

Diabetes management and pregnancy: change following audit

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Introduction

Effective management of diabetic pregnancies involves considerable time and effort for both pregnant women and the diabetes and obstetric teams. An audit on this area of management was carried out at Hope Hospital, Salford. It covered systems of care and received input from patients and staff. Areas for improvement were identified and acted upon. These changes included improved communication (for all groups), more staff training, and streamlining of systems of care. These changes appear to have brought positive results.

Audit information from three sources has influenced changes made to the management of diabetic pregnancies at Hope Hospital, Salford. They are:

- Comparison of Hope Hospital pregnancy outcomes with those from other studies
- Patients' opinions
- Views of staff.

Literature evidence

There is ample evidence, from animal and clinical studies, that good glycaemic control during organogenesis in pregnant women with diabetes prevents congenital malformations (Baker et al, 1981; Miller et al, 1981; Eriksson, 1984; Ylinen et al, 1984).

The UK Diabetic Pregnancy Survey (Lowy et al, 1986) looked at rates of congenital malformation in women with gestational diabetes mellitus (GDM) or pre-gestational diabetes mellitus (PGDM). Results showed that the rates for type I PGDM and GDM were 6.4% and 1.9% greater, respectively, than the overall UK rate.

Later studies show little evidence of improvement in these figures (Steel et al, 1990; Casson et al, 1996; Jaap et al, 1996). It is apparent, therefore, that the emphasis must shift to pre-pregnancy care and achievement of optimal maternal blood sugar levels before conception if congenital malformations are to be reduced (Steel et al, 1980; Kitzmiller et al, 1991; Nielsen et al, 1997).

The literature also suggests that women with diabetes have a higher rate of induction and caesarean section, and an increase in the

associated risks to infants (Lowy et al, 1986; Hanson and Persson, 1993; Hod et al, 1991; Kjos et al, 1993; Sama and Iffy, 1998).

Audit

At Hope Hospital, an audit of diabetic pregnancies managed by the joint diabetes/obstetric team is conducted every six months.

Outcomes of the 212 PGDM pregnancies managed over the last twelve years are:

- 14 (6.6%) major malformations
- 5 (2.4%) infant deaths
- 4 (1.9%) intrauterine deaths (IUD)
- 9 (4.3%) termination of pregnancy (TOP) due to risk from poor diabetes control. Two of these had proven severe malformations.
- 19 (9%) spontaneous abortions.

These results are similar to those reported in various studies from the Western world (Hadden et al, 1988; Crombach et al, 1990; Hawthorne et al, 1997)

More detailed examination of the Hope Hospital data showed that 14/19 (74%) women whose pregnancy resulted in one or more of these poor infant outcomes had either booked after eight weeks for their antenatal care and/or had an HbA_{1c} >8% at booking (see Table 1). The pattern of high HbA_{1c} at booking was also seen in 9/19 women who had spontaneously aborted.

Of the 193 women who had successful outcomes, 84 (43%) still failed to achieve a modest HbA_{1c} target (<8%) before conception, thus placing themselves in a high-risk category (Kappy, 1991; Nielsen et al, 1997).

However, of the 84 women with poor

ARTICLE POINTS

- 1 Examination of outcomes provides evidence for practice.
- 2 'Talk into action' improves patient care and staff satisfaction.
- 3 Consideration of the views of the consumers of a health care system is essential for its success.
- 4 Continuing audit ensures up-to-date care.
- 5 Sharing information and goals with all team members encourages continuity and a seamless service

KEY WORDS

- Gestational diabetes mellitus
- Audit
- Patient survey
- Protocol

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PAGE POINTS

1 Pre-pregnancy care is particularly important to non-attenders.

2 Early booking for antenatal care may help reduce risks to the infant.

3 Better team communication facilitates more individual patient care.

4 Dissemination of the audit results led to change with regard to induction in PGDM women.

glycaemic control, 34 had booked before 8 weeks gestation. This suggests that booking early for antenatal care may have an important influence on the outcome of the pregnancy, irrespective of the level of hyperglycaemia at conception.

These results show that over 46% of Hope Hospital patients had not received effective pre-pregnancy care. Steps were taken to improve this area of management.

