

# What impact would changing the diagnostic criteria for gestational diabetes have on our service?

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## Introduction and Rationale

There is no clear consensus on which Oral Glucose Tolerance Test thresholds to use for the diagnosis of Gestational Diabetes Mellitus (GDM), with a number of organisations using different diagnostic criteria.<sup>1-3</sup> At The Dudley Group NHS Foundation Trust (DGOH), women are diagnosed with GDM if their fasting or 2-hour plasma glucose is at least 6.0 or 7.8mmol/L respectively. There is a positive correlation between maternal hyperglycaemia and perinatal morbidity, including high birth weight, neonatal hypoglycaemia, neonatal hypersulinaemia, and primary caesarean delivery.<sup>3-8</sup> Changing DGOH's diagnostic criteria could change the number of positive diagnoses, with both economic and health implications. Any criteria used must thus be evidence-based.

## Data Collection

A literature review identified nine different criteria for diagnosing GDM and the evidence behind them in terms of perinatal outcomes. A further search was performed to evaluate the evidence behind these criteria in terms of health outcomes. OGTT results for all women (127) screened at DGOH for GDM between 01/09/13 to 04/10/13 were collected. One patient was excluded because her test was abandoned.

## Methods

We calculated complication rates at each glucose interval from the HAPO study's number of positive outcomes<sup>3</sup> (Figures 4 & 5 - purple, blue, red and green). We mapped these complication rates onto cumulative incidence rates for each glucose level found at DGOH (black dotted). Six (of the nine) GDM criteria were used to simulate different rates of GDM amongst the sample of screened DGOH patients (Figure 3 and Figures 4 & 5 orange dotted). Three criteria (OSAM, NDSG and CAAC) were excluded because their diagnostic thresholds are based on using 100g of glucose during the OGTT (Figure 2).<sup>1</sup>

## Results

Figure 1  
DGOH Fasting and 2 Hour OGTT plasma glucose interval incidence rates

Fasting plasma glucose interval (mmol/l)	Incidence rate (%)
<4.2	30.2
4.2-4.4	30.2
4.5-4.7	19.8
4.8-4.9	5.6
5.0-5.2	4.8
5.3-5.5	0.8
5.6+	8.7

2 hour OGTT plasma glucose interval (mmol/l)	Incidence rate (%)
<5.1	27.8
5.1-6.0	31.0
6.1-6.9	23.0
7.0-7.7	6.3
7.8-8.7	4.8
8.8-9.8	4.0
9.9+	3.2

Figure 2  
Adapted from reference 1

Diagnostic Criteria	Abbreviation	Glucose Dose for OGTT (g)	Fasting plasma glucose diagnostic threshold (mmol/l)	OGTT 2 hour plasma glucose diagnostic threshold (mmol/l)	Number of criteria needed for positive result
National Diabetes Data Study Group	NDSG	100	5.9	9.2	2
Carpenter and Coustan	CAAC	100	5.3	8.6	2
American Diabetes Association	AMDA	75	5.3	8.6	2
O'Sullivan and Mahan	OSAM	100	5.0	8.1	2
European Association for the Study of Diabetes	EASD	75	6.0	9.0	1
Australasian Diabetes in Pregnancy Society	ADPS	75	5.5	8.0	1
World Health Organisation	WHO	75	7.0	7.8	1
National Institute for Health and Care Excellence	NICE	75	7.0	7.8	1
The International Association of the Diabetes and Pregnancy Study Groups	IADP	75	5.1	8.5	1
The Dudley Group NHS Foundation Trust	DGOH	75	6.0	7.8	1

Figure 3  
Percentage of screened patients diagnosed positive for GDM under each criterion

