“Not So Sweet”

Diabetes in Pregnancy

The Central Australian Experience

Mary Wicks
General Physician, Alice Springs Hospital
Responsible for – Literature review/ data acquisition and analysis/ Report Author

Paula Van Dokkum
Midwife and Researcher, Alice Springs Hospital and Baker IDI
Responsible for - Concept/ data acquisition

Stacey Svenson
Midwife, Researcher and Accredited Diabetes Nurse Educator, Alice Springs Hospital and Baker IDI
Responsible for - Concept / Ethics application

And:
Acknowledging the DANCE team of 2014/15
- Glynis Dent – Accredited Diabetes Nurse Educator
- Sheetal Tipnis – Obstetrician
- Paula Van Dokkum – Midwife, Researcher
- Mary Wicks – Physician
- Stacey Svenson – Midwife, Researcher
CONTENTS

3 Introduction and Rationale for the study
5 The Study
6 Results
12 Summary
13 How do these results challenge our practice?
17 References
20 Appendix 1 Demographics
21 Appendix 2 Comparison of Old Diagnostic Guidelines (SA) and new Diagnostic Guidelines (ADIPS)
22 Appendix 3 Map of NPY Lands

Population distribution by SEIFA advantage/disadvantage quintiles, Indigenous population by state/territory and total population.

List of Tables and Figures

<table>
<thead>
<tr>
<th>FIGURE</th>
<th>Page</th>
<th>TABLE</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: Testing Outcomes</td>
<td>6</td>
<td>1: Testing Outcomes</td>
<td>7</td>
</tr>
<tr>
<td>2: Analysable cohort</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2: DIP versus Remoteness</td>
<td>7</td>
<td>2: New GDM with application of new diagnostic criteria</td>
<td>8</td>
</tr>
<tr>
<td>3: HbA1c in PDM</td>
<td>9</td>
<td>3: HbA1c in PDM</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4: Reason for no OGTT</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5: Timing of first OGTT and results</td>
<td>11</td>
</tr>
</tbody>
</table>

Abbreviations and Acronyms
DIP – Diabetes in Pregnancy
HIP – Hyperglycaemia First Detected in Pregnancy
GDM – Gestational Diabetes Mellitus (a subset of HIP)
DMIP – Diabetes Mellitus in Pregnancy (a subset of HIP)
PDM – Pre-existing Diabetes Mellitus (Type 1 or Type 2)
ADIPS – Australian Diabetes in Pregnancy Society
DANCE – Diabetes Antenatal Care and Education
ASH – Alice Springs Hospital
NPY - Ngaanyatjara, Pitjantjatjara and Yankunytjatjara – Central Australian Aboriginal Groups/ Lands
OGTT – Oral Glucose Tolerance Test (75G)
GCT – 50G Glucose Challenge Test
INTRODUCTION AND RATIONALE FOR THE STUDY

Both Type 2 Diabetes Mellitus (T2DM) and Gestational Diabetes Mellitus (GDM) are on the increase in Australia (11,13,17) and indeed the rest of the world (12). This increase in prevalence is appreciated quite starkly in the Aboriginal people of Central Australia where Type 2 Diabetes Mellitus is being diagnosed in epidemic proportions and at increasingly younger ages (10). This is very concerning for the burden of chronic disease and associated morbidity and mortality in this population, already beleaguered by ill health in nearly every measurable disease domain (14).

Identifying the causes for this increase in Diabetes Mellitus, as well as strategies to break the cycle of epigenetic transmission, are of immediate and intense concern to clinicians and researchers working in this area (13). It has been recognised that a major area for intervention for positive change is in foetal and early childhood, where a greater developmental plasticity has been noted (19). The impact of negative epigenetic marks at this stage of development can be reduced by ensuring an ideal biochemical milieu for the developing human being (6). In women with Diabetes in Pregnancy (DIP), ensuring normoglycaemia during pregnancy is the clinical aim to facilitate this ideal milieu.

