INDEX

WELCOME

It is with great pleasure, on behalf of ADIPS and the local organising committee, that we welcome you to Sydney for our 2013 Annual Scientific Meeting. The meeting deals predominantly with everyday issues associated with diabetes and pregnancy. The original presentations are of high standard and deal with a wide range of topics. We hope that you find the meeting of interest and that you learn something new to incorporate into your practice. We, the local organising committee, look forward to meeting you and hope you will join us for a leisurely dinner in the Kazbah.

Best wishes,
Aidan McElduff
(On behalf of the Local Organising Committee ADIPS)

ORGANISING COMMITTEE
Aidan McElduff – Northern Sydney Endocrine Centre/ University of Sydney
Amanda Bartlett – Private Practice
Brad de Vries – Royal Prince Alfred Hospital, Sydney
Suzie Neylon - Australasian Diabetes in Pregnancy Society Executive Officer

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CONFERENCE WEBSITE:
www.adipsasm.org

SOCIETY WEBSITE:
www.adips.org

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DELEGATE INFORMATION

VENUE
Sydney Convention and Exhibition Centre
Darling Drive, Darling Harbour
Sydney, New South Wales 2000
Phone: 02 9282 5000

REGISTRATION DESK – ASN EVENTS
The registration desk for ADIPS will be located at the main entrance immediately inside the main SCEC Entrance on Friday 30th August. From lunch on Friday 30th August and Saturday 31st August the registration desk will be located outside the session room (Room 204). The registration desk will be open:

- Friday 30th August from 8:00 AM to 6:00 PM
- Saturday 31st August from 8:00 AM to 4:15 PM

WHAT YOUR REGISTRATION INCLUDES
Full Conference and Allied Health/Student registrations include:

- Access to sessions of your choice for nominated days of attendance
- Morning tea, lunch and afternoon tea on days of nominated attendance
- Conference satchel including conference material
- Delegate abstract proceedings
- GST

CONFERENCE DINNER
This year's conference dinner will be held at **Kazbah Restaurant** Darling Harbour.
When: Friday 30th August
Time: 7:00pm onwards
Address: The Promenade, Harbourside Shopping Centre, Darling Harbour
If you haven't indicated that you would like a ticket, please visit the registration desk and ask about availability.

SPEAKER PREPARATION
Presentations are to be loaded direct to the PC in the presentation room **at least** a full session in advance of your session. You should bring your talk on a USB, saved in a format for display on a PC within the meeting room. A technician will be on hand to assist with any transfer / loading issues and to help you check your presentation.

DISPLAYING YOUR POSTER
Posters can be displayed from lunchtime on Friday 30th August. They will need to be removed by the end of afternoon tea on Saturday 31st August.

Please locate your abstract number in this handbook for correct positioning on the panels. The maximum size allowed is 1 m wide by 1.2 m high. The approved method for attaching your poster is with Velcro. Please visit the registration desk for supplies.

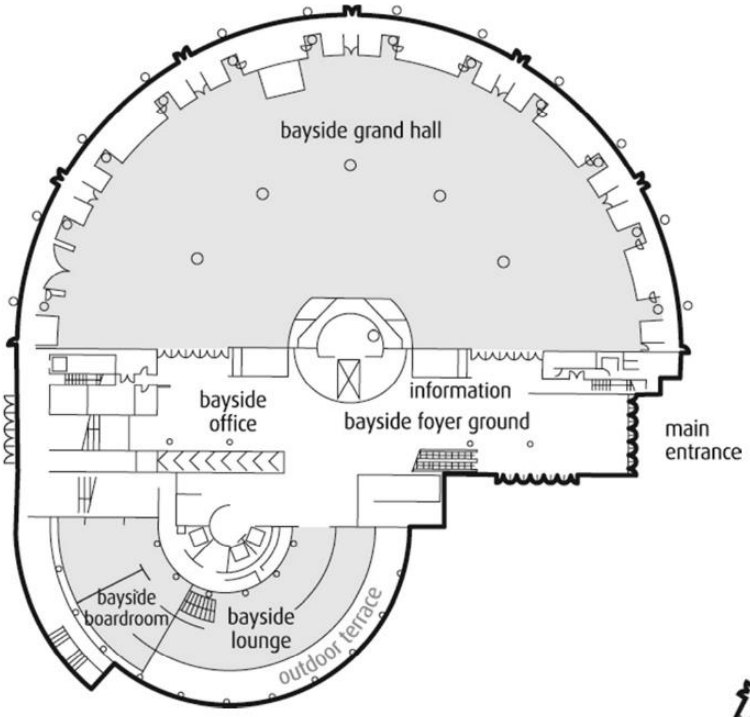
INTERNET ACCESS
There is complimentary wireless throughout the conference centre. Login details will be provided at the registration desk.

MOBILE PHONES
Please ensure your mobile phone is on silent during any session you attend.

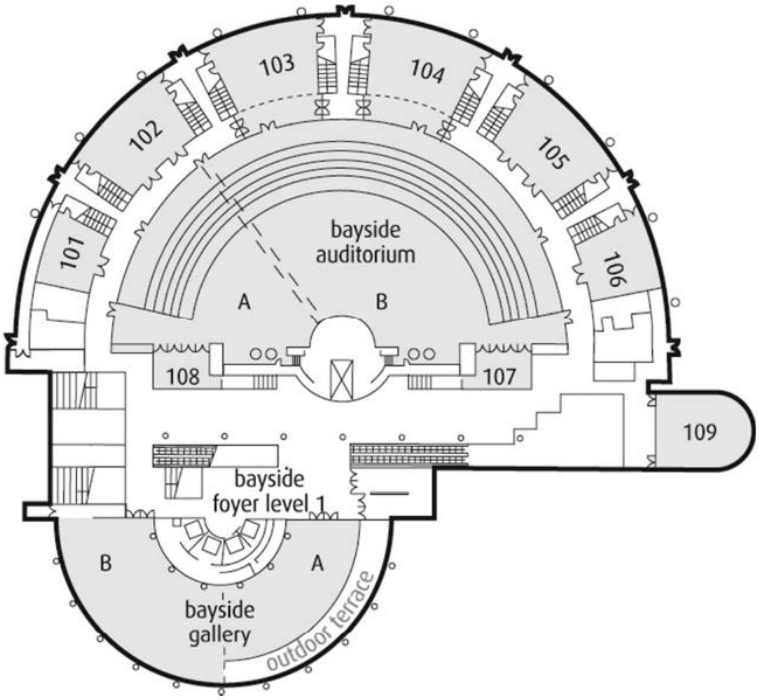
The meeting this year will have a free Smartphone/Mobile Device 'App' that will allow you to view the abstracts and program on your phone, iPad or laptop in a simple and easy to read format. To access the 'App', please open the link http://adips-2013.m.asnevents.com.au through the internet on your phone, iPad or laptop. You will be prompted to add an icon onto your device desktop.

INSURANCE
The hosts and organisers are not responsible for personal accidents, travel costs, or the loss of private property and will not be liable for any claims. Delegates requiring insurance should make their own arrangements.

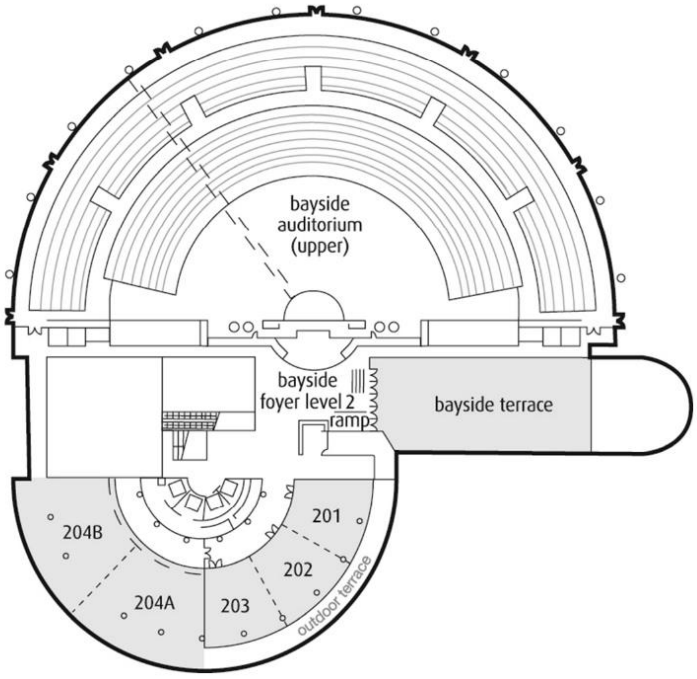
VENUE MAP



GROUND FLOOR



LEVEL ONE



LEVEL TWO

INVITED SPEAKERS

International Invited Speaker

Erica Gunderson

ERICA P. GUNDERSON, PHD, is an epidemiologist (Senior Research Scientist, Investigator) within the Division of Research, Kaiser Permanente Northern California (KPNC) since 1999. Dr Gunderson received her Doctorate in Epidemiology and the Warren Winkelstein Award for Excellence in Graduate Studies in Epidemiology from the University of California at Berkeley (UCB). She earned both MPH and MS degrees from UCB and a BS in Biological Sciences from Stanford University. She is also a registered dietitian (RD).

Before pursuing her doctoral degree and joining the KPNC Division of Research as an epidemiologist and research scientist, Dr. Gunderson spent 14 years in perinatal clinical outpatient services as part of multi-disciplinary teams in the management of low-risk and complicated pregnancies, and as a public health nutritionist. She was the Research Nutrition Supervisor for a large randomized, clinical trial, the Prematurity Prevention Project, coordinated by the Harbor-UCLA medical center within Los Angeles County's public health care system. Until 2000, she was a certified diabetes educator and developed the nutrition guidelines and patient education materials for the State of California's Diabetes and Pregnancy Program (Sweet Success). She also provided individual pre-conceptual and prenatal clinical nutrition management for glycemic control to women with pre-gestational and gestational diabetes mellitus (GDM) in San Francisco Sweet Success programs. After transitioning to a research career in 1999, Dr. Gunderson received career development support from the U.S. Office of Women's Health and the National Institute of Diabetes and Digestive and Kidney Diseases, as well as research funding from the National Institute of Child Health and Human Development the American Diabetes Association, and the NIDDK. Dr. Gunderson provided expert consultation to the Institute of Medicine (IOM) Committee re-examining the guidelines for gestational weight gain during pregnancy. She is co-investigator for the Coronary Artery Risk Factor Development in Young Adults (CARDIA) study, and principal investigator of the Study of Women, Infant Feeding and Type 2 Diabetes after GDM Pregnancy (SWIFT), a prospective cohort study of racially and ethnically diverse women with recent GDM in northern California followed for the development of type 2 diabetes after pregnancy. Her research focuses on reproductive experiences including (pre-pregnancy clinical and biochemical risk factors, parity, pregnancy complications, and lactation measures) and their relationship to women's long-term cardiometabolic health outcomes including the development of obesity, cardiovascular diseases (CVD), prediabetes and type 2 diabetes mellitus in women during midlife. Her research also evaluates the impact of breastfeeding and early life behaviors on infant growth and later child obesity, cardiometabolic risk factors, and metabolic diseases. Her current research focuses on longitudinal epidemiologic studies of women and young children that measure postpartum and early life behaviors, including lactation intensity and duration. She has published extensively on the epidemiology of pregnancy-related weight gain, childbearing and obesity in women, breastfeeding after GDM pregnancy, parity in relation to development of cardiometabolic disease risk in midlife, preconception predictors of gestational diabetes mellitus (GDM) and preterm birth, gestational weight gain and postpartum obesity, and the effects of lactation on women's long-term cardiometabolic health risks.

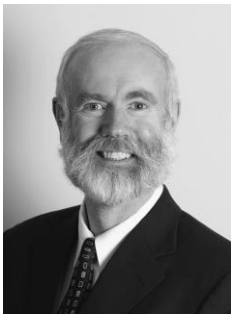
Allan Vaag

Prof Allan Vaag PhD, DMSc - Chief Physician and Professor at Rigshospitalet and Copenhagen University, Denmark

Allan Vaag was born in 1961 and graduated as MD from the University of Southern Denmark in 1986. Since then, he has been engaged in various aspects of diabetes research with an emphasis on the pathophysiology of Type 2 diabetes (T2D). Allan Vaag holds clinical specialist recognition in Endocrinology and in General Internal Medicine. Allan Vaag wrote his ph.d.-thesis on the glucose-fatty acid cycle in humans including patients with T2D, based on a series of studies documenting for the first time that acute inhibition of lipolysis with a nicotinic acid derivative significantly improves insulin action in patients with T2D (Vaag et al, JCI, 1991). Based on eight original publications, Allan Vaag subsequently wrote his Master of Science Thesis on the current state of art of the pathophysiology of T2D (1999), including studies of prediabetic first degree relatives (Vaag et al, JCI, 1992, etc.) and monozygotic twins discordant for T2D (Vaag et al, JCI, 1995, etc.), Allan Vaag has for 10 years been heading a research group at the Steno Diabetes Center in Copenhagen focusing primarily on the impact of the prenatal environment versus genetics on the etiology and pathophysiology of T2D. In 2011, Allan Vaag was appointed full Professor of

Endocrinology (Chair) at the Copenhagen University, situated at the Danish National State Hospital (Rigshospitalet), Copenhagen.The work of Allan Vaag is based upon detailed, extensive and well-powered integrative physiological studies of predominantly people at risk of T2D, which over the last two decades have documented a range of early genetic, epigenetic as well as non-genetic molecular defects of muscle and adipose tissue biology in T2D. For the last decade, one of his main interests has been in the role of the foetal environment in the development of T2D. Allan Vaag was among the first to describe early defects of both insulin action, including impaired muscle glycogen synthesis, as well as defective insulin secretion in pre-diabetic subjects, contributing substantially to our present knowledge of T2D being not only a multi-factorial disease, but also a multiple organ disease involving muscle, beta cell, liver, adipose tissue, gut, and possibly also various other organ defects. Allan Vaag has authored more than 220 original papers and more than 50 review papers in the area of diabetes research in the leading international diabetes and medical journals including New England Journal of Medicine (NEJM), JCI, PNAS, Nature Genetics, PloS Medicine, Circulation, BMJ, Lancet, Diabetes, Diabetologia, Journal of Physiology, American Journal of Physiology, JCEM and many others. Allan Vaag´s current H-index is 45 and the total numbers of citations exceede 8000. Allan Vaag has since 2004 been adjunct professor of Metabolism and Clinical Diabetes Research at the Lund University, Sweden, and since 2011 he has been a faculty member and adjunct professor of endocrinology at the CMC Vellore, Tamil Nadu, India. Allan Vaag is Associate Editor of the European Journal of Endocrinology was until recently Senior Editor of the Journal of Physiology. He has serced in a number of national and international research councils including The Danish Strategic Research Council, Denmark, as well as the Swedish and the Finish research councils.

National Invited Speakers



Grahame Caldwell

Dr Caldwell joined the Douglass practice in 1993. Although qualified in all disciplines of pathology, he has a specialised role as the Director of Chemical Pathology, Esoteric Testing and Director of Toxicology at Douglass Hanly Moir Pathology. He is also Director of the Douglass Hanly Moir Pathology laboratory at St George Private Hospital and Medical Centre. In 2002, he was appointed Clinical Director of Prenatal Testing, a division of the Sonic Clinical Institute, which performs specialised testing for diagnostic practices within the Sonic Healthcare Group.
Dr Caldwell has a keen interest in providing continuing medical education, in particular to his clinical colleagues in general practice. He is also committed to the development of improved standards and guidelines through membership of various working parties and committees, including those of Standards Australia, the National Association of Testing Authorities, the Australasian Association of Clinical Biochemists and the Royal College of Pathologists of Australasia.

Sumaria Corpus

Sumaria Corpus Aboriginal Health Worker/ Diabetes Educator, Royal Darwin Hospital NT, Darwin Diabetes Team Aboriginal Health Worker for 10 years at remote and urban clinics including 8 years of specialist work in diabetes and chronic disease. Other qualifications include Graduate Certificate in Health, Diabetes Management and Education {Flinders University SA.} Diploma in Management {Charles Darwin University NT.} The first AHW to be trained in hyperbaric oxygen therapy, and then undertaking a leadership role as acting co-ordinator of the high-risk foot service. Currently providing specialist diabetes related clinical care and education to diabetic clients at RDH to promote self-management and optimal general health and wellbeing.Involved in the delivery of medical obstetric ante-natal care for all women with GDM, pre existing diabetes and type 1 in pregnancy including urban and remote clients with regards to education, monitoring and adjustments of insulin under the consultants guidance. Research experience includes Co-ordinator of diabetes complications and screening for the DRUID Project (Diabetes Related Disorders in the Urban Region of Darwin) with Menzies School of Health Research. A member of the DRUID follows up study steering and ethics committee {AHREC}. Associate Investigator NT Diabetes In Pregnancy Partnership Project. I regularly attend remote outreach visits. Care co-ordinator for Indigenous patients with special needs such as type 1 diabetes and type 2 in adolescence to advice the team on developing realistic care planning. Although most of my patients are Indigenous, just like diabetes – I don't discriminate.