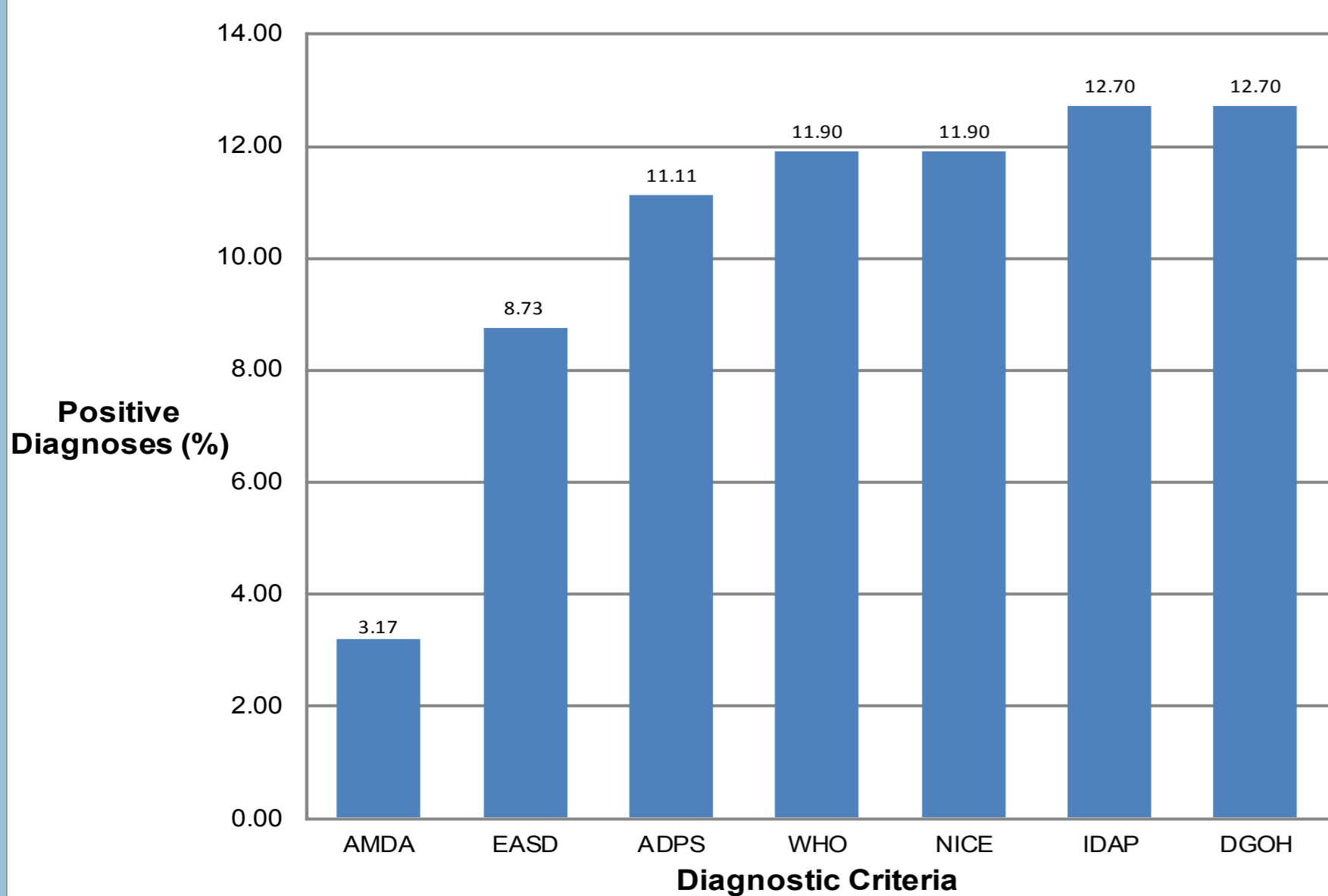


Figure 4  
Complication Rates at Differing Fasting Plasma Glucose Levels AND Fasting Plasma Glucose Levels in DGOH's Screened Population (cumulative)