The Australian Diabetes in Pregnancy Society (ADIPS) endorsed recommendations for new diagnostic criteria for Gestation Diabetes Mellitus (GDM) made by the International Association of Diabetes and Pregnancy Study Group (IADPSG) in late 2013 (1). The rationale for change was based primarily on the outcomes of the highly influential HAPO study published in 2008 (6).

The HAPO study was a large prospective multinational study which investigated adverse foetal, as well as maternal, effects of gestational hyperglycaemia. This study reviewed the outcomes of 23,316 women with fasting blood glucose levels of < 5.8 mmol/L and levels at 2 hours after a 75 gram oral glucose load of < 11.1 mmol/L. There were strong positive correlations found between elevated maternal glucose levels at 24-32 weeks gestation and a range of outcomes, the most significant of which were increased birth weights, elevated cord C-peptide levels and an elevated percentage of neonatal body fat. Maternal hyperglycaemia was an independent risk factor for adverse outcomes. In plain English – this study demonstrated poorer outcomes for both mother and baby at what appeared to be very mild levels of maternal hyperglycaemia – levels at which clinicians would previously have been relatively unconcerned.

The changes in the diagnostic criteria for GDM have created concern in the literature that antenatal clinics managing high risk women in pregnancy would be inundated with excess women referred with GDM, with an increase in numbers of 12-50% predicted (2,5). The literature is quite variable in this regard. One study of 3650 tests showed that GDM diagnosis was increased only by 7, from 1053 to 1060 actual tests (18). Another study of 1275 tests showed an increase of GDM diagnosis from 9.6% to 13% (5). We were interested in analysing how this new criteria have affected our own clinic numbers.
The DANCE clinic (Diabetes AnteNatal Care and Education) based at Alice Springs Hospital (ASH) started using the new GDM diagnostic guidelines in January 2014. Prior to this the South Australian testing guidelines were utilised (see Appendix 1 for comparison).

Alice Springs Hospital has a catchment area of approximately 1.5 million kilometres. This area crosses the state boundaries of South Australia and Western Australia which includes large areas of Ngaanyatjara, Pitjantjatjara and Yankunytjatjara land (see Appendix 3 for map). Our referral base is heavily weighted to remote dwelling Aboriginal women.

Our region is notable for its high Aboriginal population, its remoteness and its social disadvantage, with 74% of Aboriginal people assessed as living in the most disadvantaged quartile (20) (See Appendix 3 for comparison between states). Access to services is limited and the nearest tertiary level health facility is in Adelaide, 1 530 kilometres to the south.
THE STUDY

A retrospective audit of 794 pregnant women who delivered at the Alice Springs Hospital over a 12 month period from July 2014 to June 2015 was performed. The identifying data was sourced from the Hospital Birth Register. There were no exclusions. Ethics approval was gained (HREC 15-330).

We considered six major questions;

1. What is the percentage of women who birth at Alice Springs Hospital (ASH) with Diabetes in Pregnancy (DIP)?

2. Of the DIP population, what is the percentage of women with Hyperglycaemia first detected in Pregnancy (Gestational Diabetes Mellitus (GDM) and Diabetes Mellitus in Pregnancy (DMIP)?) and Pre-existing Diabetes Mellitus?

3. What proportion of the newly diagnosed GDM population reached diagnostic criteria because of the change in the national guidelines?

4. What proportion of the GDM population received the appropriate follow-up testing for Diabetes Mellitus in the post-partum period?

5. What is the average HbA1c of the women with pre-existing Diabetes Mellitus?

6. Are Primary Health Care Providers using the correct diagnostic tests and referring women appropriately to the Diabetes Antenatal Care and Education (DANCE) clinic?