Brad dr Vries

Brad de Vries is a staff specialist obstetrician and gynaecologist at the Royal Prince Alfred Hospital, Sydney and is the lead obstetrician in its gestational diabetes clinic. He is a clinical senior lecturer at the University of Sydney. His research interests include methods of safely reducing the caesarean section rate and mechanisms of vertical transmission of viruses. He is the chief investigator for a NHMRC funded multicentre trial of prophylactic manual rotation for reducing operative deliveries (the 'POPOUT Trial').

Jodie Dodd

Jodie Dodd is an Obstetrician and Maternal Fetal Medicine Specialist at the University of Adelaide and Women's and Children's Health Network. She is the current Chair of the South Australian Maternal and Neonatal Clinical Network, and is editor for the Pregnancy and Childbirth Group of the Cochrane Collaboration.The focus of her research is to ensure that care for women and their infant's is effective, and that treatment benefits outweigh harms. Using the evidence generated from randomised trials and systematic reviews, and the subsequent development of clinical practice guidelines, the reliability of treatment recommendations is enhanced, thereby improving health outcomes for women and their babies. Specific areas of research interest include care for women with a multiple pregnancy, care during labour, and obesity in pregnancy. Jodie Dodd currently holds a NHMRC Practitioner Fellowship, and prior to that a Neil Hamilton Fairley Fellowship, which enabled post-doctoral work to be undertaken through the University of Toronto, Canada.

Louise Maple Brown

Louise Maple-Brown is Head of Department of Endocrinology, Royal Darwin Hospital and a Principal Research Fellow within the Wellbeing and Preventable Chronic Diseases Division at Menzies School of Health Research. Louise leads the clinical research program within that division of Menzies, with a focus on diabetes and related conditions in Indigenous Australians. Currently Louise is the lead investigator on 2 large NHMRC-funded projects: The eGFR study (Accurate assessment and progression of kidney damage in Indigenous Australians) and the Northern Territory Diabetes in Pregnancy Partnership Project. After completing the majority of her physician and endocrinology training at St Vincents Hospital Sydney, Louise moved to Darwin in 2002 to pursue her passion for improving the health of Indigenous Australians.

Aidan McElduff

Dr Aidan McElduff is an academic physician in private practice in North Sydney and an associate professor in the discipline of medicine, Sydney University. He is the current president of ADIPS and the secretary general for the International Association of Diabetes in Pregnancy Study Groups. He has a long-standing interest in the endocrine problems/issues relating to pregnancy.

David McIntyre

Professor David McIntyre trained in Endocrinology in Australia and Belgium. He is Head of the Mothers and Babies Research Theme at the Mater Medical Research Institute in South Brisbane. David is also Director of Obstetric Medicine at Mater Health Services and Head of the Mater Clinical School of the University of Queensland. David's current research and clinical interests cover medical complications of pregnancy, regulation of fetal growth and intensive treatment of Type 1 and Type 2 diabetes. Recent research studies have examined the effects of diabetes, obesity and high blood pressure during pregnancy on the health of Mothers and Babies, both during pregnancy and with long term follow up. David is currently the Chair of the International Association of Diabetes in Pregnancy Study Groups (IADPSG). He has been closely involved in the translation of clinical research findings into clinical practice, in particular through the re definition of gestational diabetes and promotion of optimal diagnosis and treatment of this common pregnancy complication

Cynthia Porter

Cynthia Porter completed her PhD at the University of Western Australia, School of Primary, Aboriginal and Rural Health Care under the supervision of Professor Timothy Skinner, Profession Isabelle Ellis and Professor Juli Coffin, in 2012. Cynthia has worked as a dietitian (AdvAPD) and diabetes educator (CDE) in rural and remote Western Australia for 30 years. During this time there has been, for Australian Aboriginal children, an unprecedented increase in childhood obesity and a sequential increase in GDM and pre-existing diabetes in pregnancy and resulted in the MACAW study (Models of antenatal care for Aboriginal women with diabetes). Cynthia has been a council member of the Australasian Diabetes in Pregnancy Society since 2010, and co-author of the ADIPS Consensus Guidelines for the Testing and Diagnosis of Gestational Diabetes in Australia. Cynthia has had an interest in dietetic and diabetes education both at the undergraduate and postgraduate level. Cynthia received the Graz Clock Award in 2010 and an ADIPS-Novo Nordisk Educational Research Grant in 2011 to continue this research. In 2012, this research received acknowledgment at the 16th International Congress of Dietetics, Sydney and the International Association of Diabetes in Pregnancy Study Groups, Chennai. Cynthia was an invited speaker in 2013 to The 7th International Diabetes in Pregnancy Symposium, Florence, where it was identified that for Indigenous women DIP is a neglected health priority.

Shelley Wilkinson

Dr Shelley Wilkinson is an Advanced Accredited Practising Dietitian and is the Senior Research Dietitian in the Mater Mothers' Hospitals, Brisbane. She has an NHMRC TRIP (or 'translating research into practice') research fellowship for 2012-13 which provides her with mentoring, support and TRIP training – her project is titled *Translation of Gestational Diabetes Mellitus nutrition practice guidelines' schedule of visits into practice.* Shelley has been a dietitian for over 16 years and also has a PhD in Psychology. Her current work blends dietetics and psychology in all programs she develops and runs to improve maternal health nutritional status and pregnancy outcomes. She is a co-program leader for the Mater Research's Mothers and Babies Theme, 'Optimising outcomes for mothers and babies at risk' and is also very involved Mater's Allied Health Evidence Based Practice teams.

PROGRAM

Friday, 30th August 2013

Registration
8:00am - 9:00am

Symposium 1 - Guideline, an Update
9:00am - 10:30am Room 103
Chair: Aidan McElduff

9:00am **Aidan McElduff**
The Guidelines: Rationale for Change *abs#001*

9:30am **Shelley Wilkinson**
Implementing (health service) changes – An evidence-based approach to implementing evidence *abs#002*

10:00am **Grahame Caldwell**
Assessment of GDM from a laboratory perspective *abs#003*

Morning Tea
10:30am - 11:00am Exhibition Bayside Grand Hall

ADS/ADIPS Novo Nordisk Skip Martin Conjoint Plenary Lectures
12:00pm - 1:00pm Room 204
Chairs: Aidan McElduff & Glynis Ross

11:00am **Allan Vaag**
Developmental Programming of Type 2 Diabetes – Physiological Mechanisms and Role of Genetic versus Epigenetic Factors *abs#005*

11:50am **Erica Gunderson**
Breastfeeding in the Prevention of Cardiometabolic Diseases in Women with GDM and their Offspring *abs#004*

Lunch
1:00pm - 2:00pm Room 202-203

Symposium 2 - Diabetes from an Indigenous perspective in the Northern Territory and Western Australia
2:00pm - 3:30pm Room 204
Chairs: Glynis Ross & Amanda Bartlett
A Panel Discussion will occur after the 3 presentations

2:00pm **Cynthia Porter**
What are considered culturally secure models of antenatal care, when engaging Indigenous women, when diabetes is present? What is the impact to service providers when introducing the new ADIPS guidelines for an Indigenous population *abs#006*

2:20pm **Louise Maple-Brown**
Diabetes in Pregnancy in Indigenous Australians: Insights from the Top End of the NT *abs#007*

2:40pm **Sumaria Corpus**
Diabetes from an Indigenous perspective in the Northern Territory *abs#008*

3:00pm **Panel Discussion – including Ms Lee-Anne Councillor from GRAMS (**Geraldton Regional Aboriginal Medical Service**)**

Afternoon Tea
3:30pm - 4:00pm Room 202-203

ADIPS Annual General Meeting
4:00pm - 5:00pm Room 204

Open Forum/Discussion - ADIPS Consensus Guidelines for the Testing and Diagnosis of Gestational Diabetes in Australia
5:00pm - 6:00pm Room 204
Chair: David McIntyre

Conference Dinner
7:00pm - 11:00pm Kazbah Darling Harbour

Saturday, 31st August 2013

Plenary Lecture

9:00am - 10:00am Room 204

Chair: Brad de Vries

9:00am **Erica Gunderson**
Pre-pregnancy Risk Factors, Complications of Pregnancy, and Future Cardiometabolic Risk *abs#009*

Symposium 3 - Oral Presentations

10:00am - 11:00am Room 204

Chairs: Helen Barrett & Robert Moses

10:00am **Catherine Baskerville**
Evaluating the Proposed IADPSG Diagnostic Criteria for Gestational Diabetes: Maternal and Neonatal Outcomes *abs#010*

10:15am **Jeff Flack**
Prediction of post-partum abnormal glucose tolerance in women with gestational diabetes mellitus *abs#011*

10:30am **Suja Padmanabhan**
Falling insulin requirements and obstetric outcomes in women with pre gestational diabetes: A retrospective review abs*#012*

10:45am **Jencia Wong**
HbA1c in gestational diabetes mellitus (GDM): relationship to the OGTT and pregnancy outcomes abs*#013*

Morning Tea

11:00am - 11:30am Room 202 - 203

Lecture - GDM: a new follow up strategy

11:30am - 12:00pm Room 204

Chairs: Peter Wein & Alison Nankervis

11:30am **David McIntyre**
Follow up after Gestational Diabetes – a New Approach? *abs#014*

Symposium 4 - Oral Presentations

12:00pm - 1:00pm Room 204

Chairs: Peter Wein & Alison Nankervis

12:00pm **Helen Barrett**
Predictors of preeclampsia in women in the Metformin in Gestational Diabetes (MiG) study *abs#015*

12:15pm **Suzette Coat**
Metformin in Gestational Diabetes: The Offspring Follow-Up. Cognitive functioning, motor competence and behaviour in the offspring at 6-7 years. *abs#016*

12:30pm **Amina Khambalia**
Elevated iron stores in the first trimester in the absence of inflammation are associated with subsequent gestational diabetes *abs#017*

12:45pm **Victoria Rudland**
Zinc transporter 8 antibodies in gestational diabetes and post-partum: prevalence, phenotypic associations and neonatal outcomes abs*#018*

Lunch
1:00pm - 1:45pm Room 202 - 203

Poster Presentations
This conference acknowledges the sponsorship of Lilly DIABETES Personal solutions for everyday life.

1:45pm - 3:15pm Room 202 - 203
Chairs: Janet Rowan & Alison Barry

Afternoon Tea
3:15pm - 3:45pm Room 202- 203

Plenary Lecture – Obesity in Pregnancy
3:45pm - 5:15pm Room 204
Chair: Leonie Callaway

3:45pm **Brad de Vries**
The impact of obesity, gestational diabetes and induction of labour on normal vaginal birth *abs#019*

4:15pm **Jodie Dodd**
Obesity in pregnancy – the LIMIT randomised trial abs*#020*

Awards Presentation and Meeting Close
5:15pm - 5:30pm Room 204

POSTER LISTING

Katherine Allnutt
Implications for Early Pregnancy Glucose Screening Guidelines *abs# 101*
Cecilia Astorga
Women with Gestational Diabetes: who are likely to miss appointments? *abs# 102*
Robyn Barnes
Comparison of treatment and maternal outcomes in women with gestational diabetes mellitus by education setting *abs# 103*
Carina Bertoldi Franco
Effects of elevated fatty acids and/or glucose on glucose metabolism pathways in human trophoblasts *abs# 104*
Marloes Dekker Nitert
Placental FGF21 expression is increased in gestational diabetes mellitus (GDM) *abs# 105*
Jeff Flack
Impact of obesity on pregnancy outcomes in women with gestational diabetes mellitus *abs# 106*
Rebecca Goldstein
The perceived experience of gestational diabetes mellitus (GDM) diagnosis and risk perceptions among Australian women *abs# 107*
Bill Hague
The GLUTT - GLUcose Tolerance and Targets – study *abs# 108*
Catherine Kilgour
Post-delivery follow up screening of women after gestational diabetes mellitus (GDM): communication between mothers, hospital and general practice. *abs# 109*
Min Ling
Maternal vitamin D deficiency, gestational diabetes mellitus and pregnancy outcomes: results including a multivariate logistic regression model from a multi-ethnic population of women in South-Western Sydney *abs# 110*
Judy Luu
Pregnancy outcomes based on old and new diagnostic criteria for GDM – are we over or under-diagnosing women? *abs# 111*
Nadia Manzoor
Gestational Diabetes Mellitus (GDM): An alternative diagnostic paradigm. *abs# 112*
Casey Nottage
Increasing maternal body mass index and pregnancy outcomes in South Australia 2009-2011 *abs# 113*
Casey Nottage
Increasing maternal body mass index and gestational diabetes mellitus – independent and combined effects on pregnancy outcomes *abs# 114*
Ann Peacock
Randomised controlled trial of a combined web based pedometer and dietary intervention for women with previous Gestational Diabetes (the WENDY Study) *abs# 115*
Cynthia Porter
Indigenous educational resources for Diabetes in Pregnancy *abs# 116*
Arianne Sweeting
Early Prevalence and Predictors of Gestational Diabetes in a High Risk Cohort *abs# 117*
Donya Tohidi-Esfahani
Migration Status and Gestational Diabetes Mellitus in the Australian Capital Territory *abs# 118*
Tang Wong
Outcomes of women diagnosed with gestational diabetes mellitus before 20 weeks gestation *abs# 119*
Yan ZHANG
Is the strategy for care of “low-risk” women with Gestational Diabetes Mellitus really safe? *abs# 120*
George Wells
The relationship between PAPP-A, gestational diabetes and birth size *abs# 121*
Erica Wright
A Comparison of Models of Care for the Education & Management of Women with Gestational Diabetes *abs# 122*
Allsion Sigmund
Follow-up after gestational diabetes (GDM): whom are we missing? *abs# 123*
Elizabeth Johnson
Congenital anomalies in type 1 and type 2 diabetes: a case series report *abs# 124*

ORAL ABSTRACTS

1

THE GUIDELINES: RATIONALE FOR CHANGE

Aidan McElduff[1]

1. Northern Sydney Endocrine Centre/ University of Sydney, St Leonards, NSW, Australia

Controversy persists re accepting the new guidelines for the screening and diagnosis of gestational diabetes (see http://www.adips.org/). The Hyperglycaemia and Adverse Pregnancy Outcome (HAPO) study clearly identifies a continuous risk gradient between glucose levels achieved during a 75 g GTT in the latter part of pregnancy and a variety of maternal and foetal outcomes. In assessing any treatment strategy, a risk-benefit analysis is essential. The HAPO data provide very strong evidence for the risk part of this analysis. The new diagnostic criteria recognise equal risk levels for the fasting, one hour and two hour glucose values in the GTT. What is less certain is the benefit of treatment particularly relating to the fasting plasma glucose. We have good evidence from both RCTs and widespread clinical practice for treating to targets of 5.3 mmol/L fasting and 6.7 mmol/L at 2 hours. Less well recognised or ignored, is the fact that we have for RCTs (1) that demonstrate the benefit of treating to much lower fasting values (4.4 mmol/L) in GDM pregnancies in which the foetus is identified as being obese based on abdominal circumference. Reference 1 reviews the evidence linking abdominal circumference to foetal adiposity and foetal hyperinsulinaemia. Can this evidence be applied to all GDM pregnancies? I do not think it can. Tightening glycaemic control for foetuses who are not at risk of becoming obese may do more harm than good (foetuses with the glucokinase mutation are an excellent example). This applies regardless of the diagnostic criteria used to diagnose GDM. An abstract presented at last year's reach meeting using very tight glycaemic targets demonstrated a clinically important but non-statistically significant reduction in weight in the intensively treated group compared to normal women. This study was underpowered to identify this difference as significant, if it were real (3).

I think we need to stop arguing about how to diagnose GDM and begin to examine how to optimise treatment for all the women and foetuses involved. This will involve detailed analysis of individual neonates and not simply group counting of large, normal or small babies.

