Barriers and enablers to translating gestational diabetes guidelines into practice

Shelley Ann Wilkinson1,2,3
AdvAPD, PhD, BSc (Hons), GradDipNut&Diet

Sally McCray4
APD, BSc, GradDipNut&Diet

Michael Beckmann2,5
FRANZCOG

Annette Parry6
BNurs, BMid, CDE

Harold David McIntyre2,7,8
MB BS (Hons), MD, FRACP

1 Mater Mothers’ Hospital – Nutrition & Dietetics, Brisbane, Queensland, Australia
2 Mater Research – Mothers & Babies Theme, Brisbane, Queensland, Australia
3 NHMRC TRIP Research Fellow
4 Mater Health Services – Nutrition & Dietetics, Brisbane, Queensland, Australia
5 Mater Mothers’ Hospital – Obstetrics & Gynaecology, Brisbane, Queensland, Australia
6 Diabetes Educator, Mater Mothers’ Hospital, Mater Health Services, Brisban, Queensland, Australia
7 Mater Mothers’ Hospital – Obstetric Medicine, Brisbane, Queensland, Australia
8 University of Queensland – School of Medicine, Brisbane, Queensland, Australia

Correspondence to:
Shelley Ann Wilkinson, Mater Mothers’ Hospital, Nutrition & Dietetics, Raymond Terrace, South Brisbane, Queensland 4101, Australia; email: shelley.wilkinson@mater.org.au

Received: 4 September 2013
Accepted in revised form: 25 November 2013

Abstract

Reduced insulin requirements and improved blood glucose level (BGL) control in gestational diabetes mellitus (GDM) have been documented in a study validating American Nutrition Practice Guidelines that included a dietitian appointment schedule. No Australian nutrition practice guidelines exist and care differs across centres. Guideline dissemination alone does not change practice; assessment of barriers/enablers and implementation design must be theory-driven. We describe this assessment and the planned intervention to implement a schedule of dietitian consultations for GDM care.

A barriers and enablers analysis was undertaken. Data sources included hospital records, clinic observation, and staff surveys. Dietetic visits were compared with the Nutrition Practice Guideline. Barriers were categorised into domains from the Theoretical Domains Framework.

Of 44 clinic staff surveyed, most believed regular dietetic contact could influence diet, but fewer believed contact could influence BGLs, pharmacotherapy, and care costs, and only half felt contact could influence weight gain or macrosomia. Women’s lack of awareness of the benefits of scheduled contact with a dietitian and staff’s unfamiliarity with current practice were identified. There was a significant shortfall in dietitian resources. Other barriers included lack of dedicated clinic space and exclusion from the clinic care pathway.

Identified barrier ‘domains’ were: Knowledge; Beliefs about consequences; Intentions; Social/professional role/identity; Social influences; Memory, attention, and decision processes; and Environmental context and resources. Effective change interventions have been mapped to domains. Outcomes of the evaluation will be uptake of the new dietetic schedule and its effect on requirement for pharmacotherapy. Copyright © 2014 John Wiley & Sons.

Key words

evidence–practice gap; gestational diabetes mellitus; guidelines; implementation science; medical nutrition therapy; translational research

Introduction

Gestational diabetes mellitus (GDM) occurs in 5% of Australian pregnancies1 and is defined as any degree of glucose intolerance that begins, or is first recognised, in pregnancy.2 The proportion of women with GDM is increasing with the ‘obesity epidemic’3 and potentially with new international diagnostic criteria.4 This increasing prevalence is mirrored across the world and is greater in higher risk populations.5

Poorly-controlled GDM can result in significant negative maternal outcomes, such as increased caesarean and assisted deliveries and an increased risk of permanent diabetes (type 2 diabetes mellitus, [T2DM]). Adverse infant outcomes include macrosomia, hypoglycaemia, shoulder dystocia, and birth defects.6 These outcomes have financial costs associated with hospital delivered care (e.g. instrumental deliveries, longer hospital stays, neonatal intensive care admissions) and ongoing public health costs (e.g. management of overweight/obesity, T2DM and other comorbidities). Furthermore, maternal diet and lifestyle factors affect fetal programming and hence influence longer pregnancy outcomes, including the risk of infants developing (obesity-related) chronic diseases in adulthood.7