By answering the above questions we hope to be able to develop targeted strategies to improve the care of women in Central Australia with Diabetes in Pregnancy.
RESULTS

1. What is the percentage of women who birthed at Alice Springs Hospital (ASH) with Diabetes in Pregnancy (DIP)?

2. Of the DIP population, what is the percentage of women with Hyperglycaemia first detected in Pregnancy (Gestational Diabetes Mellitus (GDM) and Diabetes Mellitus in Pregnancy (DMIP)) and Pre-existing DM?

This schematic demonstrates the categories under the umbrella term of DIP. This is in keeping with the World Health Organisation definitions of 2013 (15).

All DIP (HIP (GDM and DMIP) and PDM) accounted for 128 women or 21.5% of the appropriately tested cohort (n = 594).

Figure 1: Analysable cohort

Figure 2: Testing Outcomes n= 594
Table 1: Testing Outcomes

<table>
<thead>
<tr>
<th>DIAGNOSIS</th>
<th>NUMBERS</th>
<th>ATSI</th>
<th>% of Total 794 (% of analysed 594)</th>
<th>% REMOTE DWELLING</th>
</tr>
</thead>
<tbody>
<tr>
<td>DMIP</td>
<td>17</td>
<td>76%</td>
<td>2% (2.8%)</td>
<td>65%</td>
</tr>
<tr>
<td>GDM</td>
<td>71</td>
<td>65%</td>
<td>8.9% (11.9%)</td>
<td>39%</td>
</tr>
<tr>
<td>T2DM (PDM)</td>
<td>40</td>
<td>97.5%</td>
<td>5% (6.7%)</td>
<td>90%</td>
</tr>
<tr>
<td>Normal</td>
<td>466</td>
<td>97.5%</td>
<td>58.6% (78.4%)</td>
<td></td>
</tr>
<tr>
<td>Not tested</td>
<td>179</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Of interest is that, of the pre-existing T2DM and the DMIP groups, both representing more severely deranged glucose tolerance, the majority were remote dwelling women. 90% of the pre-existing T2DM resided in remote areas (versus in or around the Alice Springs township) and 65% of the DMIPs.

This remoteness gradient has implications regarding service delivery and the DANCE clinic structure. The clinic has a “Virtual” element where teleconferencing with remote midwives occurs regarding the patients under their care. This has been an add-on to the main work of the clinic and it has not been appreciated to date what a large part of our work it represents.

Figure 3: DIP versus Remoteness and Aboriginality

Likewise, the gradient of Aboriginality also follows the gradient towards more remoteness and the more severely glucose intolerant women. Aboriginal women are more likely to be diagnosed with pre-existing Diabetes Mellitus or Diabetes Mellitus in Pregnancy.
3. What proportion of the newly diagnosed GDM population reached diagnostic criteria because of the change in the national guidelines?

The changes in diagnostic criteria included a decrease of the fasting BGL by 0.4 mmol/L to 5.1 mmol/L, an increase of the 2-hour post-prandial BGL by 0.7 mmol/L to 8.5 mmol/L and the addition of a 1 hour level of 10 mmol/L (see Appendix 2 for criteria table). This change resulted in a net increase of 2 women diagnosed with GDM. Given the predictions in the literature we were quite surprised at this low number.

Table 2: New GDM with application of new diagnostic criteria

<table>
<thead>
<tr>
<th>GDM</th>
<th>Old criteria</th>
<th>New Criteria</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>65</td>
<td>67</td>
<td>+2</td>
</tr>
</tbody>
</table>

The GDM rate in our study was 11.9% compared to 5% nationally (11). When the DMIP rate is included in the category of HIP, it was 14.8%, or nearly 3 times as high as the national rate (National data 2005-2007). Aboriginal women accounted for 65% of the GDM rate and 76% of the DMIP rate.

4. What proportion of the GDM population is receiving the appropriate follow-up testing for Diabetes Mellitus in the post-partum period?

Only seven post-natal OGTTs were identified as having been done on previously diagnosed GDM women from our cohort. Unfortunately this data was very difficult to source and is incomplete. Data on Aboriginal women was mostly accessible via the Shared Electronic Health Record (SEHR), but non-Aboriginal women's data was generally not available.

