STUDY PROTOCOL

PROTOCOL TITLE:
Comparison of conventional face-to-face dietary education with online self-learning for women with GDM – a pilot study

PROTOCOL NUMBER:
iSelf-Learn V.2.0

PROTOCOL VERSION: Version 2.0
PROTOCOL DATE: 10.02.2021

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PROTOCOL SIGNATURE PAGE

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Sponsor Name: Singapore National Medical Research Council (NMRC)- Integrated Platform for Research in Advancing Metabolic Health Outcomes of Women and Children (IPRAMHO) Centre Grant (NMRC CGAug16C008)

Declaration of Investigator

I confirm that I have read the above-mentioned protocol and its attachments. I agree to conduct the described trial in compliance with all stipulations of the protocol, regulations and ICH E6 Guideline for Good Clinical Practice (GCP)

Principal Investigator Name: Han Wee Meng

Principal Investigator Signature: _____

Date: 01.08.2020

1. BACKGROUND AND RATIONALE

Background

GDM is a significant health issue amongst women, with a pooled prevalence of 11.5% in Asia [1]. Universal screening for GDM for pregnant women between 24 and 28 weeks of gestation was introduced in Singapore since January 2018, which allows for greater detection of GDM compared to targeted screening based on risk factors. It is known that GDM is associated with complications to both the mother and child, of which there is a greatly increased risk of later development into Type 2 Diabetes. Uncontrolled glyacaemia during pregnancy is consistently associated with later risk of Type 2 Diabetes. A recent qualitative study in Scotland reported that the women with GDM did not regard the condition as important, with some women even doubting if the diagnosis was accurate or real [2], which is not incommonly observed in local context. Such perceptions may be due to the lack of education and limited understanding of the condition. As a consequence, the uptake and engagement in interventions can become compromised and become a barrier to behaviour change.

Medical nutrition therapy is established to be the first-line treatment for GDM. The main goal is to support maternal and foetal nutrition in order to ensure adequate pregnancy weight gain and foetal growth, while at the same time, maintaining euglycaemia. there is moderate evidence that dietary interventions can improve pregnancy outcome. In our hospital, all women diagnosed with GDM are currently advised to attend a 1- day educational programme in the Obstetric Day Care Centre (ODAC), where they will undergo supervised meals and blood glucose monitoring, and receive group education on the dietary management of GDM. however, the reported attendance rate of ODAC for the period between September 2016 and September 2017 was 76% with the following reasons cited for non-attendance: childcare issues, work commitments, financial difficulties, patient's low perception of necessity [3]. Women who do not attend or decline ODAC appointment will be referred to the dietetics clinic.

Recent data on the overall attendance for dietary education after diagnosis was collected for 4 weeks (April to May 2019). Out of 102 women booked into the ODAC, 82% attended the day programme. The remainder 18% were referred to one-to-one dietary counselling at our dietetics clinic and all of them defaulted the appointment. Additionally, women with GDM require frequent monitoring and follow-up to help with the short-term diet and lifestyle changes they need to make. The attendance of such follow-up appointments was 58%. Failure to attend diabetes-related appointment was associated with poorer glycaemic control by 36 weeks and a higher risk of macrosomia. Reasons for non-attendance can be complex, which may be related to the women's perceived value of the services, clinic set-up, women's level of understanding of their condition and how it affects foetal well-being [5]. Knowledge of the perceived risk may be helpful to identify and modify perceptions, which can be useful in guiding appropriate interventions to motivate the women to adopt risk-reducing behaviours.

Strategies such as reconfiguring the clinic set-up, putting in more childcare facilities to create a child-friendly environment, enabling flexible appointments, to facilitate attendance and/ or provide the important education may be necessary. However, these would likely demand greater resources. Studies using telehealth systems have emerged and shown the potential to be effective

and not inferior to traditional clinic visits. We conducted a readiness survey amongst GDM patients referred for nutrition counselling between October and December 2018. They were invited to participate in an online anonymous survey on four key aspects of readiness: availability of technology, confidence in technology, attitudes towards telehealth and interest in telehealth. results were positive and showed that confidence in using technology was high (median score 1.88, range 0-2). Perceived advantages were high (median score 3, range 0-4), while perceived advantages were moderate (median score 2, range 0-4). Participants were moderately interested in using telehealth (median score 1, range 0-2). Smartphone (90.5%), internet access (77.4%) and email (73.8%) were the three most commonly available modes of tehcnology. Sociodemographics did not seem to affect readiness for telehealth.