1. Diabetes Care 2007 :30;Supplement 2, S200-S205.
2. Abs 20 in book, published as Diabetes Care 2013;36:562–564
3. Diabetes Care 2013;36:562–564

2

IMPLEMENTING (HEALTH SERVICE) CHANGES – AN EVIDENCE-BASED APPROACH TO IMPLEMENTING EVIDENCE

Shelley Wilkinson[1]

1. Mater Mothers' Hospital/Mater Research, South Brisbane, Qld, Australia

Dissemination of guidelines and education alone does not change practice. Just as our knowledge of physical activity guidelines does not mean we always do "*a minimum of half an hour of moderate-intensity exercise on most, if not all, days of the week*", many other factors will influence our achieving a set goal. Just as time, routine, skills, social influence, environment, finance, and mood/emotions may all influence our participation in being physically active, similar barriers exist when changing the way we deliver care. When translating research into practice we need more than a knowledge of guidelines. We also must not choose an intervention or strategy for change based on its familiarity or from a perception that the strategy will work. Rather, successful change will more likely occur when we identify what is really preventing us, our teams, and our organisations from following a recommended guideline (behaviour) and what will also faciliate its adoption. We must systematically assess 'influencing factors', the barriers and enablers to following recommendations, and then apply targeted, effective interventions to generate the change required.This presentation will discuss issues around implementing evidence based recommendations, introducing evidence-based methods to determine service gaps, and outline how improvements can be made and measured in a rigourous and systematic way.

3

ASSESSMENT OF GDM FROM A LABORATORY PERSPECTIVE

Grahame Caldwell[1]

1. Douglass Hanly Moir Pathology, Sydney, NSW, Australia

The implementation of the recently published Australasian Diabetes In Pregnancy Society (ADIPS) *Consensus Guidelines for the Testing and Diagnosis of Gestational Diabetes Mellitus in Australia* requires two substantial changes to be made to pathology laboratory practice. These are the replacement of oral glucose challenge testing with a 2 hour 75 gram load oral glucose tolerance test (POGTT) for all pregnant patients and the application of new diagnostic cut-offs for the diagnosis of gestational diabetes mellitus (GDM).

Currently there are differences in pathology practice in Australia with some laboratories performing glucose challenge testing to screen for GDM together with applying the old ADIPS criteria to interpret the POGTT, and some endorsing the new conditions for the assessment and diagnosis of GDM. In order to fully implement the new ADIPS guidelines, it is important to ensure that a clear consensus is obtained to provide uniform guidance for laboratories and that the requisite resources are available to accommodate the increased number of patients undertaking a 2 hour oral glucose tolerance test. To this end, it would seem timely to review the various protocols that have been developed by different pathology practices for oral glucose tolerance testing so that a harmonised approach can be adopted in the performance of a POGTT.

It is also important to consider two other issues raised by the implementation of the new ADIPS guidelines. The first concerns the limited concordance between the two patient groups diagnosed with GDM using the old and new diagnostic criteria as this not only determines current management but also affects a patient's perceived risk of type 2 diabetes and long term follow-up. The second issue involves the specimens obtained for a POGTT and whether collection conditions should reflect those which applied to the *Hyperglycemia and Adverse Pregnancy Outcomes* (HAPO) study upon which the new GDM diagnostic criteria are based. The prevalence of GDM may be underestimated by collecting specimens in unbuffered fluoride oxalate which is currently in widespread use by pathology practices for oral glucose tolerance testing. Pathology laboratories can play a vital role in the uniform implementation of clinical guidelines. It is essential that practical details such as terminology and specimen collection conditions are clearly defined in order to achieve uniform outcomes.

4

BREASTFEEDING IN THE PREVENTION OF CARDIOMETABOLIC DISEASES IN WOMEN WITH GDM AND THEIR OFFSPRING

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Breastfeeding has numerous immediate health benefits for both mothers and infants. Emerging evidence reveals possible long-term benefits including lower risk of cardiometabolic diseases even among high risk women with gestational diabetes mellitus (GDM) and their offspring. In cross-sectional studies, lactating compared with non-lactating women with recent GDM had more favorable metabolic profiles (lower fasting glucose and triglycerides, higher disposition index), and lower prevalence of diabetes during the early postpartum period.[1;2] Breastfeeding intensity appears to be particularly important; exclusive or mostly breastfeeding (0 to 6 oz formula/day) groups have better postpartum glucose tolerance than exclusive or mostly formula feeding groups, but mixed/inconsistent feeders do not.[3] Findings lactation lower risk of incident type 2 diabetes after GDM pregnancy are conflicting, with one study showing a 50% reduction in risk and another reporting a null association.[4;5] However, lack of data on postpartum lifestyle behaviors and self-report of diabetes remain significant limitations of these studies.[4;5] A 20-year prospective study of U.S. women of reproductive age (CARDIA Study) measured cardiometabolic risk factors from before to after pregnancy at 2-5 year intervals, and reported that longer duration of lactation (>2-5 mos to >9 mos vs. 0 to <1 mos) was associated with a 2- to 7-fold lower incidence rate of the metabolic syndrome adjusted for parity, BMI, lifestyle behaviors and weight gain.[6] Findings were similar for women without GDM and those with GDM.

Breastfeeding also has been associated with a 22 to 24% lower risk of overweight, but primarily in Caucasian children and adolescents from developed countries. Yet, evidence is mixed as to whether breastfeeding confers the same protection against overweight to the offspring exposed to diabetes in utero. These offspring are more vulnerable to obesity, cardiometabolic disease and diabetes, but few prospective studies have assessed the impact of breastfeeding on their risk of overweight or metabolic disease.

Retrospective studies provide evidence that breastfeeding "adequately" may lessen child adiposity or risk of diabetes for offspring of mothers with diabetes. However, most of these studies examine breastfeeding retrospectively, and cannot distinguish mixed feeding from exclusive breastfeeding. Emerging evidence supports the hypothesis that higher breastfeeding intensity by mothers with GDM slows infant growth during the first year of life .

Prospective studies in Northern California are underway to assess whether higher intensity and longer duration of lactation prevent or delay the development of type 2 diabetes and pre-diabetes (standardized annual OGTT screening) during the two years after delivery among women with recent GDM pregnancies, and whether breastfeeding slows weight gain during early life in their offspring. The Study of Women, Infant Feeding, and Type 2 Diabetes (SWIFT) is comprised of 1,035 postpartum women with recent GDM (multi-racial/ethnic cohort; 75% minority) who delivered in the Kaiser Permanente Health Care system from 2008-2011, and were enrolled at 6-9 weeks postpartum.[7] SWIFT prospectively assesses breastfeeding intensity and duration during the first year postpartum. In the SWIFT Offspring Study, we assess growth in 470 of their infants during the first year of life. Our preliminary findings support the hypothesis that breastfeeding has long-term health benefits among women with a history of GDM and their infants. The SWIFT cohort consists of 25% White, 8% Black, 32% Asian, including East and Southeast Asians, and 32% Hispanic women. Intensively breastfeeding and Intensively formula feeding groups had similar glucose intolerance during pregnancy, and gestational weight gain, and family history of diabetes. The formula feeding group had lower educational attainment and has greater proportion of obese women. The SWIFT Study's initial findings indicate that lactation may lower the risk of incident type 2 diabetes in women, contribute to greater postpartum maternal weight loss, and slow the growth of their offspring from 3-6 months of age. Long-term follow up of the SWIFT cohort is underway.

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5

DEVELOPMENTAL PROGRAMMING OF TYPE 2 DIABETES – PHYSIOLOGICAL MECHANISMS AND ROLE OF GENETIC VERSUS EPIGENETIC FACTORS

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Around two decades, Hales and Barker along with their co-workers proposed the 'thrifty phenotype hypothesis' claiming that fetal programming could represent an important player in the origin of type 2 diabetes, the metabolic syndrome and cardiovascular disease (CVD). The hypothesis was initially met with great skepticism, but nevertheless their observations have subsequently been confirmed and expanded in many epidemiological and animal experimental studies. To this end, human integrative physiological studies have provided insights into some of the underlying molecular mechanisms. Type 2 diabetes is a multiple-organ disease, and developmental programming, with its idea of organ plasticity, is a plausible hypothesis for a common basis for the widespread organ dysfunctions in type 2 diabetes and the metabolic syndrome. Only two among the more than 50 type 2 diabetes susceptibility genes have been associated with low birth weight. This support results from twin studies of the association between low birth weight on one side, and type 2 diabetes on the other, being mainly of non-genetic origin. DNA functions may be permanently or transiently altered by epigenetic modifications including alterations in the degree of methylation of DNA at specific (CpG) sites in the promotor region of the gene, changes in the expression of short (20 bases) long miRNA sequences influencing gene or protein expression functions, or by changes in the chromatin structure or acetylation(s) of the DNA. Examples of how the fetal environment associated with low birth weight may influence epigenetic regulations in human muscle and fat samples, and thereby the risk of developing type 2 diabetes, will be presented in the lecture. For instance, young men born with low birth weight shows impaired flexibility of DNA methylations in skeletal muscle biopsies when exposed to a 5-days high fat overfeeding challenge. Nevertheless, being born with low birth weight may represent a much too simplistic marker of people at increased risk of type 2 diabetes due to adverse exposures in utero. The extent to which other more distinct exposures in fetal life such as gestational diabetes may play a role in fetal programming of type 2 diabetes will be addressed. Finally, recent data indicating that immature adipose tissue stem cell functions may be involved in developmental programming of type 2 diabetes will be presented.

6

WHAT ARE CONSIDERED CULTURAL SECURE MODELS OF ANTENATAL CARE, WHEN DIABETES IS PRESENT, TO ENGAGE INDIGENOUS WOMEN? WHAT IS THE IMPACT TO SERVICE PROVIDERS WITH THE INTRODUCTION OF THE NEW ADIPS GUIDELINES FOR AN INDIGENOUS POPULATION?

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Diabetes in pregnancy is considered an internationally neglected health priority for Indigenous women. Australian Aboriginal people do not experience the same health as Australian non-Aboriginal people. The Australian universal health care is not universally provided in rural and remote locations of Australia. Aboriginal women who become pregnant with a diabetes complication are disadvantaged in access to quality antenatal care. They are further disadvantage due to the inequity of diabetes educational services, resulting in poor glycemic control before, during and after the pregnancy. Lack of diabetes education results in a higher prevalence of poor maternal health outcomes than non-Aboriginal women. Further, Aboriginal infants born to mothers with diabetes in pregnancy, have worse health outcomes particularly stillbirth. Health service planning for rural and remote locations in Australia requires the physical buildings, equipment, resources and human resources equal to health services provided to other Australian women. This equity of service to improve access to better care is essential to provide maternity services 'close to home' and that are culturally secure for Aboriginal women. Services 'close to home' and culturally secure will improve early presentation, improve antenatal care, improve glycemic control, and minimize maternal and infant birth complications. What is the impact for Aboriginal women attending existing maternity services before and after the introduction of the new of the new ADIPS diagnostic and treatment guidelines? What was the impact of the implementation of the new guidelines to health service providers?

7

DIABETES IN PREGNANCY IN INDIGENOUS AUSTRALIANS: INSIGHTS FROM THE TOP END OF THE NT

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In the context of the escalating epidemic of chronic diseases among Indigenous Australians, it is vital that we reduce risk as early as possible in the life course of an individual. Challenges as a health care provider for this high risk population include addressing the social determinants of health, psycho-social stressors, and issues of remoteness. We have developed a partnership between researchers, health care providers and policy organisations in the Northern Territory (NT), to address the issue of diabetes in pregnancy in the high-risk population of the NT. The partnership includes a detailed research component: Pregnancy And Neonatal Diabetes Outcomes from Remote Australia – The PANDORA Study. The aims of the PANDORA Study are to: (i) accurately assess rates of diabetes in pregnancy in the Northern Territory of Australia (where 38% of babies are born to Indigenous mothers); (ii) assess demographic, clinical, biochemical, anthropometric and socioeconomic factors that may contribute to key maternal and neonatal outcomes associated with diabetes in pregnancy in the NT; and (iii) monitor relevant clinical outcomes for both the mothers and their babies. Eligible participants are all NT women with diabetes in pregnancy aged 16 years and over. Information collected includes: standard antenatal clinical information (diagnosis and management of diabetes in pregnancy), socio-economic questionnaire, standard clinical birth information (delivery, gestational age, adverse outcomes). Cord blood is collected at the time of delivery and detailed neonatal anthropometric measurements performed within 72 hours of birth. Information will be collected regarding maternal follow-up (breastfeeding, glucose tolerance test, cardio-metabolic risk factors) and growth of the baby up to 2 years post-partum. This study will accurately document rates and outcomes of diabetes in pregnancy in the NT of Australia, including the high-risk Indigenous Australian population.

8

DIABETES FROM AN INDIGENOUS PERSPECTIVE IN THE NORTHERN TERRITORY

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The Northern Territory is a large sparsely populated area and has a large Indigenous population and high rates of diabetes. At Royal Darwin hospital over 70% of our patients are Indigenous and many of them have diabetes.

The RDH Diabetes Team has inpatient and outpatient services, some being held in the hospital or urban clinics and others a long plane ride away. The NT has high levels of screening and although many of our patients have type 2 diabetes some of them as young as 10 years old.

We have group of Indigenous type 1 patients, noted to be clustered through out areas in the Northern Territory.

My role as an Aboriginal Health Worker Practitioner/Diabetes Educator in the hospital setting is to support health professionals and Indigenous women to navigate the health care system in the Northern Territory.

9

PRE-PREGNANCY RISK FACTORS, COMPLICATIONS OF PREGNANCY, AND FUTURE CARDIOMETABOLIC RISK

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Physiologic adaptations to a healthy pregnancy include marked insulin-resistance, atherogenic dyslipidemia, fat accretion, lowered blood pressure and increased inflammation.[1] These manifestations are necessary to support fetal growth and development. While many effects are reversible after parturition, a worsened maternal cardiometabolic risk profile may persist years later, particularly after a first birth. Lower plasma high density lipoprotein cholesterol (HDL-C), greater weight retention and increased abdominal obesity are associated with primiparity or pre-pregnancy obesity.[2-5] Increasing trends in pre-pregnancy weight and excessive gestational weight gain, and variable lactation practices may affect future disease risk in women during mid to late life.

The inability to meet the physiological demands of pregnancy may lead to complications such as gestational diabetes mellitus (GDM), hypertensive disorders, and premature deliveries. A history of pregnancy complications has been linked to future cardiometabolic diseases in women.[6;7] Pregnancy may be viewed as a stress test that reveals underlying tendencies for cardiometabolic disease risk, or pregnancy may exert persistent adverse effects that heighten disease risk. The childbearing experience also affects maternal behaviors and lifestyle (i.e., sleep, reduced physical activity). However, few longitudinal studies have distinguished the biological effects of pregnancy from the social and behavioral effects of childrearing.

Women may possess unfavorable cardiometabolic risk factors before pregnancy that predict future pregnancy complications. Few longitudinal studies have obtained pre-pregnancy measurements. In the multi-center U.S. CARDIA study, impaired fasting glucose and hyperinsulinemia, individually or in combination with low HDL-C among non-diabetic women, were strong predictors of GDM.[8] Pre- and inter-conceptual screening for cardiometabolic risk factors may be important for prevention of GDM and other complications during and after pregnancies. Preterm birth (PTB <37 weeks) has been associated with future maternal cardiovascular

disease (CVD) risk. Dyslipidemia may be related to both PTB and CVD, but studies have rarely assessed pre-pregnancy plasma lipids in relation to PTB. Both low and high pre-pregnancy plasma total cholesterol were associated with higher PTB risk. These risk factors may represent distinct pathways to the heterogeneous outcome of PTB as well as later life sequelae.[9]

Risk factors for cardiovascular disease in women include a history of pregnancy complications (i.e., gestational diabetes, gestational hypertension, and preeclampsia).[10] The characterization of the reproductive experience as unmasking future disease risk is a relatively new concept, and few studies have prospectively examined subclinical or clinical measures of cardiometabolic disease during the perinatal period through many years later. A history of pregnancy complications may reveal future risk of cardiometabolic diseases, including glucose intolerance and early atherosclerosis. Herein, we critically examine the scientific evidence for the role of reproductive history, including healthy pregnancies and a history of GDM, and their role in unmasking and/or development of future cardiometabolic disease and atherosclerosis in women. Modifiable risk factors, including pre-pregnancy and postpartum risk factors, may be important to early prevention of cardiometabolic diseases in women.

