

The challenges in developing a dedicated pre-pregnancy clinic

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Introduction

Planning for a pregnancy is important for all women, which encompasses several elements such as advice on smoking cessation, alcohol consumption, healthy eating, folic acid supplements and contraception. For women with diabetes, this need to plan has even greater importance. There is the additional importance of optimising their glycaemic control and assessing for the presence of the complications of diabetes prior to pregnancy. In an effort to prevent early pregnancy loss and congenital malformations in infants, optimal medical care, patient education and training must begin before conception. This is best accomplished through a multidisciplinary team approach. Ultimately, however, the woman with diabetes must become the most active member of the team.¹ As well as coping with the normal emotional and physiological diversity of pregnancy, the intensity of the management of diabetes is increased during this time.² Coping with intensive treatment to achieve good glycaemic control for pregnancy is difficult and motivation is an important factor in the long-term success of the regimen.³ However, the reality of unplanned pregnancy remains a challenge to all.

Summary

It has been well established that sub-optimal glycaemic control at conception and during early pregnancy is associated with increased fetal loss and congenital abnormalities in the infants of women with established diabetes. There is compelling evidence demonstrating that if these women improve their glycaemic control prior to and during early pregnancy, the rate of these abnormalities can be reduced.

We undertook a survey of women attending a general diabetes service – in which only half of the women of reproductive age reported receiving advice specific to pre-pregnancy care. Following this, a dedicated pre-pregnancy clinic was established.

Attendance at this clinic has resulted in women attending the maternity services at an earlier gestation and with better glycaemic control than those who did not attend for pre-pregnancy care. Despite the availability of this care, the number of women availing themselves of it remains less than half of those attending the maternity service.

The challenge now is how to inform all women of reproductive age with diabetes about the importance of obtaining this care, and how to encourage attendance for pre-pregnancy care.

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Key words

diabetes mellitus; pre-pregnancy care; pre-pregnancy clinic; education

Diabetes and pregnancy

Despite significant advances in diabetes management, and particularly its management during pregnancy, major congenital malformations remain the leading cause of mortality and serious morbidity in the infants of women with established diabetes mellitus.^{3–6} There is an abundance of evidence indicating that sub-optimal glycaemic control during early pregnancy is correlated with the increased likelihood of birth defects in these infants.^{7–9}

Specifically, hyperglycaemia during the period of organogenesis – which is during the first eight weeks post-conception – can have a teratogenic effect. More often, these malformations occur before the woman realises that she is pregnant.¹⁰

For women with diabetes it is essential that specialist care commences before pregnancy in order to reduce the rate of these anomalies.^{11–14}

Glycaemic control and congenital malformations

For many years it was noted that women with diabetes had poorer pregnancy outcomes; however, it was not until the 1980s and early 1990s that several studies examined the relationship of pre-pregnancy care in women with diabetes mellitus and the development of congenital malformations.^{12,13}

These studies demonstrated the direct correlation between glycaemic control and the incidence of congenital anomalies and spontaneous abortion rates. It was evident that women with booking glycosylated haemoglobin (HbA_{1c}) levels near the non-diabetes range had near-normal congenital malformation rates, while those well above the normal range had progressively higher rates. As the HbA_{1c} is a four- to six-week retrospective review of glycaemic control, the association between blood glucose levels during organogenesis and congenital malformations

is compelling.^{13,15,16} Subsequent studies proved that, with intensification of glycaemic control prior to conception and during the early weeks of pregnancy, congenital anomalies and spontaneous abortions rates could be significantly reduced.^{9,12,14,17,18}

These studies highlighted the importance of pre-pregnancy care for women with diabetes. The objectives of this care include an assessment of the individual's fitness for pregnancy with particular emphasis being given to the presence of the microvascular complications. Planned pregnancies are encouraged and contraception advice provided. Underpinning the objectives of this care is the desire to achieve optimal glycaemic control before conception, and to obtain maximum cooperation from the women with diabetes and their partners. Nevertheless, the reality of unplanned pregnancy remains a challenge.

In 1998, Holing *et al.* explored why women with diabetes do not plan their pregnancies. Interview data were used to compare women with planned and unplanned pregnancies under various topics. Within this study the greatest difference was that women with planned pregnancies were far more likely than women with unplanned pregnancies to understand the specific association between high blood glucose levels and birth defects (83% versus 30%).¹⁹

It could be argued that the issue of pre-pregnancy care has shifted somewhat. As almost half of all pregnancies remain unplanned, the challenge for the health care profession has shifted from what needs to be done, to, instead, how to inform all women of reproductive age with diabetes of the benefit of pre-pregnancy care, how to ensure the availability

Variable	Yes Frequency (%)	No Frequency (%)	Not sure Frequency (%)
Diabetes education	118 (83.1)	15 (10.6)	9 (6.3)
Diet	133 (93.7)	5 (3.5)	4 (2.8)
Exercise	101 (71.1)	29 (20.4)	12 (8.5)
Foot care	129 (90.8)	11 (7.7)	2 (1.4)
Pre-pregnancy care	70 (49.3)	65 (45.8)	6 (4.2)

Table 1. Reported advice received (142 participants)

of this care and, importantly, how to encourage attendance for pre-pregnancy care.