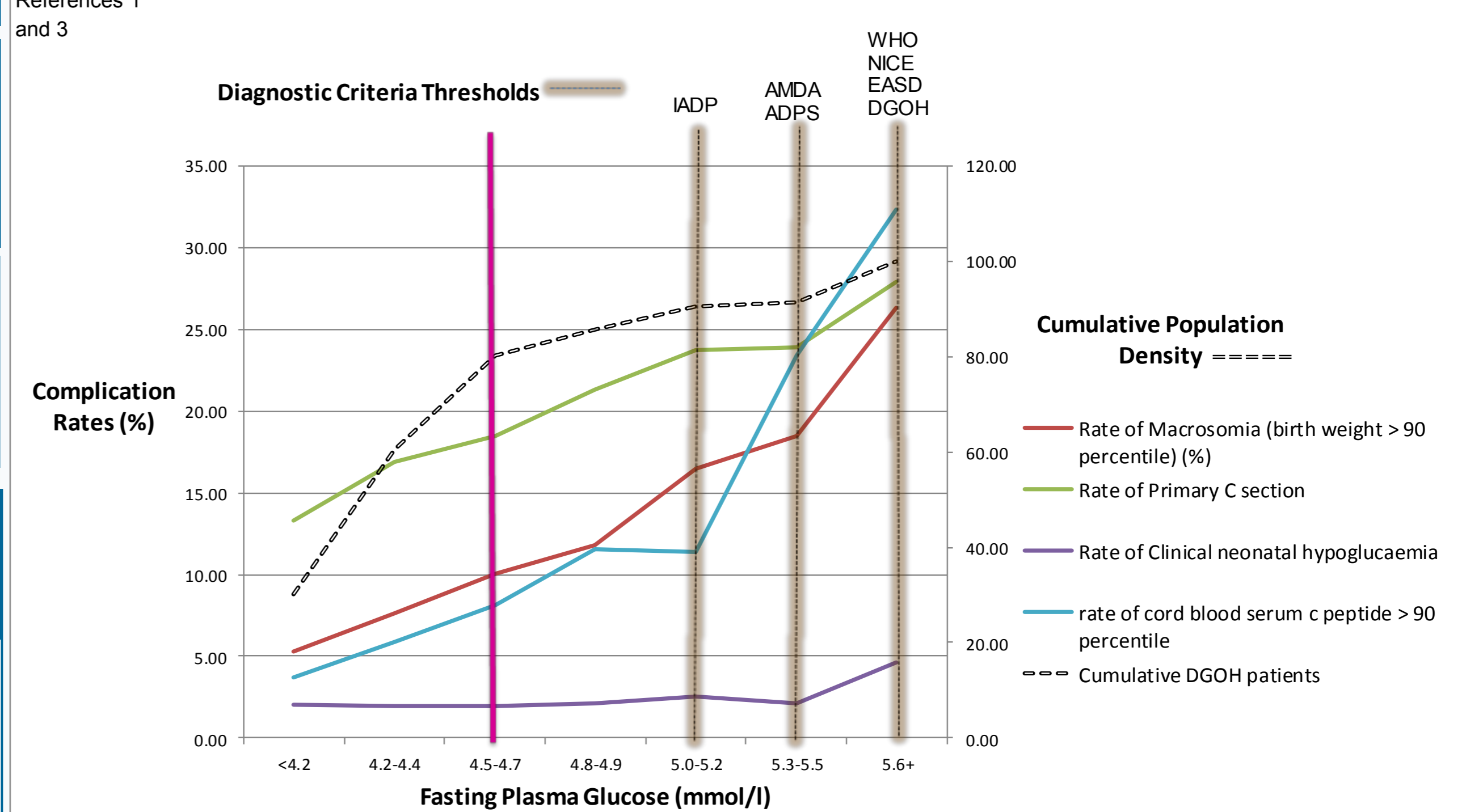
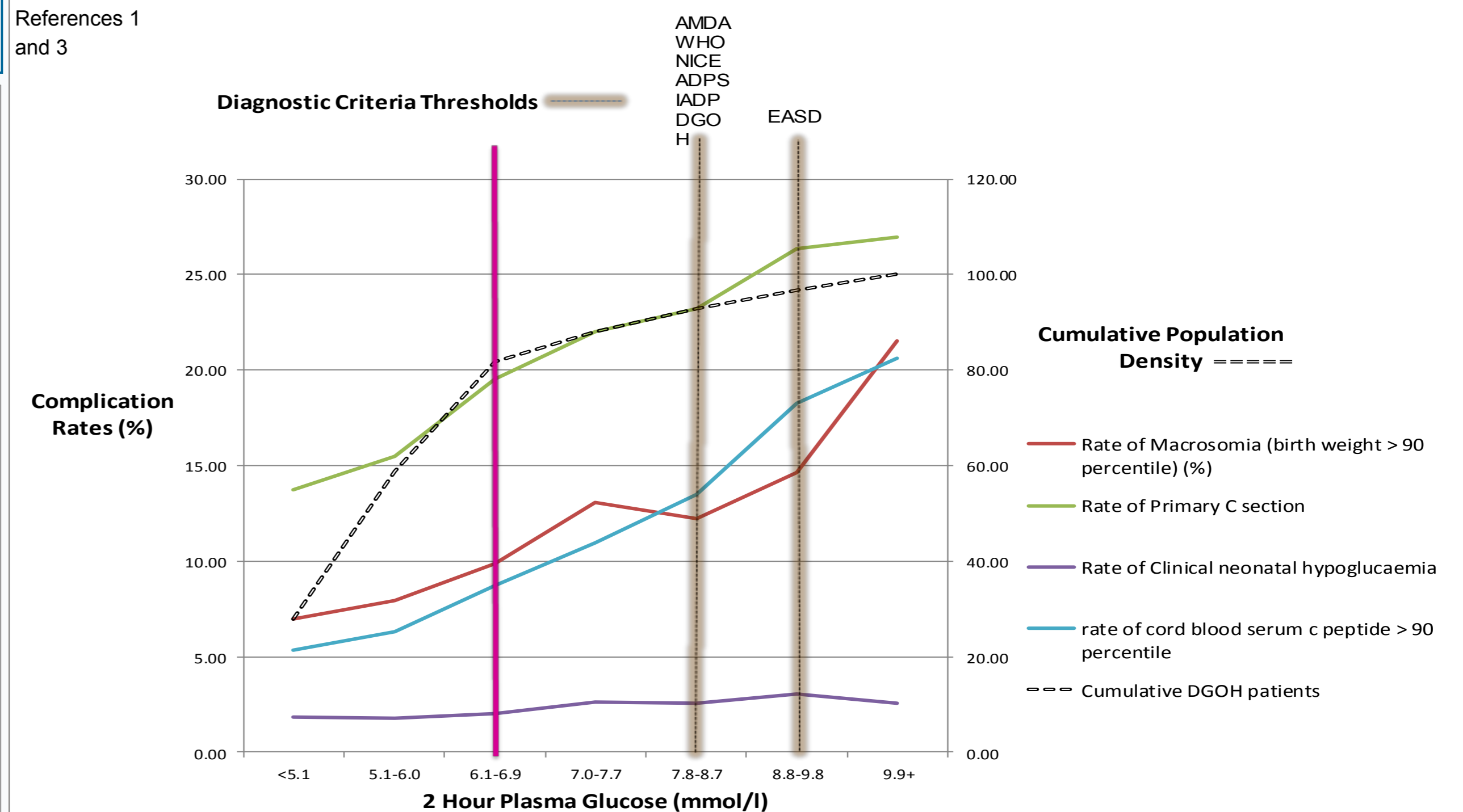