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10

EVALUATING THE PROPOSED IADPSG DIAGNOSTIC CRITERIA FOR GESTATIONAL DIABETES: MATERNAL AND NEONATAL OUTCOMES

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Background: The International Association of Diabetes in Pregnancy Study Groups (IADPSG) has recommended diagnostic thresholds[1] for gestational diabetes (GDM) based largely on the Hyperglycaemia and Adverse Pregnancy Outcome (HAPO) study, which found a continuous association between maternal glycaemia and adverse outcomes[2]. These guidelines have been recommended by ADIPS in Australia, but not yet widely implemented.

Objective: To determine whether patients meeting the IADPSG criteria for GDM (any of fasting ≥5.1mmol/L, 1-hour ≥10.0mmol/L, 2-hour ≥8.5mmol/L), but who were untreated due to not fulfilling the 1991 "old" ADIPS criteria (fasting ≥5.5mmol/L and/or 2-hour ≥8.0mmol/L), have worse obstetric outcomes than patients not meeting either criteria.

Methods: We extracted results of all 75g oral glucose tolerance tests (OGTTs) performed on pregnant women at 24-32 weeks gestation at Mater Pathology (Brisbane, Australia) between 1998 and 2012. Importantly, testing practices varied with time, and results from outside laboratories were not included, therefore the GDM prevalence is not generalisable. OGTTs were classified as meeting the old ADIPS criteria, the IADPSG criteria, both, or neither. This data was linked to demographic and outcome data from the Mater Mothers' Hospital obstetric and neonatal database (previously described[3]). Bivariate analysis was undertaken to compare demographic and pregnancy characteristics and outcomes. Multivariate analysis further explored the relationship between GDM categories and outcomes, with correction for potential confounders including BMI.

Results: 1737 OGTTs (of 9209 available) were linked to complete records. The frequency of GDM using the old ADIPS criteria and the IADPSG criteria was 12.3% and 21.9%, respectively. Eleven percent of patients met IADPSG but not old ADIPS criteria. On

multivariate analysis this latter group showed an increased risk of macrosomia (birthweight > 4000g) (OR 1.63, 95% CI 1.14-2.34), and large for gestational age (LGA) infants (OR 1.77, 95% CI 1.24-2.54). Although the unadjusted OR for neonatal hypoglycaemia was significantly increased, OR 2.60 (95% CI 1.00-6.71), this was attenuated on multivariate analysis (OR 2.62, 95% CI 0.99-6.90).
Conclusion: Offspring of women who met criteria for GDM by the IADPSG but not old ADIPS criteria (and who were therefore untreated for GDM) showed an increased risk of macrosomia and LGA infants.

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11

PREDICTION OF POST-PARTUM ABNORMAL GLUCOSE TOLERANCE IN WOMEN WITH GESTATIONAL DIABETES MELLITUS

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Background: UK NICE Guidelines suggest follow-up assessment with fasting BGL (FBGL) but not a Glucose Tolerance Test (oGTT)(1) in women with gestational diabetes (GDM). We previously published data indicating this would miss a substantial number with post-partum glucose tolerance abnormalities(2). A recent UK abstract reported good sensitivity and specificity for FBGL≥4.7mmol/L and HbA1c≥5.7% cut-offs in predicting post-partum dysglycaemia(3).
Aims: To assess prediction of 6-8 weeks post-partum dysglycaemia based on findings of post-partum oGTT results and concomitant HbA1c levels, in a large GDM cohort in South-Western Sydney.
Methods: Retrospective analysis of prospectively collected data, (1993-2012), from our GDM database. Selected women had attended a post-partum oGTT with concomitant HbA1c collection. Glycaemic status was classified according to oGTT results, (not HbA1c), with IFG being FBGL≥6.1mmol/L. Receiver operating characteristic (ROC) curves of sensitivity plotted against 1-specificity were constructed for postnatal fasting glucose and HbA1c to detect post-partum dysglycaemia.
Results: There were 2024 women with available data, with oGTT (mean±SD) 9.7±2.6 weeks after delivery. Post-partum dysglycaemia (27.7%) was: 5.6% IFG, 15.0% IGT, 2.9% both IFG and IGT, and 4.2% Type2DM. The area under the ROC curve (AUC) for any abnormality of glucose tolerance was higher for FBGL (AUC 0.732, 95% CI 0.703–0.762) than HbA1c (AUC 0.620, 95% CI 0.591–0.649)(Fig 1). This pattern was the same amongst the four major ethnic groups represented [South-East Asian (41.3%), Middle Eastern (24.1%) European (22.8%), and Indian/Pakistani (8.2%)], although AUC was greater for FBGL for Middle Eastern women (AUC 0.809, 95% CI 0.749–0.868)(Fig 2). Despite these findings, relying on both FBGL plus HbA1c would have missed 4 of 85 women with Type2DM and 23 of 303 with IGT, and 1357/1464 with Normal Glucose Tolerance would still have required an oGTT.

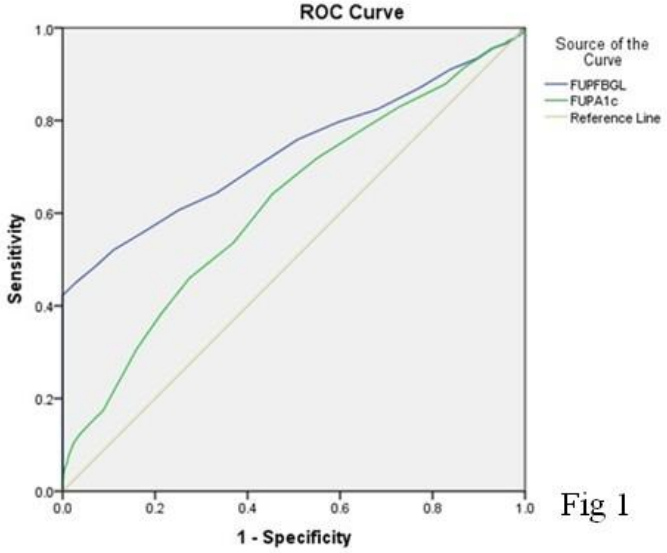

Fig 1

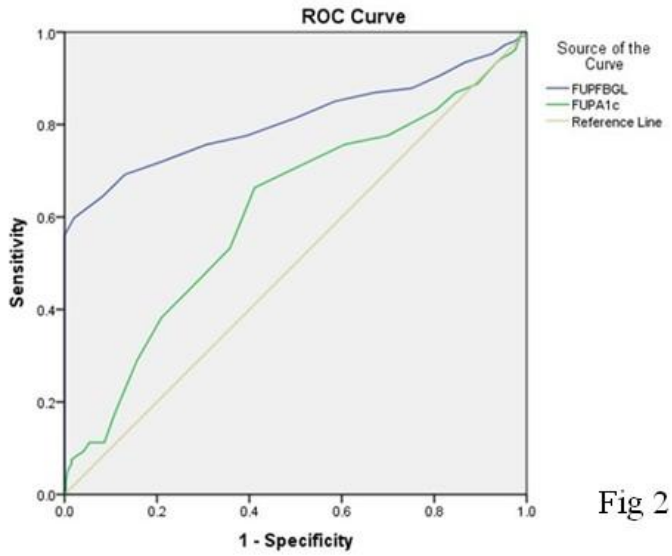

Fig 2

Conclusions: Even using low cut-offs of FBGL≥4.7mmol/L and HbA1c≥5.7%, data from this cohort of GDM women still support the use of oGTT to detect abnormalities of glucose tolerance post-partum.

Acknowledgment: All of the Diabetes Educators who have collected data and maintained the database.

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12

FALLING INSULIN REQUIREMENTS AND OBSTETRIC OUTCOMES IN WOMEN WITH PRE GESTATIONAL DIABETES: A RETROSPECTIVE REVIEW

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Background: Falling insulin requirements during pregnancy is thought to signify adverse outcomes, often prompting intervention. However evidence supporting this practice remains limited.

Objective: To investigate the clinical significance of falling insulin requirements in women with pre-gestational or overt diabetes in pregnancy.

Methods: This is a retrospective case control study of 140 pregnancies, in women with diabetes, presenting for antenatal care between 2010–2012. Women with a fall in insulin requirements of 15% or more from the peak total daily dose in late pregnancy were considered cases (n=33). The primary outcome was a composite of outcomes chosen to reflect clinical evidence of placental dysfunction including preeclampsia, intrauterine growth restriction, stillbirth (>20 weeks), premature delivery (<32 weeks) and a high systolic to diastolic ratio on umbilical artery doppler.

Results: 23.6% of women had more than 15% fall in insulin requirements with nulliparity as the only independent predictor at baseline (OR 2.4; CI 1-5.7, p =0.045). Amongst women with type 2 diabetes, those diagnosed with overt diabetes during pregnancy had an increased risk of falling insulin requirements (OR 4.3; CI 1.2 – 15.2, p=0.023) however, there was no difference between women with type 1 or type 2 diabetes. While falling insulin requirements was associated with an increased risk of preeclampsia (OR 3.7; CI 1.2-11.4, p=0.042) and the composite of clinical markers of placental dysfunction (OR 2.7; CI 1.2 – 6.1, p=0.028) it was not associated with adverse neonatal outcomes. However, there was a higher rate of neonatal intensive care unit admission (23.5% vs 1.9%, p <0.001) and earlier delivery in this group (median 37.8 weeks IQR (35.9-38.4) vs 38.3 IQR (37.3-38.9), p=0.046).

Conclusion: Falling insulin requirements, in women with pregestational diabetes is associated with an increased risk of complications due to placental dysfunction. The risk of adverse neonatal outcomes was not increased, however this may have been due to clinical intervention. Further prospective studies are needed.

13

HBA1C IN GESTATIONAL DIABETES MELLITUS (GDM): RELATIONSHIP TO THE OGTT AND PREGNANCY OUTCOMES

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Background: The HbA1c is used to diagnose diabetes outside pregnancy and provides the best predictor of outcome. Physiological changes in pregnancy can lower HbA1c levels, thus the utility of HbA1c in the diagnosis of GDM is not established and associations with pregnancy outcomes are less clear. We examine the relationship between antenatal HbA1c and post load glucose excursion, antenatal insulin use, obstetric and neonatal outcomes in GDM as a practical guide to its clinical utility.

Methods: Data from 3009 pregnancies complicated by GDM at Royal Prince Alfred Hospital were available for analysis. Clinical and biochemical measures were prospectively collected in a standardised way. The HbA1c measured at the time of GDM diagnosis was analysed in a single laboratory. Relationship of HbA1c and glucose during OGTT was examined. Data were stratified by HbA1c to examine for association.

Results: There is a clear association of increasing HbA1c with increased intervention and poorer pregnancy outcomes. An HbA1c of >5.5% is associated with a higher need for intervention, hypertension, and macrosomia despite treatment, as well as a high rate of diabetes persisting. HbA1c correlates with AUC glucose (r=0.3 p<0.0001) with potential to be used as an OGTT surrogate for diagnosis. However even those with very low HbA1c levels may still require insulin treatment and experience adverse outcomes.

Conclusion: HbA1c threshold levels >5.5% are associated with poorer pregnancy outcome, greater intervention and persisting diabetes. This level identifies the patient with a greater need for surveillance and arguably where limited resources should be prioritised. Despite a correlation between HbA1c and post load glucose, low HbA1c levels do not adequately capture the risks of having GDM. Thus the utility of antenatal HbA1c alone to diagnose GDM is likely to be limited. Whether a screening HbA1c level above 5.5% can reduce the need for OGTT in diagnosis should be explored.

HbA1c % n=3009	<4 29	4.1-4.5 143	4.6-5.0 702	5.1-5.5 1277	5.6-6.0 652	6.1-9.0 206	*p*
Age (yrs)	33.4±5.1	33.4±5.5	33.2±5.2	33.5±5.1	33.3±5.1	33.2±5.7	0.9
Insulin Rx (%)	31.0	30.1	40.3	50.1	61.0	78.6	*
Macrosomia (%)	6.9	5.0	6.3	6.3	11.2	20.4	*
Caesarean (%)	24.1	26.2	28.7	27.8	36.5	49.0	*
Hypertension (%)	3.7	11.3	8.2	13.6	17.2	26.9	*
Neonatal hypoglycaemia (%)	24.1	17.0	9.8	8.6	7.5	13.8	0.07
Post Delivery Diabetes %	n=16 0	n=94 1.1	n=429 0.9	n=681 2.1	n=312 3.2	n=86 11.6	*

*trend p<0.0001

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FOLLOW UP AFTER GESTATIONAL DIABETES – A NEW APPROACH?

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In addition to well documented associations with adverse pregnancy outcomes, gestational diabetes (GDM) is a well-recognized risk factor for future (principally Type 2) diabetes, other forms of impaired glucose metabolism (including recurrent GDM in subsequent pregnancies) and future metabolic and cardiovascular risk for both the mother and her child.

Current ADIPS guidelines recommend an initial OGTT at 6 – 12 weeks postpartum, with subsequent follow up determined by future pregnancy plans (women planning another pregnancy are recommended to have a yearly OGTT) and perceived risk of progression to Type 2 diabetes. HbA1c (depending on policies for general diabetes diagnosis) and fasting glucose are noted as possible follow up tests, with details intentionally non-specific.

The National Gestational Diabetes Register gives us the opportunity to vastly improve longitudinal follow up of women with a history of GDM and state based programmes such as "You2" in Queensland also offer valuable support and resources.

All strategies in this area represent a balance between sensitivity (the desire for early detection of diabetes and pre diabetic states) and pragmatism (the desire to have a testing programme that will actually be implemented, rather than simply promoted as the "gold standard"). Recent publications outline the potential role of a combined HbA1c + Fasting glucose strategy to improve sensitivity whilst maintaining pragmatism in "real world" practice.

Even more difficult questions surround intervention strategies for diabetes prevention post GDM. Lifestyle interventions remain attractive in theory, but difficult to implement in practice. The efficacy of thiazolidinediones is supported by randomized trial data, but their unfavourable overall adverse effects make them an unlikely panacea. Metformin has some supportive data, but largely in older women with previous GDM. Bariatric surgery offers potential benefits, but clearly is an invasive option.

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PREDICTORS OF PREECLAMPSIA IN WOMEN IN THE METFORMIN IN GESTATIONAL DIABETES (MIG) STUDY

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Gestational diabetes mellitus (GDM) is associated with an increased risk of developing preeclampsia (PE) and treatment of GDM has been shown to reduce PE rates [1]. Increased risk of PE has previously been related to maternal hyperglycaemia [2], obesity [3] and hypertriglyceridaemia [4].

Aim: To examine the predictors of PE in women commencing pharmacotherapy for GDM in the MiG study.

Methods: Women with GDM were randomly assigned metformin or insulin in the MiG study [5]. At enrollment (commencement of pharmacotherapy) fasting maternal bloods were taken. Descriptive and logistic regression analyses were undertaken to examine the relationship between maternal characteristics at enrollment and the later development of PE. Diagnosis of PE was according to SOMANZ guidelines. Data are expressed at mean (95%CI) or n(%).
Results: 46 women (6.3%) were diagnosed with PE. Seven of these women had a preceding diagnosis of gestational hypertension. At enrollment (at an average of 30 weeks gestation), women who later developed PE had a higher HbA1c (6.14% (5.84 – 6.45) vs 5.73% (5.67 – 5.78), P = 0.003), fasting triglycerides (2.93 mmol/L (2.57 – 3.29) vs 2.55 mmol/L (2.47 – 2.62), P = 0.03) and higher blood pressure. The infants of women with PE were born 9 days earlier (P<0.001) and otherwise not different.
The strongest predictors of the development of PE in univariate analysis (per unit) were maternal HbA1c (OR 1.96 (1.35 – 2.89), P<0.001), maternal triglycerides (OR 1.45 (1.07 – 1.97), P=0.002), and maternal weight gain from early pregnancy (OR 1.09 (1.03 – 1.17), P=0.01), with the odds of developing PE increasing as these variables increase. In contrast, increasing maternal HDL-cholesterol was associated with lower odds of developing PE (OR 0.29 (0.09 – 0.94), P=0.04). Following adjustment for maternal age, parity, and smoking, these variables remained significant. When also adjusted for HbA1c, fasting triglycerides became non-significant. Treatement allocation to insulin or metformin was not associated with risk of PE.
Conclusion: In women with GDM needing pharmacotherapy, increased risk of later PE is signaled by higher HbA1c and maternal triglycerides, lower maternal HDL-cholesterol and greater weight gain in early pregnancy.