Women's knowledge of pre-pregnancy care

Being cognisant of this challenge, a survey was conducted in recent years to assess the knowledge of women of reproductive age who were attending a diabetes service in a large urban teaching hospital in Ireland, and who at that time did not have a dedicated pre-pregnancy service. However, the hospital had a close working relationship with the maternity services, with dedicated combined diabetes obstetric clinics in existence for over three decades.

The purpose of this study was to investigate the knowledge of women with type 1 diabetes mellitus, who were attending the general diabetes service, about their understanding of the condition and their self-management practices, and also their knowledge of and attitudes towards pre-pregnancy care.

A *Diabetes Pre-Pregnancy Care* questionnaire was posted to 200 women with type 1 diabetes. This questionnaire was adapted from the Diabetes Care Profile which was developed and tested by the Michigan Diabetes Research and Training Centre.²⁰ A total of 155 questionnaires were returned of

which 92% (n=142) were included in the analysis, as the remainder were either partially completed (n=5) or returned blank, indicating the recipient's intention not to participate in the survey (n=8).

Study participants were asked to indicate if they recalled receiving information or advice from their diabetes nurse in relation to a number of topics relevant to diabetes care. For the majority of these questions, the respondents indicated that they had received such information. The exception to this was in relation to pre-pregnancy care for which less than half recalled receiving such information, as outlined in Table 1.

When specifically questioned about advice received if they were to plan a pregnancy, most respondents reported that they were advised to keep their blood glucose level in good control (70%, n=98). However, less than a quarter (21%, n=30) of the respondents recalled receiving advice about the need for renal screening and 33% (n=46) recalled receiving advice about eye screening prior to planning a pregnancy.

Only half of the respondents recalled receiving advice about the general issues related to pregnancy planning; namely, smoking cessation, alcohol consumption and folic acid supplementation (Table 2).

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Pre-pregnancy clinic

As a result of this survey, a dedicated pre-pregnancy clinic was established within the general diabetes service.

The purpose of this clinic is to assist women with established diabetes to achieve optimal glycaemic control, to treat any diabetes or other medical conditions, and to ensure that the women attending are in the best possible general health prior to pregnancy. The over-arching aim is to encourage planned pregnancies.

Those attending are discouraged from smoking and excessive alcohol consumption during the pre-pregnancy period, and folic acid supplementation (5mg daily) is advocated. Weight management is also addressed, as maternal pre-pregnancy obesity has been independently associated with adverse pregnancy outcomes.²¹ Patient education in self-management of diabetes is a fundamental aspect to this care, as these skills are essential to obtain and maintain glycaemic control and ultimately prepare for pregnancy.

This clinic was established prior to national guidance on pre-pregnancy care. In 2010, national guidelines were published for the management of diabetes from pre-conception to the post-natal period. These guidelines outline the specific targets for care, and also advocate that the possibility of pregnancy should be identified by direct questioning at each diabetes consultation in all women of childbearing age with diabetes.²²

Glycaemic control

Women attending for pre-pregnancy care are reviewed regularly. Their diabetes management and control are assessed and alterations to treatment are made as necessary to achieve the pre-pregnancy targets.

Variable	Yes Frequency (%)	No Frequency (%)	Not sure Frequency (%)
Stop smoking	66 (47.1)	61 (43.6)	13 (9.3)
Avoid or reduce alcohol	70 (49.6)	58 (41.1)	13 (9.2)
Take folic acid supplements	65 (46.8)	56 (40.3)	18 (12.9)
Control of blood glucose	98 (69.5)	34 (24.1)	9 (6.4)
Have a kidney test	30 (21.4)	90 (64.3)	20 (14.3)
Have an eye test	46 (32.9)	78 (55.7)	16 (11.4)

Table 2. Reported pre-pregnancy advice received

Attendees are requested to test their capillary blood glucose levels at least seven times per day, before and 1 hour after all meals, as well as pre-bedtime. They aim to achieve pre-meal glucose of 5.0mmol/L or less, and 1-hour post-meal values of less than 7.0mmol/L.²² HbA_{1c} levels are monitored regularly and women are advised to avoid trying to conceive until they have reached target, ideally for three months. Intensive insulin regimens are utilised to achieve these targets, often with complex regimens used. When necessary, continuous subcutaneous insulin infusions (CSII) are commenced.