The post-natal follow-up of women with hyperglycaemia diagnosed for the first time in pregnancy is universally poorly done and Central Australia appears to be no exception. One systematic review reports from 34% to 73% of women with GDM completed postpartum glucose screening (7). Of women recruited to the GDM Register in South Australia just over half of respondents were recorded as having had a post-partum Glucose Tolerance Test (8).

Women with GDM are at increased risk of developing Type 2 Diabetes Mellitus. This risk is estimated at between 1.5 and 10% per year. This group is also at approximately 30% risk of having GDM in a subsequent pregnancy (1).
5. How many women had pre-existing Diabetes Mellitus and what was the average HbA1c of these women?

Forty women were identified as having pre-existing Type 2 Diabetes Mellitus and there were no Type 1 DM patients in our cohort. 39 of the 40 (95%) were of Aboriginal descent with 90% of the cohort living outside of the Alice Springs Township. Thus the rate of pre-existing DM (PDM) was 5% compared to less than 1% nationally (11).

Glycaemic control in women with pre-existing Diabetes Mellitus was variable in our group. 55% of PDM had an HbA1c of 7% or less. Conversely over 40% had an HbA1c of 8% or greater. The average HbA1c was 7.89%. This is of concern given that the degree of hyperglycaemia in pregnancy is correlated to poor maternal and perinatal outcomes (6, 11,17). This audit was not an outcomes study so we cannot comment on the complication rate in our cohort or correlate glycaemic control to outcomes.

Table 3: HbA1c in PDM

<table>
<thead>
<tr>
<th>HbA1c</th>
<th>n =</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 or less</td>
<td>8</td>
</tr>
<tr>
<td>6.1 - 7</td>
<td>7</td>
</tr>
<tr>
<td>7.1 – 8</td>
<td>8</td>
</tr>
<tr>
<td>8.1-9</td>
<td>5</td>
</tr>
<tr>
<td>9.1-10</td>
<td>8</td>
</tr>
<tr>
<td>10.1-11</td>
<td>2</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>13.3</td>
<td>1</td>
</tr>
</tbody>
</table>

Figure 4: HbA1c in PDM
6. **Are primary health care providers using the correct diagnostic tests and referring women appropriately to the Diabetes Antenatal Care and Education (DANCE) clinic?**

The second part of this question is more difficult to answer in the scope of this audit, but it would seem that the referral process of women who have had an abnormal OGTT or pre-existing Diabetes Mellitus is clear and well accessed. There were 3 women identified from the cohort who met criteria for GDM but did not get referred to the DANCE clinic or were not recognised as having GDM. These were very marginal OGTT results. They had elevations of 0.2 mmol/L or less elevation of their fasting BGL.

Of more concern was the poor uptake of the early OGTT for at risk women. All Aboriginal women are considered at high risk and, in the absence of pre-existing DM, should have been screened as soon as possible after the diagnosis of pregnancy. In our cohort there were also a significant number of women from subcontinental India who are also considered at higher risk. Identification beyond Aboriginality was not available to us for this study, so we cannot comment on whether these women were offered an early OGTT or not but it appears mostly not.

Of 400 eligible Aboriginal women (excluding those with PDM) only 68 women underwent an appropriate OGTT (16 underwent 50G GCT) prior to 24 weeks of pregnancy which represents a screening rate of only 17% of a high risk group (excluding the 50G tests).

Of the remaining 316 Aboriginal women, 19 were identified as receiving limited ANC and 4 were documented as having declined the test. Although it is recognised that a woman’s behaviour of not turning up for a test can be construed as a means of declining. This issue cannot be fleshed out further due to the limitations of the data at hand. Whether the test was not offered or the pregnant women did not avail themselves of such an offer cannot be further ascertained. What is clear is that only a very small number of high risk women are undergoing appropriate testing. It is well known that the test is not popular with women, and it is recognised that the logistical issues in small remote health clinics where the midwives and nurses do the testing are considerable.

