Screening for diabetes in pregnancy in a regional area with a high Māori population

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ABSTRACT

AIMS: To identify and document factors associated with screening for diabetes in pregnancy in a regional area with a high Māori population in New Zealand.

METHODS: An audit was undertaken of routine hospital data collected from all 656 women who gave birth, between June and December in 2013 and 2014, in two Mid-North Island hospitals in the Bay of Plenty region.

RESULTS: Of the 656 woman who gave birth during these periods, only 416 (63%) were screened for diabetes in pregnancy, including 390 (60%) for gestational diabetes mellitus later in pregnancy. After controlling for age, screening was less common in Māori (56%) compared with European women (76%). After adjusting for ethnicity, women aged 35–40 years were more likely to be screened compared with women aged 25–29 years (77% versus 61%; p=0.02). Screening was associated with longer hospital stays following birth, with screened women more likely to stay >5 days than <1 day, compared with unscreened women (84% versus 56%; p<0.0001). Screening was significantly higher in 2014 than 2013 (68% versus 58%; p=0.008).

CONCLUSIONS: Greater effort is required to increase screening, especially for Māori women who have increased risk of type 2 diabetes and gestational diabetes mellitus and of poorer outcomes.

Gestational diabetes mellitus (GDM) is increasing globally.[1] Its prevalence varies depending on the ethnic make-up of populations and screening criteria adopted, with 2–6% prevalence reported for pregnancies in Europe,[1] 7% in the US,[2] and up to 20% in high risk populations,[3] including New Zealand.[4] GDM is strongly associated with body mass index (BMI), with the prevalence being 13% for women whose BMI is >25–39kg/m^2 and 21% for those >40kg/m^2.[5] Over 10% of all New Zealand births (61,038 in 2015)[6] occur at National Women's Hospital (Auckland) and in 2014, 40% of women who delivered at National Women's were overweight (BMI >25), 17% were obese, 9.8% were diagnosed with GDM, which was higher for Indian (21%), Asian (16%), Pacific (11%) and Māori (6%) women compared with European women (5%).[4] Another important driver of increasing GDM cases is the higher fertility rates for Pacific and Māori women, which are 2.7 and 2.5 births per woman respectively, compared with 1.9 for European and 1.7 for Asian women.[7]

As a consequence of the increasing prevalence and importance of GDM, the New Zealand Ministry of Health (MoH) recommends that all pregnant women have glycosylated haemoglobin (HbA_{1c}) levels tested in early pregnancy to identify undiagnosed type 2 diabetes, and to inform the screening sequence later in pregnancy.[8] Diagnosis for GDM is based on the original New Zealand Society for the Study of Diabetes criteria[9] of a fasting glucose ≥5.5mmol/L or two-hour oral glucose tolerance test (OGTT) ≥9mmol/L.[8] If glucose is 7.8–11mmol/L for the one-hour Polycose test, women are advised to have an OGTT.[8]

There is a paucity of information on the prevalence of screening for diabetes in pregnancy in New Zealand.[10] More recently, screening in Counties Manukau, South Auckland, had increased to approximately 80% in 2011[11] and 85% in 2013, with a reported 6% prevalence of GDM.[12] In 2011, National Women's reported screening rates for GDM >90%.[5] However, there do not appear to be any previous published

reports on screening for diabetes in pregnancy from regional areas.

The Bay of Plenty District Health Board (DHB) serves a population of 222,235 people and has a greater proportion of older people, Māori people (25% compared with 16% nationally),[13] and has more people categorised as most deprived socioeconomically (24%) compared with the national average (20%).[13,14] The aim of this paper is to report the prevalence of screening for diabetes in pregnancy and to identify associated risk factors in a regional area with a high Māori population.

Methods

An audit was undertaken of routinely collected hospital data from 656 women who gave birth over two six-month periods (June to December in 2013 and 2014) from two hospitals in the Eastern Bay of Plenty DHB, serving a regional area with a high Māori population (51%).