Impact of the audit

Pre-pregnancy care

Before the audit, pre-pregnancy care comprised the following:

- Patients were routinely given pre-pregnancy advice at the time of diagnosis and at annual clinic appointments.
- Separate appointments with the joint diabetes/obstetric team for pre-pregnancy counselling were also offered.

As a result of the audit, it was considered imperative that pre-pregnancy advice reach all PGDM women, regardless of whether they were planning a pregnancy or attending clinic regularly. Counselling at diagnosis, annual review and pre-pregnancy continued to be offered. In addition:

- A leaflet was designed in May 1997 and sent to all PGDM women under 40 years

of age (as identified from the Salford Diabetes Register). The leaflet advised on steps to be taken to ensure good health and diabetes control before embarking on a pregnancy, and listed contact telephone numbers.

- At the quarterly meetings of the primary healthcare team (PHCT) and the secondary team, all medical and nursing staff were urged to ensure that this topic was discussed with all appropriate patients at general appointments.
- The PHCT was also asked to contact women known to regularly miss diabetes follow-up appointments, and who may have high HbA_{1c} levels, and to offer special advice about contraception.

Re-audit

An audit carried out two years after distribution of the information letter showed disappointingly little improvement in HbA_{1c} levels at booking (Table 2).

However, there was a significant increase in the number of women booking much earlier for their antenatal care, with some booking as early as four weeks (Table 2). Earlier booking gives the team time to improve blood sugar control in the early stages of pregnancy and thus possibly avert complications to the infant.

Obstetrics

Presentation of the six-monthly audit results to the obstetric teams led to some changes in practice. Before the audit, all pregnancies in PGDM women were induced at 38 weeks because of the increased risk of unexplained IUD after this period (Ahlenius and Thomassen, 1999). Many women with GDM but no other obstetric indications and with good glycaemic control were nevertheless induced early just because they had diabetes.

As a result of the audit, the team have adopted a more individual approach. Selected PGDM women are now allowed to continue up to 40 weeks gestation and deliver spontaneously. In GDM women there is also a significant trend for fewer inductions based on diabetes only (Table 3).

Patient surveys

Two patient surveys (unpublished) identified three areas of dissatisfaction:

Table 1. Gestational stage and HbA_{1c} at time of antenatal care booking for women whose pregnancy resulted in one or more poor infant outcomes

Case	Antenatal booking (weeks)	HbA _{1c} at booking	Malformation	Outcome
1	10	11.9%	Major	Infant death
2	11	7.6%	Cardiac?	Infant death
3	9	9.1%	Major	Infant death
4	6	11.4%	None	IUD
5	10	7.9%	None	IUD
6	11	9.0%	Major	Alive
7	16	9.7%	Major	Alive
8	8	9.2%	Major	Alive
9	22	12.6%	Minor	Alive
10	11	8.0%	Major	TOP sacral agenesis
11	18	5.2%	None	IUD
12	8	9.2%	Major	Alive
13	13	8.3%	Major	Infant death
14	6	11.9%	Major	Alive
15	4	7.4%	None	IUD/twin alive
16	8	4.6%	Major	TOP cardiac
17	7	7.2%	Major	Alive
18	6	7.0%	Major	Alive
19	6	3.4%	Unknown	Infant death

- 'Too long waiting times' – patients complained of having to wait to see three professionals at clinic visits. Nevertheless, contact with the diabetologist, obstetrician and diabetes specialist nurse (DSN) is important at each clinic visit to ensure continuity and consistency of care and advice.
- 'Too many appointments' – all patients were seen every two weeks by the diabetes team and by the obstetric team as necessary. Weekly telephone contact with the DSN was maintained until glycaemic control was optimised. In addition, HbA_{1c} was monitored fortnightly on all patients and fundoscopy carried out monthly as appropriate.
- 'Poor knowledge of diabetes by midwifery staff' – patients considered that midwives and obstetric staff did not have an understanding of diabetes or the special care they required, particularly during delivery. Delays were experienced with commencement of intravenous therapy when it became necessary during labour. These areas were addressed as follows:
 - At their appointment, patients now see the DSN and the diabetologist simultaneously, thereby reducing waiting times. Discussion can centre on adjustments that have been made in the intervening weeks and future changes can be planned.
 - **In women with PGDM:**
For those achieving glycaemic targets without any other complications, e.g. proteinuria, diabetes team appointments take place every month until 32 weeks gestation. HbA_{1c} assays via patient self-collected capillary samples are sent by post every two weeks (Hounsome et al, 1996). Between appointments, patients maintain regular telephone contact with the DSN.
 - **In women with GDM:**
The patient telephones the DSN weekly with her home blood glucose results. Clinic appointments take place at diagnosis, 28 and 36 weeks, or as necessary. HbA_{1c} assays have been discontinued because the audit showed that they were not helpful in managing pregnancy in GDM. This finding is in agreement with that of Aziz et al (1992).
 - **For all people with diabetes:**
At the 36-week clinic visit a sliding-scale insulin prescription is inserted into the

