

Diabetes and pregnancy

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ABSTRACT The recent CEMACH report provides important information on outcomes and processes of care for pregnancy complicated by pre-gestational diabetes in England, Wales and Northern Ireland. Similar information for Scotland was published previously by the Scottish Diabetes in Pregnancy Study Group. The Confidential Enquiry into Maternal and Child Health found that maternal diabetes was associated with increased rates of stillbirth (4.7-fold), perinatal mortality (3.8-fold), and congenital anomaly (2-fold), compared to pregnancy not complicated by diabetes. Assessment of rates of pre-pregnancy counselling (documented in 34.5%), measurement of HbA1c in early pregnancy (38%) and pre-conception folic acid supplementation (39.2%), suggest areas where service development might be concentrated to improve outcomes. Finally, CEMACH provides the first large-scale survey of an increasingly prevalent patient group – women with type 2 diabetes in pregnancy – who made up 27.2% of the survey and showed similar adverse outcomes to the women with type 1 diabetes.

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INTRODUCTION

The last 40 years have seen dramatic improvements in outcomes of pregnancy for women with diabetes. In the 1950s and 1960s, perinatal mortality in babies born to mothers with type 1 diabetes was as high as 25–30%. While this has fallen markedly, rates of congenital malformation and perinatal mortality remain above those of the background population. The recent CEMACH report into pregnancy in women with type 1 and type 2 diabetes has generated media attention.¹ It examined outcomes of pregnancy complicated by pre-gestational diabetes in England, Wales and Northern Ireland, as well as a range of measures of the process of care. Similar information is available from the Scottish Programme for Clinical Effectiveness in Reproductive Health, particularly their joint surveys of the management of type 1 diabetes during pregnancy with the Scottish Diabetes in Pregnancy Study Group carried out in 1998/1999² and 2002/2003.³

MAIN FINDINGS OF CEMACH

The CEMACH conducted an extensive descriptive survey assessing standards of care and outcomes of pregnancy. They captured data on all women with pre-gestational diabetes delivering in England, Wales and Northern Ireland in the calendar year from 1 March 2002.

The main findings were:

- 1 An increased rate of stillbirth, perinatal mortality and congenital anomalies in pregnancies complicated by diabetes, compared to pregnancies not complicated by diabetes. Combining data for mothers with type 1 and type 2 diabetes, the rate of stillbirth was 4.7 times the background population rate at 26.8 per 1,000 total births (19.8–33.8, 95% confidence intervals). The perinatal mortality rate was increased 3.8-fold (31.8 per 1,000 (24.2–39.4)), while the rate of congenital anomalies was 41.8 per 1,000 – around twice the background rate, with the majority being malformations of either heart or nervous system.
- 2 The CEMACH report is the first large survey of the outcomes of pregnancy complicated by type 2 diabetes. The rate of type 2 diabetes in pregnancy appears to be rising, and represented 27.2% of pregnancies complicated by diabetes in the study. While this may in part reflect familiar secular trends in diabetes and obesity, the risk of type 2 diabetes in pregnancy also showed important associations with both ethnicity and socio-economic deprivation leading to a large geographical variation in the number of cases. The Confidential Enquiry into Maternal and Child Health found that type 2 diabetes complicated one in every 955 births in England, Wales and Northern Ireland. By contrast, type 1 diabetes was found in one in 364 births.

- 3 Rates of congenital malformation and perinatal mortality in pregnancies complicated by type 2 diabetes were also examined in the CEMACH report. These were both higher than in the general population and comparable to the increased rates seen in pregnancies complicated by type 1 diabetes.
- 4 The Confidential Enquiry into Maternal and Child Health recorded a number of measures of the process of diabetes care before and during pregnancy. There appeared to be scope for improvement in a number of areas. Only 38% of women had a HbA1c value measured by 13 weeks of gestation. Of those women with a measured HbA1c value, only 38% had an HbA1c under 7%. Just over 40% of women with type 1 diabetes (and under 30% of those with type 2 diabetes) were recorded as having received folic acid supplementation before pregnancy. For the majority of women, there was no record of pre-pregnancy counselling.
- 5 The process of delivery also differed from the background population – in 39% of pregnancies labour was induced (vs 21%) and in 67% baby was delivered by Caesarean section (vs 22%). The rate of pre-term delivery (before 37 completed weeks) was 36% compared to 7% for the general population.
- 6 Birth weight was higher in pregnancies complicated by diabetes than the background population with macrosomia (birth weight greater than the ninetieth percentile) in the majority of babies (51.7%). There was no difference in the birth weight distribution between mothers with type 1 or type 2 diabetes. There were increases in the rates of shoulder dystocia (complicating 7.9% of pregnancies) and Erb's palsy (at ten times the background rate).

