Perinatal outcome and antenatal care in a black South African population

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SUMMARY

The relationship between perinatal outcome and antenatal care was investigated at King Edward VIII Hospital, Durban, by a case control retrospective study of pregnancy records in 165 perinatal deaths and 156 infants surviving the perinatal period. 82% of the mothers of live infants had booked for antenatal care compared with only 60% of those who experienced a perinatal death. Hospital booking was associated with a higher infant birthweight. For those who booked earlier there was no reduction in total perinatal mortality or the stillbirth: neonatal death ratio, and many of the mothers of highest risk failed to book. This suggests that the better perinatal outcome in booked mothers may have been secondary to the type of mother who chose to book, rather than the actual antenatal care. To help reduce perinatal mortality, methods must be employed which reach those mothers who are most likely to fail to book.

INTRODUCTION

In the 1987 Perinatal Lecture at the Royal Maternity Hospital, Belfast, entitled “Obstetrics and Poverty”, Professor Hugh Philpott, University of Natal, presented startling data from two similar hospitals in Durban, South Africa. At that time, one was serving the white population, and the other the black population. Their respective mortality rates were 12 and 50/1,000: the higher figure in the black population apparently being the result of ignorance and poverty.

In 1991, during a Queen’s University Final Year Medical elective, we decided to carry out further research into these perinatal mortality figures whilst based at

Research project undertaken during a final year elective period in Durban, South Africa.

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King Edward Hospital, Durban. There, 15,000 deliveries are carried out annually, and the perinatal mortality rate for 1990 was 81/1,000 births. Antenatal care is probably the most important factor which determines perinatal outcome, but is often underutilized by lower socioeconomic groups. As in many South African hospitals caring for the black population, mothers delivering at King Edward often fail to book for any antenatal care, and attend for the first time when in labour. We investigate whether perinatal outcome is related to antenatal care in this population and if so, whether this relationship is to the actual antenatal care received, or if it is secondary to the type of mother who chooses to book for such antenatal care.

SUBJECTS AND METHODS

Data were obtained from the 1990 obstetric records at the King Edward VIII Hospital, University of Natal, Durban, South Africa. The study population consisted of 321 predominantly black South African mothers, drawn from all mothers whose babies were delivered at the hospital between January and March 1990.

A case control retrospective study was carried out. The cases comprised 165 consecutive records of mothers whose infants had died during the perinatal period, and the controls were 156 consecutive records of mothers whose infants survived the perinatal period. Case and control groups, although not individually matched, were comparable, with no significant difference in maternal age, parity, or in mode of delivery.

The perinatal period was defined as from 28 weeks' gestational age to seven days after delivery, or if this length of follow-up was impossible, to the time of discharge from hospital. A stillbirth was defined as an intrauterine death occurring after 28 weeks' gestation. Normal birthweight was defined by WHO criteria as > 2.5 kg. A booked patient was defined as one who was recorded as attending an antenatal clinic one or more times, either at the King Edward VIII Hospital, another hospital or a peripheral clinic. Gestational age at booking was assessed clinically by doctors or midwives. Hypertension was defined as a blood pressure of 140/90 mmHg on one, or if possible two occasions.

The relationship between perinatal outcome and antenatal care was assessed by comparing antenatal booking status in the two groups. Antenatal abnormalities and birthweight were noted. To test whether a possible relationship between perinatal outcome and the antenatal care received was direct, or secondary to the type of mother who chose to book; we examined two criteria, to give an indication of the effectiveness of the antenatal care itself.

1. **Gestational age at first booking.** Antenatal care is more effective if the mother books early, and late booking may be associated with a higher perinatal mortality rate due to inadequate care. Thus, a reduction in perinatal mortality with earlier booking was used as an indicator of the effectiveness of antenatal care received.

2. **Birthweight.** Low birthweight is probably the most important factor in perinatal death, due to either intrauterine growth retardation or to prematurity. Effective antenatal care should address factors causing growth retardation such
as hypertension, excess alcohol intake, and smoking, but will have little effect on
the causes of prematurity such as premature rupture of membranes, antepartum
haemorrhage or polyhydramnios.\textsuperscript{14} Thus effective antenatal care should cause a
greater reduction in intrauterine growth retardation than prematurity.