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METFORMIN IN GESTATIONAL DIABETES: THE OFFSPRING FOLLOW-UP. COGNITIVE FUNCTIONING, MOTOR COMPETENCE AND BEHAVIOUR IN THE OFFSPRING AT 6-7 YEARS

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Background: The Metformin in Gestational diabetes (MiG) trial showed that, in women with gestational diabetes (GDM),metformin was as safe and effective as insulin for both the fetus and the mother during pregnancy and at the time of delivery (1). However, as metformin is known to cross the placenta, it is important to examine the ongoing development of the offspring.
Follow-up studies of the MiG study offspring in Adelaide, Australia and Auckland, New Zealand were conducted at 2-3 years. Both independently found that cognitive and psychomotor performance of the offspring was similar, regardless of GDM treatment received by the mother (2, 3).
Method: MiG trial mothers and their offspring were invited to participate in MiG -The Offspring Follow-Up at 6-7 years (MIG-TOFU 6-7) study in Adelaide. 90 mother-child pairs participated in this follow-up study, which included assessment of growth, as well as assessment of cognitive functioning, motor competence and behaviour in the offspring. Cognitive functioning was assessed using the Weschler Intelligence Scale for Children Fourth Edition (WISC-IV). Motor competence was assessed using the Movement-ABC Second Edition (M-ABC-2) and behaviour was assessed using the Conners Parent Rating Scale-Revised (CPRS-R).
Results: This study is ongoing. To date 90 mother-child pairs have been assessed. Preliminary findings show that cognitive functioning (Full Scale IQ: insulin arm: 107.1, SD 8.49, metformin arm: 106.2, SD 10.78), motor competence (Total Test Score: insulin arm: 54.3, SD 28.37, metformin arm: 54.2, SD 24.12) and behaviour (Conners Global Index Total: insulin arm: 51.2, SD 7.97, metformin arm: 52.3, SD 11.23; DSM-IV Total (insulin arm: 51.6, SD 7.13, metformin arm: 52.4, SD 11.27) of the children are similar regardless of treatment the mother received for her gestational diabetes.
Conclusions: In this small cohort of the MiG offspring we assessed cognitive functioning, motor competence and behaviour. It is reassuring that the children whose mothers received metformin for treatment of GDM continue to have similar intellectual, gross and fine motor and behavioural outcomes when compared with children whose mothers received insulin.

1. Rowan et al., N Engl J Med 2008;358:2003-15.
2. Coat et al, poster presentation at Australian Diabetes in Pregnancy Society Annual Scientific Meeting, November 2011.
3. Battin et al, oral presentation at Perinatal Society of Australia and New Zealand Annual Congress, April 2013.

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ELEVATED IRON STORES IN THE FIRST TRIMESTER IN THE ABSENCE OF INFLAMMATION ARE ASSOCIATED WITH SUBSEQUENT GESTATIONAL DIABETES.

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Background: Elevated iron stores, reflected in high serum ferritin (SF) levels have been associated with type 2 diabetes and gestational diabetes mellitus (GDM). However, data on whether elevated SF reflects inflammation or excess iron stores is conflicting.
Aim: To determine whether first trimester SF is associated with subsequent GDM in the absence of inflammation.
Methods: Information for NSW women with archived serum samples collected for first trimester Down syndrome screening in 2007 at a state laboratory was linked to birth and hospital discharge records. Maternal weight and gestational age at testing were derived from laboratory data, maternal characteristics from birth records and GDM diagnosis from hospital data. Serum was analysed for SF (µg/L) and C-reactive protein (CRP; mg/L). Women with inflammation (CRP >5) or Type 1 or 2 diabetes were excluded. SF was used to measure iron stores with SF>200 defined as high, indicating iron overload. Medians (1st, 3rd quartile range) were calculated for SF concentrations. The association between iron stores and GDM was examined using multivariate logistic regression.
Results: Of 3,073 pregnancies, 96 (3.1%) developed GDM. Median SF concentrations was 26.3 µg/L (14.8, 43.9) for all women and were significantly higher for GDM (36.5 µg/L: 18.7, 54.4) compared to non-GDM pregnancies (25.9 µg/L: 14.7, 43.5, p= 0.001). Mean CRP levels were not different between GDM and non-GDM pregnancies (11.8 vs. 10.4 mg/L, p=0.17). Eleven women had iron overload, none of whom developed GDM. Adjusting for age, gestational age, weight, smoking, parity and multiple pregnancies, the odds of developing GDM was 1.37 (95% CI:1.03, 1.83) for every µg/L increase in SF concentrations.
Conclusions: In absence of inflammation, moderately elevated iron stores are associated with GDM and may be a useful early clinical marker for risk of GDM. Confirmation of these findings using other biochemical measures of excess iron is warranted.

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ZINC TRANSPORTER 8 ANTIBODIES IN GESTATIONAL DIABETES AND POST-PARTUM: PREVALENCE, PHENOTYPIC ASSOCIATIONS AND NEONATAL OUTCOMES

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Background: Zinc transporter 8 (ZnT8) antibodies are highly β-cell specific and tend to persist through prediabetes to diagnosis of diabetes. The presence of ZnT8 antibodies during gestational diabetes (GDM) pregnancies is less well studied and may identify patients at risk of future autoimmune diabetes.
Aims: To investigate the prevalence and clinical associations of ZnT8 antibodies in GDM patients, at diagnosis and post-partum.
Methods: Patients diagnosed with GDM at Royal Prince Alfred Hospital were assessed at diagnosis and 3 months post-partum. Sera were analysed for ZnT8 antibodies using a commercial ELISA that detects the 325Arg and 325Trp variants. GAD, IA2 and insulin antibodies were analysed using commercial radioimmunoassays.
Results: 302 women with GDM were recruited. 163 attended post-partum testing. ZnT8 antibody testing was performed in 271 patients antepartum and 124 patients post-partum. The prevalence of ZnT8 antibody positivity was 4.8% antepartum and 1.6% post-partum. The overall prevalence of any antibody positive was 9.9% antepartum and 12.3% post-partum (Table 1).

Table 1. Prevalence of ZnT8 antibodies and islet autoantibodies in GDM pregnancies

Antibody	Antepartum n=302	Post-partum n=163
ZnT8 (n)	13	2
GAD (n)	7	8
IA2 (n)	6	9
Insulin (insulin naïve) (n)	4	1
Total (n (%))	30 (9.9)	20 (12.3)

Of those patients with a positive antibody during pregnancy who attended post-partum testing, ZnT8 antibody titre significantly decreased from pregnancy to post-partum (Figure 1) whereas there was no significant change in titre for patients with a positive GAD, IA2 or insulin antibody (Table 2).

Figure 1. Trajectory of ZnT8 antibody titres for patients with GDM and elevated ZnT8 antibodies antepartum (Cut-off positive level 15 u/mL)

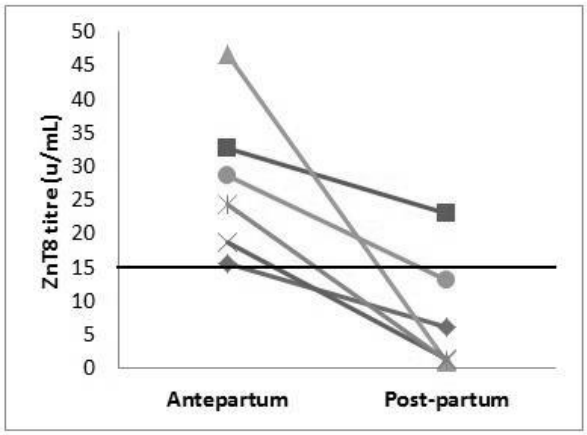

Table 2. Antibody titres antepartum and post-partum in patients with GDM and a positive antibody antepartum

Antibody	Antepartum n=163	Post-partum n=163	Paired tests
ZnT8 median [IQR] (u/mL) n=6	26.5 [18.0-36.2]	3.8 [1.1-15.6]	Z=2.2; p=0.03
GAD median [IQR] (u/mL) n=6	2.1 [1.2-50.4]	2.9 [1.3-32.6]	Z=1.8; p=0.07
IA2 mean ± SD (u/mL) n=5	2.5 ± 0.9	2.3 ± 0.8	T=0.5; p=0.6
Insulin (insulin naïve) (u/mL) n=1	0.6	0.6	n/a

When ZnT8 antibody titres were stratified by quartiles, there were no significant differences between quartiles in maternal phenotype, degree of hyperglycaemia, insulin treatment or neonatal outcomes.

Conclusions: ZnT8 antibody was the most prevalent antibody during GDM pregnancies but was not associated with maternal demographics, glycaemic control or neonatal outcomes. The decline in ZnT8 antibody titre from antepartum to post-partum was unexpected, given the relative immunosuppression in pregnancy. This may represent a change in islet cell hyper-reactivity, possibly related to hormonal or placental factors.

Further studies may identify the significance of positive ZnT8 antibodies in GDM that persist post-partum.

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THE IMPACT OF OBESITY, GESTATIONAL DIABETES AND INDUCTION OF LABOUR ON NORMAL VAGINAL BIRTH

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Obesity and gestational diabetes are independently associated with a number of obstetric complications including increased risk of intrapartum caesarean section. Contrary to common opinion, the best available evidence suggests that induction of labour reduces this risk. The link between gestational diabetes, obesity and caesarean section will be outlined and the evidence that induction of labour may attenuate this association in pregnancies with a high baseline risk will be presented. Antenatal factors such as maternal age, parity, height, gestational diabetes, maternal BMI, estimated fetal weight, fetal head circumference and increased cervical length at 37 weeks gestation are associated with increased risk of caesarean section. More research is needed, but the data available suggest that women at higher risk of caesarean section may benefit from induction of labour and at the very least, induction of labour need not be avoided in order to increase the chances of a normal vaginal birth.

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OBESITY IN PREGNANCY – THE LIMIT RANDOMISED TRIAL

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Obesity is a significant health issue for women during pregnancy and childbirth, with estimates suggesting that 35% of women aged between 25 and 35 years are overweight or obese. More recent data suggests that approaching 50% of women enter pregnancy with a body mass index greater than 25kg/m^2. There are well documented risks associated with obesity during pregnancy and childbirth, maternal complications including hypertensive conditions and pre-eclampsia, gestational diabetes, infection, thromboembolic events, need for induction of labour, caesarean section and perinatal death. Infants of mothers who are overweight or obese are more likely to be macrosomic, require admission to the neonatal intensive care unit, be born preterm, be identified with a congenital anomaly, and to require treatment for jaundice or hypoglycaemia.

This presentation will discuss some of the findings from the LIMIT randomised trial.

POSTER ABSTRACTS

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IMPLICATIONS FOR EARLY PREGNANCY GLUCOSE SCREENING GUIDELINES

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Background

Recent national and international guidelines recommend screening for diabetes in early pregnancy. The Australasian Diabetes in Pregnancy Society (ADIPS) recommends screening women at high risk for gestational diabetes mellitus (GDM). The British National Institute for Health and Clinical Excellence (NICE) recommends screening at 16-18 weeks' gestation in women with previous GDM. Early screening for undiagnosed type II diabetes mellitus (T2DM) is recommended by The American Diabetes Association (ADA) and the International Association of the Diabetes and Pregnancy Study Groups (IADPSG); the latter does not set specific criteria and also considers the role of universal screening.

Aim

To identify the number of women considered at risk for hyperglycaemia in early pregnancy according to selective screening guidelines.

Methods

Data from consecutive singleton pregnancies in women without pre-existing diabetes were extracted from the Monash Health Birthing Outcomes System database. Risk profiles were analysed and ADIPS, ADA, NICE and IADPSG guidelines were applied to calculate the number of women requiring early screening.

Results

492 women (41.5% nulliparous) were included. The number of women eligible for early pregnancy screening according to recommended guidelines was:

	Recommendation for Screening	Number of Women Recommended for Screening	Percentage of Women Recommended for Screening
ADIPS*	According to risk factors**	369	75%
ADA	BMI $\geq$25kg/m^2 plus additional risk factor(s) for T2DM	143	29%
NICE	Previous GDM	20	4%
IADPSG[#]	Universal	492	100%

*ADIPS Consensus Guidelines Version 2 - 3.5.13

** BMI, age, ethnicity, family history T2DM, previous GDM or glucose abnormality, macrosomia, PCOS, medications (antipsychotics, steroids)

[#]IADPSG also recommend risk factor based screening but do not list specific risk factors

42 women were diagnosed with GDM (47.6% nulliparous) according to current ADIPS criteria at 24-28 weeks' gestation.

Conclusions

It is appropriate that women at high risk of abnormal glucose status in early pregnancy are screened, however current recommendations vary widely and their effectiveness has yet to be evaluated. The potential implications for resource allocation in adopting these guidelines are significant.

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WOMEN WITH GESTATIONAL DIABETES: WHO ARE LIKELY TO MISS APPOINTMENTS?

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Aims: Ensuring compliance to therapy is a major challenge for clinicians in managing patients with diabetes mellitus. For women with gestational diabetes (GDM), adherence to therapy is important as this has impact on maternal and fetal well-being. The aim of this study was to assess the failure-to-attend (FTA) rate of women with GDM to their diabetes-related appointments. Methods: A retrospective review of women with GDM who attended diabetes service at Liverpool Hospital in 2011 was conducted. The hospital appointment booking system provided information regarding the women's attendance of their diabetes-related appointments. Uni-variate and multi-variate regression analyses were performed to assess the association between women who FTA at least twice and various clinical parameters.

Results: Out of the 366 women included in this study, 136 women (37.2%) failed to attend at least 1 diabetes-related appointment, while 80 women failed to attend 2 or more appointments (multi-FTA). The women attended a median of 8 diabetes-related appointments during their pregnancy. Those in the multi-FTA group had greater body mass index, were less likely to be nulli-parous, had higher rate of previous GDM and were more likely from non-European background. By 36 weeks, a greater proportion of women in multi-FTA group had glycated haemoglobulin above 5.5%. From multivariate analysis, these women had an increased risk of macrosomia (OR 1.98, p=0.076).

Conclusion: Identification of factors associated with FTA for women with GDM is important. This can help clinicians review their clinic setup to cater for the needs of women with GDM and hopefully to improve their attendance rates.

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COMPARISON OF TREATMENT AND MATERNAL OUTCOMES IN WOMEN WITH GESTATIONAL DIABETES MELLITUS BY EDUCATION SETTING

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Background: There is limited evidence on the effectiveness and outcomes of group versus one-to-one dietary education (with or without an interpreter) for women with GDM.

Aim: To compare group versus individual dietary education (with and without an interpreter), in terms of insulin therapy requirements and pregnancy outcomes in women with GDM.

Methods: All women who received one initial individual appointment with a dietitian (1-2-2011 to 31-1-2012) individually without an interpreter-(Individual) were compared to women who received initial education 1) individually with an interpreter-(Interpreter) (1-2-2011 to 31-1-2013) or 2) in a group setting-(Group) (1-2-2012 to 31-1-2013). All women received at least one individual follow-up appointment usually within two weeks of the initial education. The same initial dietary information was provided in all settings. Data collected were: insulin requirement, maternal weight gain, rates of SGA, LGA, mode of delivery, and rates of delivery complications. Data were compared by t-test or Chi-squared test. Fisher-Freeman-Halton exact test was used to detect differences in ethnicity. Statistical significance was $p<0.05$.

0>Results: Data were analysed for 194 (Group), 241 (Individual) and 140 (Interpreter) women. Group and Interpreter women were slightly older (32.3±4.9 and 32.9±5.5 versus Individual 31.1±5.1; p=0.016 and p=0.002 respectively). There was no difference in ethnicity or other baseline characteristics (Group versus Individual), however Interpreter patients differed by ethnic background, (more SE Asians in the interpreter group) and had a significantly lower pre-pregnancy BMI (see Table). The number of women requiring bolus insulin to control post-prandial glucose was not significantly different. The Table shows other parameters.

