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inner east
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partnership

Gestational Diabetes Mellitus in the Eastern Health Catchment FINAL REPORT

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Glossary

ADIPS	Australian Diabetes in Pregnancy Society
AIHW	Australian Institute of Health and Welfare
BGL	Blood Glucose Levels
BMI	Body Mass Index
CDE	Credentialed Diabetes Educators
DE	Diabetes Educator
DHHS	Department of Health and Human Services
DISC	Diabetes Initiative Steering Committee
DNE	Diabetes Nurse Educator
EMPHN	Eastern Melbourne Primary Health Network
GDM	Gestational Diabetes Mellitus
GP	General Practitioner
GTT	Glucose Tolerance Test
IEPCP	Inner East Primary Care Partnership
MAGDA	Mothers after Gestational Diabetes in Australia
NDSS	National Diabetes Services Scheme
NGDR	National Gestational Diabetes Register
RACGP	Royal Australian College of General Practitioners
RANZCOG	Royal Australian New Zealand College of Obstetricians and Gynaecologists
RCT	Randomised Control Trial
WAG	Women after Gestational Diabetes

Executive Summary

The Department of Health and Human Services (DHHS) funded Inner East Primary Care Partnership (IEPCP) to understand the prevalence of Gestational Diabetes Mellitus (GDM) in at risk population groups in the EMR, the knowledge within the community of GDM, and to analyse the evidence of effective prevention and management initiatives to reduce the incidence and impact of GDM. The methodology for this project included statistical analysis, literature review, key informant interviews with health professionals and community workers, consultation with peak diabetes organisations and health services, and interviews with women with GDM.

Gestational diabetes mellitus (GDM) usually occurs in the 24th to 28th week of pregnancy and is diagnosed when there is too much glucose in the blood, indicating that the body can't make enough insulin, or that the insulin is not working as well as it should. (State Government of Victoria, 2015) GDM usually disappears after the birth of the baby. (Department of Health, 2015) (Diabetes Australia, 2015) The Department of Health estimates GDM is increasing in Australia with around 12 – 14% of pregnant women (about 17 000 women every year) developing GDM. (Department of Health, 2015) (NDSS, 2016) As at December 2016, there were 1282 women in the Eastern Health catchment with GDM on the NDSS register. Once diagnosed, GDM is managed by monitoring blood glucose levels and by adopting a healthy eating plan and doing regular physical activity. Women who have GDM are at significant risk of developing type 2 diabetes as well as complications with pregnancy and labour. Babies of women who have had GDM have increased risk of obesity, insulin intolerance and diabetes.

One of the goals in the National Diabetes Strategy 2016-2020 is to reduce the impact of pre-existing and gestational diabetes in pregnancy. There are a number of high risk factors for GDM including previous GDM, maternal age over 40 years, family history of diabetes, BMI over 35kg/m², previous large baby, polycystic ovary syndrome, certain medications and previous complicated pregnancy. Moderate risk factors are ethnicity and BMI between 25-35kg/m².

The **literature review** identified that secondary prevention of GDM that targets women who have been diagnosed with GDM may be the best option for intervention to prevent the development of GDM during a second pregnancy, and the development of type 2 Diabetes. The barriers to this are limitations of screening, engaging women postpartum, health literacy, education, cultural background, GP time, and fragmented health services.

Based on the research, there are a number of options critical to follow up care and engaging women:

- GP reminder systems
- Home-based intervention, such as telephone counselling
- On-site childcare facilities for health or lifestyle intervention services
- Flexible appointment times
- Better integration of the health system that women use in the gestational and post-natal period
- Increase in knowledge and support among pregnant women and the community about GDM
- Focus on improving health literacy in knowledge about GDM
- Promotion of breastfeeding
- Advocate for easier testing using HbA1c. HbA1c is now available for the annual screening of high risk patients for diabetes and pre-diabetes, including women with a history of GDM. However, for now the Oral Glucose Tolerance test at 6 weeks postpartum remains the accepted screening process. At this time HbA1c is unreliable due to the acute physiological changes to blood volume and red blood cell dynamics that occur in postpartum women.
- Addressing obesogenic environments
- Involving postpartum women in the design of interventions

- Improving models for maternal and child health in specific at risk communities.

In the **consultation phase** of the project, 23 interviews were conducted with specialists and other practitioners supporting women with GDM, and 13 interviews were conducted with women with GDM. A number of issues were identified:

- Delays in early screening for high risk women -- there are concerns amongst stakeholders that women at high risk of GDM are not being screened when their pregnancy is confirmed by their GP;
- Follow up of women diagnosed with GDM - there was a high level of confidence for GTT done at Eastern Health but in other situations staff questioned follow up of women with positive results;
- Limited options for education for women with GDM - women who have GDM are only offered limited group education sessions with lack of flexibility for those unable to attend;
- Women not requiring insulin managed by Obstetrics team - concerns that blood glucose levels of these women may not be being optimally monitored and lack of communication with GPs;
- Lifestyle advice and interventions to reduce risk of GDM and to manage GDM - there are limited opportunities to systematically intervene to support women who are overweight to manage weight and adopt healthy lifestyle options during pregnancy;
- Post-Partum GTT – multiple test forms distributed but lack of follow up options;
- Resource issues – increased demand has increased pressures on services with longer waiting times at Eastern Health.

Based on the literature review, scoping of current services and consultations, recommendations for future work were:

1. Provide support for women during and after pregnancy to manage GDM and reduce risk
2. Build the capacity of general practitioners to support women at risk
3. Improve systems to ensure identification and management of women at risk of and with GDM is optimal
4. Address the obesogenic environment

Further collaborative work will be undertaken to address some of the recommendations.

1. Introduction

The Department of Health and Human Services (DHHS) funded Inner East Primary Care Partnership (IEPCP) to understand the prevalence of Gestational Diabetes Mellitus (GDM) in at risk population groups in the EMR, the knowledge within the community of GDM, and to analyse the evidence of effective prevention and management initiatives to reduce the incidence and impact of GDM.

The specific aims of the project were to:

- Identify the incidence of GDM for particular population groups in the EMR;
- Conduct a literature review of health promotion and early intervention evidence and best practice for GDM;
- Identify existing initiatives, services and referral pathways to prevent and manage GDM in the catchment;
- Better understand community knowledge about GDM prevention and management;
- Develop an understanding of GP awareness and application of new GP guidelines for GDM screening and management, skills and confidence in treating GDM;
- Identify service pressures and gaps and recommend strategies to respond to them.

The methodology for this project included statistical analysis, literature review, key informant interviews with health professionals and community workers, consultation with peak diabetes organisations and health services, and interviews with women with GDM. The project was supported by a Steering Committee comprised of representatives from:

- Eastern Health
- Carrington Health
- Eastern Melbourne PHN
- Department of Health and Human Services
- Inner East Primary Care Partnership
- Diabetes Victoria

The project will contribute to the aims of the Eastern Metropolitan Region (EMR) Diabetes Initiative Steering Committee (DISC) by providing a region wide assessment of GDM and recommendations for a region wide, best practice approach for future activities to reduce the risk and impact of GDM and the management of the condition.

2. Definition

Gestational diabetes mellitus (GDM) occurs during pregnancy and will usually disappear after the birth of the baby. (Department of Health, 2015) During pregnancy, hormones made by the placenta stop the mother's insulin from working properly. As the baby grows, mother's body needs to make two or three times more insulin than usual to keep blood glucose at normal levels. GDM is diagnosed when there is too much glucose in the blood. It means that the body can't make enough insulin, or that the insulin is not working as well as it should. (State Government of Victoria, 2015) GDM usually occurs around the 24th to 28th week of pregnancy. (Diabetes Australia, 2015)

3. Prevalence

The Department of Health estimates that around 12 – 14% of pregnant women (about 17 000 women every year) will develop GDM. (Department of Health, 2015) (NDSS, 2016) GDM is becoming more prevalent in Australia, possibly due to the changing demographics of women who become pregnant (age, ethnicity and weight), and the increasing rates of undetected type 2 diabetes in the Australian community. Rates of GDM

in the community include women who have had undiagnosed abnormalities of glucose intolerance before falling pregnant. (Nankervis, et al., 2013)

The NDSS are currently registering 99 women with GDM every day, and 36 198 for 2015-16 - an increase of 16% from the previous 12 months (see Figure 1). (NDSS, 2016) Hospitals in the Eastern Health catchment are seeing big increases in numbers of newly diagnosed women, insulin initiation (124.6% increase between 2014 and 2015 at Angliss Hospital), and in incoming phone calls about GDM. This is partially due to changes in the diagnostic criteria for GDM (see Table 1).

Figure 1: Number of women with GDM registered on NDSS (Australia wide)

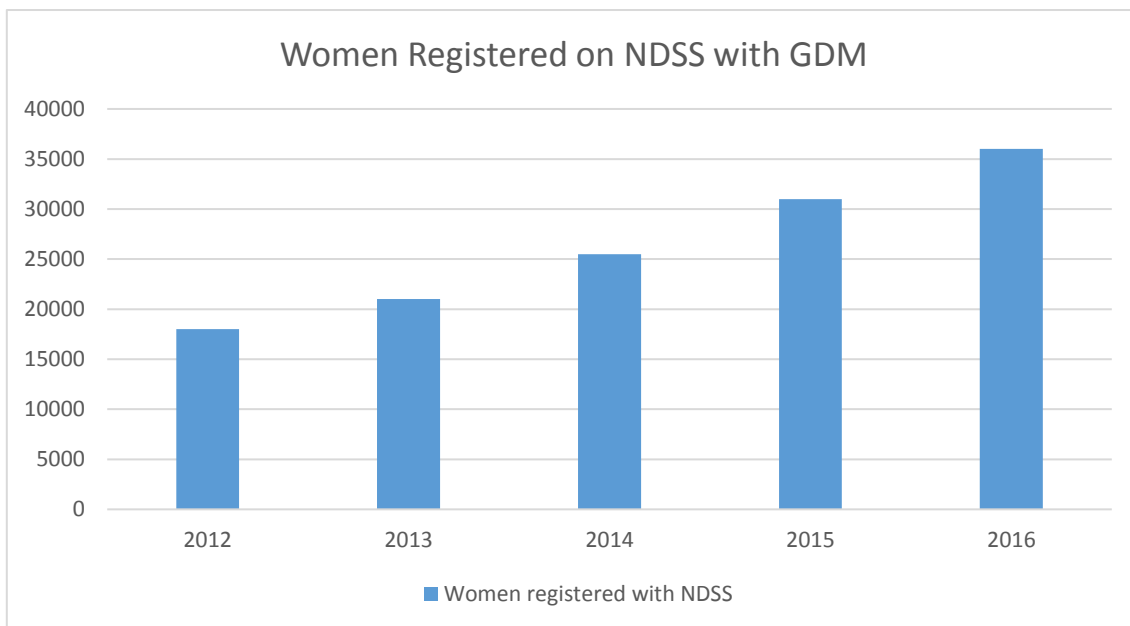


Table 1: Change from 2014 to 2015 in GDM presentations and contacts

Newly Diagnosed Gestational Diabetes			
	Angliss Hospital	Box Hill Hospital	Total
2014	236	357	593
2015	268	459	727
% increase	13.5%	28.5%	22.5%
Insulin Initiation			
	Angliss Hospital	Box Hill Hospital	Total
2014	81	220	301
2015	182	353	535
% increase	124.6%	60%	77.7%
Women on insulin who call DNE			
	Angliss Hospital	Box Hill Hospital	Total
2014	881	2286	3167
2015	1412	3553	4965
% increase	60%	55%	57%

As at December 2016, there were 9 694 women in Victoria with GDM on the NDSS register. Table 2 details the number of women in each local government area in the Eastern Region and in the EMPHN catchment. The rate of GDM in Maroondah is classified as very high, and high in Boroondara, Whitehorse, Knox and Monash.

