

Alternative screening protocols may miss most cases of gestational diabetes mellitus during the COVID-19 pandemic

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Australian professional bodies have recommended measurement of fasting plasma glucose at 24-28 weeks gestation, instead of the gold standard oral glucose tolerance testing, to diagnose gestational diabetes mellitus during the COVID-19 pandemic. Using a retrospective cohort of 16,169 women, we found that this approach would miss about 50-70% of diagnoses.

In Australia, gestational diabetes mellitus (GDM) is diagnosed by 75g oral glucose tolerance test (OGTT). The diagnostic criteria are: fasting plasma glucose (FPG) \geq 5.1 mmol/L; 1-hour glucose \geq 10.0 mmol/L; and/or 2-hour glucose \geq 8.5mmol/L.^{1,2} International consensus favours OGTT over single measures of glucose because, in the pivotal HAPO study, hyperglycaemia at each timepoint was independently associated with adverse outcomes, individual measures were not well-correlated with one another, and no single measure was clearly superior in predicting adverse outcomes such as birthweight above the 90th percentile, shoulder dystocia and pre-eclampsia.^{2,3}

To reduce contact time at pathology collection centres during the COVID-19 pandemic, measurement of FPG alone has been advocated.^{4,5} One guideline advised that a result $<$ 4.7 mmol/L may not merit follow-up OGTT.⁴ Another advised diagnosing GDM by stand-alone FPG \geq 5.1 mmol/L.⁵

To determine the proportion and characteristics of GDM cases that would be missed by alternative criteria, we extracted the results of all obstetrician-referred OGTTs performed by our private community-based laboratory between January 2017 and April 2020. Analysis, including determination of Wilson-Score confidence intervals (CI), was with SAS 9.4 (SAS Institute Inc., Cary, NC, USA).

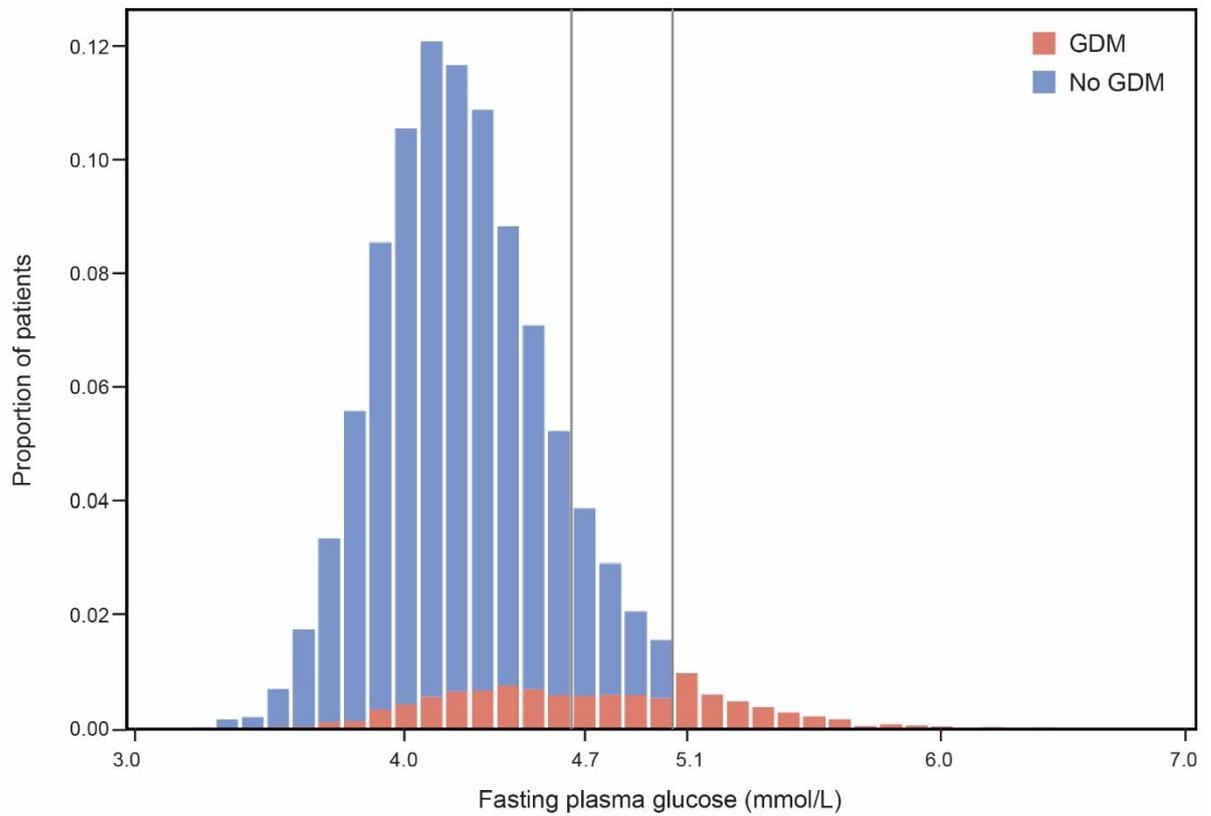
Of 16,169 patients, 1,790 (11.1%) were diagnosed with GDM by OGTT. A rule-out threshold of FPG < 5.1 mmol/L would have resulted in 1,202 cases (67%; 95% confidence interval (CI): 65%-69%) being missed, and a threshold of < 4.7 mmol/L would have resulted in 831 cases (46%; 95% CI: 44-49%) being missed (Figure). Women with GDM and normal fasting glucose did not have significantly lower 1- or 2-hour concentrations than those with increased fasting glucose (data not shown).