Maternal demographic and laboratory data are routinely collected on all women who attend outpatient clinics or on admission to hospital. All data are entered into the hospital-based patient management system. Each contact with the hospital generates a code indicating the type of service provided, health professional consulted, diagnoses and procedures undertaken. All laboratory tests are conducted through public funded laboratories whose tests results are accessed electronically through the software management program 'Éclair' by Primary Health Organisations and hospitals in the Bay of Plenty region.

Heath related and laboratory data for all women who had delivered in the two hospitals serving the Eastern Bay of Plenty region were accessed to complete this audit. Data were cross-checked for accuracy and anonymised prior to data analyses.

Standard univariate and multivariate methods were used for analysing categorical and continuous outcome data, using PROC FREQ, PROC UNIVARIATE and PROC REGRESS in SAS version 9.3 (SAS Institute, Cary, North Carolina, 2010).

Results

The proportion of all women audited (n=656) who were screened for any type of diabetes in pregnancy was 63%. Figure 1 outlines the screening tests undertaken by 416 of the total cohort of women who delivered in two of the three hospitals in the Bay of Plenty DHB, over two six-month periods (June to December in 2013 and 2014).

Figure 1: Number of women who delivered in two hospitals, serving a regional population in the Bay of Plenty region who underwent screening tests for diabetes in pregnancy.

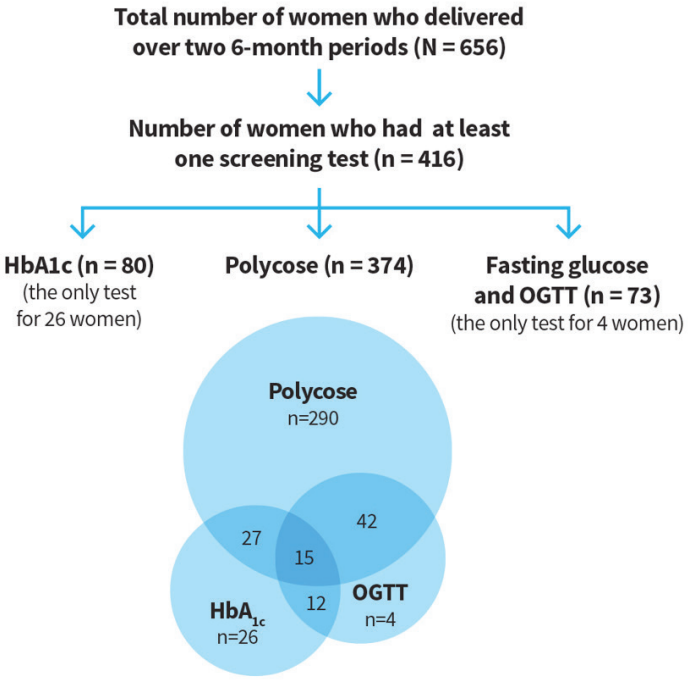

Table 1: Demographic maternal characteristics for women who were screened compared with those not screened for diabetes in pregnancy (n=656).

Variable and level	Total n (%)*	Screened women n=416 n (%)#	Non-screened women n=240 n (%)#	P-value
Age (years)				
< 20	95 (14)	59 (62)	36 (38)	
21–24	168 (26)	99 (59)	69 (41)	0.07
25–29	184 (28)	112 (61)	72 (39)	
30–34	130 (20)	85 (65)	45 (35)	
35–40	79 (12)	61 (77)	18 (23)	
Ethnicity				
NZ European/Other	206 (31)	157 (76)	49 (24)	
Māori	410 (63)	231 (56)	179 (44)	<0.0001
Asian	30 (5)	23 (77)	7 (23)	
Pacific	10 (1.5)	5 (50)	5 (50)	
Hospital of birth				
Secondary	618 (94)	394 (64)	224 (36)	0.40
Minor	37 (6)	21 (57)	16 (43)	
Antenatal bloods				
Yes	628 (96)	415 (66)	213 (34)	<0.0001
No	28 (4)	1 (4)	27 (96)	
Length of stay				
<1 (days)	299 (46)	166 (56)	133 (45)	
2	131 (20)	85 (65)	46 (35)	<0.0001
3–4	140 (21)	93 (66)	47 (34)	
>5	86 (13)	72 (84)	14 (16)	
Year				
2013 (June–December)	303 (46)	177 (58)	126 (42)	0.01
2014 (June–December)	353 (54)	239 (68)	114 (32)	

P-value showing significance of variation in percentages in subgroups, from the chi-square value from the Fisher test.
* Percent by column.
# Percent by row.