Table 2: Women registered with GDM on the NDSS register as at December 2016

Area	Number of women with GDM on the NDSS register
Boroondara	179
Manningham	169
Knox	282
Maroondah	213
Monash*	283
Whitehorse	263
Yarra Ranges	176
EMPHN	2379
Victoria	9694

**Monash is not part of the Eastern Health catchment*

4. Policy Context

Women who have had GDM are at significant risk of subsequently developing type 2 diabetes. Within five years up to 50% of women diagnosed with GDM will develop type 2 diabetes. (Department of Health, 2015) (Lim, Skinner, Eakin, & Dunbar, 2014) The prevention of type 2 diabetes was the main recommendation in the National Chronic Disease Strategy signed by COAG in 2007. The Australian Government has now released a national diabetes strategy.

4.1 Australian National Diabetes Strategy 2016-2020

This strategy identifies effective and appropriate interventions to reduce the impact of diabetes in the community, by describing seven high-level goals with potential areas for action and measures of progress. The guiding principles of this Strategy need to be incorporated into any policies and programmes considered for implementation. They are:

1. Collaboration and cooperation to improve health outcomes
2. Coordination and integration of diabetes care across services, settings, technology and sectors
3. Facilitation of person-centred care and self-management throughout life
4. Reduction of health inequalities
5. Measurement of health behaviours and outcomes.

The goals under the Strategy are:

1. Prevent people developing type 2 diabetes
2. Promote awareness and earlier detection of type 1 and type 2 diabetes
3. Reduce the occurrence of diabetes-related complications and improve quality of life among people with diabetes
- 4. Reduce the impact of pre-existing and gestational diabetes in pregnancy**
5. Reduce the impact of diabetes among Aboriginal and Torres Strait Islander people
6. Reduce the impact of diabetes among other priority groups
7. Strengthen prevention and care through research, evidence and data

Potential areas for action under the Strategy are focused on women who have a previous history of GDM or women who have pre-existing diabetes. The Strategy considers: identifying and addressing risk factors; offering appropriate testing, and providing post-pregnancy support and counselling. (Department of Health, 2015).

4.2 Guidelines for diagnosis and treatment

Gestational diabetes usually has no symptoms. If symptoms do occur they are most often: unusual thirst, excessive urination, tiredness and thrush (yeast infections). (State Government of Victoria, 2015)

There are two conflicting guidelines for the diagnosis and treatment of gestational diabetes. The Royal Australian College of General Practitioners (RACGP) recommend that all pregnant women should be screened between 26 and 28 weeks gestation with a non-fasting glucose challenge. (RACGP, 2014) If one high risk, or two moderate risk factors for GDM are present, then earlier testing at around 10-12 weeks is recommended. (SA Maternal & Neonatal Clinical Network, 2015)

However there are conflicting guidelines for the plasma glucose levels required for diagnosis. The RACGP levels are higher than those recommended by the Australian Diabetes in Pregnancy Society (ADIPS) and the Royal Australian and New Zealand College of Obstetricians and Gynaecologists. This means that high-risk women tested by their GPs may not be diagnosed until later testing at Eastern Health. Adoption of the ADIPS diagnostic criteria for pregnant women at Eastern Health in 2015 has led to an increase in prevalence figures in the Eastern Health catchment. (RACGP, 2013) (RANZCOG, 2015) (ADIPS, 2012)

Once diagnosed, GDM is managed by monitoring blood glucose levels and by adopting a healthy eating plan and doing regular physical activity. It should be noted that there are currently no national nutrition guidelines or systematic dietetic best practice for GDM (Wilkinson, McCray, Beckmann, & McIntyre, 2015). For many women (73.5% in 2015 at Eastern Health) insulin injections will also be necessary. After the baby is born GDM usually disappears. (Diabetes Australia, 2015) (NDSS, 2016)

5. Impact

5.1 Impact on the mother

Mothers with GDM are at high risk of induced labour, are more likely to have a pre-term birth, caesarean section or other operative delivery, hypertension, and a longer hospital stay than mothers without diabetes in pregnancy. (AIHW, 2010) Gestational diabetes may also increase the risk of depression during pregnancy and in the post-partum period. (Raisanen, et al., 2014) (Hinkle, et al., 2016) The adverse effects of GDM are higher for certain groups of women, such as Aboriginal and Torres Strait Islander mothers. (AIHW, 2010) Long term effects include higher risk of: recurrent GDM in subsequent pregnancies; progression to type 2 diabetes; developing cardiovascular disease. (AIHW, 2010) Ongoing support and care after pregnancy, with a focus on health and lifestyle, is recommended to help prevent future development of type 2 diabetes. (Department of Health, 2015)

5.2 Impact on the child

As glucose crosses the placenta, the baby is exposed to the mother's glucose levels later in pregnancy. This stimulates the baby's pancreas to produce extra insulin. Babies of mothers with GDM have increased risk of stillbirth, caesarean section, macrosomia (high birth weight), shoulder dystocia (delivery obstructed by the shoulders), respiratory distress syndrome, birth injuries and jaundice. After birth, when the baby is no longer exposed to the mother's glucose levels, the baby's extra insulin can cause temporarily low blood glucose. Again, the adverse effects of GDM are higher for Aboriginal and Torres Strait Islander mothers. (AIHW, 2010) (Diabetes Victoria, 2012) (RACGP, 2014)

The children of mothers who had GDM are at an increased risk of developing obesity, glucose intolerance, and type 2 diabetes. However, if gestational diabetes is well managed, these risks are greatly reduced. (Department of Health, 2015) (AIHW, 2010)

6. Risk Factors

6.1 Determinants

The social determinants of health are 'the conditions in which people are born, grow, work, live, and age'. (WHO, 2016) A recent Victorian study of women during their first pregnancy found that rates of GDM differ by social gradient. In this study, socioeconomic disparities were not significant for younger women, but for older women GDM rates were the highest among women living in the most disadvantaged areas. As the mean age for first pregnancy increases, the socioeconomic determinants of GDM will become increasingly important. (Abouzeid, et al., 2015)

While some women who develop gestational diabetes have no known risk factors, research has found the following factors will result in increased risk of GDM: (State Government of Victoria, 2015)

6.2 High Risk Factors

- Previous GDM
- Previously elevated blood glucose levels
- Maternal age \geq 40 years (other sources suggest 30 years (State Government of Victoria, 2015)) The average age of women giving birth in Australia continues to rise: from 29.7 years in 2004, 30 years in 2009, and 30.2 years in 2014. (AIHW, 2016)
- Family history of diabetes (i.e. first degree relative, or a sister with GDM)
- BMI $>$ 35kg/m²
- Previous large baby (birthweight $>$ 4500g or $>$ 9th centile)
- Polycystic ovary syndrome
- Medication with corticosteroids or antipsychotics
- Previous complicated pregnancy, such as multiple pregnancy (SA Maternal & Neonatal Clinical Network, 2015) (State Government of Victoria, 2015) (Abouzeid, et al., 2015).

6.3 Moderate Risk Factors

- Ethnicity (Asian, Indian subcontinent, Aboriginal, Torres Strait Islanders, Pacific Islander, Maori, Middle Eastern, non-white African)
- BMI 25-35 kg/m²

Women with either of these factors as their only risk factor are considered at moderate risk. (SA Maternal & Neonatal Clinical Network, 2015) (Nankervis, et al., 2013)

6.4 Population Groups

Mothers from certain cultural backgrounds are at an increased risk of GDM. These are:

Aboriginal and Torres Strait Islander women

GDM is nearly twice as common for Indigenous mothers than for non-Indigenous mothers. In 2005-07, 5.1% of Aboriginal and Torres Strait Islander mothers were diagnosed with GDM. Indigenous mothers with GDM have higher rates of induced labour, and are more likely to have a pre-term birth, caesarean section, hypertension, and a longer stay in hospital. They are also more likely to have twins or higher order multiples. (AIHW, 2010)

Table 3: Women who gave birth in Australia, by Indigenous status and diabetes in pregnancy status, 2005-2007 (AIHW, 2010)

	Pre-existing diabetes	Gestational diabetes mellitus	No diabetes	Total
Number				
Indigenous	443	1,562	28,513	30,518
Non-Indigenous	4,501	37,539	760,135	802,175
Not stated	38	38	971	1,017
Total	4,982	39,139	789,619	833,710
Per cent				
Indigenous	1.5	5.1	93.4	100.0
Non-Indigenous	0.6	4.7	94.8	100.0
Not stated	3.7	0.8	95.5	100.0
Total	0.6	4.7	94.7	100.0

Goal 5 of the National Diabetes Strategy is to reduce the impact of diabetes among Aboriginal and Torres Strait Islander Peoples. Areas for action include: promotion of pre-conception, pregnancy and early years programmes to enhance education and health, and to detect gestational and previously undiagnosed diabetes and manage it through pregnancy, and to coordinate follow up and postnatal care for mothers and babies. (Department of Health, 2015) A 2016 survey of women giving birth to Aboriginal babies in South Australia found that 16% of the women who had gestational diabetes had not seen a GP since the birth. Women living in remote areas were more likely to have seen a GP than women living in Adelaide.