Parameters/outcomes	Group n=194	Individual n=241	Interpreter n=140
Pre-pregnancy BMI (kg/m^2)	28.1	27.3	24.3 *
South-East Asian background	23.2%	24.9%	59.3%
Maternal weight gain after diagnosis(kg) (Mean±SD)	2.2±3.4	2.7±3.6	2.95±2.96 **
Insulin required n=(%)	77 (39.7)	82 (34.0)	39 (27.9) **
Bolus insulin required (%)	26.8%	25.3%	19.4%
Average bolus insulin injections per patient on insulin per day	2.21	2.27	2.33
Mean insulin dose ± SD (IU)	29.5±28.1	37.8±41.9	27.6±27.7
SGA n=(%)	22 (11.5)	20 (8.6)	6 (4.4) #
LGA n=(%)	22 (11.5)	38 (16.4)	21 (15.6)
Caesarean delivery n=(%)	54 (28.1)	67 (28.9)	38 (28.4)
Emergency Caesarean n=(%)	22 (11.3)	28 (11.6)	13 (9.3)
Forceps n=(%)	3 (1.5)	5 (2.1)	3 (2.1)
Vacuum n=(%)	15 (7.7)	15 (6.2)	11 (7.9)
Early delivery (<37 weeks) n=(%)	15 (7.9)	18 (7.8)	6 (4.4)
Neonatal Hypoglycaemia n=(%)	4 (2.3)	9 (4.0)	4 (3.1)
Jaundice n=(%)	17 (9.6)	23 (10.3)	11 (8.5)
Shoulder Dystocia n=(%)	0	1 (0.4)	2 (1.6)

*p<0.0001 versus Group / Individual Education **p<0.05 versus Group / Individual Education
p=0.026 versus Group

Conclusion: Changing to Initial Group education does not appear to compromise treatment and maternal outcomes in English speaking women with GDM. The significant differences seen in the Interpreter group require further investigation but may be due to language barriers or other cultural and/or physiological differences.

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EFFECTS OF ELEVATED FATTY ACIDS AND/OR GLUCOSE ON GLUCOSE METABOLISM PATHWAYS IN HUMAN TROPHOBLASTS

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Introduction: Maternal obesity, diabetes and/or dyslipidaemia are associated with adverse gestational outcomes. The placenta may adapt to protect the fetus or it may become dysfunctional and contribute to poor outcomes. The purpose of this research is to evaluate in primary human trophoblasts interactions between glucose and lipid metabolism.

Methods: The protocol for trophoblast isolation from normal term placentas was optimised. Total glucose uptake was assessed after 36 h of culture over a 2 h period using [U-14C]-glucose at various cold glucose concentrations +/- 0.25 mM non-esterified fatty acids

(NEFA, oleate/palmitate 1:1). Cells were also cultured for 3 days +/- epidermal growth factor (EGF) to promote syncytialisation +/- 0.1 mM NEFA. Lipid droplet formation was assessed by oil red O staining.
Preliminary results: Trophoblast yield was 200-600 million per placenta (>98% purity). Glucose uptake increased linearly with increasing glucose concentrations without reaching plateau with a trend for attenuation in the presence of NEFA. Lipid droplet formation was evident in the presence of NEFA with a trend for enhancement with EGF (preliminary data).
Conclusion: Glucose uptake into trophoblasts increases across a wide range of glucose concentrations, unlike glycolysis which plateaus at 5 mM (previously shown). Trophoblast lipid droplet formation may be enhanced by EGF.

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PLACENTAL FGF21 EXPRESSION IS INCREASED IN GESTATIONAL DIABETES MELLITUS (GDM)

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Background and Aims:
The hormone fibroblast growth factor 21 (FGF21) is a regulator of metabolism mainly in the liver and adipose tissue. Circulating FGF21 levels are increased in type 2 diabetes mellitus and obesity. It is unclear if the placenta expresses FGF21 and if expression is altered in GDM. Furthermore, it is unclear if FGF21 is present in the fetal circulation. This study aims to assess placental expression of FGF21 in women with or without GDM and to analyze FGF21 expression in cord blood and its correlation with maternal serum levels of FGF21.
Materials and Methods:
Twenty women with GDM and 19 normoglycemic women were recruited. Maternal blood was collected in the late third trimester. Placentas and cord blood were collected at delivery. Placental FGF21 mRNA expression was analyzed by qPCR using TBP as endogenous control and normalized for cellular composition. Placental protein levels were assessed by western blot and quantified by densitometry analysis. Serum concentrations of FGF21 were analyzed by ELISA.
Results:
Placentas were obtained from 20 women with and 19 women without GDM. The groups were similar in maternal body mass index, age, gestational age at delivery, and birthweight centile. Women with GDM had increased FGF21 mRNA expression compared to controls (3.02 (0.58-36.15) vs. 0.32 (0.09-1.93); median (interquartile range), p=0.004). FGF21 protein was detected in placenta, again with high interindividual variability, and was seven fold higher in GDM (2.89 (1.44-5.10) *vs.* 0.42 (0.05-1.98), p<0.05). Maternal serum FGF21 concentrations were similar in GDM (323 (75-921) pg/mL) and controls (269 (49-731) pg/mL, p=0.81). Maternal serum FGF21 levels did not correlate with placental FGF21 expression. No FGF21 was detected in cord serum.
Conclusion:
Placental expression of FGF21 mRNA and protein is increased in women with GDM. Placental FGF21 is not detectable in cord serum. There is no relationship between placental expression and maternal serum levels of FGF21.

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IMPACT OF OBESITY ON PREGNANCY OUTCOMES IN WOMEN WITH GESTATIONAL DIABETES MELLITUS

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Background: Obesity is increasing in the community and is associated with adverse pregnancy outcomes.
Aims: To assess the proportions of obese versus normal and overweight women, and compare their pregnancy outcomes from a large GDM cohort in South-Western Sydney.
Methods: Retrospective analysis of prospectively collected data from our GDM database, (1993-2012), on women diagnosed and managed by ADIPS criteria(1). Selected women had delivery outcome data and had attended a post-partum oGTT. Post-partum glycaemic status was classified according to oGTT results, (not HbA1c), with IFG being FBGL≥6.1mmol/L. Data were compared by t-test or Chi-squared test. Fisher-Freeman-Halton exact test was used to detect differences in ethnicity. Statistical significance was p<0.05.
0>Results: There were 1851 women with available data: 77.8% BMI (kg/m2) 18.5-29.9 [Gp1], and 22.2% with BMI ≥30 [Gp2]. There were differences in ethnicity with significantly lower numbers of South-East Asian and South Asian women in Gp2. Data in the Table show that obese women were slightly older, were diagnosed slightly earlier and had higher gravida and parity. There was statistically significantly higher insulin use and mean maximum dose (40.8 versus 28.9 units). Overall weight gain was less in the obese women and there was no increase in early delivery, although there were more caesarean births. There were no significant differences in baby outcomes including shoulder dystocia (3 in the Gp2 versus 7 in Gp1). SGA rates were similar but there were more LGA babies and more post-partum dysglycaemia in the obese GDM women.

Parameters	Gp1 n=1440	Gp2 n=411	p value
Age (years)	32.4±5.2	33.0±5.1	<0.05
Gestation at GDM diagnosis (weeks)	27.1±5.6	26.3±5.9	<0.05
Gravida	2.66±1.6	3.46±2.1	<0.0001
Parity	1.13±1.2	1.73±1.7	<0.0001
Insulin Use	25.3%	54.5%	<0.0001
Weight Gain at GDM Diagnosis (kg)	9.9±6.7	8.3±10.3	<0.0001
Total Pregnancy Weight Gain (kg)	12.1±5.5	10.5±6.8	<0.0001
Early Delivery (<37 Weeks Gestation)	5.0%	5.8%	=0.542
Caesarean Delivery	21.4%	33.3%	<0.0001
SGA (<10th centile)	8.5%	10.1%	=0.323
LGA (>90th centile)	12.2%	17.2%	<0.05
Any Abnormality on post-partum oGTT	25.3%	32.9%	<0.0001
T2DM on post-partum oGTT	3.3%	5.1%	=0.078

Conclusions: In this cohort, obese women with GDM were more likely to require insulin therapy, to undergo caesarean delivery, had more LGA babies and post-partum dysglycaemia than those who were normal weight and overweight combined. These data highlight the need for particular attention to weight management including prior to pregnancy.

Acknowledgment: All of the Diabetes Educators who have collected data and maintained the database.

1. Hoffman L, Nolan C, Wilson JD, Oats JJN, Simmons D. Gestational diabetes mellitus – management guidelines. The Australasian Diabetes in Pregnancy Society. Med J Aust 1998; 169:93–97.

2. Acknowledgment: All of the Diabetes Educators who have collected data and maintained the database.

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THE PERCEIVED EXPERIENCE OF GESTATIONAL DIABETES MELLITUS (GDM) DIAGNOSIS AND RISK PERCEPTIONS AMONG AUSTRALIAN WOMEN

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Title: The perceived experience of gestational diabetes mellitus (GDM) diagnosis and risk perceptions among Australian women.

Background: Significant controversy surrounds the proposed IADPSG guidelines for GDM diagnosis. It is important to explore the experience of GDM diagnosis and impact on women before the introduction of these guidelines.

Aim: To describe the experience of GDM diagnosis and risk perceptions related to maternal and baby health outcomes.

Method: Cross-sectional study of 51 women attending Monash Health, Victoria, Australia for antenatal care (2008-2010).

Results: The median age of participants was 33 years. Half (51%) were Australian born, with 31% from South East, Southern or Eastern Asia. 37.5% had a previous GDM diagnosis. Almost a third (32.6%) were in their first pregnancy.

Most women (82.6%) were satisfied with the GDM screening test explanation and 67.4% felt the results of screening test were explained well. 80.6 % and 72.2% of women were satisfied with information given about lifestyle management and medical therapy respectively.

Only 17.4% associated complications of maternal anxiety and depression with uncontrolled GDM whilst almost all (89.4%) associated poor control with perinatal complications including macrosomia. Half (54.3%) thought poor control was associated with induction of labour/caesarean birth and 76.1% felt it was linked to neonatal nursery admission, neonatal hypoglycaemia or jaundice. Most (76.1%) thought insulin could reduce macrosomia but only 30.4% thought insulin could reduce induction of labour/caesarean birth.

71.7% perceived an increased risk of diabetes and 80.4% perceived they could reduce their risk. 80.4% perceived a future risk of GDM and 63% perceived they could reduce their risk. Over half (58.7%) thought their baby had an increased risk of diabetes later in life. Most were confident that lifestyle changes could improve GDM (89.1%) and prevent longer-term diabetes (84.4%). Smaller numbers thought that medical therapy would change these outcomes (65.9 and 36.4% respectively).

Conclusion: Women attending Monash Health were largely satisfied with the GDM diagnosis experience and knowledge of risks associated with GDM was fair. Areas for targeted education include explanation of GDM test results and information provision at diagnosis.

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THE GLUTT - GLUCOSE TOLERANCE AND TARGETS – STUDY

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The proposed IADPSG criteria for diagnosis and management of GDM[1] will impact both on women so diagnosed and on healthcare resources invested in such management. The new criteria, based on the HAPO study[2] , have not been subjected to RCT to establish their superiority over existing criteria with regard to clinical benefit to mothers or offspring either short or longer term, or to assess their cost-effectiveness and economic sustainability.

We plan two concurrent RCTs to investigate these proposals within the SA population, together with a nested population study to assess the prevalence of the 12 most common MODY gene variants in women diagnosed with GDM, and a careful health economic analysis of the costs/benefits of the interventions over the first two years of the lives of the offspring.

Trial A: women not previously diagnosed diabetic will be tested with a 2h 75g OGTT at 24-28 weeks gestation, or earlier if at increased GDM risk. Those with fasting glucose 5.1-5.4 mmol/L will be randomised to observation ("not GDM") or treatment ("mild GDM"). Women with 2h glucose ≥8.0 mmol/L will be treated as GDM.

Trial B: women diagnosed with ADIPS GDM will be randomised to "very tight control": target fBGL <5.0 mmol/L, 2hppBGL <6.7 mmol/L, or "tight control": target fBGL <5.5 mmol/L, 2hppBGL <7.0 mmol/L.

Primary outcomes: LGA, pre-eclampsia.

1350 women will be sufficient to show with active management of "mild GDM" a 40% reduction in the risk of LGA (alpha 0.05 two-tailed, 90% power, 4% loss to follow up) from 15% to 9%, and a 49% reduction in the risk of pre-eclampsia from 10% to 5.1%. 718 women will be sufficient to exclude a difference in the risk of LGA with "very tight control" of GDM of more than 8% (alpha 0.05 two-tailed, 90% power, 4% loss to follow up).

We anticipate a 3.5 year recruitment and 18-24 month follow-up.

1. IADPSG Consensus Panel: Metzger et al. IADPSG recommendations on the diagnosis and classification of hyperglycemia in pregnancy. Diabetes Care 2010 Mar;33(3):676-82
2. HAPO Study Cooperative Research Group: Metzger et al. Hyperglycemia and adverse pregnancy outcomes. N Engl J Med 2008 May 8;358(19):1991-2002

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POST-DELIVERY FOLLOW UP SCREENING OF WOMEN AFTER GESTATIONAL DIABETES MELLITUS (GDM): COMMUNICATION BETWEEN MOTHERS, HOSPITAL AND GENERAL PRACTICE.

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Background: Australian and international guidelines recommend that all women diagnosed with gestational diabetes mellitus (GDM) undertake post-delivery follow up screening to assess regulation of blood glucose levels and monitor an increased risk of developing type two diabetes.

Why mothers fail to complete recommended post-delivery follow up screening after a GDM complicated pregnancy is nt well understood [1], however quality of intergroup communication has been implicated [2, 3]

Multiple care settings and care providers are associated with communication problems, miscommunication and communication failures - particularly when pregnancy or birth complications occur. Ineffective communication is associated with negative effects on experiences and outcomes; conversely effective communication is associated with positive outcomes like improved quality of patient care, and patient and clinician satisfaction[2].

Method: Individual in-depth convergent interviews were undertaken with a) mothers following GDM (n=13), b) hospital maternity clinicians caring for GDM mothers (n=10); and c) general practitioners providing postnatal follow up (n=10). Interviews were recorded and transcribed then verified by individual participants. Transcripts were analysed using Leximancer text mining software then interpreted using Communication accommodation theory, to identify intergroup relations and influence on patient care [4].

Results: These results provide the first study of intergroup communication between major stakeholders; patients, hospital, and general practitioners regarding post-delivery follow up screening after GDM.

Implications: Multidisciplinary team care is recommended for women with complications of pregnancy, including GDM. Understanding current intergroup communication may help establish more effective strategies to improve postnatal screening rates of the increasing number of women diagnosed with gestational diabetes mellitus (GDM).

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MATERNAL VITAMIN D DEFICIENCY, GESTATIONAL DIABETES MELLITUS AND PREGNANCY OUTCOMES: RESULTS INCLUDING A MULTIVARIATE LOGISTIC REGRESSION MODEL FROM A MULTI-ETHNIC POPULATION OF WOMEN IN SOUTH-WESTERN SYDNEY

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Background: Vitamin D deficiency has been linked to impaired glucose metabolism[1,2].

Aim: To investigate the link between vitamin D deficiency and impaired glucose metabolism by studying the relationship between serum 25-hydroxyvitamin D (25[OH]D) and clinical indicators for glycaemic control and pregnancy outcome in gestational diabetes mellitus (GDM).

Methods: Retrospective analysis of prospectively collected data (Feb-2011 to Apr-2013) on GDM women diagnosed by ADIPS criteria, with glycated haemoglobin (HbA1c) and 25[OH]D collected shortly thereafter. Logistic regression was used to identify predictors associated with vitamin D deficiency.

Results: There were 628 women from diverse ethnic backgrounds (31.4% South-East Asian, 23.4% European, 23.2% Middle Eastern, 15.3% Indian/Pakistani, 6.7% Other), diagnosed with GDM at (mean±SD) 24.6±6.1 gestational weeks. Vitamin D deficiency (2013 ANZBMS guideline) was present in almost half (48.2%), with mild (30-49nmol/L), moderate (12.5-29nmol/L) and severe (<12.5nmol/L) degree in 61%, 34% and 5% respectively. Compared with vitamin D sufficient women, women with vitamin D deficiency had significantly higher fasting blood glucose level (BGL) ($r=-0.22$, $p<0.001$), HbA1c ($r=-0.20$, $p<0.001$), gravida ($p=0.022$), parity ($p=0.006$), pre-pregnancy body mass index (BMI) ($p<0.001$), number of GDM risk factors ($p=0.005$), likelihood of requiring insulin therapy ($p<0.001$) and LGA babies ($p=0.038$). There were no significant differences between subgroups in women's age, gestation at GDM diagnosis, 2-hour BGL on oGTT, pregnancy weight-gain, gestational age at delivery, caesarean delivery or oGTT/HbA1c at 6-8 week post-partum. In the multivariate logistic regression model, pre-pregnancy BMI ($p<0.001$) and HbA1c ($p=0.003$) were statistically significant predictors of vitamin D deficiency.

