised trials of intervention in women with mild hyperglycaemia in pregnancy have documented a broad range of benefits including

reductions in birth weight >90<sup>th</sup> centile, caesarean section, neonatal hypoglycaemia and cord C-peptide >90<sup>th</sup> centile [7-9].

Following an evaluation of data from available trials, authorities recommended new criteria to diagnose GDM (Table 1). These targets are based upon blood sugar levels following a 75 g Oral Glucose Tolerance Test (OGTT) performed between 24-28 weeks gestation. Treatment targets have also been refined in line with results from these published trials and expert opinion (Table 2)[7-11].

New diagnostic criteria for Gestational Diabetes*
Fasting Blood Sugar Level (BSL): >5.0 mmol/l
1-hour BSL: >10mmol/l
2-hour BSL: >8.4mmol/l
*Cut off points following a 75 gram oral glucose tolerance test performed between 24-28 weeks pregnancy
*One or more must be abnormal for a diagnosis of GDM

**Table 1:** Diagnosis of Gestational Diabetes Mellitus

New treatment targets for Gestational Diabetes
Fasting Blood Sugar Level (BSL): <5.1 mmol/l
1-hour BSL: <7.5 mmol/l
2-hour BSL: <6.8 mmol/l

**Table 2:** Treatment targets for Gestational Diabetes Mellitus

Unfortunately, achieving consensus in the diagnosis and treatment targets for GDM is only the starting point. Clinicians now face the challenge to deliver care for women whose pregnancy is complicated

with GDM so that therapeutic outcomes are achieved in a cost effective way.

Since the aim of care is to achieve glycaemic control, dietary interventions are key. However, dietary interventions range in price. The cheapest models provide women with a written pamphlet. The next step up would be models of care where a patient educator provides patients with written information and dietary counselling, through to group sessions with a qualified dietician, to repeated individualised sessions with a dietician at the extreme price range. The cost of these interventions ranges from US\$1 to US\$300 per patient [2]. A direct comparison of the relative efficacy of these differing approaches, with other factors controlled, has not occurred.

The next question is drug therapy. Fortunately, nearly 70% of patients with GDM can be managed with dietary intervention alone. However, the remaining patients require medication. Until recently this was exclusively administered as insulin, but in recent years Metformin has been substituted for insulin with comparable outcomes [12,13]. However, patients with high blood sugar levels usually benefit from insulin or combined therapy [13].

The type of monitoring required in pregnancy complicated by GDM is also unclear. Fetal cardiotocography and ultrasound have been utilised to manage pregnancy but their 'value add' in management is unclear [7-9].

Likewise, the ideal time to deliver patients whose pregnancy is complicated by GDM is subjected to debate. When fetal compromise is present, timing of delivery is dependent upon fetal factors. However, it is less clear whether a pregnancy complicated by GDM but subsequently managed with good glycaemic control and normal fetal growth should warrant induction or be left to await natural labour.

Postnatal management is also diverse. Some centers monitor babies for 48 hours with serial blood sugar levels whilst others are happy for expedited discharge.

Strangely the one intervention that has a substantiated evidence base, a postnatal OGTT performed between 6-12 weeks postpartum to detect women with type 2 diabetes, seems to slip through the practice net. Studies show up to 16% and 6% of women with GDM will have ongoing glucose intolerance or type 2 diabetes respectively by three months postpartum. Therefore, this patient population represents a cohort where early diagnosis and intervention could achieve benefits in terms of long term chronic disease morbidity [14]. Yet follow up is inconsistent [15].

Clinicians need to streamline the management of GDM to ensure interventions are effective and efficient. Streamlined pathways are required to deliver dietary advice, monitor glycaemia and monitor

fetal wellbeing without undue intervention secondary to antenatal tests and labour induction.

These are the next wave of challenges for clinicians.

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