Women from South East Asia and other Asian countries such as China and Vietnam, North Africa, the Middle East, India, and Polynesia and Melanesia

These women are three times as likely as mothers born in Australia to have GDM. In 2005-07, 10% of mothers born in high-diabetes-risk regions had GDM. These mothers had higher rates of pre-term birth, induced labour, delivery with no labour, caesarean section, hypertension and a longer stay in hospital. (AIHW, 2010)

Table 4: Women who gave birth in Australia, by region of birth and diabetes in pregnancy status, 2005-2007 (AIHW, 2010)

	Pre-existing diabetes	Gestational diabetes mellitus	No diabetes	Total
Number				
High-diabetes-risk regions	643	9,536	86,626	96,805
Australia	3,754	24,736	606,008	634,498
Other regions	539	4,638	91,638	96,815
Missing/not stated/not assigned	16	229	5,347	5,592
Total	4,952	39,139	789,619	833,710
Per cent				
High-diabetes-risk regions	0.7	9.9	89.5	100.0
Australia	0.6	3.9	95.5	100.0
Other regions	0.6	4.8	94.7	100.0
Missing/not stated/not assigned	0.3	4.1	95.6	100.0
Total	0.6	4.7	94.7	100.0

7. Intervention

7.1 Primary Prevention

Under the National Diabetes Strategy, prevention is focused on the reduction of modifiable risk factors by:

- Supporting the development of a health-promoting environment
- Embedding physical activity and healthy eating in everyday settings
- Education and social media campaigning
- Increasing the availability of healthy food and reducing the availability of unhealthy food
- Reducing the exposure of children to advertising of energy-dense, nutrient poor foods and beverages
- Strengthening the public health workforce to support people to make healthy choices
- Addressing maternal, family and child health. (Department of Health, 2015)

Across Australia, almost half of all mothers are overweight or obese. A BMI of 30 or more at a first antenatal visit is defined as obesity in pregnancy. In 2014 20% of women who give birth were obese (BMI 30 and over), 26% were overweight (BMI 25-29.9), 50% were in the normal weight range (BMI 18.5-24.9), and 4% were underweight. (AIHW, 2016)

Primary prevention occurs before pregnancy, or when pregnancy first begins. Australian Institute of Health and Welfare statistics show that in the Eastern Melbourne PHN catchment, only 57% of mothers attend an antenatal visit in the first trimester (less than 14 weeks). This compares with the highest rate for first trimester visits of 87% in Tasmania. Nonetheless, this is still the highest rate of any Victorian PHN area. (AIHW, 2016)

Table 5: Percentage of mothers attending first antenatal visit in first trimester by PHN area

PHN area	% mothers attending antenatal visit in the 1st trimester
E Melbourne	57%
SE Melbourne	55%
Western Victoria	53%
NW Melbourne	47%
Gippsland	46%
Murray	42%

This data may reflect current antenatal systems. The first antenatal visit recorded in perinatal data may be the first hospital visit, often referred to as 'booking in'. However this may occur after the first trimester and the woman may have received earlier antenatal care from her GP. (AIHW, 2016)

The Australian Government Department of Health guidelines suggest that a first antenatal visit should occur before 10 weeks pregnancy. (Department of Health, 2015)

Lifestyle Interventions

The Cochrane Collaboration has consistently evaluated effective, evidence-based interventions for the primary prevention of GDM. A number of systematic reviews of diet and exercise programs for pregnant women found that while women may improve their diet and physical activity overall and reduce excessive weight gain during pregnancy, there is no strong evidence of a reduction in risk of GDM resulting from this kind of intervention. (Bain, et al., 2015) (Muktabhant, Lawrie, Lumbiganon, & Laopaiboon, 2015) (Tieu, Crowther, & Middleton, 2008) (Morisset, et al., 2010) The benefits of diet and exercise programs may be stronger if begun pre-pregnancy, however no pre-conception dietary and exercise interventions were found by the Collaboration to review.

Levels of adherence to these types of interventions are highly dependent on social support, levels of education, women's time constraints, and strong supervision by medical and other professionals. For this reason they are impractical to administer and will have inequitable results. (Opray, Grivell, Deussen, & Dodd, 2015) (Wang, et al., 2016) (Lappanen, et al., 2014)

Treatment Interventions

A number of other treatment-style interventions for prevention have been investigated with promising, though not strong evidence. These include:

- Dietary supplementation with a naturally occurring sugar called myo-inositol (which has a role in the body's sensitivity to insulin). In one trial it was associated with a reduction in the rate of GDM – from 28% in the women who did not take the supplement, to between 8-18% in women who took it. (Crawford, Crowther, Alsweiler, & Brown, 2015)
- Supplementation with probiotics, or 'good' bacteria', have the potential to change a person's metabolism. There is only one RCT (involving 256 women) that looked at supplementing diets with probiotics from early pregnancy. The probiotics were found to have reduced diagnosis of GDM by two thirds, as well as reducing the weight of babies by nearly 130g at birth. (Barrett, Dekker Nitert, Conwell, & Callaway, 2014)
- Vitamin D may have a role to play in glucose homeostasis. Optimal Vitamin D status in pregnancy is yet to be determined. (Senti, Thiele, & Anderson, 2012)

Health Literacy/Educational Interventions

Findings from a Victorian study indicated that there are gaps in women's understanding of GDM: its causes, effects, and lifestyle risk factors. (Poth & Carolan, 2013) The Whitehorse Community Health and Eastern Health intervention for at risk women (**The Healthy Lifestyles Program**) presenting at the Birralee Maternity Unit in 2010 was an eight week educational intervention that used group sessions plus individual health coaching via telephone or email. 75% of the recruited women increased their daily exercise, reviewed their eating habits and clinical outcomes from a 28 week OGTT showed that none of the participants had developed GDM. Evaluation of The Healthy Lifestyles Program found numerous barriers to engagement for the women, including tiredness, lack of time, morning sickness, financial barriers to healthy diets, and a lack of support and/or motivation.

There appears to be a lack of accessible information about healthy gestational weight gain. **Text4Two** was a Deakin University/Mercy Hospital RCT intervention designed to determine the feasibility and effectiveness of a 'mobile health' intervention promoting healthy diet, physical activity and gestational weight gain in pregnant women who were overweight or obese prior to pregnancy. The intervention content followed evidence-based guidelines and was delivered in a multi-modality format: tailored text messages, access to a responsive information website viewable on mobile devices, video messages, and chat room via Facebook. Intervention participants received four or five individually tailored, interactive text messages per week delivering information, encouragement, and monitoring of individual goals. The website, video content and Facebook group were promoted and linked in the text messages. Over 90% of the women engaged completed the study. Most women engaged regularly with the program, and 97.6% reported that the intervention was helpful. The secondary outcomes demonstrated a significantly lower gestational weight gain in the intervention group (the intervention group gained approximately 2 kilograms less than the control group). (Willcox, et al., 2017)

The literature shows that the provision of gestational weight gain guidelines by health professionals will predict women meeting those guidelines. A 2015 study by Deakin University at a public maternity hospital in Melbourne showed that women's understanding of appropriate weight gain and its consequences is generally poor and that very few recalled being given information by their GPs or consultants during their

first appointment. Instead they requested the information from their health professionals, used the internet, and sourced information from books and friends. (Willcox, et al., 2015)

7.2 Secondary Prevention

Women who have been diagnosed with GDM during pregnancy may represent the best opportunity for the health system to intervene and prevent the development of GDM during a second pregnancy, and the development of Type 2 Diabetes in the future. However, optimal care for these women faces a number of individual and systemic difficulties, such as:

- Barriers to screening
- Difficulty in engaging postpartum women
- Health literacy
- Maternal characteristics, such as education and cultural diversity
- Time constraints on GPs
- Fragmentation of health services, and
- A focus on individual lifestyle modification programs and self-management. (Lim, Skinner, Eakin, & Dunbar, 2014) (Wilkinson, Upham, Janamian, C, & Jackson, 2014)

In Victorian public health services, newly diagnosed women with GDM are referred to their local hospital clinic for management of their GDM while pregnant. Most services offer a one-off group with a dietician and diabetes educator. In the groups, participants learn more about GDM and are given dietary advice. They are also taught blood glucose monitoring. The women keep in regular contact with the clinic via telephone, recording and texting their blood glucose readings and meeting face to face up to 3 times when required. Referrals are made to endocrinologists in more complex cases or if they are insulin dependent. Discharge information is provided to the GP with a reminder to follow up GTT post-birth. For women who are non-English speaking, supports vary, but may include one to one education or an opportunity to bring a friend to the group to provide language support.

Key points of difference with the above model were: Link Health and Community (a community health service) provide this service on behalf of Monash Health which may be a more attractive option for some participants as it is in a local community health setting. At Northern Health a Diabetes Nurse Practitioner can prescribe and adjust insulin levels which reduces the load on endocrinologists. Western Health have developed a suite of GDM information and resources using health literacy principles which include extensive use of pictures, plain English text and repeat and recall of information presented.

Role of General Practitioners

A general practitioner (GP) plays a key role in providing long-term preventative health care management. Guidelines for GPs highlight the importance of breastfeeding, lifestyle modification, contraception and risk counselling to improve outcomes. GPs will also recommend an oral glucose tolerance test within 6-12 weeks of birth, with further testing every three years, or annually if contemplating another pregnancy. Unfortunately, surveys report that only about half of those eligible Australian women return for the follow up test, and only a quarter of those within the recommended time period. For this reason the RACGP now recommends an easier test to perform called HbA1c for postpartum women. (Wilkinson, Upham, Janamian, C, & Jackson, 2014) (RACGP, 2013) (RACGP & Diabetes Australia, 2016)

GPs also have a role to play in the long-term follow up of women diagnosed with GDM during pregnancy. Advice from GPs is important for women and can motivate women to adopt healthy lifestyle modifications, however GPs have varying knowledge and confidence in advising on lifestyle interventions. Australian research found that GP practices are:

'reinforced by systems and process barriers of prioritisation of issues during a consultation, a lack of integration of recall tools and intervention resources in daily workflow, and uncertainty about responsibility for screening, as well as poor communication between secondary and primary care sector and fragmentation of pre- and postnatal care services.' (Wilkinson, Lim S, O'Reilly, D, & McIntyre, 2014)

Good4Mum was a collaborative project between the MAGDA project (see below), and a selection of GP practices in Victoria. Findings from this study are yet to be published. Information from a recent Knowledge Translation day focused on the findings suggests that this intervention focused on systemic change to support GPs through quality improvement. Under the intervention women who are registered with NDSS have this information sent to their GPs. GP systems software was optimised so that GPs are alerted to GDM diagnosis and reminded to intervene. The second arm to this intervention was to support GPs and nurses to deliver intervention to the women previously diagnosed with GDM through online training.

Information and Screening

Most of the **peak diabetes organisations** nationally and state-wide (for example, Diabetes Victoria) provide information about GDM on their website for women who have been diagnosed with GDM. These either link to the NDSS Gestational Diabetes web page, or provide similar information in their own format. The ability to find this information varies between the state bodies.