Australian guidelines recommend a dietitian as an important member of the multidisciplinary team caring for a woman with GDM,8 and medical nutrition therapy is the primary intervention strategy for managing blood glucose levels (BGLs) in women diagnosed with GDM.9,10 Reduced insulin requirements and improved BGL control have been documented in a study validating American Dietetic Association Nutrition Practice Guidelines. In this study, women received medical nutrition therapy according to an evidence-based appointment schedule, with a minimum of a 1-hour initial counselling session and two review appointments.
Barriers and enablers to translating gestational diabetes guidelines into practice

<table>
<thead>
<tr>
<th>TDF Domain</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>An awareness of the existence of something</td>
</tr>
<tr>
<td>Skills</td>
<td>An ability or proficiency acquired through practice</td>
</tr>
<tr>
<td>Social/professional role and identity</td>
<td>A coherent set of behaviours and displayed personal qualities of an individual in a social or work setting</td>
</tr>
<tr>
<td>Beliefs about capabilities</td>
<td>Acceptance of the truth, reality or validity about an ability, talent or facility that a person can put to constructive use</td>
</tr>
<tr>
<td>Optimism</td>
<td>The confidence that things will happen for the best or that desired goals will be attained</td>
</tr>
<tr>
<td>Beliefs about consequences</td>
<td>Acceptance of the truth, reality or validity about outcomes of a behaviour in a given situation</td>
</tr>
<tr>
<td>Reinforcement</td>
<td>Increasing the probability of a response by arranging a dependent relationship, or contingency, between the response and a given stimulus</td>
</tr>
<tr>
<td>Intentions</td>
<td>A conscious decision to perform a behaviour or a resolve to act in a certain way</td>
</tr>
<tr>
<td>Goals</td>
<td>Mental representation of outcomes or end states that an individual wants to achieve</td>
</tr>
<tr>
<td>Memory, attention and decision processes</td>
<td>The ability to retain information, focus selectively on aspects of the environment and choose between two or more alternatives</td>
</tr>
<tr>
<td>Environmental context and resources</td>
<td>Any circumstance of a person’s situation or environment that discourages or encourages the development of skills and abilities, independence, social competence and adaptive behaviour</td>
</tr>
<tr>
<td>Social influences</td>
<td>Those interpersonal processes that can cause an individual to change their thoughts, feelings or behaviours</td>
</tr>
<tr>
<td>Emotion</td>
<td>A complex reaction pattern, involving experiential, behavioural and physiological elements, by which the individual attempts to deal with a personally significant matter or event</td>
</tr>
<tr>
<td>Behavioural regulation</td>
<td>Anything aimed at managing or changing objectively observed or measured actions</td>
</tr>
</tbody>
</table>

Table 1. The domains of the Theoretical Domains Framework (TDF)

with a dietician, plus a postnatal follow-up session. Further, studies have also demonstrated dietary counselling following GDM diagnosis can reduce the incidence of macrosomia and slow excessive gestational weight gain.

Systematic, evidence-based delivery of dietary care to women with GDM in Australia does not occur, this is mirrored in our hospital’s GDM service. Reasons for failure to adhere to best practice are multifactorial and include: unfamiliarity with Nutrition Practice Guidelines among relevant staff; inadequate dietary resources; and women’s lack of awareness of the benefits of regular dietary counselling.

Awareness and dissemination of guidelines alone do not change practice. The assessment of influencing factors and implementation and evaluation design must be systematic and theory-driven. An integrative framework, such as the Theoretical Domains Framework (TDF) (Table 1), has been designed as a vehicle to help apply theoretical approaches to interventions aimed at behaviour change, as well as providing an explicit framework for evaluation. The TDF aims to synthesise a multitude of coherent behaviour change theories into a single framework that allows assessment and explanation of behavioural problems and associated barriers and enablers, and inform the design of appropriately targeted interventions. The TDF, consisting of 14 ‘domains’ (see Table 1), was developed through an expert consensus process, including factor analysis and validation to identify psychological and organisational theory relevant to health practitioner clinical behaviour change. Identification of project-specific domains can be explored (prospectively) through interviews, questionnaires and observation or it can be used as a coding framework (retrospectively) for analysis of data (barriers) collated from numerous sources. Constructs exist in each domain to enable identification, classification, and refinement of these behaviour change barriers into appropriate domains at individual, team, and organisational levels. Following identification of project-relevant domains, application of evidence-based behaviour change interventions that work at individual, team or organisational level can be applied (e.g. using the Behaviour Change Wheel).