It was not possible in this study to ascertain directly whether a low birthweight was
due to growth retardation or to prematurity, but an estimate may be made on the
basis that intrauterine growth retardation tends to lead to stillbirth\textsuperscript{14} whereas
prematurity tends to lead to neonatal death.\textsuperscript{15} Therefore effective antenatal care
may be indicated by a reduction in the stillbirth: neonatal death ratio in booked
compared to unbooked mothers. This reduction should be most marked with an
earlier gestational age at booking.\textsuperscript{16}

All statistical analysis was done by the chi square test with significance defined
as \( p < 0.05 \).

![Number of infants](image)

\textbf{Fig 1. Perinatal outcome in selected booked and unbooked pregnancies at King Edward VIII Hospital, Durban.}

The Table shows the distribution of the most commonly recorded antenatal
abnormalities. The presence of an antenatal abnormality was more common
\(( p = 0.002)\) in the perinatal death group (63\%) compared to the live group
\((45\% - 2\%)\). Hypertension was the most frequently recorded antenatal abnormality,
affecting 22\% - 4\% of the study population. Proteinuric hypertension (including
eclampsia) which represented 70\% of all hypertension, was almost twice as
common in the perinatal death group (19\% - 4\%) compared to the live group
\((11\% - 4\%)\), although the difference was not statistically significant.

The acceptance of antenatal care should allow detection and appropriate manage-
ment of antenatal abnormalities and thus may partly explain the better perinatal
outcome associated with mothers who had booked for antenatal care. However,
our hypothesis is that this relationship may be secondary due to the type of
mother who chooses to book, rather than to the actual antenatal care. For those
mothers who booked, there was no significant difference in gestational age at first
booking, between the perinatal death and live birth groups, and in particular no
evidence of a lower perinatal mortality with earlier booking (Fig 2). Thus antenatal
care itself did not appear fully responsible for the lower perinatal mortality seen in
those mothers who had booked.

\textbf{RESULTS}

Of the 321 mothers in the study, 228 were recorded as having booked for ante-
natal care, and 93 had not booked.

Fig 1 shows there was a significant association between perinatal outcome
and booking for antenatal care in this population, with
82\% - 1\% of mothers in the
live group having booked for antenatal care compared to
only 60\% - 6\% in the perinatal
death group \(( p < 0.001)\).
TABLE
Frequency and percentage of maternal antenatal abnormalities in pregnancies with live births and perinatal deaths

| Antenatal abnormality                      | Live  | Dead  | Total population |
|-------------------------------------------|-------|-------|------------------|
|                                           | n     | %     | n     | %     | n     | %     |
| **Maternal**                              |       |       |       |       |       |       |
| Hypertension with proteinuria             | 18    | 11.6  | 27    | 16.4  | 45    | 14.1  |
| Hypertension without proteinuria          | 15    | 9.7   | 7     | 4.2   | 22    | 6.9   |
| Eclampsia                                 | 0     | 0.0   | 5     | 3.0   | 5     | 1.6   |
| Cardiac disease                           | 0     | 0.0   | 1     | 0.6   | 1     | 0.3   |
| Anaemia                                   | 0     | 0.0   | 2     | 1.2   | 2     | 0.6   |
| Rhesus negative                           | 2     | 1.3   | 0     | 0.0   | 1     | 0.6   |
| Positive                                  | 1     | 0.6   | 2     | 1.2   | 3     | 0.9   |
| **Obstetric**                             |       |       |       |       |       |       |
| Preterm labour treated successfully       | 1     | 0.6   | 1     | 0.6   | 2     | 0.6   |
| Preterm labour failed treatment           | 0     | 0.0   | 9     | 5.5   | 9     | 2.8   |
| Prelabour membrane rupture                | 2     | 1.3   | 1     | 0.6   | 3     | 0.9   |
| Prelabour membrane rupture with infection | 0     | 0.0   | 2     | 1.2   | 2     | 0.6   |
| Post dates                                | 4     | 2.6   | 2     | 1.2   | 6     | 1.9   |
| Multiple pregnancy                        | 6     | 3.9   | 1     | 0.6   | 7     | 2.2   |
| Placenta praevia                          | 1     | 0.6   | 2     | 1.2   | 3     | 0.9   |
| Abruptio placenta                         | 1     | 0.6   | 11    | 6.7   | 12    | 3.8   |
| Polyhydramnios                            | 0     | 0.0   | 3     | 1.8   | 3     | 0.9   |
| **Other**                                 | 19    | 12.5  | 28    | 16.8  | 47    | 14.8  |

