

Impact on maternal and foetal outcomes of diagnosing gestational diabetes mellitus with HbA1c, fasted or random plasma glucose: A single centre retrospective cohort study

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Introduction

Gestational diabetes mellitus (GDM) is associated with significant maternal and foetal morbidity.

The gold standard Oral Glucose Tolerance Test (OGTT) requires a 2-hour wait between the first and second blood test. To reduce the risk of COVID-19 transmission during the COVID-19 pandemic, University Hospitals Sussex NHS Foundation Trust created a new testing regime. The OGTT was replaced with HbA1C and/or random plasma glucose (RPG) or fasted plasma glucose (FPG) to diagnose GDM.

This study aims to assess whether the new testing regime influenced foetal and maternal complications related to GDM, and whether it can play a more active role in diagnosing GDM in future practice.

Methods

A retrospective analysis of women with GDM, pre-COVID-19 (March 2019-2020) diagnosed with OGTT and during COVID-19 (March 2020-2021), diagnosed with HbA1c/FPG/RPG, was performed. The study group was at an English hospital Trust. Patients diagnosed with CBG testing were excluded.

Participant characteristics, testing regimes, treatment, maternal and foetal health outcomes were compared, and statistical analysis was conducted.

Risks associated with GDM

Obstetric Risks

Caesarean section
Obstructed labour
Episiotomy
Perineal tear
Pre-eclampsia

Fig. 1, Table 1: Obstetric risks associated with GDM, summarising potential complications during pregnancy.

Foetal/Neonatal Risks

Shoulder dystocia
Congenital malformation
Admission to Neonatal Intensive Care Unit
Macrosomia
Intrauterine death
Neonatal hyperglycaemia
Intrauterine hypoxia increasing the risk of:

- Foetal polycythaemia
- Hyperbilirubinemia
- Renal vein thrombosis

Fig. 2, Table 2: Foetal/neonatal risks associated with GDM. The table summarises potential adverse outcomes for the baby.