The **National Gestational Diabetes Register (NGDR)** was established to help women manage their future health. It is free for women diagnosed with GDM. Since 2011 women can 'opt out' if they do not wish to be involved. Once registered, women are sent information and reminders for screening tests as per Table 6 (NDSS, 2016)

Table 6: Information and screening reminders schedule from the NGDR

WHEN	WHAT	WHO
At registration	Booklet posted: <i>"Gestational Diabetes – Caring for yourself and your baby"</i>	Pregnant Woman
8-16 weeks post-partum (this is guessed as due date is not always collected; if unknown will send reminder 6 months post registration)	Screening reminder letter	Woman with GDM; General Practitioner
Baby approx. 10 months old	NGDR expiry letter Booklet posted: <i>"Life after Gestational Diabetes"</i>	Woman who had GDM; General Practitioner
12 months after registration	Screening reminder letter due to risk of type 2	Woman who had GDM; General Practitioner
Annual reminders for screening tests each year for 4 years	Screening reminder letter due to risk of type 2	Woman who had GDM; General Practitioner

Information booklets and reminder letters are mailed to patients from registration until 5 years post-birth. The GP receives copies of screening reminder letters. Both booklets have limited translated versions available via the NDSS multicultural portal which also includes factsheets and videos.

<http://multiculturalportal.ndss.com.au/resource-directory-page/?q=GESTATIONAL%20DIABETES>

The Victorian government's **Health Translation Directory** has many resources on pregnancy and GDM but nothing on healthy gestational weight gain:

http://www.healthtranslations.vic.gov.au/bhcv2/bhcht.nsf/PresentEnglishResourceAll?Open&x=&s=Pregnancy_and_post-natal_care

Western Health are developing resources with a health literacy lens for their website. The test version can be accessed at <http://www.gdm-test.com/>.

Lifestyle Interventions

Lifestyle interventions are limited by the intensive support required from clinical providers and the difficulty in engaging women in regular groups or in meeting with service providers.

Mothers after Gestational Diabetes in Australia (MAGDA) was a randomised controlled trial of a postnatal diabetes prevention program. The intervention was a group-based lifestyle modification program over the women's first postnatal year. The intervention comprised of one individual session, five group sessions, and two telephone sessions. Only 10% of the women attended all sessions, 53% attended one individual and at least one group session, and 34% attended no sessions. The findings suggested that the intervention could prevent weight gain over 12 months, but getting women to engage was challenging and the intervention would not be sustainable in routine health services. (O'Reilly, et al., 2016)

Women after Gestational Diabetes Program delivered through Baker IDI is an intervention program involving 5/60 minute group sessions run by health professionals at local venues to which women are able to bring their children and babies. Follow up is via telephone contact over the following 12 months. Women are educated about: healthy eating and nutrition; physical activity and sleep; stress, depression and staying motivated; and healthy cooking.

Life! Helping you prevent diabetes, heart disease and stroke is another lifestyle modification program supported by the Victorian Department of Health and Human Services and delivered by Diabetes Victoria. This is delivered as either a group course or a telephone health coaching service and is free for most Victorian women who have been diagnosed with GDM. The program includes a prevention program for Aboriginal people and their families, facilitated by Aboriginal health workers. Diabetes Victoria changed the criteria for these services to 18 years (down from 45 years) which has increased the range of people accessing these services. They also deliver culturally relevant sessions to CALD communities. (Diabetes Victoria, 2016) (State Government of Victoria, 2015). Diabetes NSW offers phone coaching for anyone with diabetes including GDM.

You2connect Diabetes Qld is a peer support program specifically for women with GDM. It matches the woman with a person who has had GDM to provide one to one support.

Gestational Diabetes Nutrition Best Practice Model of Care was a research project implemented in Mater Hospital Queensland that compared usual dietetic care with a new best practice model of care. Outcomes were evaluated and compared over 9 months for each model used. The best practice model of care followed the GDM Nutrition Practice Guidelines (NPGs) from America with women being offered one new individual visit with a dietician and a minimum of two review individual appointments. Each visit provided medical nutrition therapy suitable in the Australian context. While the research results did not significantly reduce the proportion of women requiring insulin, partly due to issues with implementation, it did increase the proportion of women seen according to best practice and highlighted areas for improvement in clinical approaches, information provision and education of clinicians. The model will be further trialled at other sites. (Wilkinson, McCray, Beckmann, & McIntyre, 2015)

Engaging women in GDM interventions

Recruitment of women to lifestyle intervention programs after a first pregnancy is one of the major challenges for GDM intervention. Lessons from a recent successful recruitment program in the US are:

- Using a multilevel approach
- Using a dedicated in-person recruiter
- Integrate recruitment into clinical flow

- Allow for flexibility in recruitment
- Minimize barriers to participation
- Use an opt-out strategy with providers.

This was an RCT trial of a web-based lifestyle program intervention. Women were recruited who were pregnant or within 6 weeks of delivery and were diagnosed with GDM in the second or third trimester.

The multilevel recruitment strategy included: targeting GDM clinics in hospitals, presenting to obstetricians, midwives, residents, nursing staff at those clinics, leaving information in nursing break rooms, emailing those obstetricians and midwives requesting permission to approach patients and notifying them that this was an 'opt-out' process, periodically updating clinical staff, posting flyers and leaving brochures in GDM clinics and waiting rooms on inpatient floors. Twice a week a recruiter went to clinic sessions and relevant hospital units to identify eligible subjects and inform them about the study, and to remind previously enrolled women about the study. The recruitment process was designed to ensure that privacy was maintained and that multiple opportunities were given for women to give consent.

Women were able to bring babies and/or other children with them to study visits, and financial compensation was available to cover childcare and transportation costs. The intervention group took part in a web-based program to address other potential barriers.

Of the 125 women who were eligible for the intervention, 107 consented to be involved. Of those women 73% presented at a 6 week visit, 73% presented at the 6 month visit, and 81% at the 12 month visit. (Nicklas, et al., 2016)

7.3 Suggested points of intervention based on the research

Research has recommended a number of options critical to follow up care and engaging women:

- GP reminder systems
- Home-based intervention, such as telephone counselling
- On-site childcare facilities for health or lifestyle intervention services
- Flexible appointment times
- Better integration of the health system that women use in the gestational and post-natal period
- Increase in knowledge and support among pregnant women and the community about GDM
- Focus on improving health literacy in knowledge about GDM
- Promotion of breastfeeding
- Advocate for easier testing using HbA1c. HbA1c is now available for the annual screening of high risk patients for diabetes and pre-diabetes, including women with a history of GDM. However, for now the Oral Glucose Tolerance test at 6 weeks postpartum remains the accepted screening process. At this time HbA1c is unreliable due to the acute physiological changes to blood volume and red blood cell dynamics that occur in postpartum women.
- Addressing obesogenic environments
- Involving postpartum women in the design of interventions
- Improving models for maternal and child health in specific at risk communities. (Lim, Skinner, Eakin, & Dunbar, 2014) (O'Reilly, et al., 2016) (HealthWest Partnership, 2015) (Carolan, Steele, & Margetts, 2010)

8. Consultation

The consultation phase of this project was undertaken by Marie Gill from Gill and Wilcox. In-depth semi-structured interviews with service providers and women with, or who have recently had GDM were conducted to identify existing referral pathways and services for diagnosis and management, service gaps, pressures and challenges. Consultation also aimed to gain an understanding of GP awareness of and confidence with GDM guidelines for diagnosis, screening and management; and women's awareness and knowledge about GDM diagnosis, screening, management and future risk.

Most interviews were conducted via telephone, for approximately 30-40 mins using a predetermined interview schedule which was adapted when required. The same interviewer was used for all interviews. A content and thematic analysis of the summarised interview data was conducted to elicit key themes and formulate recommendations. Recruitment for interviews was challenging and a number of strategies were used to engage stakeholders.

Table 7: Outline of Stakeholder Consultations

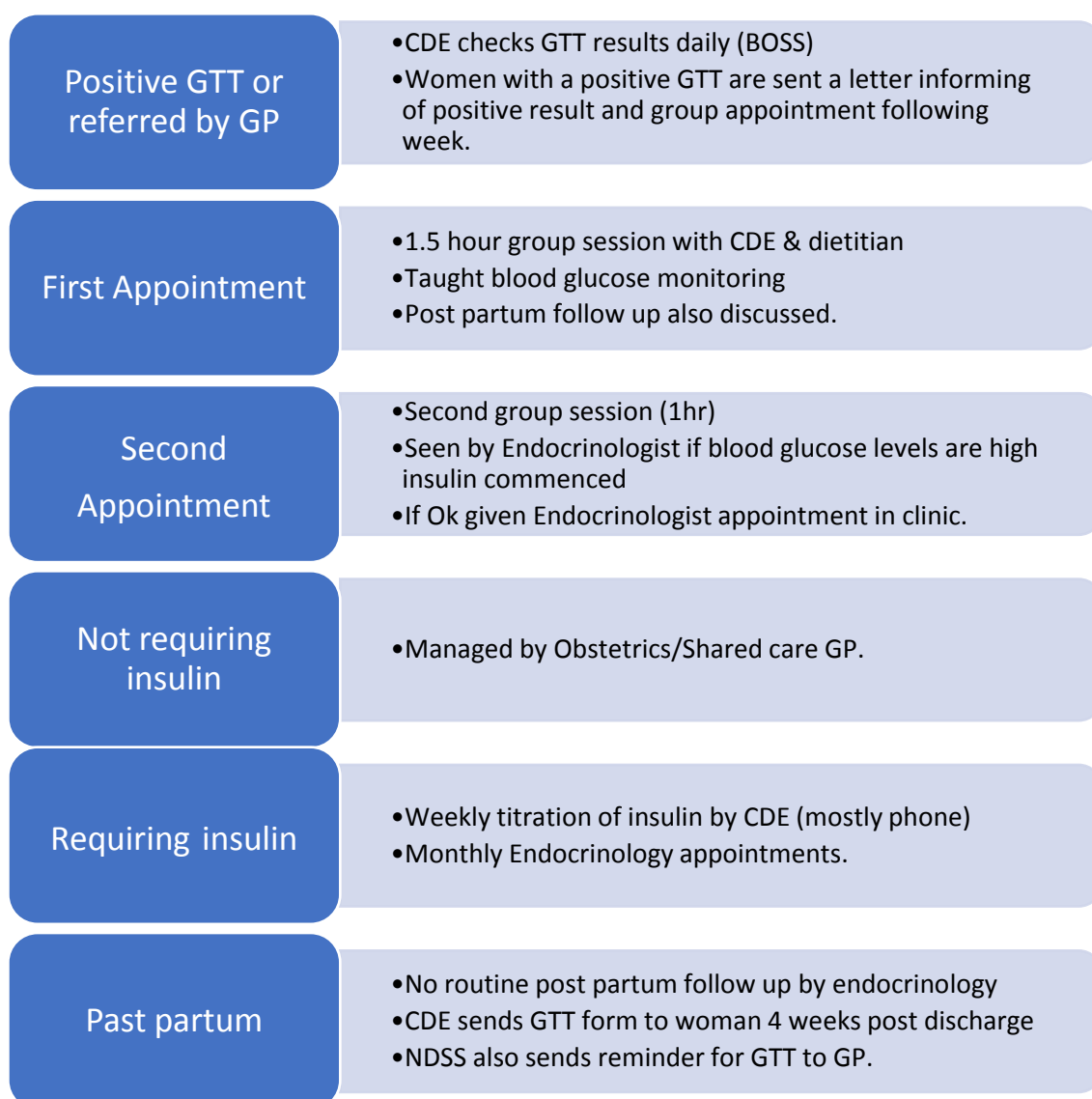
Consultation targets	Consultations Completed
Eastern Health - Angliss and Eastern Endocrinologists/ Obstetricians/Credentialed Diabetes Educators (CDEs) & midwives 9 interviews	9- Interviews 3 - endocrinologists & 3 - CDEs 1 - Obstetrician & 1 – APD Family and Children 1 - GP liaison
General Practitioners / Practice Nurses (PN) /CDEs Shared Care clinics 10 interviews - 7 GPs (2 Chinese speaking) and 3 PN and/or CDEs	13 - Interviews 4 - CDEs (1 Chinese speaking) 2 - GPs 7 - Practice Nurses
Maternal & Child Health Nurses (MCHN) 2 interviews	2 - Interviews MCHNs at Maroondah and Whitehorse
Women with GDM 10 participants + 3 Chinese speaking	13 women with GDM interviewed 2- Chinese speaking 1-Japanese 3 -of Indian background 1- Aboriginal