This paper describes an evidence-practice gap diagnosis which informs the implementation and evaluation of an evidence-based dietary model of care including a schedule of dietitian visits, in a tertiary hospital’s setting.
We outline the systematic approach taken to identify barriers and enablers, the design and the implementation of this model of care, and the planned evaluation.

Methods

We followed the outline recommended by French et al. that involved four steps to assess influencing factors and design of implementation strategies in a translational research project. These steps are:

1. Who needs to do what, differently?
2. Using a theoretical framework, which barriers and enablers need to be addressed?
3. Which intervention components (behaviour change techniques) and modes of delivery could overcome the modifiable barriers and enhance the enablers?
4. How can behaviour change be measured and understood?

The TDF guided the categorisation of identified barriers at individual, team and organisational levels. Constructions within each of the domains were used to assist with identification, classification, and refinement of these issues into appropriate domains. Data sources included: routinely collected hospital data; staff surveys; clinic observation and team discussion; and evidence from the literature and relevant reports.

Routinely collected hospital data.

Data from women accessing the Mater Mothers’ Hospital (MMH) GDM clinics were obtained from the MMH electronic database (‘Mater Matrix’) from the years 2009–2011. Mater Matrix data are entered prospectively during a 90-minute maternity booking history conducted by a midwife. Data are again updated following any hospital admission, including hospital admission for labour and birth. Descriptive information about service usage, demographic, pregnancy and delivery information related to GDM care were extracted and tabulated. Dietetic intervention (number of women seen, number of appointments, number of review appointments) was extracted by the allied health database. Team Allied Health Data Information System (TAHDIS) and double checked against department paper-based activity documentation. Number and schedule (new/review/postnatal) of dietetic visits were compared against the American Nutrition Practice Guidelines schedule of visits.

Staff surveys. Baseline staff surveys were conducted during the first three months of the project and pre-implementation phase. Pen-and-paper surveys were distributed for completion during established clinical meetings by profession-specific clinical champions. The multidisciplinary GDM clinic staff (n=44) were surveyed about: knowledge of current nutrition practice within the service including current number of visits, booking processes; recommended nutrition practice as per American Dietetic Association Nutrition Practice Guidelines; and belief in the influence of dietetic counselling on outcomes (lifestyle, care, medical-related outcomes).

Clinic observation and team discussion during the first three months of the project planning and pre-implementation were guided by the National Institute of Clinical Studies barriers and enablers tool (worksheets with discussion prompts for data gathering), supported by relevant texts to guide engaging staff in this process. This involved the first author (SW) meeting with nominated clinical champions from each profession (midwifery, obstetrics, obstetric medicine, diabetes education, and dietetics) and key senior GDM clinic professionals (obstetric medicine, diabetes educator and dietetics), and reviewing the worksheet questions in relation to the clinic operations. During the same three months, women attending the hospital were consulted: (i) in the GDM clinic (following appointments; in the first three months); and (ii) in other nutrition services (e.g. antenatal classes) during that time. Questions were guided by a script that asked what women knew about GDM, when they did (or would like to) find out about GDM, the format they would prefer this to take, and any other information they would like. Answers were recorded (written) by the dietitian running the clinic or group.

We identified barriers and enablers, the design and implementation strategies in a translational research project. These were:

Routinely collected data. Drawing from the Mater Matrix database over 2009–11 (Table 2), the number of women attending the MMH for GDM care was between 175–219 per year. Approximately one-fifth of women required insulin, oral hypoglycaemic agents use was minimal, and approximately three-quarters of women received dietary advice for blood glucose control.