GDM testing protocol

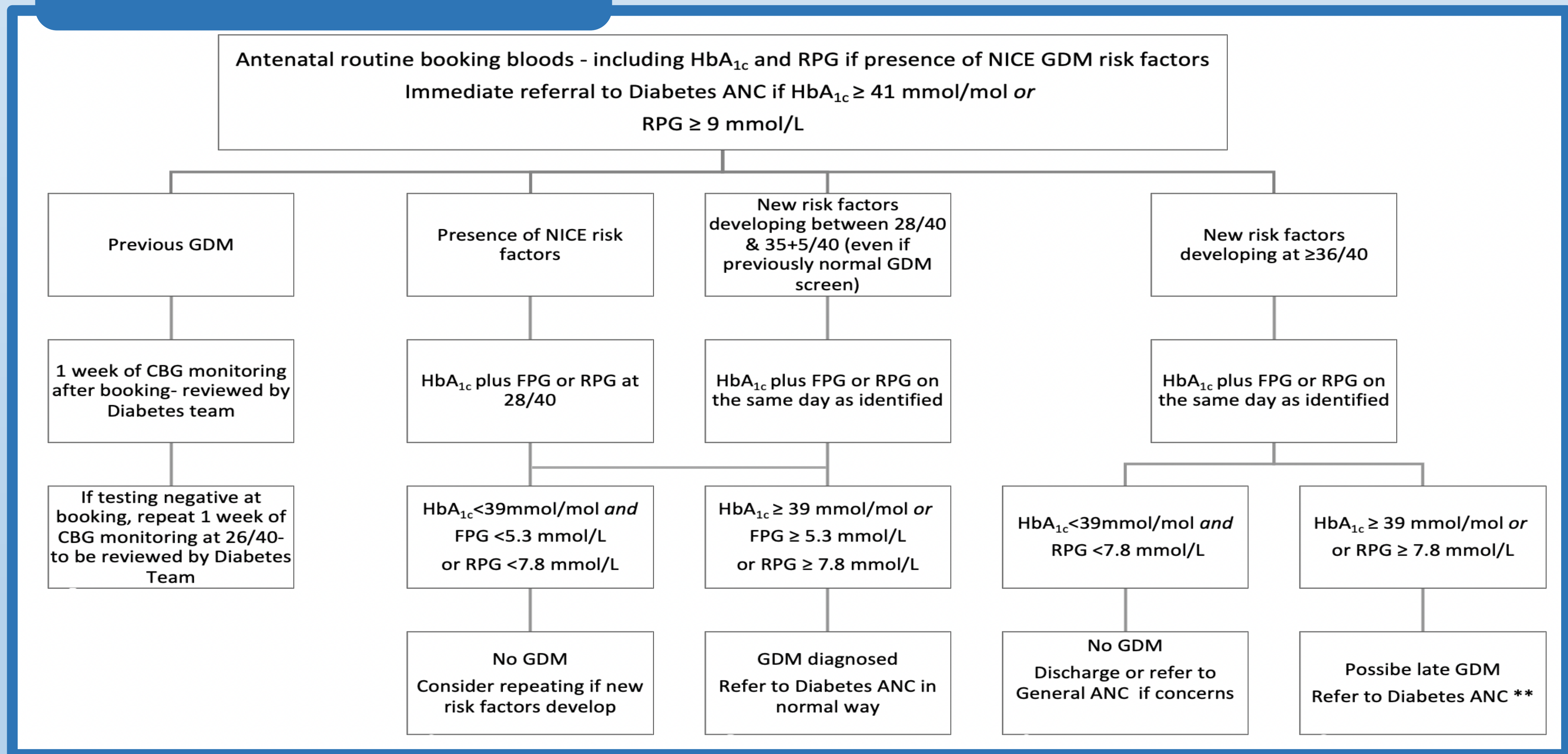


Fig. 3, Diagram 1: The testing protocol used by University Hospitals Sussex to diagnose GDM instead of the OGTT, during the COVID-19 pandemic, using HbA_{1c} and/or RPG or FPG. The presence of pre-existing National Institute for Health and Care Excellence (NICE) risk factors and NICE risk factors that develop during pregnancy, determine the gestation for testing.

The results show that the protocol has the same diagnostic rate as the OGTT, with no evidence of an increase in foetal or maternal GDM-associated complications, demonstrating this was a safe way to manage the diagnosis of GDM. This suggests the testing protocol could be used to diagnose GDM instead of the OGTT, which may be preferred and more practical for pregnant women, as the OGTT is an arduous testing modality. The results are also important for the management of GDM in future pandemics. Further longitudinal prospective cohort studies are crucial to optimise recognition and subsequent management of GDM.

Results

Finding	Pre-pandemic	Pandemic	Significance
Group size	100	83	
Rate	1 in 13.5 pregnancies	1 in 13.5 pregnancies	ns
Most common pre-pregnancy risk factor	BMI > 30Kg/m2	BMI > 30Kg/m2	ns
Management : Sole insulin therapy	25.8%	40.5%	p=0.038
Gestation at diagnosis	28.1 weeks	28.3 weeks	ns
Gestation at birth	38.2 weeks	38 weeks	ns
Foetal birthweight	3222.5g	3248.1g	ns
Diagnosis at first test	79%	59%	p=0.007
Foetal complications	7%	7.2%	ns
Induction	60%	72.5%	ns
Episiotomy	37.7%	10%	p<0.05
Korner method of delivery: spontaneous vertex	45%	48.2%	ns

Fig. 4, Table 3: Comparison of maternal and foetal characteristics and outcomes between the pre-pandemic and pandemic periods. Significance was determined using appropriate statistical tests, with p-values indicated where statistically significant differences were observed (ns = not significant).

Key Findings

- Women were more likely to be diagnosed at the first test pre-pandemic
- Sole insulin therapy was used more frequently during the pandemic
- The majority of women had labour induced
- No significant difference in rate, gestation at diagnosis and birth, risk factors indicating testing, participant characteristics and birth weight
- No significant difference in foetal birth complications
- No significant difference in all other maternal birth complications
- No cases of stillbirth or neonatal death in either group

Discussion