Over the whole cohort 177 women were identified as having no OGTT or GCT during their pregnancy. The table below documents the reasons for this, if any were noted.

<table>
<thead>
<tr>
<th>Reason for no OGTT</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Declined</td>
<td>23</td>
</tr>
<tr>
<td>Limited ANC</td>
<td>20</td>
</tr>
<tr>
<td>Premature birth &lt; 24 weeks</td>
<td>0</td>
</tr>
<tr>
<td>Still birth</td>
<td>5</td>
</tr>
<tr>
<td>No reason stated</td>
<td>131</td>
</tr>
</tbody>
</table>
Table 5: Timing of first OGTT and results

<table>
<thead>
<tr>
<th>Gestation</th>
<th>Number</th>
<th>GDM</th>
<th>DMIP</th>
<th>% pick-up</th>
<th>NORMAL</th>
<th>Repeated</th>
<th>Number repeated that were Positive (previous Negative)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 12w</td>
<td>21</td>
<td>3</td>
<td>1</td>
<td>19</td>
<td>17</td>
<td>13</td>
<td>4 (30%)</td>
</tr>
<tr>
<td>12-23</td>
<td>72</td>
<td>12</td>
<td>3</td>
<td>21</td>
<td>57</td>
<td>30</td>
<td>6 (20%)</td>
</tr>
<tr>
<td>24-28</td>
<td>312</td>
<td>27</td>
<td>5</td>
<td>10</td>
<td>280</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29-30</td>
<td>75</td>
<td>10</td>
<td>4</td>
<td>19</td>
<td>61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31-35</td>
<td>50</td>
<td>5</td>
<td>1</td>
<td>12</td>
<td>44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36+</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Of the 21 women undergoing first trimester screening 17 were normal and 13 were repeated later as per guidelines (76%). Of the 72 women being screened in the second trimester 57 were normal and 30 were repeated (53%). Of note is that approximately 20% of the testing in the first two trimester’s yielded positive results.

The majority of women received screening during the ideal 24-28 week of gestation. Of course this should be a second test for the high risk woman who had a normal early screen. These repeat tests also yielded 20-30% positivity.

Of concern was the number of very late OGTTs performed. The utility of screening at 38 weeks is highly questionable. The other issue, in terms of workload and patient flow, was the referral of these women with very late positive OGTT’s to the DANCE clinic. The latest referral to the DANCE clinic was at 36 weeks gestation.

This raises the question as to what is the latest gestation that an OGTT should be offered? Is it accurate beyond the 24-32 week period (the HAPO data is based on this range), and if so, is there time to intervene beyond simple lifestyle change, in a way that would be meaningful to the pregnancy outcome? Can we advise a gestational cut-off for doing the 75G OGTT and subsequent referral for specialist management?
SUMMARY - SNAPSHOT

RATES OF DIP

21.5% of the tested cohort had some form of Diabetes in Pregnancy - T2DM, GDM or DMIP. This is significantly higher than reported national levels (11).

- Pre-existing DM (all T2DM) was 5% which is 10 times as common.
- GDM was 11.9% and DMIP 2.8% which is 3 to 4 times as common.

As a proportion of the whole DIP cohort;

- T2DM represented 31%
- DMIP 13%
- GDM 56%

Combining T2DM and DMIP as the more glycaemically abnormal group represents 44% of the cohort. The relative rates of PDM are substantially higher than the NT as a whole. The NT Diabetes in Pregnancy Register (2011-2016) reports 17.5% of PDM (Type 1 and Type 2 DM) and 82.5% of GDM (21- unpublished).

IMPACT OF THE NEW GDM CRITERIA

- Negligible impact noted – 2 new GDM cases.

APPROPRIATE TESTING

- Only 17% of the high risk women received 75G OGTT early testing for DIP which is recommended by guidelines (1)
- 22% of women had no screening for DIP during their pregnancy.
- 16 women had 50G GCT tests – not recommended by the ADIPS guidelines.
- Postnatal testing – poor data availability but suggestive of serious deficit in testing.

