GDm-Health

Oxford University Hospitals NHS Trust

Acceptability of a novel smartphone assisted blood glucose monitoring system for women with gestational diabetes

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Background

Gestational Diabetes Mellitus (GDM) is defined as the new onset or recognition of glucose intolerance in pregnancy. Evidence supports tight blood glucose regulation to prevent adverse maternal and fetal outcomes. Finger-prick, home blood glucose (BG) monitoring remains the most common method of monitoring diabetes control in pregnancy. With changes to GDM screening criteria and socio-demographic changes, the number of women with GDM is predicted to rise in the UK.

In response to the increasing clinical demand for GDM services, a novel, real time, smartphone based BG monitoring system was developed in collaboration with the Oxford University Institute of Biomedical Engineering (figure 1 and 2). This application enabled transmission of labelled BG results to a secure website within the NHS, allowing the diabetes care team to monitor results and provide diet and/or treatment advice between hospital appointments by SMS or phone call as required.

Aim

To assess in pregnant women the acceptability and satisfaction of using a remote smartphone BG monitoring system as part of their clinical care for gestational diabetes.

Results

From June 2012 until August 2013, 106 women with GDM were screened for eligibility to participate in this service improvement project. Of 59 eligible women, 52 women agreed to participate. Of these 48 continued using the GDm-health system until delivery (92%) with 17610 blood glucose results transmitted. 49 women completed the satisfaction questionnaire.

14 women rated all nine questions with the most positive rating of '+3 (strongly agree). There were no questions scored by any women as -3 (strongly disagree) or -2 (disagree).

1. Overall satisfaction

Overall scores indicated that women were satisfied with the care they received. Comments were in agreement with these scores, with women stating they felt very well supported and were happy with their diabetes management.

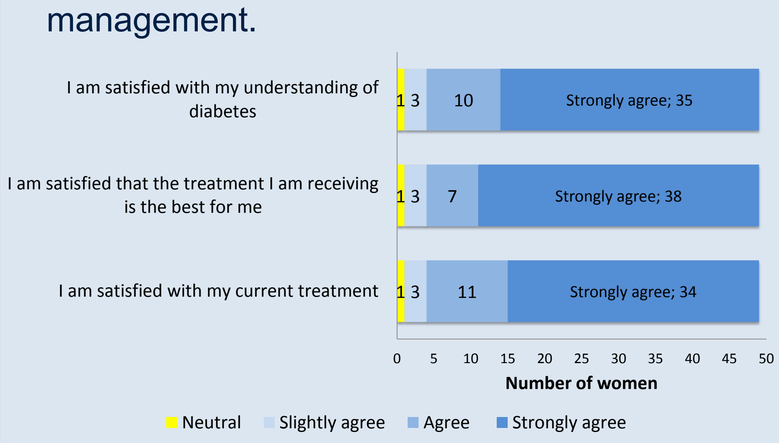
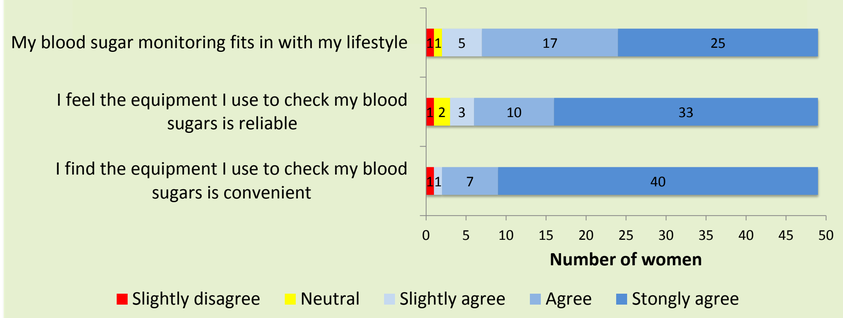