Conclusion: This study identified a high prevalence of vitamin D deficiency in a multi-ethnic population of GDM women, with greater insulin requirement and more LGA babies, but no other significant differences in birth outcomes or follow-up glucose tolerance in the two subgroups. Both pre-pregnancy BMI and HbA1c were independent predictors for vitamin D deficiency by multivariate regression analysis. Further exploration of these findings is warranted.

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2. Maternal vitamin D deficiency, ethnicity and gestational diabetes. RJ Clifton-Bligh, P McElduff and A McElduff. Diabet Med 28 June 2008; 25(6); 678-684.

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PREGNANCY OUTCOMES BASED ON OLD AND NEW DIAGNOSTIC CRITERIA FOR GDM – ARE WE OVER OR UNDER-DIAGNOSING WOMEN?

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Gestational diabetes mellitus (GDM) historically complicates 3-14% of all pregnancies. Prior to 2010, the diagnostic criteria for GDM was a fasting blood glucose level above 5.5 mmol/L fasting or above 8.0mmol/L 2 hours following a 75g oral glucose load (1). Based on the Hyperglycaemia and Adverse Pregnancy Outcomes (HAPO) study (2) the International Association of Diabetes and Pregnancy Study Groups (IADPSG) proposed new guidelines for the diagnosis of GDM in 2010 (3). These recommended a 75 g oral glucose tolerance test for all women not already known to be diabetic at 24–28 weeks of gestation with GDM diagnosed if blood glucose levels exceeded 5.1mmol/L fasting, 10.0 mmol/L after 1 hour and 8.5mmol/L after 2 hours. Early studies indicate that the new criteria may result in 21-31% more pregnancies being labelled as GDM (4).

To evaluate the benefit of adopting the new IADPSG recommendations, we retrospectively studied pregnancy outcomes in all pregnant women who undertook a 75g OGTT over an 18 month period in 2009-2011 through the Hunter Area Pathology Service. We compared pregnancy outcomes for women using both the old and new criteria. Our results showed that the majority of women (85%) would be identified as having normal glucose tolerance on both criteria (Group A), 5% would be classified as GDM on the new criteria only (Group B) and 2.7% would be classified as GDM based on old criteria only (Group C) with 7.1% identified as GDM on both criteria (Group D).

Poisson regression, adjusted for gestational age and maternal age, indicated that those who tested positive on current ADIPS but not proposed IADPSG criteria (group C) or vice versa had adverse events rates similar to women classified as GDM on both criteria and significantly higher than women with normal glucose tolerance (Table 1).

Our study confirms that our current criteria for GDM misses many women with adverse outcomes. Using the new IADPSG criteria will identify more women with GDM but will miss 18% of women who are currently being treated as GDM. These women also carry an increased risk of adverse events and further studies are needed.

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2. The HAPO Study Cooperative Research Group. Hyperglycemia and adverse pregnancy outcomes. N Engl J Med 2008;358:19912002.
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GESTATIONAL DIABETES MELLITUS (GDM): AN ALTERNATIVE DIAGNOSTIC PARADIGM.

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Introduction. The Australasian Diabetes in Pregnancy Society (ADIPS) has adopted the glucose levels for the diagnosis of GDM proposed by the International Association of Diabetes in Pregnancy Study Groups (IADPSG). This will result in an increased number of women being diagnosed with GDM. This will have work load implications and potentially other problems. This poster details the prevalence of GDM using an odds ratio (OR) of 2.0.

Methods. This was a post hoc analysis, applying an OR of 2.0, of a prospective study conducted to determine the prevalence of GDM using the IADPSG criteria. After a 75 g GTT, the diagnostic glucose levels with an OR of 2.0 were; fasting ≥5.3, one-hour ≥ 10.6 and two-hour ≥ 9.0 mmol/L.

Results. The prevalence of GDM was 5.6% for patients attending a public hospital, 8.4% for women attending a private practice pathologist and 7.1% overall. Whereas with an OR of 1.75, 57% of women would have been diagnosed with GDM on their fasting result, with an OR of 2.0, only 33.7% of women were diagnosed on the fasting result

Conclusion. Diagnosing GDM with an OR of 2.0 would result in a prevalence similar to that found with the old ADIPS criteria. This may be a discussion point for clinicians concerned about the higher number of women being diagnosed with the new criteria and the possible work load implications.

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INCREASING MATERNAL BODY MASS INDEX AND PREGNANCY OUTCOMES IN SOUTH AUSTRALIA 2009-2011

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Background Overweight and obesity in pregnancy is increasing. While there are well-documented maternal and infant risks associated with obesity in pregnancy, most studies in this area have used Body Mass Index (BMI) as a categorical variable. This can underestimate the effects of different BMI.

Objectives To evaluate the effect of maternal BMI on pregnancy outcomes using BMI categories and actual BMI as a continuous variable.

Methods Data from 58,233 singleton pregnancies from 2009-2011 in the South Australian Pregnancy Outcome Unit's population database were reviewed. BMI was recorded prior to 20 weeks gestation in 42,153 (72.4%). Those with a BMI <18.5 kg/m2 (n = 1,294) were excluded. The remaining 40,859 pregnancies were analysed both using BMI as a continuous variable and also divided into four BMI categories. Logistic regression models with adjustment for age, parity, ethnicity, smoking status and hospital type (where appropriate) were employed to report odds ratios and 95% confidence intervals.

Results Preliminary analyses have shown that increased maternal BMI leads to linear increases in risk of gestational diabetes mellitus, pregnancy induced hypertension, induction of labour, caesarean section (elective and overall), large for gestational age infants and macrosomic infants (all p <0.01), the odds ratios increasing for every unit rise of maternal BMI across the entire BMI range. Furthermore, pre-term birth, post-partum haemorrhage, increased maternal length of stay, birth injuries, special care and intensive care nursery admissions and infant length of stay, were related to increasing BMI when analysed in BMI categories.

Conclusions Several complications of pregnancy are related to increasing BMI, with several being related to unit increases in BMI rather than to changes in BMI category. Even small differences in BMI have effects on pregnancy outcomes.

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INCREASING MATERNAL BODY MASS INDEX AND GESTATIONAL DIABETES MELLITUS – INDEPENDENT AND COMBINED EFFECTS ON PREGNANCY OUTCOMES

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Background Increased maternal Body Mass Index (BMI) is a well-established risk factor for developing gestational diabetes mellitus (GDM). Obesity and GDM are also independently associated with adverse pregnancy outcomes (APO). Epidemiological examination of the independent and combined associations of these conditions with pregnancy outcomes is warranted.

Objectives To determine the independent and combined associations of GDM and obesity with pregnancy outcomes.

Methods Data from 58,233 singleton pregnancies from 2009-2011 in the South Australian Pregnancy Outcome Unit's population database were reviewed. BMI was recorded prior to 20 weeks gestation in 42,153 (72.4%). Those with a BMI <18.5 kg/m2 or with pre-existing diabetes (n = 1,573) were excluded. The remaining 40,580 pregnancies were analysed using logistic regression models with interactions for 4 BMI categories and GDM (with adjustment for age, parity, ethnicity, smoking status and hospital type (where appropriate)), resulting in eight groups which allowed examination of the associations of hyperglycaemia only, increased BMI categories only and the combined effects of hyperglycaemia and increased BMI category.

Results For several APOs, such as induction, caesarean section, pregnancy induced hypertension, post-partum haemorrhage, maternal length of stay, need for special care or intensive care nursery admission, large for gestational age, macrosomic infants and infant length of stay, there was an increased odds ratio (OR) with increasing BMI category for all women, regardless of GDM status. There was also an increased OR for these outcomes for pregnancies complicated by GDM compared with non-GDM pregnancies within each BMI category. The highest ORs were seen in pregnancies with the double effect of obesity or severe obesity and GDM. In pregnancies not complicated by GDM there was an increase in OR for these outcomes with increasing BMI category.

Conclusions In this large population study, maternal obesity and GDM are associated with APO, both independently and when combined. The combination of obesity and GDM has a stronger association with APO than either factor alone.

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RANDOMISED CONTROLLED TRIAL OF A COMBINED WEB BASED PEDOMETER AND DIETARY INTERVENTION FOR WOMEN WITH PREVIOUS GESTATIONAL DIABETES (THE WENDY STUDY)

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Background: Research to determine strategies to delay or prevent the development of Type 2 Diabetes Mellitus (T2DM) is vital, particularly in proven high risk population groups, including women previously diagnosed with Gestational Diabetes Mellitus (GDM), plus BMI >25kg/m2.

Methods: In a three month trial, 24 women with a history of GDM 6 to24 months prior to enrolment and BMI > 25 kg/m2 provided informed consent and were randomly assigned to receive either usual care (UC, n=12) or an intervention (INT, n=12) consisting of (1) an internet-supported pedometer program designed to increase physical activity through walking, and (2) a healthy eating four session workshop underpinned by behaviour change theory. The primary outcome was change(Δ) in weight from 0 to 3 months. Secondary outcomes included glucose metabolism (assessed using fasting glucose, fasting insulin and HOMA IR as an estimate of insulin resistance) and body composition (assessed using bio impedance methodology).

Results:Twelve UC and seven INT women returned for three month follow up and form the basis of this report. At three months, Mean(SD) results were as follows: ΔWeight: INT group -2.5(2.3) kg vs. UC group +0.2(1.6) kg (p=0.009). ΔWaist circumference: INT group -3.6(4.5) cm vs. UC group -0.1(3.6)cm (p=0.07). Δ Hip circumference: INT group -5.0(3.3) cm vs. UC group -0.2(2.6) cm (p=0.002).

There were no significant changes in glucose metabolism at 0 to 3 months or between groups. Body composition were as follows: Δ Body fat: INT group -1.3(3.3)% vs. UC group 0.4(1.7)% (p=0.19). Δ Lean body mass: INT group 0.3(2.8)% vs. -0.7(3.6)% (p=0.58).

Discussion: This combined physical activity and dietary intervention proved effective in promoting short term weight loss in women with previous GDM and deserves consideration in larger scale studies. No changes in glucose metabolism or body composition were demonstrated. Despite multiple recruitment strategies including media involvement, recruitment proved difficult.

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INDIGENOUS EDUCATIONAL RESOURCES FOR DIABETES IN PREGNANCY

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Aim: For Australian Aboriginals there is lack of culturally secure educational resources available for health professionals working in the field of diabetes in pregnancy. The ADIPS Educational Research prize provided support for this research.

Method: Over a five-year period, Aboriginal women with diabetes attending antenatal clinics were recruited for focus groups or for individual participation. Resources were developed in the areas of maternal and infant health with the focus on nutrition for pregnancy, diabetes in pregnancy for self-management, PCOS, conception and contraception. Using a cyclical approach to develop, evaluate and correct educational resources and further testing the resources with various language groups for transferability. Peer review by experts in the field approved the technical content.

Results: A comprehensive series of educational resources suitable for people with limited health literacy, limited literacy and numerical literacy resulted from the research. The resources are easily downloaded and reproducible, in a variety of formats ranging from simple brochures, diary formats, in a Power Point (Microsoft) format or printed as flip charts to be suitable for yarning groups.

Conclusion: The ADIPS Educational Research prize has resulted in an extensive, comprehensive and culturally secure collection of educational resources suitable for Australian Aboriginal women. These resources have approval by the ADIPS council to be hosted on the ADIPS Website as a resource for health professionals working in the field of diabetes in pregnancy or for pre-conception use in general diabetes clinics.

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EARLY PREVALENCE AND PREDICTORS OF GESTATIONAL DIABETES IN A HIGH RISK COHORT

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Background: Gestational diabetes (GDM) is an increasingly common pregnancy complication. It is unclear whether earlier testing of women at higher risk for GDM is warranted on detection yield or pregnancy outcomes and whether biomarkers may predict GDM.

Objective: Determine the prevalence of early versus late GDM diagnosis for women at higher risk of GDM and analyse maternal demographics and biomarkers that may predict risk of early GDM.

Methods: We conducted a two-arm, parallel randomised controlled study at a tertiary hospital to assess the impact of antenatal dietary intervention on neonatal anthropometry. 139 women with ≥ 1 GDM risk factor(s) were recruited at ~12 weeks' nuchal visit and randomised to a dietary intervention. Early GDM screening was conducted between 14-20 weeks' gestation with a 75 gram oral glucose tolerance test (OGTT) using ADIPS criteria. If early OGTT was negative, OGTT was repeated between 26-28 weeks' gestation. Food record diaries and baseline biochemistry were assessed prior to dietary intervention.

Results: 21/139 (15.1%) women had GDM diagnosed before 20 weeks' gestation. Overall 40/139 (29%) women developed GDM. Differences in maternal demographics and biomarkers between early and late GDM diagnosis are summarised in Table 1. At baseline, women with early GDM diagnosis had significantly higher fasting free fatty acids (543 ± 34 vs 364 ± 24µmol/L, p<0.001) (mean±SEM) and were more likely to have had previous GDM (48 ± 0.1 vs 11 ± 0.1%, p=0.009). A non-significant trend was observed for lower LDL cholesterol (2.4 ± 0.1 vs 2.9 ± 0.2mmol/L, p=0.040), lower saturated fat recounted in pre-study diet (24 ± 2 vs 31 ± 3grams, p=0.026) and increased parity (1.1 ± 0.2 vs 0.5 ± 0.2, p=0.014) in this group. Other maternal characteristics, biomarkers and pregnancy outcomes were similar whether GDM was diagnosed early or late.

Conclusion: In our higher risk cohort, half of the women with GDM already had abnormal glucose tolerance before 20 weeks gestation. These women had higher fasting free fatty acids, reflecting underlying insulin resistance. Whether early diagnosis and treatment of GDM in higher risk cohorts improves pregnancy outcomes requires further study.

Table 1: Maternal Baseline Profile at 14-20 Weeks' Gestation according to Timing of GDM Diagnosis

1. Demographics	Early GDM	Late GDM	p-value
Age (years)	36.0 ± 1.1	33.5 ± 1.3	0.15
Pre-Pregnancy BMI (kg/m^2)	27.5 ± 1.2	26.8 ± 1.4	0.63
Previous GDM (%)	48 ± 0.1	11 ± 0.1	0.009
Parity	1.1 ± 0.2	0.5 ± 0.2	0.014
High Risk Ethnicity (%)	48 ± 0.1	37 ± 0.1	0.50
Baseline Diet:			
Energy (kJ)	7860 ± 4523	8962 ± 320	0.057
Carbohydrate (grams) (%)	208 ± 15 (44.1)	244 ± 12 (45.0)	0.075
Fat (grams) (%)	68 ± 5 (31.9)	79 ± 5 (32.5)	0.118
Saturated fat (grams) (%)	24 ± 2 (11.3)	31 ± 3 (12.6)	0.023
Glycaemic load (grams) (%)	112 ± 9	135 ± 7	0.052
2. Biomarkers			
OGTT:			
Glucose (mmol/L)			
0 minutes	4.6 ± 0.1	4.7 ± 0.1	0.484
60 minutes	9.8 ± 0.3	7.5 ± 0.2	<0.001
120 minutes	8.6 ± 0.3	6.2 ± 0.2	<0.001
Insulin (pmol/L)			
0 minutes	49 ± 5	47 ± 5	0.850
60 minutes	513 ± 70	374 ± 43	0.098
120 minutes	535 ± 113	274 ± 30	0.036
HbA1c (mmol/L)	32.7 ± 0.9	29.6 ± 1.2	0.11
Free Fatty Acids (µmol/L)	543 ± 34	364 ± 24	<0.001
Adiponectin (µg/ml)	9.7 ± 1.1	11.3 ± 1.2	0.299
TSH (mIU/L)	1.7 ± 0.2	2.1 ± 0.2	0.147
25 OH Vitamin D (nmol/L)	57 ± 4	51 ± 4	0.306
Total Cholesterol (mmol/L)	5.0 ± 0.2	5.6 ± 0.2	0.052
Triglycerides (mmol/L)	1.4 ± 0.1	1.5 ± 0.1	0.393
LDL (mmol/L)	2.4 ± 0.1	2.9 ± 0.2	0.040
Ferritin (µg/L)	42 ± 6	47 ± 8	0.625
Results are mean ± SEM			

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MIGRATION STATUS AND GESTATIONAL DIABETES MELLITUS IN THE AUSTRALIAN CAPITAL TERRITORY

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Objective: To determine if recent migration to Australia is a risk factor for gestational diabetes mellitus (GDM) in the Australian Capital Territory (ACT).