2. HYPOTHESIS AND OBJECTIVES

Long term Aim:
Our study aims to assess if telesupport-telehealth alternative strategies will work in our local context. The rationale behind this project is to design a sustainable mode of education delivery to bring care beyond hospital to home.

Primary Objectives

1. To determine the feasibility and acceptability of using telehealth in the care of women with GDM by providing a self-learning alternative via an online portal to a one-to-one dietary education, conducted face-to-face in a dietitian clinic.

2. To trial the use of the new care model to reach out to a higher proportion compared to the conventional model (Service utilization), as determined by the completion of the online self-learning, comparing it to attendance rates with the conventional model.

3. To use the new care model to provide care that would be comparable to those who in the traditional outpatient clinic setting, as measured by the glycaemic and pregnancy outcomes, as well as patient satisfaction and patient experience.

3. EXPECTED RISKS AND BENEFITS

We anticipate that participants will experience both direct and indirect benefits if they participate in the study. The study provides an alternative mode of delivery of dietary education and monitoring/ feedback to patients, which is intended to create convenience compared to the traditional mode, thereby increasing the change of patients receiving the care/ education necessary for the management of their condition. There may also be a potential for patients to be more active in their care and hence, will develop a greater understanding of their condition. The indirect benefit would be establishing a new care model that will demonstrate feasibility and acceptability, which will help to guide the delivery of service and future care model.

In terms of risk, there may be an increased increased number of contact points for patients

with the additional communications requires resulting in risk of having to spend more time addressing their healthcare needs or possibly inducing heightened levels of distress. The study design has tried to make the number of visits comparable to the standard care. Due to the number of questionnaires, they may feel questionnaire fatigue, however the questionnaires are spread out at the different visits. There may also be potential risks from disclosures associated with transmitting or storing of blood glucose report, which will be mitigated by only one study team member accessing the reports and password-protecting them for the dietitian to retrieve.

There will be minimal risks to the foetus, as the management of the condition of Gestational Diabetes Mellitus will be in accordance to the standard practice care guidelines.

4. STUDY POPULATION

4.1. List the number and nature of subjects to be enrolled.

50 women, aged between 21 and 51 years of age, with singleton pregnancy, diagnosed with Gestational Diabetes Mellitus will be enrolled.

4.2. Criteria for Recruitment and Recruitment Process

Potential participants will be informed of the study by a study brochure given out to them by their doctor, nurse or clinic assistant in the clinic when an oral glucose tolerance test is being ordered. Those who are diagnosed with GDM will be referred by the primary care provider to the study team. They will be assessed for eligibility to participate in the study by the study team members who are assigned by the PI. They will be contacted by phone by the Clinical Research Coordinator (CRC) or diet tech to inform of their eligibility to participate in the study and to arrange to meet at their upcoming doctor's appointment or meet via video consultation to further explain about the study details and take written consent. They will be given ample time to think and ask questions about the study before informed consent will be taken. Participation in this study will provide benefit to the pregnant women, who might otherwise not receive any dietary education due to a variety of personal and circumstantial reasons. There will be no difference to the care of the pregnant women if she declines to participate.

Participants have the right to withdraw at any point from the study without penalty. The delivering of routine clinical care will not be affected, should participants decide to withdraw from the study. If voluntary withdrawal occurs, the collected data will not be removed from the study.

4.3. Inclusion Criteria

Participants would be recruited based on the following inclusion and exclusion criteria.