Figure 1: The GDm-Health remote blood glucose monitoring system

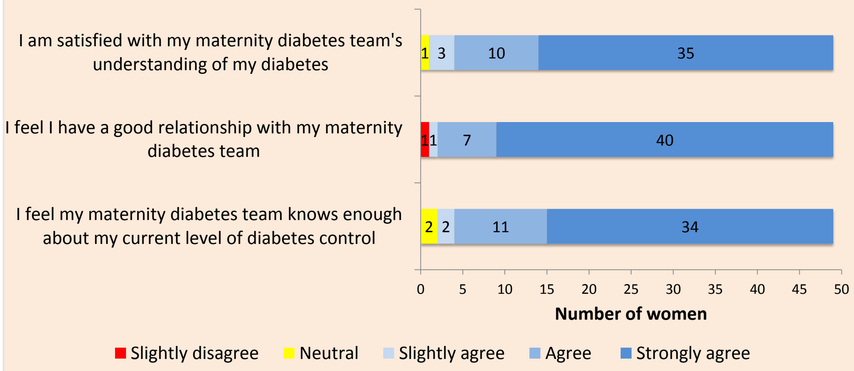
2. Attitudes towards the technology

Women scored the technology highly for convenience and reliability. In the comments a small number of women noted problems with lack of 3G coverage where they lived, resulting in delayed transmission of results. One woman discontinued using the system for this reason.



3. Attitudes towards the diabetes team

The majority of women reported they agreed or strongly agreed that they had a positive relationship with the diabetes team and felt the team had a good understanding of their condition.



TREAT Trial of Remote Evaluation and Treatment GDM

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Methods

Participants and setting: A service development study was conducted within the maternity diabetes service, NHS Oxford University Hospitals Trust. The screening policy for GDM was in line with the 2008 NICE recommendations for Diabetes in Pregnancy.

Women with GDM not requiring immediate pharmacological treatment and who could communicate in English were approached to participate in a service development project. The clinical results of BG monitoring are presented elsewhere.

Satisfaction with using the system and their care was assessed through a structured short questionnaire completed by women after the birth of their baby and discharge from hospital. The questionnaire comprised nine questions selected to assess general satisfaction with diabetes care, acceptability and reliability of the technology, and relationship with the maternity diabetes care team. All questions were scored by the women on a 7-point Likert scale ranging from -3 (strongly disagree) to +3 (strongly agree). Women were encouraged to provide free text responses to support their responses to the questions.

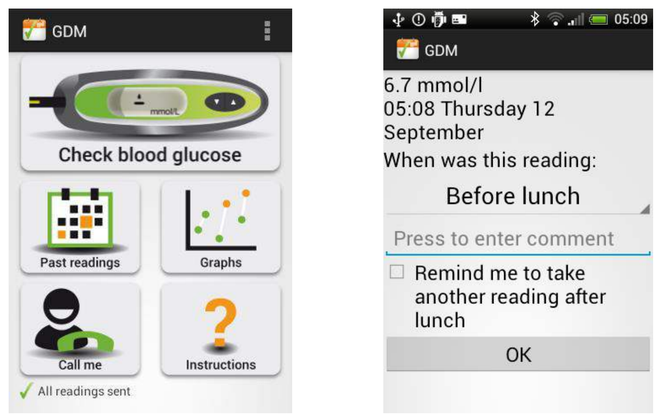

Figure 2: Screen shots from the smartphone application as seen by women

Conclusions

This service improvement project has demonstrated that remote blood glucose monitoring using GDm-health is acceptable and convenient for women.

Integrating smartphone applications into antenatal care packages for GDM has the potential to streamline service delivery and promote patient satisfaction with care. Robust clinical, economic and satisfaction evaluations of different solutions are needed before they can be supported as an alternative to weekly or fortnightly outpatient clinic visits to monitor BG levels. In order to address these issues we are currently conducting a RCT (TREAT-GDm, clinicaltrials.gov NCT01916694).

Research addressing scalability, sustainability and data security using smartphones with different operating platforms must needs to be addressed. The challenge is evaluating all of these issues in the rapidly-changing area of mobile technology.