GLYCAEMIC CONTROL OF TYPE 2 DM

- Poor - Average HbA1c was 7.89% with 40% of women having HbA1c > 8%.
HOW DO THESE RESULTS CHALLENGE OUR PRACTICE?

Central Australian health service delivery is complex. The DANCE clinic, like many other medical specialty groups, has patients across three states and resident in the remotest parts of Australia. Remoteness is added to low socioeconomic status and cross-cultural communication challenges to complicate, and enrichen, this space immeasurably.

We also have a multitude of health services involved in the care of pregnant women – the Aboriginal Community Controlled sector representing multiple stand-alone services, the Northern Territory Department of Health and private General Practitioners. The midwives providing on the ground care also come from a multitude of services and may have vast geographical areas to manage.

Further to these issues the following issues have been raised by the results of this audit:

RESOURCING

- The DANCE clinic has between 20-25% of the obstetric population in the Central Australian region “on its books”. It functions with one Midwife, one Diabetes Nurse Educator (who also has significant other responsibilities within Alice Springs Hospital), an Obstetrician for less than one working day and a Physician who shares the medical role with an Endocrine Registrar (who has only 0.5 FTE allocated to the hospital). There is no dietician and minimal administrative support.

- It is recognised that there are a myriad of other health professionals in remote communities and health services also involved in the care of these women. These health professionals also need support and time to communicate effectively with the coordinating group – the DANCE team.

- Quite simply the clinic can only provide the bare bones of a service given the current resourcing despite the strengthening evidence that this is a critical time for intervention in the life of the unborn child.

- It was noted in the introduction that glycaemic control during the perinatal period is critical to outcomes, not only of the birth and the wellbeing of the baby, but evidence is strongly suggesting that this period of metabolic plasticity is critical to the genesis of chronic disease in the adult that baby will become, through epigenetic mechanisms. Simply put – the effort to stem the epidemic of T2DM in remote Central Australia demands that this period of life is intensively resourced. Yet in Central Australia it appears easier to get funding for accommodating the increasing number of renal dialysis patients (22) than it is to get funding for preventative strategies that may prevent the requirement of that end stage service in the decades to come.

- There is a subset of women who may be considered as lower risk compared to other women in the same “high risk” clinic. These are women with GDM who are able to maintain glycaemic control to the recommended levels with lifestyle changes alone (diet and exercise). A pathway for them that minimises their attendance at the DANCE clinic while remaining under the auspices of the clinic will be pursued.
THE “VIRTUAL” DANCE CLINIC

- It was sobering to confirm the number of women with T2DM who live remotely. The “Virtual” element of the DANCE clinic has often been left to the end of the physical clinic day and yet these remote women represent the majority of those at the more severe end of glycaemic dysfunction with all the attendant risks inherent there. These women do attend the face-to-face clinic on occasion when they come to Alice Springs for routine ultrasounds and obstetric review. So it is not as if the face-to-face clinic is only for local residents. Nonetheless it has led us to re-think the way we provide service for these women and support their local midwives and clinicians.

- A teleconference session with the midwives of the Tennant Creek / Barkley region has commenced as a trial. It is undertaken on a day that is not a face-to-face clinic day so that it is not just a footnote to the days’ work.

- Means of communicating with the DANCE clinic have expanded with the utilisation of a generic email address to which remote midwives can send patients BGL records and provide and request information.

- Enhancing the service provided to very remote dwelling women with DIP will require ongoing review and innovative thinking. Given the rise in Aboriginal youth with T2DM (25) it can be expected that this need will grow further.

MULTIDISCIPLINARY EDUCATION SESSIONS

- Ways of providing educational sessions for women on their initial referral to the DANCE clinic are being investigated. The current model is that the clinic caters for both initial and ongoing clients. Obviously the educational requirement of the women on their first visit to the clinic is substantially higher than at subsequent visits. Hence the clinic flow becomes significantly blocked when one woman needs more intensive education.