8.1 Current services and referral pathways in the catchment

Consultations with Credential Diabetes Educators (CDE) and Endocrinologists suggest a systemised and consistent approach by the diabetes team to management of women with GDM accessing obstetric care at Eastern health. This includes strong processes for identifying women who have a positive GTT, notifying women of a positive result, offering them a group education session and follow up of their blood glucose control if they require insulin.

Women who fail to attend their scheduled group education program are phoned and their education session rescheduled. If they fail to attend twice the midwife is notified and asked to follow up with the woman.

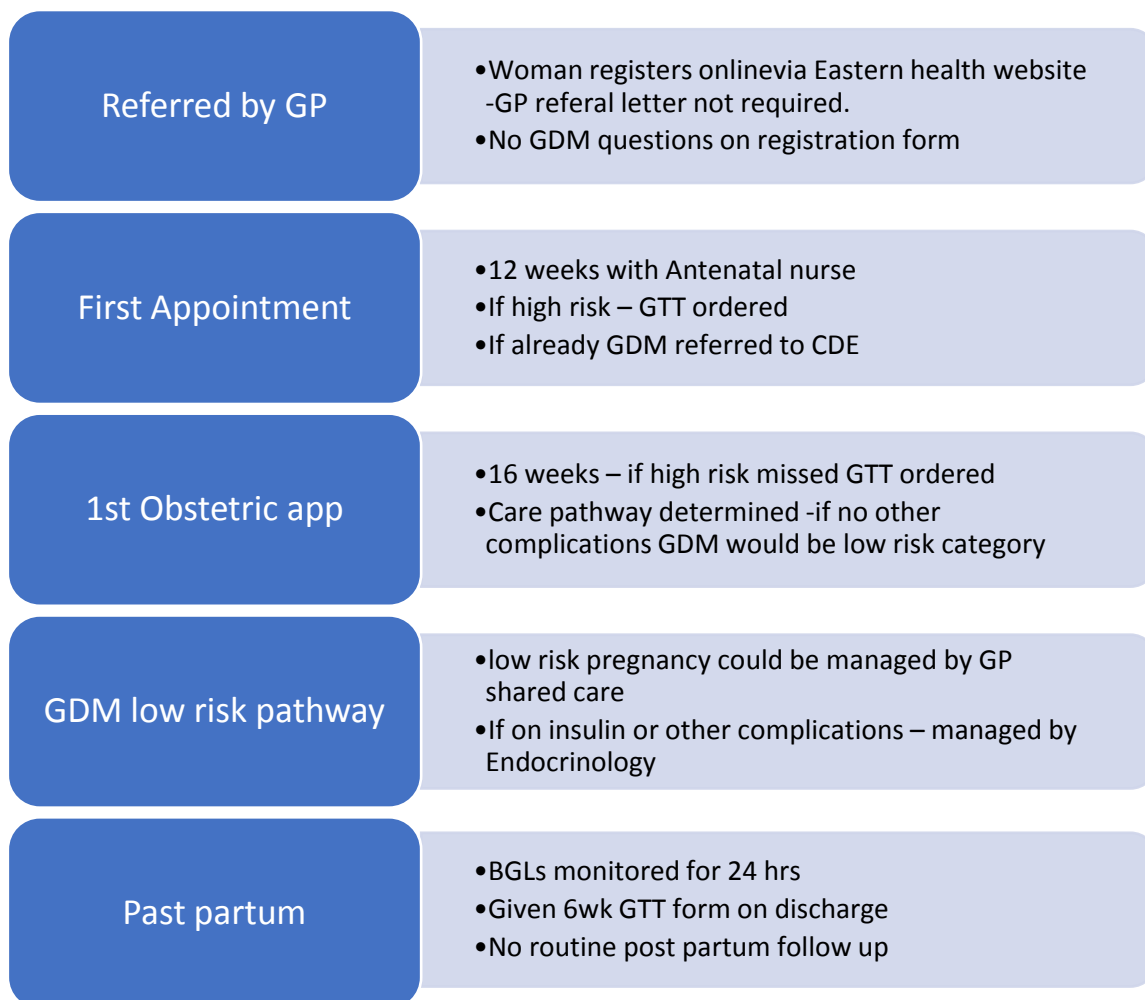
Figure 2: Eastern Health Endocrinology GDM pathway



Issues identified by CDE's and endocrinologists included delays in early screening for high risk women; follow up of women diagnosed with GDM; limited options for education for women with GDM; women not requiring insulin being managed by Obstetrics team; Lifestyle advice and interventions to reduce risk and manage GDM; post-partum GTT; and resourcing due to the increased numbers of women being diagnosed with GDM.

The Eastern Health Head of Obstetrics and Associate Program Director of Women and Children were also consulted. There is a strong reliance on the diabetes team to manage diabetes for women requiring insulin treatment. This can be burdensome for women as they require additional appointments and requires good interaction between departments. These interviews identified other similar issues: delays in early screening for high risk women; follow up of women diagnosed with GDM; lifestyle advice and interventions to reduce risk and manage GDM; and post-partum GTT. The GDM pathway used varies slightly from Endocrinology.

Figure 3: Eastern Health Obstetric GDM pathway



8.2 Maternal & Child Health Nurses

Consultations with maternal and child health nurses indicated no routine question or reminders about GDM, unless the information is provided by the discharge hospital or woman themselves. Their focus is on health and wellbeing of the baby with encouragement to women to take a whole of family approach to healthy living. They are also not involved in pre-pregnancy planning. They indicated a lack of clear pathways for referral to healthy lifestyle programs suitable for women with young babies and toddlers.

8.3 General Practitioners

It was difficult to find general practitioners willing to participate in the consultation. A Chinese speaking CDE working in general practice who sees many Chinese speaking women identified lack of willingness of women to pay for education sessions; language barriers to sessions offered at Eastern Health; lack of contact from hospitals once referred; and lack of understanding by the women of Australian health care systems.

The two general practitioners consulted indicated they are aware of the new diagnostic criteria and high risk groups and organise a GTT when identified. They do receive reminders from NDSS to organise post-partum GTT and offer healthy lifestyle advice and future pregnancy planning advice. Issues identified were concerning information and communication from Eastern Health and ambiguity in defining their role in managing GDM.

8.4 Women with GDM

Thirteen women with gestational diabetes from Angliss and Box Hill maternity services were interviewed, 7 from Box Hill and 6 from Angliss. Five of the women interviewed were in their second trimester and 8 in their third trimester. Six of the women were first time pregnancies.

Diagnosis and presentation

The week of diagnosis of GDM varied from 10 to 26 weeks as indicated in Table 8 below. Table 9 provides a summary of the key characteristics of the women interviewed.

Table 8: Week of diagnosis of GDM (n=13)

Week of diagnosis of GDM	Number of women
Diagnosed at 10 weeks	2
Diagnosed between 11-21 weeks	4
Diagnosed between 26-28 weeks	7

Table 9: Key characteristics of the women interviewed (n=13)

	YES	NO or Unsure	Angliss	Box Hill
Number of women at high risk of GDM	7	6	3	4
Gestational Diabetes with previous pregnancies	5	2		
Number of women at high risk that had GTT in first trimester	2		2	0
Number of women at high risk that had GTT in second trimester	4		1	3
Number of women at high risk that had GTT in third	1		0	1

Screening for GDM for women at increased risk for GDM

At Angliss, 3 of the women interviewed were known to be at increased risk of GDM due to previous GDM. Two of these women had their GTT at 10 weeks after contact from the midwife.

At Box Hill, 4 women were known to be at increased risk either because of previous GDM or because of Asian ethnicity. Three of these women had their GTT done at 16 weeks ordered by the midwife or obstetrician; the fourth lady had it done at 26 weeks. This may have been due to the fact that she recorded her country of birth as Mauritius but she is Chinese Mauritanian.

Awareness of risk for GDM

Most of the women (9) knew about GDM either because of previous GDM or they knew friends who had GDM, most who had previously had GDM indicated they did not know about GDM in their first pregnancy. Although women may have said they knew about GDM some were not aware of the risk factors for developing GDM. Points to note are:

- 4 of the 5 women who reported having had GDM in previous pregnancies indicated that they were aware that they were at higher risks for GDM and of the need to have an early GTT. (One woman said that her previous pregnancy had been 16 years ago when she was very young and so she only had a very vague recollection of the whole experience.)
- All of these 4 indicated that they discussed this with their GP at the time they had their pregnancy confirmed. 2 of these women said the GP said to wait until they saw the midwife/obstetrician for further investigations; 2 women said their GP did a blood glucose test and said they were OK.
- 2 other women were identified as high risk due to their Chinese ethnicity. Both were first pregnancies and were unaware that they were at increased risk of GDM.
- Other than the 4 women who indicated that they had previously had GDM, none of the other women indicated that they were aware of the risk factors for GDM.