Inclusion Criteria:

- Women aged above 21 years of age
- Singleton pregnancy
- Women diagnosed with GDM before 32 weeks
- Women willing and have provided written consent to participate
- Women with ability to use telemedicine services after briefed, have sufficient communication abilities (written, listening and spoken) to be fully involved
- Women with access to phone and internet
- Women willing to download and send blood glucose readings to research team

4.4. Exclusion Criteria

- Multiple pregnancies
- Gestational age 35 weeks and above
- Women with existing Type 1 or Type 2 Diabetes or OGTT results suggestive of preexisting Diabetes defined as fasting blood glucose of ≥7.0 or 2 h ≥11.1 mmol/L
- Women receiving oral steroid therapy
- Women with evidence of fetal complications (such as fetal anomalies, intrauterine growth retardation) and known history of pregnancy complications (e.g. pre-eclampsia)

5. STUDY DESIGN AND PROCEDURES/METHODOLOGY

Eligible women diagnosed with GDM before 32 weeks of gestation who declined ODAC will be recruited to participate in the study. Patients who have been successfully recruited will be randomized to either the intervention group (telehealth) or the control group (standard). The clinical research coordinator (CRC) and/ or diet tech will receive the list of patients from ODAC (who have a positive result for GDM) and contact these patients via phone call to arrange for a Zoom meeting for study recruitment and consent-taking. Randomization of consented patients will be performed using open-labelled, non-stratified method in blocks of 5 participants. During the recruitment (conducted via Zoom), the CRC or diet tech will issue a glucometer (Abbott Optium Neo) and test strips, which will be sponsored by the study. The CRC or diet tech will make arrangement for the glucometer and test strips to be couriered to the patients (intervention group) or to be collected by the patients at the hospital (control group). The patients will keep the glucometer and any remaining test strips/ lancets after completion of the study. The patient will be taught how to test her blood glucose level and the glycaemic targets. The patient will also be asked to complete a 24-hour diet history recall and a preeducation knowledge survey.

Patient data will be collected: age, nationality, education level, employment status, family history, personal history (including history of GDM), obstetric history, anthropometry (pre-

pregnancy and current). In order to assess the feasibility of telehealth, information on transport cost to visit the hospital, cost of taking time-off from employment will also be collected from the patients.

Intervention group

The dietary education self-learning module will be uploaded on an online portal (Singhealth Health Buddy app). The enhancement to the Health Buddy app to design this component to facilitate the study is currently in discussion. The patient will be directed to download the Health Buddy app, if she does not already have it. She will be instructed on the use of the app and how to access the module. The Health Buddy app is an existing secured online platform, however the GDM self-learning module will be custom built for this study to be trialed in the selected group of patients.

Patients will have to complete an online dietary education module within 72 hours (3 days), with pre- and post-test assessment to assess the effectiveness of the education. Completion of the module will be tracked by the completion of the post-test assessment, patient experience and usability of telehealth surveys posted immediately after the module. The patient experience survey that will be used will be the existing hospital survey. Patients will be asked to answer the relevant questions (Q1-7, Q37-42). The questions where counter staff is mentioned will be changed to the CRC or diet tech for the intervention group. The telehealth usability questionnaire will cover all factors on the usability, which includes usefulness, ease of use, effectiveness, reliability and satisfaction. These questionnaires will be in the app and once completed, patients will be prompted to email them to the study team, via the app. The diet tech will monitor the completion of the assessments and surveys. She will send reminders after 3 days if the patient has not completed the surveys.

For the blood glucose monitoring, patients will be encouraged to also use the Health Buddy app to record their blood glucose profile and subsequently email to the dietitian via the app. This will allow the service providers to be able to view their blood glucose profile. Failing to do so, the CRC or diet tech will contact the patients and arrange to meet at their doctor's visit, when the CRC or diet tech will meet the patients and download their profile to a study laptop. The profile will be saved using the patient study ID in the local drive of the study laptop, which will only be used in the hospital premise. If the patient uses the app to store her data, the data will be stored in her own personal device that is used to log in to the app. As the Health Buddy is secured with personal ID, only the patient will have access to the data she stores in the online portal. No other data will be collected from the online portal.

The dietitian will contact the patients between 2 and 4 weeks after the first online education has been completed, at a previously selected preferred timing during office hours (9am to 5.30pm). The telehealth consult can only take place after the blood glucose profile from the patients have been received. The first telehealth consult will be scheduled to last up to 20minutes and subsequent follow-up calls, 10 minutes. The first telehealth consult will be to establish dietary compliance and where necessary, do a 24-hour dietary recall. The dietitian will discuss about the glucose profile and address any difficulties or clarifications that may be

raised. Subsequently, the dietitian will follow up with patients on a monthly basis, more frequently if the blood glucose profile is suboptimal. The diet tech will help to review the blood glucose profile (based on an algorithm set by the dietitian) and schedule patients who will need a close review with the dietitian (by sending a SMS to the patient).

