



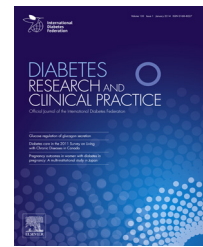
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Diabetes Research
and Clinical Practice

journal homepage: www.elsevier.com/locate/diabres



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Review

Telemedicine interventions for gestational diabetes mellitus: A systematic review and meta-analysis

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ARTICLE INFO

Article history:

Received 23 February 2015

Received in revised form

9 July 2015

Accepted 24 July 2015

Available online xxx

Keywords:

Gestational diabetes

Telemedicine

Telehealth

Glycaemic control

Self-monitoring

ABSTRACT

Objective: To evaluate the effect of telemedicine on GDM service and maternal, and foetal outcomes.

Methods: A systematic review and meta-analysis of randomised controlled trials (RCT) of telemedicine interventions for GDM was conducted. We searched English publications from 01/01/1990 to 31/08/2013, with further new publication tracking to June 2015 on MEDLINE, EMBASE, PUBMED, CINAHL, the Cochrane Central Register of Controlled Trials and the World Health Organization International Clinical Trials Registry electronic databases. Findings are presented as standardised mean difference (SMD) and odds ratios (OR) or narrative and quantitative description of findings where meta-analysis was not possible. **Results:** Our search yielded 721 abstracts. Four met the inclusion criteria; two publications arose from the same study, resulting in three studies for review. All studies compared telemedicine to usual care. Telemedicine was associated with significantly fewer unscheduled GDM clinic visits, SMD. Quality of life, glycaemic control (HbA1c, pre and postprandial blood glucose level (BGL)), and caesarean section rate were similar between the telemedicine and usual care groups. None of the studies evaluated costs.

Conclusions: Telemedicine has the potential to streamline GDM service utilisation without compromising maternal and foetal outcomes. Its advantage may lie in the convenience of reducing face-to-face and unscheduled consultations. Studies are limited and more trials that include cost evaluation are required.

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<http://dx.doi.org/10.1016/j.diabres.2015.07.007>

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1. Introduction

The prevalence of Gestational Diabetes Mellitus (GDM) is estimated between 2% and 16% of all pregnancies [1]. The diagnosis of GDM typically occurs in week 24–28 of pregnancy, when routine oral glucose tolerance test (OGTT) screening is performed [1,2]. Based on GDM management guidelines and recommendations, a ‘step-up’ approach is suggested to control hyperglycaemia [3,4]. First line intervention involves dietary modification and physical activity [5–7] or an oral hypoglycaemic agent (OHA) [5]. In approximately half of cases, GDM is managed using insulin [2,5], which requires intensive monitoring and regular insulin adjustment [2]. The additional demand placed on pregnant women beyond regular pre-natal care may lead to missed appointments and sub-optimal GDM management [4–6].

Suboptimal GDM control is associated with serious perinatal and neonatal complications including babies that are large for gestational age (LGA), greater chance for caesarean delivery, brachial plexus injury in the baby, preeclampsia, and gestational hypertension [4,5,8]. Nearly 50% of women with GDM develop type 2 diabetes within 8 years of delivery [9]. Furthermore, results of a systematic review and meta-analysis of associations between GDM and type 2 diabetes showed women with GDM had approximately 7.5 fold risk of developing type 2 diabetes compared to women with normoglycaemia during pregnancy [10].

Sustainable and innovative models of care that improve patient outcomes with minimal burden and disruptions on the patient are critical [11]. Fineberg argues that the key elements of sustainability are affordability for patients, healthcare service and government and acceptability by all stakeholders [12]. High cost and inefficient systems of care can be barriers to sustainability [12] of otherwise innovative health care provision. Hence cost benefits and/or savings are integral to sustainability of care.

Telemedicine refers to the use of information and communication technologies (ICT) to bridge the distance gap in the pursuit of sharing health information and delivering health care [13]. Interest in telemedicine is increasing as a potentially innovative and sustainable intervention approach to GDM management. Information

sharing may occur between healthcare professionals or between healthcare professionals and patients. A distinction is often made between telemedicine (service delivery by doctors) and telehealth (service delivery by any healthcare professional) [14]. The World Health Organization (WHO) [14] has adopted an interchangeable use of telemedicine and telehealth. Another common term is telemonitoring in which patients remotely monitor their condition, relay data to their healthcare professionals for evaluation and feedback/action [13,15,16]. For the purpose of this review we adopted the broad definition of telemedicine/telehealth, including telemonitoring.

Systematic appraisals of telemedicine have been conducted for various diseases and population groups [15–19]. However we have not identified any reviews that specifically or exclusively appraised the use of telemedicine in GDM. Jana and Pare [16] reviewed the use of telemedicine in type 1 and 2 diabetes and reported “...significant reduction in HbA1c and complications, good receptiveness by patients and patient empowerment and education.” Other systematic reviews of telemedicine or telemonitoring have reported mixed results. A review of telemedicine in chronic disease management generally reported similar outcomes between telemedicine and controls [15] while reviews of the use of telemedicine in asthma (where it may reduce exacerbations and hospitalisation [17]) and in smoking cessation (where higher quit rates were found in favour of mobile phone-based interventions [18]) have been positive.

Few studies of telemedicine include cost assessment. In 2002, only 9% of telemedicine studies reportedly included cost evaluations and the results were generally inconclusive [19]. Nevertheless net cost savings have been reported in favour of telemedicine, largely attributed to avoided travel-associated costs [20,21].

Despite the lack of systematic reviews of telemedicine in GDM, one quasi-controlled study that looked at telemedicine in managing diabetes in a mixed group of pregnant women with type 1 diabetes or GDM, showed acceptance levels of 85% and usage (weekly transmission of data) was 76% [22]. With mixed results in terms of effectiveness and costs, and yet rapid growth of telemedicine we conducted a systematic review of the literature and meta-analysis to examine the effect of telemedicine for GDM on glycaemic control, mother and infant

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