(Note participants were only asked about previous history of GDM and cultural background but not about other risk factors for GDM).

Most of the women who had GDM for the first time said they were shocked that they had it as they were not expecting it and felt that they must have caused their GDM in some way. They also talked about feeling that people would be judging them. Women who had GDM with previous pregnancies described the same sentiments when they got GDM for the first time.

Quotes from women interviewed:

I felt really bad with my first pregnancy. People don't understand and said it was because I was fat. I didn't know any of the risk factors. I was angry that I had it and didn't want to talk about it

Feel like I caused it by not losing weight after last pregnancy. I feel like people are judging me. I tend not to tell people I have GDM because I am embarrassed and that they will judge me

Preferred method of obtaining information

Most of the women indicated that they prefer to get their information about GDM from the internet because they can do it in their own time and seek out the information that they are most interested in. All the women whose first language was not English indicated that they sort information via the internet in their first language and had found this really helpful.

One woman said she would prefer written information in the mail as if she received it by text or email it would get lost in all her other work messages. All the other women indicated emails or text were the best ways of communicating information to them.

All of the women indicated that they had looked for information on the internet via google search. When asked if they looked at where the information came from or if they looked up Diabetes Organisations sites most said no, but said they looked at a number of different sites to check that the information was accurate.

I tend to Google a lot. I prefer to read information myself and then talk to health professionals if I need help or can't manage

I like using websites; I can check things in my language

I prefer the internet, it is easy to access, with lots of different sources and I can do it in my own time

Most of the women said it would be helpful to be given a list of reputable websites and some indicated it would have been good to include this in the letter they received about their results and appointments.

Half of the women indicated that they had joined online GDM support groups or chat forums and had found it really helpful to hear what other women had to say. Again the women whose first language was not English indicated that chat forums/support groups in their first language had been very reassuring.

A consistent observation from the women was that they found it good to see comments from women who had posted baby photos saying their baby was born without complications.

Support provided by the hospital

All of the women indicated they were happy with the support provided by the hospital. They had all attended the group session/s and all except one woman indicated that this had been useful, including the women who had previously had GDM and attended group sessions before as they found them a good refresher. Some women indicated that they had accessed additional support from the DNE's and Endocrinologists. They felt supported by the fact that they could call the DNE whenever they needed to and that they were having regular appointments with the Endocrinologist. Some women indicated that their sugar levels were stable so they had not needed to contact the DNE but they were happy that they had that option if they needed it. One woman indicated she was unhappy with the support received.

I would have liked to have the diagnosis explained more gently not just told to come to a group because you have diabetes. I felt angry and sitting in the group made me angrier. I did my own research and found I was at increased risk for type 2 and so was my baby; I found this distressing and didn't feel I had anyone to talk to about this

All of the women indicated that they felt they had a better understanding of GDM as a result of attending the group education programs.

I left feeling informed from the group sessions and I feel like I can call if I am worried. Coming regularly to the Endocrinologist helps me take it seriously; I think the regular contact is good

The group was good because it clarified things. It was also good to meet other women with GDM especially to see some who were thin. It made me feel better - helped me see not just overweight people get GDM. I was not that keen on coming to the group but I am glad I did

Unmet needs and suggestions for improvement

Most of the women said they were happy with the service they had received and could not suggest any areas for improvement. A few of the women suggested providing recommendations on websites via letter/text/email before the group.

Most women indicated that receiving their GTT results in the mail was OK; two (2) women suggested that they would have preferred to be told in person either via phone or at their appointment.

A few women (4) also suggested improving the notification process as they had received text messages to attend group sessions before they had received the letter in the post to tell them they had GDM, this had created confusion for them and some distress.

I got a text for the group before the letter so that was a bit confusing wasn't sure what appointment was for

I was told my text message to come to a class. I didn't know why, I was very shocked and upset when I got to the class and realised why. I think a phone call would have been better than a text or letter that way you can clarify things

One of the women from Angliss expressed concern that the Educator was only there a few days a week and another suggested more opportunities to speak to other women with GDM.

Only having a clinic on one day a week at Angliss was an issue for a few women.

A few women from both sites expressed concerns about wait times in the clinics.

A few of the women also suggested that they would have liked to know more about GDM and the risk factors before they had their GTT, indicating that they may not have been so shocked and may have been more careful with their diet.

It would have been good to know why I was having a GTT and the risk factors for GDM before the test, and then it may not have been such a shock. I think it would also have been good to speak to other women with GDM

I would have liked to know earlier about risks of GDM, I may have been more careful with my diet and other things

Concerns about having GDM

The main concern expressed by women about having GDM was concern for the baby's wellbeing, in particular during and post birth. Concerns expressed were about the baby being too big or having problems with Blood Glucose Levels (BGLs) after the birth and the increased risk of Type 2 diabetes later in life.

I do worry about the baby but otherwise not too concerned. My BGLs are Ok, I actually wonder if I have diabetes as only one of my results were high and they said because of the new criteria I fit into diabetes

Their increased risk of developing Type 2 diabetes later in life was also an area of concern expressed by many of the women.

A few of the women described feeling upset and angry about having GDM.

I was a bit shocked when I got the letter. Still not sure that it is right because all my tests are Ok. It is annoying having to go through all this because I already eat healthy and exercise

I felt upset and depressed about having to make changes to my diet, it is hard when cooking for the whole family

Three of the women indicated that they were not really convinced that they had GDM. These were all women who had been diagnosed in their third trimester and all indicated that they only had one abnormal result in their test and that their sugar levels since starting monitoring were mostly stable.

Understanding of future risk

All of the women indicated that they expected their diabetes to go away after the baby was born; most understood that they needed to monitor their BGLs for 24hrs after the birth and they needed to have a follow up GTT. Most knew it was 6 weeks after the baby was born. Most women also indicated that they thought they needed yearly GTTs.

I am sure it will go away and I will just go back to exercise and eating healthy

I think I will be ok if I make changes to my diet. It would be good to have reminders from the GP for the check up

All of the women indicated that they understood that they were at increased risk of type 2 diabetes later in life. Two (2) women indicated that they felt it was inevitable that they would get type 2 diabetes because of a strong family history of type 2.

Most women indicated that they know that they need to eat healthy and exercise to reduce their risk of GDM in future pregnancies and type 2 diabetes in the future. Only a few women specifically mentioned maintain a healthy body weight as important.

Support in the future

Most of the women indicated that they felt confident about making lifestyle changes that would decrease their risk of getting type 2 diabetes in the future. Most suggested they would not be likely to attend any formalised program as they anticipated they would be busy with a new baby.

Some felt it would be helpful if the GP sent them regular reminders and monitored things for them. Most indicated they would mostly likely go back to their GP if they were worried about anything.

Think I can manage by myself don't think I would have time for anything else with a baby and toddler

No time for group program. It would be good for my GP to follow up with me when I am there for other things. Maybe a letter in the mail as reminder to do the GTT

Not sure if I would need any support. I will probably just be relieved not to test and busy with baby so will see how I go

8.5 Summary of consultation findings

Delays in early screening for high risk women

There are concerns amongst stakeholders that women at high risk of GDM are not being screened when their pregnancy is confirmed by the GP. Eastern Health staff feel most women are not being screened until their first visit to antenatal but do not have figures to quantify this. Community stakeholders also identified early screening for high risk groups may not be occurring.

No GP referral is needed for women to book themselves into antenatal care, so a positive GTT result is not routinely communicated to the hospital and the antenatal care registration process does not ask about GTT tests. This process is currently under review as is including questions about GDM in the registration process.

There was a high level of confidence that high risk women attending Box Hill get a GTT at first visit (12weeks) and if not at the second visit (16weeks) to the ante natal clinic. There was less confidence that this happens for most women at Angliss.

From the interviews with the women, it was women at high risk attending Box Hill that were less likely to get a GTT in the first trimester. Women who know they are at high risk also indicated they alerted their GPs to this at the time pregnancy was confirmed but were not ordered a GTT.

Follow up of women diagnosed with GDM

There was a high level of confidence that if the GTT is done at Eastern Health the CDE's will identify positive results and notify women.

If the GTT is **not done** at Eastern Health there was a variation in confidence levels of staff regarding follow up of women who have a positive GTT. Box Hill staff were confident that most women are referred to education by Obstetrics if not routinely picked up through CDE review of Boss data base. Angliss staff indicated that they have a lot more women in shared care with GPs and some women seeing private

Obstetricians; concerns were expressed that some of these women were not monitored adequately, not referred to CDE/Endocrinology or referred very late in pregnancy.

CDEs reported most women do attend the education program (although figures are not available).

Women requiring insulin have a monthly endocrinologist appointment this was identified as burdensome for women as appointments are over and above the routine obstetric appointments and so women struggle to attend these appointments.

Limited options for education for women with GDM

Due to resourcing issues women who have GDM are only offered limited group education sessions. If they are unable to attend group education, there is no capacity to follow up individually so these women need to be monitored by the antenatal team.

Most of the women interviewed indicated that they were happy to attend group education and had found it useful, most women also indicated that they felt further support was available if they needed it. Although it should be noted this may just be a reflection of the fact that interviews were conducted with women who were attending the group. Views of women who have not attended the group session have not been captured in this consultation process.

The one community CDE who works predominantly with Chinese women indicated that these clients report that group education and language issues are a barrier for them. Cost is also a barrier to accessing private services.

Women not requiring insulin managed by Obstetrics team

If blood glucose levels are within target range, women with GDM are managed by the Obstetrics team with the assumption that blood glucose levels will be monitored and referral back to the Diabetes team will be made if blood glucose levels become elevated. All stakeholders involved in this process, including GPs, expressed concerns that blood glucose levels of these women may not be being optimally monitored and there is a risk that elevated blood glucose levels may not be identified and acted on. GPs indicated that they are happy to manage GDM as part of the shared care program only if they are confident that Eastern Health is providing education and endocrinology support.

GPs also expressed concerns about lack of communication from Eastern Health in relation to GDM.

All the women interviewed indicated they were happy with the level of support provided and they felt confident to get in touch with the CDEs if their bgl's were not stable and within the normal range.

Lifestyle advice/interventions to reduce risk of GDM/management of GDM

There was consensus across all stakeholders that there are limited opportunities to systematically intervene to support women who are overweight to manage weight and adopt healthy lifestyle options during pregnancy. This is due mainly to insufficient resources, but lack of processes and alternative referral pathways also contributes to this.