notes of all patients receiving insulin therapy so that it is available if and when the patient commences labour.

- Midwives and junior obstetric staff attend study days twice a year. The days include a group of patients discussing their care.
- Monthly lunch-time workshops on pertinent subjects, e.g. management of hypoglycaemia, are held for all maternity ward staff.

Staff views

Meetings are held after every joint clinic for the whole team, as well as each quarter with the wider obstetric staff and PHCT.

The hospital midwives and junior doctors expressed a need for updating on diabetes care and for streamlining of the system for prescribing intravenous treatment.

Community midwifery staff expressed concern about the lack of a protocol for the screening and treatment of GDM. The system in place was regarded as haphazard. Specific comments included the following:

- Women were referred first to the joint clinic, then sent for a glucose tolerance test, then attended a further appointment some weeks later for the result.
- Often, weeks passed from the first episodes of glycosuria until a diagnosis was made. Consequently, treatment may have been commenced too late to prevent macrosomia.

In response to these concerns, a protocol for screening for GDM was devised (Table 4).

PAGE POINTS

1 The patient information letter caused a shift to earlier booking for antenatal care.

2 Action taken in response to results of the patients' survey led to a reduction in appointments and waiting times.

3 Updating of staff leads to improved patient care and staff satisfaction.

Table 2. Effect of letter distribution on gestational stage and HbA_{1c} at time of antenatal care booking

	Antenatal booking stage			HbA _{1c} level at booking		
	<8 wks	≤8 wks	Total	±7.0%	>7.0%	Total
Before letter sent out	71 (42%)	100 (58%)	171 (100%)	41 (26%)	116 (74%)	157 (100%)
After letter sent out	28 (74%)	10 (26%)	38 (100%)	11 (31%)	25 (69%)	36 (100%)

Table 3. Reasons for induction in women with GDM over two time periods

Reason for induction	1988–1993	1994 onwards
Not induced	40 (26%)	121 (46%)
Obstetric only	46 (30%)	83 (31%)
Diabetes only	50 (32%)	34 (13%)
Diabetes and obstetric	19 (12%)	26 (10%)
Total	155 (100%)	264 (100%)

Table 4. Outline of protocol for screening for GDM

- The patient is retested one week after an episode of glycosuria. If the result is 2%, the urine is also tested for ketones. Positive ketones and 2% glycosuria result in an immediate referral to the diabetes team
- Following two episodes of glycosuria the community midwife refers the patient directly to the 'midwifery day care unit'
- Patients are admitted as day cases for a glucose tolerance test or a blood glucose profile, depending on the gestational stage of the pregnancy
- Tests are performed on the day care unit, thus avoiding waiting lists for laboratory appointments
- Venous samples are assayed by the laboratory and results phoned to the ward immediately
- The diabetes medical staff are informed and a diagnosis is made
- If positive, patients are taught blood monitoring, seen by the dietitian and follow-up appointments with the diabetes team are arranged.

Some of the views and ideas put forward at staff meetings also coincided with patients' concerns.

Conclusion

The continuous audit of the systems of pregnancy care at Hope Hospital provides information on where these systems are ineffective and where changes need to be made. The process is continuous because results stimulate further questions.

Staff and patient surveys supply information from the 'coal face' and are essential for any assessment. Statistical analysis and literature review enable comparison with other centres and provide a measure of achievement.

By providing evidence for changes in practice, the audit led to several small research studies being initiated. More pertinently, the use of audit has streamlined care and improved both patient and staff satisfaction. ■

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