- One possible model is to offer group sessions weekly on a non-clinic day that encompasses education regarding DIP, teaches the women how to monitor their blood glucose levels and the expectations around that activity, and provides lifestyle advice and education to positively influence their glucose levels. It is hoped that the DNE and a dietician could be engaged with these sessions perhaps involving the external agency Healthy Living NT (HLNT) who hold the government contract for providing such services in our region.

- The levels of appropriate testing for DIP were really quite abysmal indeed with only 17% of high risk Aboriginal women receiving appropriate testing prior to 24 weeks gestation.

- The OGTT is not an easy test. In remote clinics these tests are administered by midwives or nurses. It is logistically difficult to get a woman fasting and sitting in a remote clinic for the minimum of 2 hours required. The women do not like this test. It is an unpleasant drink and is a time consuming procedure. A stunning 22% of women had no testing for DIP at all during their pregnancy and, further to this, there were a significant number of incomplete tests, further testifying to the logistical difficulties experienced by everyone involved.

- The pattern of a fasting glucose and HbA1c measurement was a common one found in this data. I suggest this was an attempt by clinicians to get some meaningful assessment from women who may have declined, or were thought to be likely to decline, the recommended OGTT test especially in early pregnancy.

- First trimester screening for DIP is aimed at uncovering possible undiagnosed Diabetes Mellitus, in our case, Type 2 DM. An alternative to the 75G OGTT is a combination of fasting glucose and HbA1c. This strategy is recommended by the Minymaku Kutju Tjurkurpa – Women’s Business Manual (2014 edition) (24) as a second line option if an OGTT is not possible. This appears to be a safe strategy to adopt in our setting as the first line test, but would be limited due to the significant number of women who present to health services for their first antenatal visit after the first trimester. The OGTT remains the test of choice at these gestations. If negative then the woman lines up for a second OGTT. As a remote midwife has commented- “you can only get one OGTT in a pregnancy”. The implication being that the woman can only be coerced once to undergo this test.

- The utility of HbA1c in diagnosing GDM is still unclear and is unsupported by any relevant guidelines, although a recent Australian study demonstrated that a HbA1c ≤ 5.4% had a Negative Predictive Value of 91% when performed between 24 and 28 weeks gestation (23).

- In summary, given the extremely low levels of appropriate testing demonstrated in this audit and the growing prevalence of T2DM in Central Australia, screening for DIP urgently requires testing regimens that are more acceptable to health staff and pregnant women without losing diagnostic accuracy.
REFERRAL TO THE DANCE CLINIC – WHAT IS THE LATEST TIME FOR AN OGTT?

- The latest referral of a woman to the DANCE clinic with GDM was at 36 weeks gestation. Add to this another week of BGL monitoring to get a glycaemic profile then this is clearly quite late to make any but the most negligible impact on the outcome of the gestation for mother and child. The HAPO data was based on OGTT testing between 24 and 32 weeks gestation. There is no clear evidence base outside of this gestation.

- GDM testing should be done at the recommended period of 24 to 28 weeks of gestation. It would appear reasonable to extend that window up to 32 weeks if it is not possible to test at the recommended time, given that the HAPO data was based on this range.

- Referrals to the DANCE clinic after 34 weeks will likely reap little benefit for anyone. It would be preferred that these women be counselled in regard to diet and exercise and undertake some BGL monitoring in the community. They should be discussed with the DNE and Obstetrician if BGL’s are beyond accepted targets.

ONGOING QUALITY MONITORING OF THE DANCE CLINIC

- This audit highlighted many issues that were quite illuminating for the DANCE clinic staff and others who care for this cohort of women with DIP.