Inadequate dietitian resources to enable all GDM women to be reviewed according to Nutrition Practice Guidelines were identified. Although there was an increase by 20–25% in the proportion of women with GDM seen by the MMH dietitian for a new or one-review appointment, care provided over 2009–2011 did not meet the minimum recommendations as outlined in the American Dietetic Association Nutrition Practice Guidelines (Table 3). Of women diagnosed with GDM, the dietitian saw 70.8%, 94.7%, and 92.5% for an initial consult (2009, 2010 and 2011 respectively) and few had a review appointment (<1%, 5.6%, and 5.3%).

Staff surveys. Forty-four clinic staff were surveyed (obstetric medicine n=6 [85.7% of professional group], obstetrician/gynaecologists n=16
[51.6%], midwifery n=20 [47.6%], diabetes educator n=1 [100%], and nutrition and dietetics n=1 [100%]).

The staff’s knowledge of Nutrition Practice Guidelines, current actual number of visits and how women accessed a dietitian was measured. Most staff believed regular dietary contact could influence diet, but fewer believed contact could influence BGLs, pharmacotherapy requirements, and care costs, and only about half felt dietary contact could influence gestational weight gain or macrosomia (Figures 1 and 2).

**Clinic observation.** Women’s lack of awareness of the benefits of scheduled contact with a dietitian was identified, as well as preferred time to engage and inform them (before OGTT test and at first GDM clinic visit). Barriers other than insufficient dietary resources included lack of dedicated clinic space, lack of appointment scheduling system and process for nutrition & dietetics, and absence of the dietitian from the clinical care pathway that outlines the multidisciplinary best practice schedule of visits.

**Literature and local audits.** Insights about GDM care identified in the literature and via broader audits were reviewed and combined with the survey and clinic observation findings.12,13,23,24

**Barrier and enabler identification and TDF domain mapping.** Identified barriers to implementation of the Nutrition Practice Guidelines schedule of visits and the groupings of the barriers into the TDF ‘domains’ are collated in Table 4. Identified barriers have been grouped into the theoretical domains of: Knowledge; Beliefs about consequences; Intentions; Social/professional role and identity; Environmental context and resources; and Memory, attention and decision processes.

**Enablers,** identified through clinic observation and team discussion, include a strong clinician–consumer relationship, project funding for dietician clinic time, a positive research and audit culture of the organisation, managers and clinical experts on the project team and statewide GDM guidelines steering committee, and a TRIP fellowship to lead and inform the translation process.

**Discussion**
We described an evidence-practice gap diagnosis which informs an intervention to implement and evaluate a dietician model of care that includes an evidence-based schedule of visits to see a dietitian, in a tertiary hospital GDM clinic. The identified barriers and enablers to adoption of the Nutrition Practice Guidelines model of care have been sorted into domains which will allow mapping of evidence-based interventions to be incorporated into a wider project for evaluation of their effectiveness,17,18,22 outlined in Table 4.

Our findings reflect the minimal literature (Australian or otherwise) about delivery of best practice GDM care, primarily as our team has contributed to this evidence base in collaboration with other centres.12,13,24 Interestingly, there is little published literature about implementation and evaluation of best practice GDM nutrition care. Most literature focuses on efficacy trials of interventions for GDM rather than the implementation of these interventions (and factors that influence their adoption).

The project will have two study intervention populations in which outcomes will be assessed: women diagnosed with GDM at the MMH and staff working in the MMH GDM clinics. To evaluate the effectiveness of the intervention strategies, this project will employ a pre-post study design, evaluating outcomes of interest prior to and following implementation of the GDM Nutrition Practice Guidelines. The project consists of pre-implementation and implementation phases which will be approximately nine months each. Scalability and sustainability of the project will also be considered over the implementation phase, and key learnings and resources developed during this project will be considered when planning local and broader implementation and sustainability strategies.