Diabetes complications

Much of the focus of pre-pregnancy care relates to fetal anomalies, but consideration should also be given to the woman with diabetes in relation to screening for complications. Of particular importance are the microvascular changes associated with diabetes. All women should have retinal screening. The aim is to identify the presence of retinopathy and, if necessary, to treat it in order to avoid rapid progression of retinal

disease during pregnancy that could lead to permanent deterioration or blindness.

Screening for the presence of nephropathy is also advocated, as it has been associated with increased maternal and perinatal morbidity.²³ The prevalence of pre-term deliveries is considerably increased in women with microalbuminuria, predominantly due to pre-eclampsia. The albumin excretion level in conjunction with metabolic control at the time of conception is a predictor of this.²² In the presence of overt diabetic nephropathy, and particularly if serum creatinine levels are abnormally high, there is an increased risk of permanent deterioration in maternal renal function, poorer obstetric outcomes and congenital malformations in the infants of these women.^{24,25}

Consideration should also be given to the macrovascular complications of diabetes as these are associated with increased maternal mortality and morbidity. Specialist care is required for these women, particularly those with ischaemic heart disease.

The pre-pregnancy clinic facilitates an assessment and stabilisation of diabetes complications to

minimise the risk to the mother during pregnancy. Occasionally, women may be advised against proceeding to plan a pregnancy, a decision that is never taken lightly and is always guided by the intention of avoiding permanent deterioration to the woman's health.

Type 2 diabetes

The increasing prevalence of type 2 diabetes is well recognised. Pregnancy planning for women with type 2 diabetes poses its own challenges. Women in this group tend to be older and more likely to be overweight. Many have experienced a pregnancy prior to developing diabetes and may not appreciate the significance of pregnancy planning now that they have diabetes.

Pregnancy complicated by type 2 diabetes should be considered high risk as the rates of spontaneous abortions and congenital malformations are significantly higher than those seen with type 1 diabetes.²⁶ These women should be referred for specialist diabetes care with access to a pre-pregnancy service.

Referral to the pre-pregnancy clinic

Initially, this clinic was limited to the women attending the diabetes service within the hospital. However, referrals from several other large academic hospitals within the city are now made directly to this specialist service.

Assisted reproduction

The incidence of people requiring treatment for infertility has increased.²⁷ Ideally, all women with diabetes who are planning to undergo investigations or treatment for infertility should be referred for pre-pregnancy care prior to commencing treatment. This care should continue until pregnancy has been achieved.

Clinic outcomes

Three large maternity hospitals, each with a weekly combined diabetes obstetric clinic, provide care within this area. General diabetes care is provided by five academic hospitals in addition to several other peripheral hospitals.

Attendance at the pre-pregnancy clinic has resulted in women attending the maternity services at an earlier gestational age and with better glycaemic control than those who did not attend for this care.

Collectively, over a two-year period, of 168 women with type 1 diabetes attending the maternity service, 42 (25%) had attended the pre-pregnancy clinic. Those who attended were older, with a mean age of 33.5 years versus 30.8 years. They had also had diabetes for an average of two years longer than those who did not attend. However, the infants' birth weights were similar in both groups. These women attended the maternity services at an earlier gestational age (6.1 versus 7.5 weeks) and had better glycaemic control (6.5% versus 7.3% [48mmol/mol versus 56mmol/mol]) than those who did not attend for pre-pregnancy care.

Of the women with type 2 diabetes during this timeframe, 64 attended the maternity services of whom 10 (15.6%) attended the pre-pregnancy clinic. Again, attendees were older and had had diabetes for a longer duration.

Within this group, the mean HbA_{1c} was 6.1% (43mmol/mol) for those who attended versus 6.9% (52mmol/mol) for those who did not. Attendance at the pre-pregnancy clinic also resulted in an earlier booking at the maternity services of 5.7 versus 8.5 weeks' gestation. Similar to the women with type 1 diabetes, the infant birth weights were comparable between groups.

These results are positive for those who attended for pre-pregnancy care; however, promoting attendance for pregnancy planning remains a challenge.

Conclusion

Sub-optimal glycaemic control at conception and during early pregnancy has been strongly correlated with increased fetal loss and congenital abnormalities in infants of women with established diabetes. It has been demonstrated that, if these women improve their glycaemic control prior to and during early pregnancy, the rate of these abnormalities can be reduced.

A survey of women attending a general diabetes service highlighted that only half of the women of reproductive age reported receiving advice specific to this care.

This survey resulted in the establishment of a dedicated pre-pregnancy clinic. Attendance at this clinic has resulted in women attending the maternity services at an earlier gestation and with better glycaemic control than those who did not attend for pre-pregnancy care. Overall, however, the percentage of women availing themselves of this care remains disappointingly low.

The challenges now are how to inform all women of reproductive age with diabetes about the importance of obtaining specialist care prior to becoming pregnant, and how to encourage attendance for this care.

Declaration of interests

There are no conflicts of interest declared.

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