Of the 416 women who were screened, only 12% had an HbA_{1c} test for prediabetes or type 2 diabetes, 57% underwent a Polycose test between 24 and 28 weeks and 11% had a fasting glucose test and OGTT. Thirteen (3%) of the 416 women screened were diagnosed with GDM, two women had pre-existing diabetes, one each with type 1 and type 2 diabetes, and the status of nine women (4%) could not be determined. Of the 13 women diagnosed with GDM, nine (69%) were Māori, three were European and one of Indian ethnicity.

Of the 80 women who had HbA_{1c} levels tested, 19% (n=15) had had levels ≥40mmol/mol (including one ≥50mmol/mol), and of those, two had pre-existing diabetes, nine had a fasting glucose and an OGTT (including two women who had a Polycose test) and one woman had a Polycose test. The remaining three women had no fasting or glucose challenge test. Two women who underwent the Polycose test had glucose levels >11mmol/L, 14 women who had a fasting glucose test had levels ≥5.5mmol/L and 11 women who had an OGTT had glucose levels ≥9mmol/L.

Table 1 compares demographic characteristics of the 416 women who underwent screening for diabetes in pregnancy with the 240 women not screened who gave birth over two six-month periods in two hospitals in the Eastern Bay of Plenty region. Significantly more New Zealand European and Asian women were screened compared with Māori and Pacific women, and a higher proportion of women were screened in 2014 compared with 2013 (P=0.01).

Table 2: Multivariate prevalence rates (RR) for factors associated with screening for diabetes in pregnancy, adjusted for age & ethnicity as appropriate (n=656).

Variable and level	Screened N (%)		RR (95% CI) Adjusted*	P-value Adjusted*
Age (years)				
25-29	112	61	1.00	
< 20	59	62	1.15 (0.92–1.44)	0.21
21–24	99	59	1.05 (0.88–1.25)	0.59
30–34	85	65	1.04 (0.87–1.23)	0.68
35–40	61	77	1.24 (1.06–1.47)	0.02
Ethnicity				
European/Other	157	76	1.00	
Māori	231	56	0.73 (0.65–0.83)	<0.0001
Asian	23	77	1.01 (0.81–1.26)	0.91
Pacific	5	50	0.67 (0.36–1.27)	0.11
Length of stay (days)				
<1	166	56	1.00	
2	85	65	1.08 (0.92–1.28)	0.36
3–4	93	66	1.14 (0.97–1.34)	0.13
>5	72	84	1.44 (1.25–1.66)	<0.0001
Year				
2013 (June–Dec)	177	58	1.00	
2014 (June–Dec)	239	68	1.17 (1.04–1.32)	0.008

P-value showing significance of variation in percentages in subgroups, from the chi-square value from the Fisher test.
*Age adjusted for ethnicity; ethnicity adjusted for age; and length of stay and year adjusted for age and ethnicity.

Table 2 shows women aged 35–40 years were more likely to be screened than women 25–29 years after controlling for ethnicity, and Māori and Pacific women were less likely to undergo screening compared with European women after controlling for age, although the latter was not significant due to the small number of Pacific women (n=10). After controlling for age and ethnicity, women who were screened were more likely to remain in hospital for at least five days compared with women who had not undergone screening. The proportion of women who underwent screening significantly increased from 58% to 68% between the last six months of 2013 and 2014.

Discussion

This report documents the prevalence of screening for diabetes in pregnancy and associated risk factors in a regional area with a high Māori population. Only 12% of women underwent an HbA1c screening test for prediabetes and type 2 diabetes in early pregnancy, with 19% of those women having elevated levels, and only 60% of women were screened for GDM at 24 to 28 weeks. Screening rates for Māori and Pacific were unacceptably low and significantly lower than those for New Zealand European, European and Asian women. Women aged 35–40 years of age were more likely to be screened compared with women 25–29 years of age.