**Women with GDM.** Women will be engaged in the project through their attendance at the MMH GDM clinics. As this is a pre-post study design, women attending the clinic in the pre-implementation phase will receive dietician care according to current practice (new visit and ad-hoc reviews). Women attending the MMH GDM clinic in the implementation phase

<table>
<thead>
<tr>
<th></th>
<th>2009 n (%)</th>
<th>2010 n (%)</th>
<th>2011 n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MMH women with GDM</strong></td>
<td>219 (100)</td>
<td>187 (100)</td>
<td>173 (100)</td>
</tr>
<tr>
<td><strong>MMH women with GDM</strong> seen by dietitian</td>
<td>155 (70.8)</td>
<td>177 (94.7)</td>
<td>160 (92.5)</td>
</tr>
<tr>
<td><strong>GDM treatment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulin</td>
<td>57 (26) n/a</td>
<td>50 (26.7)</td>
<td>38 (20.7)</td>
</tr>
<tr>
<td>Oral hypoglycaemic agents</td>
<td>162 (74.7)</td>
<td>137 (73.3)</td>
<td>131 (75.7)</td>
</tr>
</tbody>
</table>

Table 2. Characteristics of women with GDM who have attended the Mater Mothers’ Hospital (MMH) during years 2009–2011; from the Mater Matrix database

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No. of women with GDM at MMH</strong></td>
<td>219</td>
<td>187</td>
<td>173</td>
</tr>
<tr>
<td><strong>% of women who have a ‘first’ visit with a dietitian</strong></td>
<td>70.8%</td>
<td>94.7%</td>
<td>92.5%</td>
</tr>
<tr>
<td><strong>% of women who have 1, 2 or 3 dietician ‘review’ visits</strong></td>
<td>&lt;1%, 0, 0</td>
<td>5.6%, 0, 0</td>
<td>5.3%, 0, 0</td>
</tr>
</tbody>
</table>

Table 3. Comparison of number of women seen by dietitian: current Mater Mothers’ Hospital (MMH) practice vs American Dietetic Association Nutrition Practice Guidelines schedule of visits
will receive best practice dietetic care following the GDM Nutrition Practice Guideline schedule of visits. Women will be offered one new visit, a minimum of two review appointments and a six-week postnatal appointment with the MMH dietitian. Each scheduled visit will provide evidence-based medical nutrition therapy content suitable for the Australian context. Dietary advice will be individualised and will follow current Australian nutrition advice for pregnancy,\(^\text{25,26}\) adapting requirements to manage BGLs,\(^\text{11}\) and will utilise existing, peer-developed and peer-reviewed GDM education material.\(^\text{27}\) This includes general education about the inclusion of low glycaemic index foods in daily meals. Accompanying the post-implementation visit will be written material outlining the ‘new’ appointment schedule and the benefits – this document’s content, delivery and format will be informed through consumer engagement, as indicated in Table 4. Women’s dietary intake, physical activity levels and satisfaction with the service will be assessed using valid and reliable measures.\(^\text{28–30}\)

**MMH GDM staff.** Clinic staff will include dietitians, diabetes educators, obstetricians, endocrinologists, and midwives. Staff will be engaged (in separate professional groups, as well as mixed groups) through clinical meetings, presentations and educational sessions. The format and
Barriers and enablers to translating gestational diabetes guidelines into practice

<table>
<thead>
<tr>
<th>Identified barriers (step 2 of 4 in French et al.’s process)</th>
<th>TDF (Domain)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of staff awareness of GDM Nutrition Practice Guidelines</td>
<td>Knowledge</td>
</tr>
<tr>
<td>Lack of staff ‘belief’ in benefits of seeing a dietitian for GDM/benefits of ongoing dietetic support/importance of dietary modification</td>
<td>Beliefs about consequences</td>
</tr>
<tr>
<td>Lack of staff ‘belief’ in benefits of seeing a dietitian for GDM/benefits of ongoing dietetic support/importance of dietary modification</td>
<td>Intentions</td>
</tr>
<tr>
<td>Lack of dietitian in clinics</td>
<td>Social/professional role/identity</td>
</tr>
<tr>
<td>Lack of a room in clinics across the week</td>
<td>Social influences</td>
</tr>
<tr>
<td>Dietitian not integrated into clinics beyond initial visit</td>
<td>Memory, attention, decision processes</td>
</tr>
<tr>
<td>Women’s lack of awareness of benefits of ongoing support and contact with a dietitian following GDM diagnosis</td>
<td>Environmental context and resources</td>
</tr>
</tbody>
</table>

Table 4. Barriers classified according to the Theoretical Domains Framework (TDF) and evidence-based interventions to facilitate guideline implementation

content of these sessions will be informed by the baseline staff survey and initial staff engagement meetings, and promoted through engagement of leaders of specific clinical groups within the clinic.