Figure 5  
Complication Rates at Differing 2 Hours OGTT Plasma Glucose Levels AND 2 Hour OGTT Plasma Glucose Levels in DGOH's Screened Population (cumulative)



## Analysis and Discussion

### Where to set the diagnostic thresholds?

Lowering the diagnostic criteria will increase positive diagnoses, but may decrease complication rates. However, there is no single threshold at which all complication rates drastically change, so no obvious useful diagnostic threshold. Eg Figure 5 shows that EASD use a 2 hour threshold of 9.0mmol/l. Above this, there is a sharp rise in macrosomia rates. Below this, however, primary C section rates increase dramatically (at levels which other criteria such as WHO, consider positive).

### Advantages and Disadvantages of changing diagnostic criteria?

At fasting plasma glucose levels of 4.5-4.7mmol/l, and a 2 hour levels of 6.1-6.9mmol/l, cumulative population density plateaus. Lowering diagnostic criteria to these points (Figures 4 and 5 pink vertical line), would not greatly increase diagnosis rates (80% of DGOH patients had glucose levels below this threshold) but may have a material effect on complication rates. Increased diagnoses may increase burdens on healthcare services and patient experiences. These costs may be outweighed by decreased complication rates, requiring less service provision and having less of an affect on patients' lives.

### Limitations

(1) Setting a specific diagnostic threshold is difficult because previous research has grouped complication rates into wide glucose ranges. (2) This audit could not consider the costs of complications vs. positive diagnoses. (3) HAPO was a large multinational study;<sup>3</sup> results may not reflect complication rates in DGOH patients.

## Conclusions and Recommendations

It is not possible to recommend whether the DGOH diagnostic criteria for GDM should be changed. It is not possible to assess the impact that changing the criteria will have on DGOH's overall service. The graphs show how GDM diagnosis rates change at different thresholds, but the affect on complication rates is uncertain due to this audit's limitations.

## References

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