GPs indicated that they see lifestyle counselling pre and post pregnancy as part of their role but would value opportunities to refer women to formal tailored programs. They were not as confident in providing weight loss/control during pregnancy advice.

Most women indicated that the information about lifestyle and eating was adequate and they felt confident managing these aspects during and post pregnancy. Most indicated that they had sought additional information from websites and online chat forums and would probably do this in the future if needed.

Post-Partum GTT

There are number of processes for facilitating a post-partum GTT for women who have GDM. Potentially women could receive at least 2 GTT forms from the hospital and one from the GP, this may create some confusion for women.

Eastern Health have strong processes for following up women who have their GTT done at Eastern Health but this only around 30% of women. Approximately 28% of these women have a positive result. Figures on who is not attending for follow up GTT are not available so it is unclear how representative this figure would be for the whole cohort.

There are no post-partum follow up appointments or lifestyle interventions offered by Eastern Health, both CDEs and Endocrinologist saw a role for Community Health in this.

Most women indicated that they thought their GP was the best person to follow up on tests in the future and that regular reminders from their GP would be helpful.

Most women indicated they would be unlikely to attend any programs in relation to preventing type 2 diabetes or about lifestyle interventions post baby.

Resource issues

Eastern Health diabetes services have experienced a significant increase in demand for services as a result of the changed criteria for diagnosis of GDM. This increase has created pressures on the service, women have long wait times in the clinic and staff reported feeling under pressure most of the time.

Community Health Services and private CDEs reported receiving very few referrals for GDM from GPs or specialist services.

9. Recommendations

Based on the literature review and consultation findings, recommendations for future work were identified in four key areas.

In planning future work, it is advised that interventions are co-designed with women at risk of GDM, and that change is collaborative across the range of stakeholders.

1. Provide support for women during and after pregnancy to manage GDM and reduce risk

Strategy	Possible actions
<p>Reduce risk of elevated blood glucose levels during pregnancy and post-delivery by providing women with a range antenatal and postnatal support and education options to support healthy eating, weight control and lifestyle interventions.</p>	<ol style="list-style-type: none"> 1. Review Eastern Health data to improve understanding of the demographics of women who are not attending group education sessions to better target at risk women 2. Source credible, good quality web based healthy lifestyle and GDM information and make these accessible to the target group (such as Western Health and Deakin examples) 3. Use technology such as SMS messaging and on-line peer support to provide coaching and on-line support for behaviour modification
<p>Develop a community health model for providing support to women to manage GDM and decrease diabetes risk post-delivery.</p>	<ol style="list-style-type: none"> 1. In partnership with Eastern Health, trial a model of community health based GDM education and support: <ul style="list-style-type: none"> • Provide ante-natal group sessions and/or use of technology in innovative ways; • Provide support post-delivery using phone and web based technology to encourage post-natal GTT and/or HbA1C, and continue lifestyle modifications.

2. Build the capacity of general practitioners to support women at risk

Strategy	Possible actions
<p>Support GPs to identify at risk women and order a GTT in a timely manner and take appropriate action if the result is positive.</p>	<ol style="list-style-type: none"> 1. Develop a localised GDM pathway on Health Pathways Melbourne including key information for women about reasons for GTT and impact of GDM 2. Provide professional development for GPs on GDM
<p>Support GPs to identify and provide counselling to women at high risk of GDM including risk reduction; encouraging early screening; and systematic postnatal follow up including lifestyle counselling.</p>	<ol style="list-style-type: none"> 1. Investigate and collate referral options for GPs for healthy lifestyle counselling 2. Ensure the localised GDM pathway has links to appropriate referral options and healthy lifestyle resources for patients 3. Provide professional development for GPs on healthy lifestyle counselling 4. Advocate to add reminders to GP medical software to do and check post-delivery GTT 5. Advocate for HbA1c at 12 weeks post-delivery if GTT missed

3. Improve systems to ensure identification and management of women at risk of and with GDM is optimal

Strategy	Possible actions
Review registration and GP referral processes for obstetric care to ensure women at high risk are identified, tested and monitored for GDM appropriately.	<ol style="list-style-type: none"> 1. Examine Eastern Health data to quantify number of at risk women who have a GTT ordered/performed by their GP prior to referral and the number of high risk women who have a GTT when first presenting to Obstetrics and how results are recorded 2. Review communication processes between Eastern Health Endocrinology and Obstetric departments
Improve coordination of care for women with GDM who are in shared care.	<ol style="list-style-type: none"> 1. Review communication processes between GPs undertaking shared care and Eastern Health 2. Ensure systems are in place to inform GPs undertaking shared care when women have been diagnosed with GDM 3. Clarify shared care roles and responsibilities of all team members and communicate these to all parties 4. Inform GPs about monitoring and follow up of women with GDM during and post-pregnancy
Reduce confusion for women and GPs regarding post-delivery GTT.	<ol style="list-style-type: none"> 1. Streamline current practice for post-delivery GTT 2. Identify options for building on and supporting NDSS reminder processes

4. Address the obesogenic environment

Strategy	Possible actions
Advocate with key stakeholders to make changes that address the obesogenic environment	<ol style="list-style-type: none"> 1. Input to local council municipal public health and wellbeing action plans to address obesogenic environments 2. Develop healthy eating policies and strategies in health services

Appendix

Appendix A: Websites

Australian Diabetes Map

<http://www.diabetesmap.com.au/#/>

Australasian Diabetes in Pregnancy Society

<http://adips.org/>

Diabetes Victoria

<https://www.diabetesvic.org.au>

Diabetes Australia

<https://www.diabetesaustralia.com.au/gestational-diabetes>

Health Translations Directory

<http://www.healthtranslations.vic.gov.au/bhcv2/bhcht.nsf>

Life! Program

<https://www.lifeprogram.org.au/>

MAGDA Study

<http://www.magdastudy.org.au/>

National Diabetes Services Scheme (NDSS)

<https://www.ndss.com.au/>

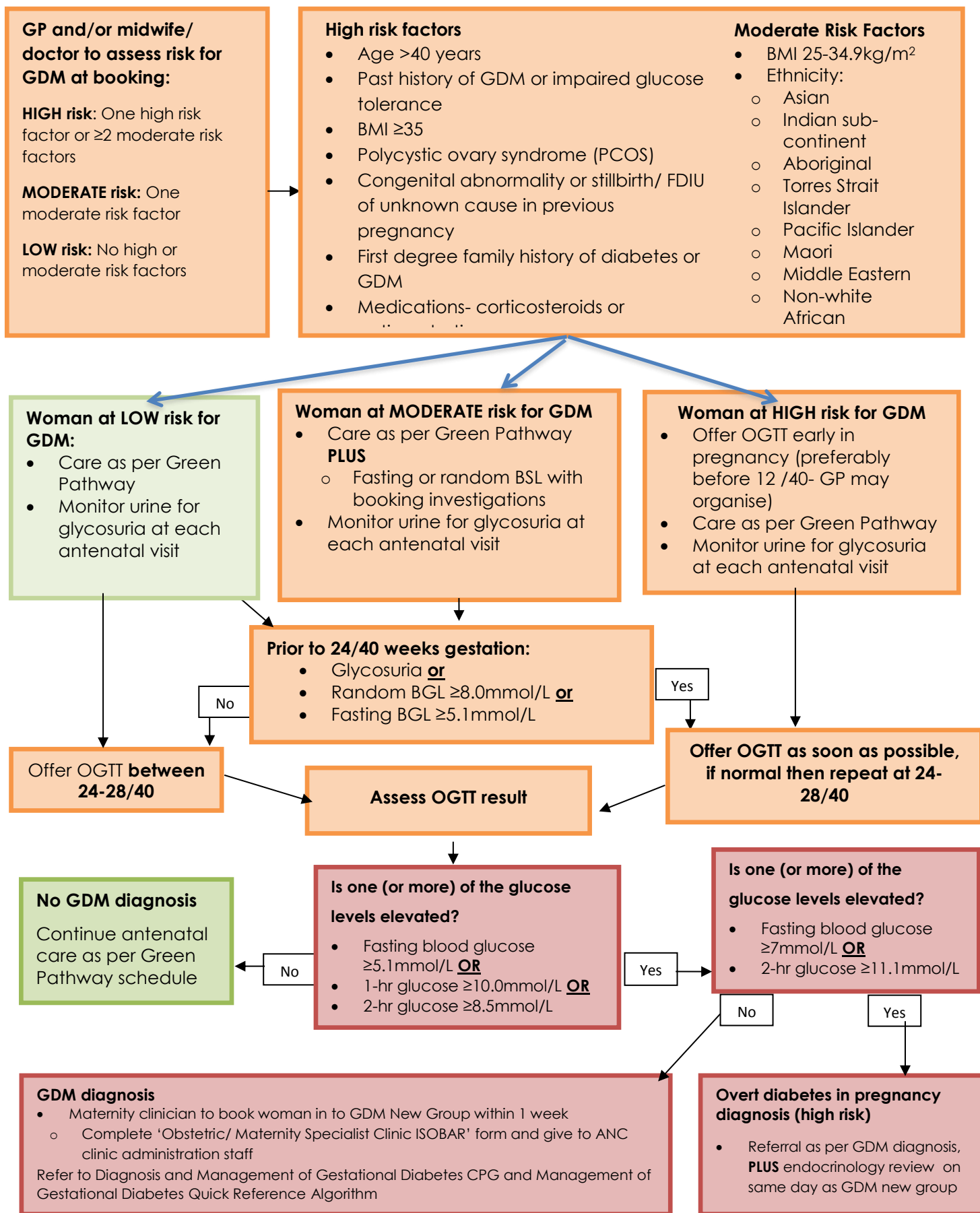
NDSS Multicultural Portal

<http://multiculturalportal.ndss.com.au/>

Women after Gestational Diabetes Program

<https://bakeridi.edu.au/Assets/Files/Baker-IDI-women-after-gestational-diabetes-program.pdf>