Methods: Demographics of 136 women with GDM who attended the ACT Diabetes Education Clinics from February to June 2013 were obtained by a questionnaire with particular focus on migrant status, geographic origin and years lived in Australia. Additional information obtained on participants included age, pre-pregnancy BMI, proficiency in spoken English and socioeconomic status. Data was compared to that of the ACT Perinatal and Maternal Data Collection (ACT-PNMDC) 2006-2010 and the Australian Bureau of Statistics (ABS) 2011 Census.

Results: Of the 136 women with GDM surveyed, 72(52.9%) were migrants to Australia with 30(22.1%) from South Asian countries, 17(12.5%) from South-East Asian countries, 13(9.6%) from China, and 12(8.8%) from all other countries. Two-thirds of these migrant women had migrated to Australia within the last 9 years. The migrant compared to Australian-born GDM women were of comparable age and socioeconomic background. Pre-pregnancy BMI was significantly lower in South-Asian and all other Asians compared to Australian-born women with GDM (25.9±4.8, 22.1±3.6 and 29.7±9.6 kg/m^2, respectively; $p<0.05$). The 2006-2010 ACT-PNMDC showed that 6.5%, 4.4% and 3.0% of women with GDM and 2.3%, 2.2% and 1.0% of women without GDM were

from South Asian countries, South-East Asian countries, and China, respectively. However, a high percentage of women (40.6%) were coded as coming from "other" countries in the ACT-PNMDC. Also of note, while 52.9% of the women with GDM in this survey were migrants to Australia, only 25.7% of females were coded as being migrants to Australia in the 2011 ABS census of the ACT.

Conclusions: Recent migrant women, particularly from Asian countries, are at increased risk of GDM in the ACT. This data will assist in tailoring GDM education programs to women most at risk.

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OUTCOMES OF WOMEN DIAGNOSED WITH GESTATIONAL DIABETES MELLITUS BEFORE 20 WEEKS GESTATION

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Background: ADIPS guidelines suggest an early oGTT in women at high risk for GDM(1). A previous study by Hawkins et al. demonstrated that women with an early diagnosis of GDM had an increased risk for LGA(2).

Aims: To compare outcomes of women diagnosed before and after 20 weeks gestation in a large GDM cohort in South-Western Sydney.

Methods: Retrospective analysis of prospectively collected data from our GDM database (1993-2012). Selected women, diagnosed by ADIPS criteria(3), had delivery outcome data and had attended a post-partum oGTT with concomitant HbA1c collection. Post-partum glycaemic status was classified according to oGTT results, (not HbA1c), with IFG being FBGL>6.1mmol/L. Data were compared by *t*-test or Chi-squared test. Fisher-Freeman-Halton exact test was used to detect differences in ethnicity. Statistical significance was $p<0.05$.

Results: There were 1879 women with available data, 244 diagnosed <20 weeks gestation (<20WkDx) and 1635 after 20 weeks (>20WkDx). There were no significant differences in ethnicity, but <20WkDx women were older, with higher gravida, parity, self-reported pre-pregnancy BMI and more risk factors for GDM. In the< 20WkDx women there was significantly more insulin use, but no significant increase in early delivery (<37weeks) or caesarean delivery, with non-statistically significant differences in SGA and LGA. Of note was the significant increase in any abnormality of glucose tolerance on 6-8 weeks post-partum glucose tolerance test (oGTT), especially Type2DM (see Table - mean±SD or percent).

Parameters	<20WkDx	>20WkDx	p value
Age (years)	33.4±4.9	32.3±5.2	<0.001
Gravida	3.16±1.7	2.76±1.8	<0.001
Parity	1.43±1.3	1.22±1.4	=0.02
Pre-pregnancy BMI (kg/m2)	27.1±6.9	25.6±5.9	<0.001
GDM Risk Factors	2.2±1.2	1.5±1.2	<0.0001
Insulin Use	50.8%	28.1%	<0.0001
Total Pregnancy Weight Gain (kg)	9.97	12.1	<0.0001
SGA (<10th centile)	10.1%	8.8%	=0.518
LGA (>90th centile)	10.5%	13.6%	=0.195
Any Abnormality on post-partum oGTT	40.6%	24.9%	<0.0001
T2DM on post-partum oGTT	9.8%	2.7%	<0.0001

Conclusions: Although women with a diagnosis of GDM before 20 weeks gestation had worse baseline metabolic characteristics compared to those diagnosed after 20 weeks, the rates of adverse neonatal outcomes were similar. In this cohort, these women had less weight gain and non-significantly less LGA than those diagnosed after 20 weeks. Therefore early diagnosis of GDM, coupled with early intervention, had favourable perinatal and fetal outcomes. However these women require heightened surveillance post-partum due to an elevated risk of persisting dysglycaemia.

Acknowledgment: All of the Diabetes Educators who have collected data and maintained the database.

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IS THE STRATEGY FOR CARE OF "LOWRISK" WOMEN WITH GESTATIONAL DIABETES MELLITUS REALLY SAFE?

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***Introduction*:** Gestational Diabetes Mellitus (GDM) patients are stratified into "low-risk" and "high-risk" groups in Canberra, according to whether they can control their glucose level with diet and exercise. High-risk patients, mostly needing insulin treatment, are referred to the multidisciplinary clinic, while low-risk patients continue normal antenatal care. The aim was to determine if low-risk patients have satisfactory outcomes considering their lower level of obstetric surveillance.

***Methods*:** A retrospective clinical audit of GDM patients treated between 2010 and 2012 was conducted. Maternal demographic data and neonatal and maternal clinical outcomes data were analysed.

***Results*:** Records of 337 patients were reviewed. Low-risk compared to high-risk mothers were younger (31.69±4.91 vs. 33.01±4.97 years, P<0.05), leaner (BMI 26.4±6.73 vs. 30.7±8.24 kg/m2, p<0.0001), with lower rates of pre-eclampsia (2.2% vs. 8.0%), induced labor (15.2% vs. 50.9%) and elective C-sections (12.5% vs. 20.5%); but had more premature deliveries (13.8% vs. 8.0%), low-birth-weight neonates (9.4% vs. 6.2%, n.s.), macrosomic neonates (7.1% vs. 5.4%, n.s.). Emergency C-section rates were similar (14.7% vs. 13.4%).

***Conclusion*:** The stratification system into low and high-risk GDM is efficient. The low-risk group, however, is at increased risk of premature delivery and a similarly high rate of emergency C-section as the high-risk group.

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THE RELATIONSHIP BETWEEN PAPP-A, GESTATIONAL DIABETES AND BIRTH SIZE

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BACKGROUND: First trimester maternal serum PAPP-A is used to assess the risk of fetal chromosomal abnormalities. More recently, lower PAPP-A has been linked to the development of gestational diabetes (GDM). In other studies, higher PAPP-A is associated with increased birthweight. The exact relationship between maternal diabetes, PAPP-A and birthweight is unknown. AIMS: To examine the relationship between PAPP-A and GDM or pregestational diabetes, and between PAPP-A and birthweight. METHODS: We prospectively measured serum PAPP-A in 1382 women presenting for their nuchal translucency scan from July 2009-July 2011 at our institution. Pregnancy outcomes were obtained through the statewide Obstetrix database. Another 305 women with pregestational or gestational diabetes who attended the diabetes clinic in the same antenatal service between August 2007 and December 2012 were added to the database. RESULTS: There were 1282 women without diabetes, 364 with GDM, 23 with T1D and 18 with T2D. Lower PAPP-A was independently associated with GDM and T2D. GDM was associated with an 8.5% (CI 15.4, 1.6%) (p=0.016) decrease and T2D with a 36.8% (CI 63.6, 10.0%) (p=0.007) decrease in PAPP-A MoM. Conversely, higher PAPP-A was associated with a higher birthweight. In a multivariate model, women with the highest PAPP-A quartile had an OR of 2.1 (CI 1.3-2.3) for a LGA baby (p=0.001), with babies that were 129g (CI 74, 185g) (p<0.001) heavier than the lowest quartile. PAPP-A and pregestational diabetes were independent predictors of birthweight. CONCLUSION: Maternal PAPP-A at the time of nuchal translucency screening is independently associated with diabetes status and baby size. This may reflect placental function as well as the underlying metabolic milieu. Further evaluation should determine if PAPP-A can help identify pregnancies at risk of either GDM or LGA.

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A COMPARISON OF MODELS OF CARE FOR THE EDUCATION & MANAGEMENT OF WOMEN WITH GESTATIONAL DIABETES

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Health services strive to be efficient, timely, equitable, accessible, safe & effective with care based on best practice. However, lack of staff & the increasing demand for a service often drive the decision of how a service is delivered. These issues have led to a Review of our current model of care (MoC) for women with gestational diabetes (GDM).Our aim was to conduct a survey of selected metropolitan Diabetes Centres & to compare the MoCs used to provide education & care to women with GDM.A 10 question multiple choice & short answer survey tool was developed. Twelve public hospital Diabetes Centres known to provide education services to women with GDM were contacted by phone and invited to participate in a telephone survey. A diabetes educator (DE) read the survey questions to the participating DE & transcribed the verbal responses which were entered into a database. Results are descriptive & analysis univariate.All 12 Centres contacted completed the survey. Data are presented for 13 Centres including our own. Participating centres: NSW 5, VIC 2, TAS 1, ACT 1, NT 1, QLD 1, SA 1, WA 1. Number of referrals per week varied between centres: 1-5 (15%), 6-10 (39%), 11-14 (23%),≥ 15 (23%). All (100%) reported an access time to first contact (a group session) of 1-5

days.Estimated total hours of education by DE: 0 (8%), 1-3 (77%), 4 - 5 (7%), ≥ 6 (8%). Estimated dietitian hours: ≤ 1 hour (23%), & ≥ 1hour (77%) based on the MoC. Data show that following the initial group session MoCs varied widely for mode of education, management, participating disciplines & role responsibilities.
In summary, all Centres use the same 1-5 day standard to achieve efficient, timely & equitable access to education. This is achieved by conducting a weekly group session. Further evaluation is needed to determine MoC effectiveness for safe, best practice.

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FOLLOW-UP AFTER GESTATIONAL DIABETES (GDM): WHOM ARE WE MISSING?

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Background: Studies examining risk and predictors of glucose intolerance post-GDM rely on retrospective data, or following longitudinal cohorts. Early gestational age at diagnosis, higher antepartum OGTT values and greater BMI confer greater risk of subsequent diabetes[1] . However, data from women who fail to attend follow-up (around 50%[2]), or decline participation in longitudinal studies, are missed. It is not clear whether these women represent a group at lower/higher risk of glucose intolerance and thus whether studies over/underestimate subsequent risk.

Methods: From September 2012, women attending the GDM clinic were invited to participate in a longitudinal follow-up study. Those with pre-gestational diabetes(22), minimal English proficiency(10) and non-residents(4) were excluded. Women who returned consent were booked for OGTT at 6-12 weeks postpartum. Women who did not return consent were advised to have follow-up OGTT, and given the option of booking it at our centre. Demographic and medical details of study-consenters versus non-consenters and OGTT-attendees versus non-attendees were compared.

Results: 120 of 232 women returned consent for the longitudinal study. There were no significant differences in mean age (31.8 vs 32.5yrs), gestational age at GDM-diagnosis (24wks) or booking-in BMI (29 both groups) between those who did or did not return consent forms. Mean fasting/2hr BGL on antepartum OGTT was identical in both groups (5.1/8.9mmol/L), as was mean 3rd trimester HbA1c (5.5%). Of 112 study non-consenters, 26 completed, 26 failed to attend and 29 await postpartum OGTT. 31 are lost to follow-up. Of 120 study-consenters, 54 completed, 36 failed to attend and 30 await OGTT. Comparing 80 GTT-attendees with 62 who failed to attend, attendees were older (mean 33 vs 31yrs, p=0.01), but there was no difference in gestational age at diagnosis, antepartum OGTT or BMI. Previous history of GDM did not affect OGTT attendance (14% both groups), nor was there any difference in delivery mode, parity, insulin-use or proportion of overseas-born women (71 vs 61%, p=0.28).

Conclusions: Antepartum characteristics known to predict higher diabetes risk were not significantly different in non-study participants and non-attendees for postpartum OGTT. Non-attendance rates are high; further exploring predictors and reasons for non-attendance would enable design of strategies that improve follow-up.

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CONGENITAL ANOMALIES IN TYPE 1 AND TYPE 2 DIABETES: A CASE SERIES REPORT

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Background:
Poorly controlled diabetes in pregnancy is associated with an increased rate of congenital anomalies and adverse neonatal outcomes. Data from the United Kingdom showed that the relative risk of a major congenital anomaly in a patient with type 1 or 2 diabetes is 2.2 [1]. In New Zealand, the rate of congenital anomalies has previously been quoted as 5.5% in type 1 diabetic patients, and 4.4% in type 2 diabetes. [2]
Method:
We conducted a prospective audit of women with type 1 and 2 diabetes under the care of the Diabetes in Pregnancy service at Waikato Hospital between 2007 and 2012. We analysed the characteristics of women who had babies with minor or major congenital anomalies. Other risk factors for congenital anomalies are explored.
Results:
102 patients with type 1, and 116 patients with type 2 diabetes, were analysed. 14 women (6.4%) had babies with congenital anomalies. Some babies had more than one anomaly. Of these 14 women, only 50% have a recorded preconception HbA1c (7/14). Of these seven patients, one was type 2 and six were type 1. The average pre-conception HbA1c was 70mmol/mol (8.6%). Skeletal anomalies were the most commonly observed (5 babies), followed by renal tract anomalies (3 babies). Preconception folic acid was only taken in 4/14 patients (29%).
Conclusion:
This case series highlights the need for good preconception advice in diabetic women of childbearing age. Good glycaemic control prior to conception and in the early stages of pregnancy is vital in helping to ensure a good pregnancy outcome.

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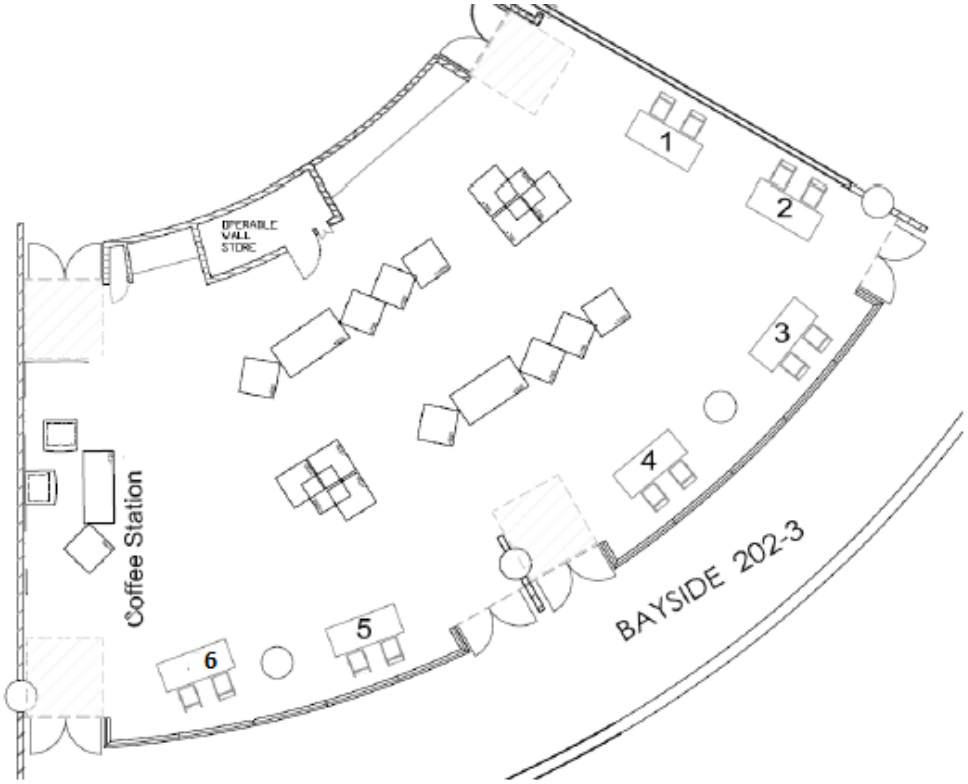

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