Diabetes and pregnancy: preconception care, pregnancy outcomes, resource utilization and costs

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Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
Preconception care for women with diabetes.

Type of intervention
Primary prevention.

Economic study type
Cost-effectiveness analysis (cost-consequences analysis).

Study population
Diabetic women who were either making their first preconception visit to the study sites (PC subjects) or were making their first prenatal visit to the sites without having received preconception care (PN subjects).

Setting
University-affiliated teaching hospitals and private community hospitals. The economic study was carried out in the USA.

Dates to which data relate
The dates during which effectiveness and resource use data were collected were not stated. 1992 prices were used.

Source of effectiveness data
The evidence for final outcomes was based on a single study.

Link between effectiveness and cost data
Costing was undertaken retrospectively on the same patient sample as that used in the effectiveness analysis.

Study sample
Of 196 women with established diabetes who were identified, 154 (79%) were enrolled in the study. Of those enrolled in the study, 37% (n=57) received preconception care and only 44% of these (n=25) became pregnant, and all but one of them delivered by the study end. Of the 97 women who received prenatal care, 89 delivered. Because there were only 15 women with type 2 diabetes and they were all in the PN group, the authors limited their report to the 24 PC women and 74 PN women with type 1 diabetes. Power calculations were not used to determine the sample sizes. Reasons for non-participation included refusal (7%), loss to follow-up (6%), loss or termination of the pregnancy before the interview (5%) and delivery before the interview (2%).
Study design
A prospective, multicentre case-series study in the United States. Patients were recruited at five different centres.

Analysis of effectiveness
The analysis of the clinical study was based on treatment completers only. The primary health outcome used was the outcome of the pregnancy (in terms of birth weight and proportion of major congenital anomalies). Within one week of enrolment, the women were called at home and a 30-minute telephone interview was conducted by trained project staff. In addition, a thorough review of all office and clinic records and maternal and infant hospital records was conducted using a standard data-collection instrument. PC women with type 1 diabetes were more likely to be white, were more highly educated and had a higher family income than PN women with type 1 diabetes. PC women were significantly earlier in pregnancy than PN women and were significantly more likely to experience spontaneous abortions than were PN women.

Effectiveness results
Mean birth weights were significantly higher for infants of PC women than for infants of PN women: 3,584g (+/- 166g) versus 3,167g (+/- 102g), p<0.05. Infants of PC mothers were significantly less likely to require intravenous glucose after delivery than were infants of PN women (5% versus 37%, p<0.05). Major congenital anomalies were diagnosed in 10 infants (14%) of PN women but in only 1 infant of a PC woman (5%).

Clinical conclusions
This study demonstrated that PC women with type 1 diabetes are seen earlier in gestation and have better glycosylated haemoglobin levels at their first prenatal visit, and throughout pregnancy, than do PN women with type 1 diabetes. This suggests that when implemented in community practice, preconception care achieves its major intended goals of better glycemic control during fetal organogenesis to reduce the risk of major congenital malformations and better timing of pregnancy so that it is more likely to be planned and wanted.

Measure of benefits used in the economic analysis
No summary benefit measure was identified in the economic analysis and only separate outcomes were reported (cost-consequences analysis).

Direct costs
Quantities and costs were analysed separately. The cost of physician visits and of a hospital inpatient day were those included in the analysis. The estimation of quantities was based on actual data. Price information was taken from other studies.

Indirect Costs
Not included

Currency
US dollars ($).

Sensitivity analysis
No sensitivity analysis was performed.

Estimated benefits used in the economic analysis
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Cost results
When the mean number of both preconception and prenatal care visits for PC women who became pregnant was compared with the mean number of prenatal visits for PN women, PC women made, on average, two more outpatient visits than PN women (19.2 +/- 2.2 versus 17.2 +/- 1.2). However, the difference was not statistically significant. During the preconception and prenatal periods, PC women were significantly less likely to be hospitalised for control of diabetes or other causes than were PN women (40% versus 80%, p<0.05). When PC women were hospitalised, their length of hospitalisation tended to be shorter than for PN women. PC women who were hospitalised before delivery spent a mean of 5.6 (+/- 1.9) days as inpatients as compared to PN women, who spent a mean of 18.2 (+/- 2.5) days. The mean length of hospital stay after delivery was three days for PC women and almost five for PN women. The difference in mean length of stay was almost two days. The small incremental increase in outpatient visits (two visits) is more than offset by the reduction in inpatient utilisation (20 days for women and their infants). This consistent and substantial reduction in resource utilisation among PC women and their infants, as compared to PN women and their infants, translates into substantial cost savings. If the cost of a physician visit is taken to be $66 and the direct cost of a day's hospital care due to diabetes to be $1,706, then the net cost saving is approximately $34,000 per patient.

Synthesis of costs and benefits
Synthesis was not undertaken by the authors as it was not relevant, given that incremental costs were negative and incremental benefits were positive (extended dominance).

Authors' conclusions
The authors suggested that their results show that the savings, measured as direct medical costs, may be several times greater than previously recognised. In each instance, the savings were substantial and occur in the short term. Thus, for both health and economic reasons, clinical practice and health policy should support the provision of preconception care for women with diabetes.

CRD COMMENTARY - Selection of comparators
A justification was given for the comparators used. The authors stated that despite the clear benefits of preconception care, most women with diabetes in the United States present to the health care system after conception. You should consider whether this is relevant to your own setting.

Validity of estimate of measure of benefit
Power calculations were not used to determine the sample sizes which were 74 PN women and only 24 PC women. As the authors stated, their findings may reflect ascertainment bias in that PC subjects are followed more carefully before pregnancy. In contrast PN subjects might experience spontaneous abortions without seeing a health care provider or even being aware that they are pregnant. Additionally, there were potential confounders present as the groups were not comparable in several key socio-demographic characteristics (the PC group was predominantly white, of higher socio-economic status and had had fewer previous abortions).

Validity of estimate of costs
Resource quantities were reported separately from prices. Only physician visits and in-patient days were included in the cost analysis and insufficient details of the cost estimation were given.

Other issues
The authors’ conclusions are too conclusive given the uncertainties in the data. Appropriate comparisons were made...
with other studies, but the issue of generalisability to other countries was not addressed.

**Implications of the study**
The authors suggest that clinical practice and health policy should support PC for women with diabetes but their results need further validation as indicated above in the commentary.

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