COMPARISON WITH PREVIOUS STUDIES AND SURVEYS

The Confidential Enquiry into Maternal and Child Health is to be congratulated on this wide-ranging survey which creates a number of challenges to those providing healthcare for women with diabetes during their pregnancies. In the main, the results are in keeping with previous surveys. In Scotland, the latest audit of pregnancies of women with diabetes (with babies born in 2003–2004) suggested a perinatal mortality rate of 25.6 per 1,000 (7–64.3) and congenital anomaly rate of 38 per 1,000 (14–80). In the last three years, similar surveys in France and Holland have confirmed increased rates of perinatal mortality and congenital anomaly in those populations. Examination of the process of care also reveals broad similarities. In Scotland, 60% of pregnancies were planned, 55% had a measure of HbA1c pre-pregnancy, 32% had formal pre-pregnancy care recorded, and only 55% were receiving periconceptual folic acid.

IMPORTANCE AND CHALLENGES

The CEMACH report is important reading for healthcare providers. A positive aspect for patients is how often pregnancy complicated by diabetes results in a healthy baby. Nevertheless, there are a number of areas where clinical care might be improved. The CEMACH report, like several before, including the Scottish data, emphasises the importance of planning pregnancy and pre-pregnancy care. Folic acid is effective in reducing neural tube defects – known to be increased with maternal diabetes – and it is disappointing that it is only the minority of women with diabetes who start their pregnancy with this simple treatment. Similarly, we know that excellent glycaemic control (usually defined as HbA1c <7%) early in pregnancy is associated with improved outcomes. While this target may be difficult to achieve – not least because hypoglycaemia remains a barrier to achieving tight glycaemic control – the CEMACH data suggest that there is scope for improvement. With appropriate pre-pregnancy counselling and planning of pregnancy, the incidence of congenital abnormality should be further reduced by careful attention to maternal glycaemia in early pregnancy.

The increasing number of women with type 2 diabetes, highlighted in the CEMACH report, brings new challenges. Ethnicity of women with type 1 and type 2 diabetes differs, and language and socio-economic circumstance may create barriers to delivering optimal care to women with type 2 diabetes during pregnancy. The report also confirms areas in which further research will be needed to allow improvements. There are gaps in our knowledge. Supporting women through pregnancy to achieve near normal glycaemia is challenging for staff and patients alike, and there is certainly room for technological innovation to allow achievement of near-normal glycaemia without the current attendant risk of severe hypoglycaemia. Similarly there is much about the control of fetal growth, let alone adverse outcomes such as stillbirth and early neonatal death, that we do not understand. One of the features of diabetes care in pregnancy is that while perinatal mortality has generally improved – probably in response to improved obstetric practices, control of glycaemia during pregnancy, and neonatal care – birth weight has changed little over the years. Similarly, many reports suggest that macrosomia can occur despite near-normal – at least in terms of HbA1c – glycaemic control. This indicates the limitations of HbA1c, which reflects average glycaemia but appears less sensitive to recurrent peaks of blood sugar, which appear important to fetal growth. It is also apparent that different fetuses may respond differently to the abnormal intrauterine environment of mothers with diabetes. Finally, there is an urgent need for better detection of fetuses at risk of stillbirth.

CONCLUSIONS

In 1989, the St Vincent Declaration suggested that outcomes of pregnancy should be similar in women with and without diabetes, and set a five-year target to achieve this. While the CEMACH report suggests there is still some way to go before the St Vincent target is met, it is to be welcomed as a further step in recording improvements in outcomes for women with type 1 and type 2 diabetes.

KEYPOINTS

- The outcome of pregnancy in a mother with diabetes has improved dramatically over the past 50 years.
- A recent UK study has shown that stillbirth, perinatal mortality (death occurring shortly before or shortly

after birth) and congenital abnormalities remain 2–5 times more frequent than in pregnancies not complicated by diabetes.

- Increasingly, it is maternal type 2 diabetes which complicates pregnancy; its outcomes are very similar to those seen in mothers with type 1 diabetes.
- Interventions proven to improve pregnancy outcome, such as tight glycaemic control in early pregnancy and supplementary folic acid, are often not being utilised.
- Further research is needed to improve our understanding of the mechanisms underlying the adverse effects of diabetes on pregnancy.
- Better planning of pregnancy, pre-pregnancy counselling and peri-conception support could already achieve improvements in outcome.
- Achieving these goals is a challenge for both women with diabetes and healthcare systems.

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