Appendix B: Eastern Health Diagnosis of GDM: Clinical Practice Guidelines



Bibliography

- Abouzeid, M., Versace, V., Janus, E., Davey, M., Philpot, B., Oats, J., & Dunbar, J. (2015). Socio-cultural Disparities in GDM Burden Differ by Maternal Age and First Delivery. *Plos One*.
- Abouzeid, M., Versace, V., Janus, E., Davey, M.-A., Philpot, B., Oats, J., & Dunbar, J. (2014). A Population-based Observational Study of Diabetes during Pregnancy in Victoria, Australia, 1999-2008. *BMJ Open*.
- ADIPS. (2012). *ADIPS*. Retrieved from Australasian Diabetes in Pregnancy Society: <http://adips.org/>
- AIHW. (2010). *Diabetes in Pregnancy: its impact on Australian women and their babies*. Australian Institute of Health and Welfare.
- AIHW. (2016). *Australia's Mothers and Babies 2014 - in brief*. Retrieved from Australian Institute of Health and Welfare: <http://www.aihw.gov.au/publication-detail/?id=60129557656>
- AIHW. (2016). *Perinatal Data Portal: Antenatal period*. Retrieved from Australian Institute of Health and Welfare:
http://analytics.aihw.gov.au/Viewer/VisualAnalyticsViewer_guest.jsp?reportPath=%2FAIHW%2FReleasedPublic%2FPerinatal%2FReports%2FNOV2016&reportName=Antenatal%20period&reportViewOnly=true&viewerMode=modern&commentsEnabled=false&propertiesEnabled=false&appSw
- Australian Government Department of Health. (2015). *Diabetes*. Retrieved from The Department of Health: <http://www.health.gov.au/internet/main/publishing.nsf/Content/chronic-diabetes>
- Bain, E., Crane, M., Tieu, J., Han, S., Crowther, C., & Middleton, P. (2015). *Diet and Exercise Interventions for Preventing Gestational Diabetes Mellitus (Review)*. Cochrane Database of Systematic Reviews.
- Barrett, H., Dekker Nitert, M., Conwell, L., & Callaway, L. (2014). *Probiotics for preventing gestational diabetes*. Cochrane Database of Systematic Reviews.
- Carolan, M., Steele, C., & Margetts, H. (2010). Knowledge of Gestational Diabetes among a Multi-ethnic Cohort in Australia. *Midwifery*.
- Crawford, T., Crowther, C., Alsweiler, J., & Brown, J. (2015). *Antenatal dietary supplementation with myo-inositol in women during pregnancy for preventing gestational diabetes*. Cochrane Database of Systematic Reviews.
- Department of Health. (2015). *Australian National Diabetes Strategy 2016-2020*. Retrieved from Australian Government Department of Health:
<http://www.health.gov.au/internet/main/publishing.nsf/content/3AF935DA210DA043CA257EFB000D0C03>
- Department of Health. (2015). *National Antenatal Care Guidelines*. Retrieved from Australian Government Department of Health: <http://www.health.gov.au/antenatal>
- Diabetes Australia. (2015). *Gestational Diabetes*. Retrieved from Diabetes Australia:
<https://www.diabetesaustralia.com.au/gestational-diabetes>
- Diabetes Australia. (2015). *Managing Gestational Diabetes*. Retrieved from Diabetes Australia:
<https://www.diabetesaustralia.com.au/managing-gestational-diabetes>
- Diabetes Victoria. (2012). *Gestational Diabetes*. Retrieved from Diabetes Victoria: <https://s3-ap-southeast-2.amazonaws.com/dv-resources/OrchestraCMS/a1f90000003H5lcAAC.pdf>

- Diabetes Victoria. (2016). *Life program for professionals*. Retrieved from Diabetes Victoria: <https://www.diabetesvic.org.au/Professionals-type?tags=Left-Mega-Nav%2FLife%20Program%20for%20Professoianls%2F&bdc=1>
- Dunbar, J., Jayawardena, A., Johnson, G., Roger, K., Timoshanko, A., Versace, V., . . . Janus, E. (2014). Scaling Up Diabetes Prevention in Victoria, Australia: Policy development, Implementation, and Evaluation. *Diabetes Care*, 934-942.
- HealthWest Partnership. (2015). *Responding to Gestational Diabetes in Braybrook*. Melbourne.
- Hinkle, S., Buck Louis, G., Rawal, S., Zhu, Y., Albert, P., & Zhang, C. (2016). A Longitudinal Study of Depression and Gestational Diabetes in Pregnancy and the Postpartum Period. *Diabetologia*.
- Lappanen, M., Aittasalo, M., Raitanen, J., Kinnunen, T., Kujala, U., & Luoto, R. (2014). Physical Activity During Pregnancy: Predictors of change, perceived support and barriers among women at increased risk of gestational diabetes. *Maternal and Child Health Journal*.
- Lim, S., Skinner, T., Eakin, L., & Dunbar, J. (2014). *Telephone-based MAGDA in postpartum women with a prior history of gestational diabetes*. The Australian Primary Health Care Research Institute.
- Morisset, A.-S., St-Yves, A., Veillette, J., Weisnagel, S., Tchernof, A., & Robitaille, J. (2010). Prevention of Gestational Diabetes Mellitus: A review of studies on weight management. *Diabetes/Metabolism Research and Reviews*.
- Muktabhant, B., Lawrie, T., Lumbiganon, P., & Laopaiboon, M. (2015). *Diet or Exercise, or Both, for Preventing Excessive Weight Gain in Pregnancy*. Cochrane Database of Systematic Reviews.
- Nankervis, A., McIntyre, H., Moses, R., Ross, G., Callaway, L., Porter, C., . . . McElduff, A. (2013). *ADIPS Consensus Guidelines for the Testing and Diagnosis of Gestational Diabetes Mellitus in Australia*. Australasian Diabetes in Pregnancy Society.
- NDSS. (2016). *Diabetes Map*. Retrieved from National Diabetes Services Scheme: <https://www.ndss.com.au/diabetes-map>
- NDSS. (2016). *Gestational Diabetes*. Retrieved from National Diabetes Services Scheme: <http://gd.ndss.com.au/>
- NDSS. (2016). *Gestational Diabetes as at 30 June 2016*. Diabetes Australia.
- NDSS. (2017). *Diabetes Map*. Retrieved from National Diabetes Services Scheme: <https://www.ndss.com.au/diabetes-map>
- Nicklas, J., Skurnik, G., Zera, C., Reforma, L., Levkoff, S., & E, S. (2016). Employing a Multi-level Approach to Recruit a Representative Sample of Women with Recent Gestational Diabetes Mellitus into a Randomized Lifestyle Intervention Trial. *Maternal & Child Health Journal*, 261-269.
- O'Reilly, S., Dunbar, J., Versace, V., Janus, E., Best, J., Carter, R., . . . Group, M. S. (2016). Mothers after Gestational Diabetes in Australia (MAGDA): A randomised controlled trial of a postnatal diabetes prevention program. *Plos Medicine*.
- Opray, N., Grivell, R., Deussen, A., & Dodd, J. (2015). *Directed preconception health programs and interventions for improving pregnancy outcomes for women who are overweight or obese*. Cochrane Database of Systematic Reviews.
- Poth, M., & Carolan, M. (2013). Pregnant Women's Knowledge about the Prevention of Diabetes Mellitus: A qualitative study. *British Journal of Midwifery*.

- RACGP & Diabetes Australia. (2016). *Clinical Guidelines: General practice management of type 2 diabetes 2016-2018*. Retrieved from Royal Australian College of General Practitioners: <http://www.racgp.org.au/your-practice/guidelines/diabetes/13-diabetes-and-reproductive-health/133-gestational-diabetes-mellitus/>
- RACGP. (2013). *Australian Family Physician*. Retrieved from Royal Australian College of General Practitioners: <http://www.racgp.org.au/afp/2013/august/gestational-diabetes-mellitus/>
- RACGP. (2014). *Clinical Guidelines*. Retrieved from The Royal Australian College of General Practitioners: <http://www.racgp.org.au/your-practice/guidelines/diabetes/13-diabetes-and-reproductive-health/133-gestational-diabetes-mellitus/>
- Raisanen, S., Lehto, S., Nielsen, H., Gissler, M., Kramer, M., & Heinonen, S. (2014). Risk Factors for and Perinatal Outcomes of Major Depression during Pregnancy: a population-based analysis during 2002-2010 in Finland. *BMJOpen*.
- RANZCOG. (2015). *College Communiques*. Retrieved from Royal Australian and New Zealand College of Obstetricians and Gynaecologists: <https://www.ranzcog.edu.au/womens-health/college-communicues/1392-diagnosis-of-gestational-diabetes-mellitus-gdm-in-australia.html>
- SA Maternal & Neonatal Clinical Network. (2015). *Clinical Guideline: Diabetes Mellitus and Gestational Diabetes*. Government of South Australia.
- Senti, J., Thiele, D., & Anderson, C. (2012). Maternal Vitamin D Status as a Critical Determinant in Gestational Diabetes. *Journal of Obstetric, Gynecologic & Neonatal Nursing*.
- State Government of Victoria. (2015). *Diabetes - gestational*. Retrieved from BetterHealth Channel: <https://www.betterhealth.vic.gov.au/health/conditionsandtreatments/diabetes-gestational>
- State Government of Victoria. (2015). *Type 2 Diabetes and Cardiovascular Disease Prevention*. Retrieved from health.vic: <https://www2.health.vic.gov.au/public-health/preventive-health/diabetes-and-cardio-vascular-disease-prevention>
- Tieu, J., Crowther, C., & Middleton, P. (2008). *Dietary advice in pregnancy for preventing gestational diabetes mellitus*. Cochrane Database of Systematic Reviews.
- Wang, C., Wei, Y., Zhang, X., Zhang, Y., Xu, Q., Su, S., . . . Yang, H. (2016). Effect of Regular Exercise Commenced in Early Pregnancy on the Incidence of Gestational Diabetes Mellitus in Overweight and Obese Pregnant Women: A randomized controlled trial. *Diabetes Care*.
- WHO. (2016). *Social Determinants of Health*. Retrieved from World Health Organization: http://www.who.int/social_determinants/en/
- Wilkinson, S. A., McCray, S., Beckmann, M., & McIntyre, D. (2015). Evaluation of a process of implementation of a gestational diabetes nutrition model of care into practice. *Nutrition & Dietetics*, 1-7.
- Wilkinson, S., Lim S, U. S., O'Reilly, S., D, A., & McIntyre, H. D. (2014). Who's responsible for the care of women during and after a pregnancy affected by gestational diabetes? *The Medical Journal of Australia*, S78-S81.
- Wilkinson, S., Upham, S., Janamian, T., C, N., & Jackson, C. (2014). *Policy Options*. The Australian Primary Health Care Research Institute.

Willcox, J., Campbell, K., McCarthy, E., Lappas, M., Ball, K., Crawford, D., . . . Wilkinson, S. (2015). Gestational Weight Gain Information: seeking and sources among pregnant women. *BMC Pregnancy & Childbirth*.

Willcox, J., Wilkinson, S., Lappas, M., Ball, K., Crawford, D., McCarthy, E., . . . Campbell, K. (2017). A mobile health intervention promoting healthy gestational weight gain for women entering pregnancy at a high body mass index: the txt4two pilot randomised controlled trial. *BJOG*.