The primary process outcome will be uptake of the new dietetic model of care, as measured by adherence to Nutrition Practice Guidelines appointment schedule. The secondary process outcomes will be: (i) clinician knowledge, (ii) clinician acceptance, and (iii) clinician awareness of the GDM Nutrition Practice Guidelines. The primary clinical outcome will be the effect of the Nutrition Practice Guidelines schedule on requirement for pharmacotherapy. The secondary clinical outcomes will be the effect of the new Nutrition Practice Guidelines schedule on: diet quality, macronutrient and micronutrient profiles; physical activity levels; and birth weight. We will also collect data on mode of delivery and common perinatal complications; however, the project will not be sufficiently powered to detect changes in these secondary outcomes. We will also examine (potential) costs savings of less medication use, fewer specialist appointments, and fewer special care nursery admissions vs increased costs of supporting ongoing use of the Nutrition Practice Guidelines appointment schedule.

We will be able to detect a significant difference in insulin initiation in our samples, based on the sample (n=120/group) in the validation of the American Dietetic Association Nutrition Practice Guidelines study. In this study, Reader et al. demonstrated a significant difference in insulin initiation with n=215 (intervention: 24.6% vs usual care 31.7%). Most outcome measures outlined above are routinely collected and will be available from the Mater Matrix and the allied health database (TAHDIS). Extra measures are being collected during patient consultations or staff engagement. Staff measures are being collected through pen-and-paper surveys and extra patient measures (diet, physical activity and patient satisfaction) are being collected during dietetic consultations at ~26–28 and 36 weeks of pregnancy. Any significant differences in outcome measures collected pre- and post-implementation will be determined with appropriate statistical analyses.

Health services significance and conclusion

The importance of the translation of an evidence-based dietetic model of care for women with GDM is underpinned by short- and long-term personal, clinical and public health implications of non-adoptions of Nutrition Practice Guidelines. The number of women diagnosed with GDM may also increase dramatically in the near future following the HAPO (Hyperglycaemia and Adverse Pregnancy Outcomes) study findings. This large, multi-centre trial was able to determine the linear association between maternal BGLs and adverse outcome measures and through data modelling determined the new diagnostic criteria. This study’s outcomes have informed the revision of diagnostic criteria released by the International Association of Diabetes and Pregnancy Study Groups, recently adopted by the Australasian Diabetes in Pregnancy Society. Using these criteria, the percentage of women with GDM attending the MMH may increase to 12.5% (unpublished data, Mater Matrix), with similar dramatic increases and workload impacts to be expected across the country.

No Australian GDM Nutrition Practice Guidelines exist and no systematic delivery of dietetic care to women with GDM occurs in Australia, including in our hospital. Reasons for non-adherence to best practice are multifactorial and have been identified through a systematic, evidence-based approach. Effective implementation strategies to overcome identified barriers have been mapped onto the respective barriers and will be evaluated pre/post implementation. This project will add Australian data to the evidence base around GDM health care delivery, as well as increase understanding of the implementation science methodology, particularly through the support of the TRIP fellowship. Both will inform ongoing service delivery planning for improved maternal and infant health outcomes for Queensland (and Australian) women. It will also provide leverage and evidence for statewide dissemination and adoption and implementation of the dietetic model of care.

Declaration of interests

There are no conflicts of interest declared.

References

References are available online at www.practicaldiabetes.com.
Barriers and enablers to translating gestational diabetes guidelines into practice

References
24. Dietitians and Nutritionists Strategic Coalition. Current models of care for nutrition services for adults living with type 2 diabetes mellitus and women with gestational diabetes in Queensland. Edited by DSNC Q; 2010. [Professional state network report. Copy available, if required, from corresponding author, SA Wilkinson; email: shelley.wilkinson@mater.org.au.]