This study confirmed that low birthweight is an important factor in perinatal death, with a mean birthweight in the perinatal death group of only 1.8 kg compared to 3.0 kg in the live group. Fig 3 suggests that mothers who booked for antenatal care tended to have infants of higher birthweight, but perinatal death was still associated with low birthweight. Thus any beneficial effect of receiving antenatal care does not fully account for the better perinatal outcome in booked mothers.

Fig 2. Perinatal outcome (alive or dead) related to gestational age at first booking.

Fig 3. Mean birthweight (kg) in booked and unbooked mothers by perinatal outcome.

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Most of the lower birthweights in the perinatal death group appear to have been due to intrauterine growth retardation rather than prematurity, as 81% of perinatal deaths were stillbirths and only 19% were neonatal deaths. There was no reduction in the stillbirth: neonatal death ratio in mothers who had booked, nor was any reduction seen with earlier booking, again suggesting that antenatal care was not fully responsible for the lower perinatal mortality in booked mothers.

DISCUSSION

The principal aim of antenatal care is the early recognition and management of the high risk patient. In the United Kingdom, improved antenatal care has been an important factor in the large reduction in perinatal mortality seen over the past 30 years. Conversely, in populations such as we studied, even with improvements in antenatal care, perinatal mortality is still high, and this is often attributed to the underlying socioeconomic factors, and to a poorer level of nutrition and general health. Whilst these factors undoubtedly play a major role in the high mortality rate, our study highlights two areas of particular interest.

Our results show that receiving antenatal care itself cannot fully explain the associated better perinatal outcome. Most mothers who book appear already to be of low risk in this population — the very action of booking probably a reflection of better overall health education and awareness. However, being a low risk mother does not necessarily correlate with having a low risk fetus. Recent work in the Royal Maternity Hospital, Belfast has shown that higher perinatal mortality rates may occur in so called low risk mothers and it is suggested that modern antenatal care should look at both maternal and fetal wellbeing, increasing emphasis being placed on finding the high risk fetus. In our study population, being a low risk mother was associated with a better perinatal outcome, but further improvements may be possible if the high risk fetus is actively looked for in those mothers who book early. Simple methods include use of “kick counts” and cardiotocography. Full ultrasound biophysical profiles, even where available, are impractical and probably inappropriate, but simple assessment of liquor volume and growth alone may be very predictive.

The major problem facing this population is that most high risk mothers fell into the perinatal death group, yet these were the very patients who were most likely not to book. For antenatal care to achieve its aim of early recognition and management of the high risk patient, not only must uptake of antenatal care be encouraged in the general population, but specifically amongst those mothers who are failing to book. Illiteracy and poverty both contribute to poor antenatal care. Literacy is probably more important than the degree of affluence, and a low maternal educational standard is associated with a lower application of maternity care routines and a lower perceived value of antenatal care.

Widely dispersed populations in rural areas show an exponential decrease in outpatient attendance with distance. Cultural and traditional practices often prefer a traditional birth attendant, and this influence may be so strong that even educated patients stay at home rather than attend the antenatal clinic. Mothers are also more likely to underutilize care if embedded in strong tie·non disperse social networks, preferring the advice of friends and family to hospital staff.

The long term solution to these problems is widespread education and provision of accessible antenatal care facilities. This may be difficult and expensive, and
even educated mothers may underutilize antenatal services. One simple improvement might be provision of flexible hours for antenatal care. A study from Kenya showed a 50% increase in utilization when antenatal care was integrated with other services provided daily.24 A short term solution may be a variety of case finding methods. The use of outreach workers to locate unattended pregnant women is probably not cost effective,25 but community health leaders (unpaid members of the community, trained for a week or less) have been used effectively in some projects.24

The principal aim of future health planning in this type of population must be to increase uptake of antenatal care in general, and in particular to employ methods of reaching those mothers in the community most at risk of a perinatal death. As well as quantity of antenatal care, improvement in the quality of care, with awareness of the high risk fetus, may help to reduce high perinatal mortality rates.

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