Between 34 and 38 weeks' gestation, patients will be informed to complete another dietary module on postnatal nutrition and education on type 2 Diabetes. Again, the completion of the module will be tracked by their completion of the survey.

Control group
Women will be given an appointment to attend a dietary counselling session with a dietitian. The patient will have completed a 24-hour diet history recall and a pre-education knowledge survey at the time of randomization. The session will take about 45minutes and will cover the same dietary education as per the online module. They will be required to complete a patient experience survey and a post-education knowledge survey at the end of the session. Subsequently, they will also be scheduled to attend a face-to-face outpatient follow-up appointment with the dietitan every 2 to 4 weeks to review their blood glucose profile, weight and diet. During the final review between 34 and 38 weeks gestation, patient will be educated on postnatal nutrition and type 2 Diabetes.

For consistency, all women will receive structured dietary advice, standardized healthy eating information for pregnancy and a standardized meal plan. They will be asked to monitor their blood glucose profile seven times a day on at least one day a week (three readings before meals, i.e. fasting before breakfast, before lunch and before dinner and three readings at 2 hours post-meals after breakfast, lunch and dinner and one reading before bedtime) until delivery of their baby. Birth outcome data will be collected after the patient has delivered. These include birth weight to assess for large-for-gestational age bay, type of delivery (normal vaginal delivery or caesarean section), incidence of neonatal hypoglycaemia defined as 3.0mmol/L) and the total maternal weight gain will also be collected from the electronic medical records.

The following is a summary of the procedures involved in each group:
Intervention group

- Complete 2 modules of self-learning dietary education - (1) antenatal nutrition and GDM before 30 weeks gestation, (2) post-natal nutrition 34-38 weeks gestation
- At least once a week of 7-point self-monitoring of blood glucose profile until delivery of baby
- Regular communication through email with research team of blood glucose profile
- Telephone consultations every 2-4 weeks
- Complete patient experience and knowledge surveys

Control group

- Attend dietitian appointment, lasting 1-hour, at the hospital
- At least once a week of 7-point self-monitoring of blood glucose profile
- Attend face-to-face consultation at the hospital every 2 to 4 weeks
- Complete patient experience and knowledge surveys

Study visit schedule

Visit no.	Intervention group	Control group
Visit 0 (recruitment)	Zoom meeting (15minutes) for recruitment, followed by e-consent taking Online self-learning at home (up to 60minutes)	Zoom meeting (15minutes) for recruitment, followed by e-consent taking
Visit 1 (week 1)	Telehealth consult (30minutes)	Face-to-face dietary counselling (45-60minutes)
Visit 2 (week 3-5)	Telehealth consult (30minutes)	Face-to-face dietary counselling (30minutes)
Visit 3 (week 7-9)	Telehealth consult (30minutes)	Face-to-face dietary counselling (30minutes)
Final visit (week 10-12)	Telehealth consult (30minutes) + online self-learning (up to 30minutes)	Face-to-face dietary counselling (30minutes)

6. SAFETY MEASUREMENTS

6.1. Risks of Participation

As mentioned in section 3, three potential risks were identified namely, a) increased contact time/ heightened anxiety related to their healthcare needs; b) questionnaire fatigue; and c) risks from disclosures associated with storing of blood glucose report.

6.2. Complaint Handling

Participants with complaints will be encouraged to discuss these initially with a member of the study team. All complaints will be taken seriously and will be discussed during the regular team meetings. Participants will also be made aware of the SingHealth Centralised Institutional Review Board contact details, if they have concerns about the study and wished to speak to someone independent from the study team.

7. DATA ANALYSIS

7.1. Data Quality Assurance

The data will be evaluated for completeness and accuracy by all the study team members who are involved in data analysis assigned by the PI. Data validation function is used in the database to ensure data entry accuracy.

7.2. Data Entry and Storage

The questionnaires will be collected digitally via a secure server approved by the institution and in compliance with the PDPA Act (e.g. FormSG). This will minimize contact during administration as much as possible, and be environmentally-friendly.

