GDm-Health

Feasibility of a smartphone assisted system for treatment advice and medication adjustment

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Introduction

Increasing diagnoses of gestational diabetes mellitus (GDM) are challenging maternity diabetes services [1]. We have developed a smartphone assisted blood glucose (BG) monitoring system (GDm-Health) aiming to reduce clinic visits for well-controlled women.

Aim

To determine whether treatment delivered with the GDm-Health system can prevent hyperglycaemia in women with de novo diagnosed (nGDM) and previous pregnancy GDM (pGDM).

Methods

Women screened in their current pregnancy for GDM as per NICE 2008 [2] and diagnosed as per IADPSG [3] guidelines, and those diagnosed with GDM in a previous pregnancy, were approached to participate in a service improvement project. Six-point BG profiles were monitored and one-week blood glucose means were analysed at recruitment and before delivery.

Results

We recruited 52 women with GDM, of whom 45 had otherwise uncomplicated pregnancies and used the system until delivery. There were 28 nGDM (mean (SD) gestation at recruitment 30 (3) weeks; at delivery 38 (1) weeks) and 17 pGDM (18 (6) weeks; 39 (1) weeks).

At recruitment, none of the women were receiving any form of glucose-lowering treatment. Treatments at delivery are summarised in table 1.

Blood glucose profiles

The aim of glucose lowering treatment was to maintain blood glucose levels between 4 and 6 mmol.l^{-1} at all times, as specified in the local hospital guidelines.

BG means (SD) at recruitment and delivery were 6.2 (0.7) and 5.8 (0.7) mmol.l^{-1} ($p < 0.001$) in nGDM, and 5.5 (0.7) and 5.4 (0.7) mmol.l^{-1} ($p = 0.56$) in pGDM. Fig. 3 shows the mean blood glucose in each group over the course of pregnancy.

Fig. 1: Schematic of the GDm-Health system

Table 1: Prescribed treatments at delivery. Note that the percentages add up to more than 100%, because some women received more than one treatment.

Prescribed treatment at delivery	nGDM (N = 28)	pGDM (N = 17)
Diet only	21 %	24 %
Metformin	43 %	47 %
Mealtime insulin	57 %	41 %
Background insulin	29 %	12 %

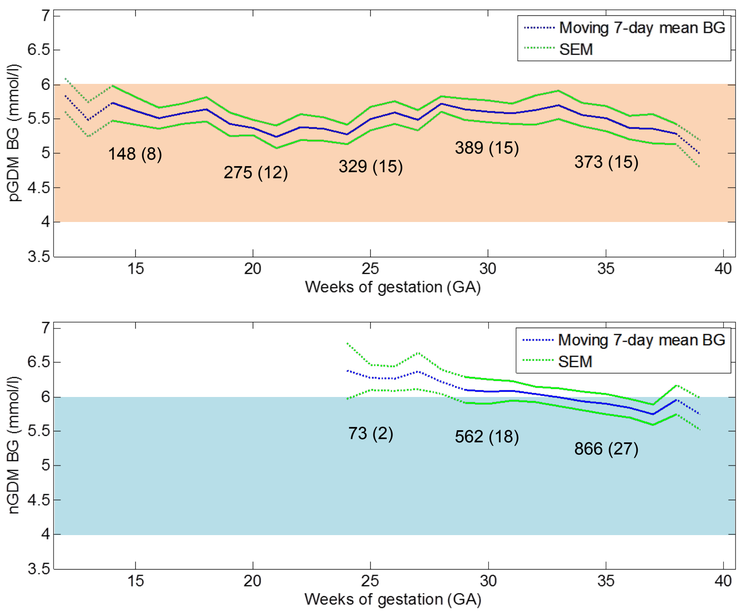

Fig. 3: One-week moving average of each group's mean blood glucose ± standard error of mean (SEM). pGDM group (top); nGDM group (bottom). The numbers displayed at every 5-week point indicate the number of BG (number of women) included in calculating the average at these points in time. Dotted lines are used where the number of women is less than N/2.

Participants

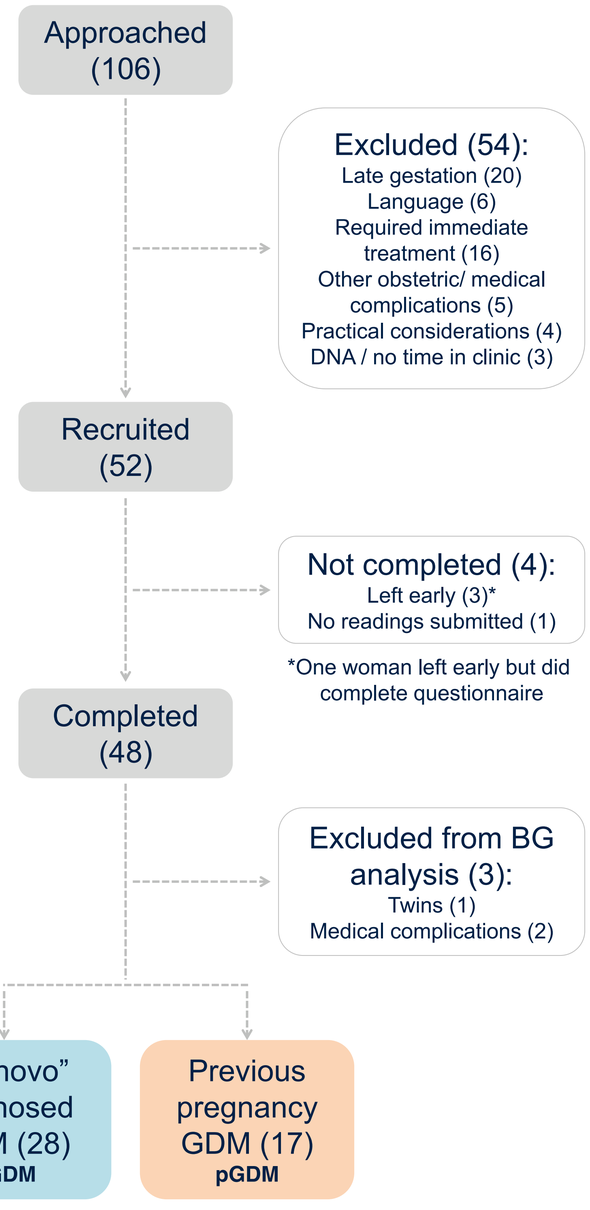

Fig. 2: Participants in the service improvement project.

Conclusion

The use of smartphone assisted monitoring with GDM-Health was associated with improved blood glucose control in the nGDM-group. Women in the pGDM-group who used the system did not develop hyperglycaemia.

Effects on clinical and economic outcomes are currently under investigation at the NHS Oxford University Hospitals Trust in a randomised controlled trial (NCT01916694, http://clinicaltrials.gov).

TREAT Trial of Remote Evaluation and Treatment GDM

References:
[1] Whitelaw & Gayle. *Obstetrics, Gynaecology and Reproductive Medicine*; 21:2:41-46
[2] NICE. http://guidance.nice.org.uk/nicemedia/live/11946/41319/41319.doc; July 2008.
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