Missing the diagnosis of GDM exposes women and their newborns to significant risks, including birth weight above the 90th percentile, primary caesarean delivery, neonatal hypoglycaemia, premature delivery, shoulder dystocia or birth injury, intensive neonatal care, hyperbilirubinemia and preeclampsia. Use of fasting glucose to screen for GDM would miss a large proportion of cases, with the potential for significant harm to mothers and offspring. Clinicians must recognise the substantial limitations of stand-alone FPG so that pregnant women can be adequately counselled and, if opting out of OGTT, considered for careful monitoring for consequences of undiagnosed GDM such as accelerated growth or polyhydramnios. In regions without significant community spread of COVID-19, modifying sample collection procedures to ensure strict physical distancing and having dedicated collection centres for vulnerable populations may be better than using deficient diagnostic criteria.

References:

1. Nankervis A, McIntyre HD, Moses R et al. ADIPS consensus guidelines for the testing and diagnosis of gestational diabetes mellitus in Australia. Sydney: Australasian Diabetes in Pregnancy Society (ADIPS), 2013 (updated 2014 Nov). <http://www.adips.org/downloads/ADIPSConsensusGuidelinesGDM-03.05.13VersionACCEPTEDFINAL.pdf> (accessed Apr 2020).
2. International Association of Diabetes and Pregnancy Study Groups Consensus Panel, Metzger BE, Gabbe SG et al. International association of diabetes and pregnancy study groups recommendations on the diagnosis and classification of hyperglycemia in pregnancy. *Diabetes Care* 2010; 33: 676-682.
3. HAPO Study Cooperative Research Group, Metzger BE, Lowe LP et al. Hyperglycemia and adverse pregnancy outcomes. *N Engl J Med* 2008; 358: 1991-2002.
4. Diagnostic testing for gestational diabetes mellitus (GDM) during the COVID 19 pandemic: antenatal and postnatal testing advice. Sydney: Australasian Diabetes in Pregnancy Society (ADIPS), 2020. https://www.adips.org/documents/RevisedGDMCOVID-19GuidelineFINAL30April2020pdf_000.pdf (accessed Jun 2020).
5. COVID-19 and gestational diabetes screening, diagnosis and management. Melbourne: Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG), 2020. <https://ranzcog.edu.au/news/covid-19-and-gestational-diabetes-screening,-diagn> (accessed Apr 2020).

Figure: Distribution of fasting glucose results at 24 - 28 weeks gestation in patients with (n=1,790) and without (n=14,379) gestational diabetes mellitus (GDM)



The vertical grey lines denote thresholds below which new guidelines propose that oral glucose tolerance testing is not required during the COVID-19 pandemic.