- Available clinical systems are not currently able to provide the DANCE clinic with the real-time data required to make informed decisions about aspects of an individual woman’s care or indeed to inform the strategic direction of the clinic. It was envisaged that a database, constructed and kept by the clinicians at the clinic, could fill this gap. After several months of use, and the capacity to continue data entry being challenged by staff leave, it was not considered feasible to continue it in its current form. It was subsequently grossly simplified to being a list with simple demographic and obstetric information only. Administrative assistance would be required to relaunch such a database in the future.

- There is a Clinical Register of Diabetes in Pregnancy in the NT (26) that initially started as an opt-in database. It is hoped that it will become an opt-out system so that it can reflect the complete picture of DIP in the NT. It is promising in regard to what it may be able to deliver at the clinical level to help with quality assurance in the future.
REFERENCES


(5) Moses, R., Morris, G.,Petocz, Fernando San Gil, P. and Garg, D. The impact of potential new diagnostic criteria on the prevalence of gestational diabetes mellitus in Australia, MJA • Volume 194 Number 7 • 4 April 2011.


(25) Azzorpardi, P., et. al., Type 2 diabetes in young Indigenous Australians in rural and remote areas: diagnosis, screening, management and prevention. MJA 197 (1) · 2 July 2012.

http://digitallibrary.health.nt.gov.au/prodjspui/bitstream/10137/517/14/Chronicle%2c%20Vol%2024%2c%20Issue%204%2c%20December%202012.pdf
APPENDIX 1

DEMOGRAPHICS

<table>
<thead>
<tr>
<th>Age</th>
<th>Number</th>
<th>% of total</th>
<th>% Aboriginal</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 – 16</td>
<td>15</td>
<td>1.8</td>
<td>100</td>
</tr>
<tr>
<td>17 - 20</td>
<td>116</td>
<td>14.6</td>
<td>90.5</td>
</tr>
<tr>
<td>21-30</td>
<td>403</td>
<td>50.7</td>
<td>58</td>
</tr>
<tr>
<td>31-40</td>
<td>249</td>
<td>31.3</td>
<td>32.1</td>
</tr>
<tr>
<td>&gt;40</td>
<td>11</td>
<td>1.3</td>
<td>36.3</td>
</tr>
</tbody>
</table>

Age Range 11-43 years

![Age Range 11-43 years](image1)

Aboriginal Vs Non-Aboriginal n= 794

![Aboriginal Vs Non-Aboriginal](image2)

Place of Residence

<table>
<thead>
<tr>
<th>Residence</th>
<th>ATSI %</th>
<th>T2DM</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS</td>
<td>429</td>
<td>26.5</td>
</tr>
<tr>
<td>Darwin/ Katherine</td>
<td>3</td>
<td>66.6</td>
</tr>
<tr>
<td>Tennant Creek</td>
<td>67</td>
<td>65.6</td>
</tr>
<tr>
<td>Interstate</td>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td>Remote</td>
<td>256</td>
<td>94.5</td>
</tr>
<tr>
<td>Remote SA</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>Remote WA</td>
<td>8</td>
<td>87.5</td>
</tr>
<tr>
<td>All Non-AS</td>
<td>365</td>
<td>36</td>
</tr>
<tr>
<td>TOTAL</td>
<td>794</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX 2

Comparison of Old Diagnostic Guidelines (SA) and new Diagnostic Guidelines (ADIPS)

<table>
<thead>
<tr>
<th></th>
<th>Old Criteria GDM</th>
<th>New Criteria GDM</th>
<th>DMIP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fasting</td>
<td>≥ 5.5 – 6.9</td>
<td>5.1-6.9</td>
<td>≥ 7</td>
</tr>
<tr>
<td>1 hour</td>
<td>≥ 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 hour</td>
<td>7.8 – 11</td>
<td>8.5-11</td>
<td>≥11.1</td>
</tr>
</tbody>
</table>
APPENDIX 3

1. Map of NPY Lands


2. Population distribution by SEIFA advantage/disadvantage quintiles, Indigenous population by state/territory and total population, 2011(20; Figure 2.09-2).