Women who were screened were more likely to stay in hospital for ≥5 days compared with women not screened. Although reasons are not known for the extended hospital stays, women with a pre-existing health condition or pregnancy-related complication were more likely to undergo screening, perhaps due to greater engagement with health care services.

The 60% screening prevalence for GDM for this regional area was far lower than the two recently reported for the Auckland region, being >90% for National Women's for all ethnic groups[4] and 85% in Counties Manukau in South Auckland.[12] However, despite the overall high screening rate for Counties Manukau, the prevalence was only 61% for Māori women,[11] and remains

the lowest compared with all other ethnic groups; 81–83% for Asian, 77% for European and 72% for Pacific women in 2011,[11] and only slightly higher than the 56% for Māori women in our survey.

Internationally, indigenous women (including Māori) are more likely to have undiagnosed type 2 diabetes during pregnancy compared with European women.[8,15] Early identification and treatment of women with borderline and type 2 diabetes and with GDM is associated with reductions in pregnancy and perinatal complications.[1,9,16,17] In addition, GDM is an established risk factor for progression to type 2 diabetes, which carries up to a 70% lifetime risk,[18] and a diagnosis of borderline GDM, is important to women.[19] In a study in Northland, 60% (n=110) of all women diagnosed with GDM between 1997 and 2005 were followed up for a median 2.4 year period, and of those, 32% had an abnormal fasting blood glucose test or had developed diabetes or impaired glucose tolerance.[20]

Despite on-going controversy about the ideal diagnostic criteria for GDM,[21,22] universal screening in early pregnancy for type 2 diabetes and in the second trimester for GDM is recommended.[8] This report shows the status of diabetes in pregnancy was not known for 30% of the women and, based on the New Zealand National Health 2008/9 survey, potentially 2.3% of Māori women aged 25–44 years could have undiagnosed diabetes and 31% have prediabetes,[23] and be at increased risk of GDM.[8]

The new MoH guideline[8] may help assist lead maternity carers (LMC), who have previously reported that a lack of information and clear guidelines for screening for diabetes in pregnancy is a barrier in advising and arranging for women to undergo screening.[10] Targeting women at risk of GDM for screening, rather than all women,[10,24] results in underreporting of GDM.[25]

Achieving universal screening for diabetes in pregnancy is a challenge, but was achieved in the Cook Islands after the introduction of a screening programme that offered screening to all eligible women.[26] One New Zealand study that interviewed 26 Māori women to identify barriers to screening for diabetes in pregnancy, reported that two of the five women who had not undergone screening felt additional tests were unnecessary, as previous pregnancies had been uneventful.[10] In contrast, reasons given by the 21 women who underwent screening included having a positive relationship with their LMC, understanding the consequences of GDM and knowing they were at increased risk of GDM.[10]

Findings from this paper showed screening rates for GDM increased between 2013 and 2014. A new multidisciplinary hospital-based maternity service for women with diabetes in pregnancy may have contributed to this increase or it may be following a natural upward trend. Further initiatives and active engagement with Māori and Pacific communities are required to reduce the ethnic variation in screening and inequity in accessing health care services to achieve universal screening rates in line with National Women's[5] and in the Cook Islands.[26] The new MoH guideline provides an opportunity to encourage all DHBs to audit and report screening trends. Without these data, the impact of the new guideline and local initiatives to improve existing services to maximise screening opportunities will remain elusive.

Limitations of this audit include the limited number of variables collected, including the absence of well-known risk factors for GDM, such as BMI, to establish if they were associated with screening and their association with pregnancy and perinatal complications. No details were available for the small number of women who had a home delivery in this region. In addition, it is possible that pregnancy-related adverse outcomes were underestimated, as a small number of high risk women may have been transferred out of the area. Despite these limitations, this audit included all women who gave birth at two of the three hospitals in the Bay of Plenty region and is representative of all women undergoing screening for diabetes in pregnancy residing in a regional area with a high Māori and socioeconomically disadvantaged population.

This report highlights the poor uptake of screening for prediabetes, type 2 diabetes and GDM in pregnancy in a high risk population group. Further resources are required to increase engagement with Māori and Pacific communities to achieve universal and equitable screening rates across all ethnic groups and regions in New Zealand.

Competing interests:
Nil.
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