All digital data are encrypted and stored securely within the institution's shared drive with a password-key known only to study team members involved in the data analysis, as appointed by the PI.

All participants are assigned a unique code and the identification key to the codes is separately stored in the password-protected file on the shared drive. Access to the identification key is only limited to the study coordinator.

8. SAMPLE SIZE AND STATISTICAL METHODS

8.1. Determination of Sample Size

As an exploratory pilot randomized control trial, a sample size has been set at 50 participants, based pragmatically on our available resources and time constraints.

8.2. Statistical and Analytical Plans

Primary outcome measure will be:

- Completion/ attendance rates

Secondary outcome measures will be:

- Feasibility (Time and cost savings)
- Patient experience ratings (using questions from hospital feedback form)
- Blood glucose profile - number of episodes out of range (based on pre-meals 4.4-5.5, post-meals 5.5-6.6)
- Birth outcome data (birth weight to assess for large-for-gestational age bay, type of delivery (normal vaginal delivery or caesarean section)
- Incidence of neonatal hypoglycaemia defined as 1.9mmol/L or 2.8mmol/L)
- Total maternal weight gain)
- Pre- and post-education knowledge survey

SPSS will be used to perform statistical analysis. Summary univariate analysis will be used to describe the demographics of the study population and to compare between groups. Categorical variables will be summarized using frequencies/ percentages and comparisons between groups will be analyzed using Chi-Square statistics or Fisher's Exact test. Assuming Gaussian distribution, continuous variables will be reported as mean with standard deviations. T-test will be used to determine whether the differences between groups reached statistical significance. Median with interquartile range will be reported for the non-normally distributed variables and the non-parametric equivalent test was used.

The primary analysis will compare the completion/ attendance rates between the two groups, using chi-square test. Paired samples t-test will be used to analyze the pre- and post-education assessment scores to determine the effectiveness of the education.

9. DIRECT ACCESS TO SOURCE DATA/DOCUMENTS

KKH will permit study-related monitoring, audits and/or IRB review and regulatory inspection(s), providing direct access to source data/document as required.

10. QUALITY CONTROL AND QUALITY ASSURANCE

The data will be evaluated for completeness and accuracy by all the study team members who are involved in data analysis assigned by the PI. Data validation function is used in the database to ensure data entry accuracy. All participants will be assigned a unique identifier code which will allow the monitoring of the completeness of the dataset.

11. ETHICAL CONSIDERATIONS

This study will be conducted in accordance with the ethical principles that have their origin in the Declaration of Helsinki and that are consistent with the Good Clinical Practice and the applicable regulatory requirements.

This study protocol, including the Patient Information and Informed Consent Form, must be approved in writing by the Centralised Institutional Review Board (CIRB), prior to enrolment of any patient into the study.

The principal investigator is responsible for informing the CIRB of any amendments to the protocol or other study-related documents, as per local requirement.

11.1. Informed Consent

Informed consent will be obtained from all participants. Patients will be contacted by phone by the CRC or diet tech to inform of the study and to arrange for a Zoom meeting. The consent form will be sent to the patient via email, together with details of the Zoom meeting. The place chosen for the consent process will not inconvenience the patient or require the patient to make a special arrangement. Patient will be informed of the study via the phone first, followed by an email. She would be given time to consider before the actual written consent will be taken.

The consent process will take place via Zoom meeting by the CRC or Diet tech. Electronic signatures may be obtained with a simple electronic signatures in Adobe Sign (in Adobe Reader) or other similar platforms. For example, a stylus or finger drawn signature and a typed name. The consent will be returned via email to the study team.

11.2. Confidentiality of Data and Patient Records

All data will be anonymised and a code list will be kept to identify participants in order to enable monitoring of the data-set. Only the CRC, diet tech and the PI will have access to participant identification details. Co-Investigators will have access to the anonymised data. All databases will be password protected. The key to the participant identifier will be saved in a separate data-base and password protected. Only the PI and those authorized by the PI will have access to this information.

12. RETENTION OF STUDY DOCUMENTS

Study documents will be stored in a locked cupboard in Dietetics office (KKH Level 2) with controlled card access for 7 years after the completion of the project. Following 7 years the documents will be destroyed.