UK study of intrapartum care for low risk primigravidas: a survey of interventions

F L R Williams, C du V Florey, S A Ogston, N B Patel, P W Howie, V R Tindall

Abstract

Study objective—To determine the extent of intrapartum intervention received by primigravidas.

Design—Cross sectional survey of NHS hospitals in the UK.

Setting—One hundred and one randomly selected hospital maternity units.

Participants—Forty consecutive primigravid women, judged to be at low risk at the start of labour, in each hospital.

Main outcome measures—Seven groups of interventions or monitoring procedures were identified from the first, second, and third stages of labour: fetal monitoring, vaginal examinations, artificial rupture of membranes, augmentation of labour, pain relief, type of delivery, and episiotomy. Data were collected during 1993.

Main results—Ninety eight hospitals took part in the study and data were collected on 3160 low risk primigravidas. Seventy four per cent of these women had continuous cardiotocography. The proportion of women having restrictive or invasive fetal monitoring showed appreciable geographical variation for both the first and second stages of labour. Using the criterion of a vaginal examination every four hours and allowing for the length of each woman's labour, 72% had more vaginal examinations than expected; there was a significant geographical variation in the number of women receiving more than five examinations. Fifty three per cent had artificial rupture of membranes; the procedure was performed over a wide range of cervical dilatations (0 cm–10 cm). Thirty eight per cent of labours were augmented, most commonly by intravenous syntocinon; the procedure showed significant geographical variation. Twenty eight per cent had a spinal block or epidural analgesia for the relief of pain; this intervention varied by geographical region only for the second stage of labour. Over one quarter of the women required instrumental delivery. Forty six per cent had an episiotomy; the frequency of this intervention varied substantially by region. There were no infant deaths. Twelve babies were recorded at birth as having a congenital anomaly.

Conclusions—The rates of several interventions seem high for this low risk group and there was substantial geographical variation in the use of six interventions. Clinical trials are needed to evaluate the optimum criteria for using these interven-

tions from which guidelines should be drawn up by local groups and the Royal College.

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The level of intrapartum intervention is unknown in UK women considered to be at low risk of complications at the start of their pregnancy. It is accepted that interventions should be avoided unless there are clear indications to the contrary,¹ yet there is a general belief among midwives, obstetricians, and women that there are too many unexplained intrapartum interventions.² Because data are not routinely and completely collected and published in England and Wales, there are no national intervention rates by which to evaluate this belief. However, the issue is important for at least two reasons. Firstly, obstetricians and midwives must satisfy themselves that they are using the correct procedures and amount of intervention for every woman according to her needs. Secondly, all women are encouraged to complete a birth plan, which requires them to choose specific interventions; an understanding of the frequency and effectiveness of use of these interventions would enable them to make a more informed choice.

We were commissioned by the Clinical Standards Advisory Group (CSAG) to provide baseline data on the amount and type of intrapartum intervention in a random sample of UK primigravidas who were judged to be at low risk of intervention. Primigravidas were studied because they are believed to be a more homogeneous group than multigravidas and because their experience would not be affected by their previous obstetric history. In this paper we describe the frequency of major intrapartum interventions in primigravidas who had an uneventful antenatal experience and were expected to have a normal delivery.

Methods

SAMPLING

A sampling frame of all the consultant maternity units in Great Britain was obtained from the annual returns to the Royal College of Obstetricians and Gynaecologists. The RCOG believes that the data it receives about the number of deliveries are close to 100% complete. A detailed summary of the sampling methods has been published elsewhere.³ So that the data could be collected within one year, hospitals delivering less than 1000 births per annum were excluded. Two hundred and twenty six hospitals from a total sampling frame of 237 were eligible for inclusion in the study. In the absence of information about

Departments of
Epidemiology and
Public Health

F L R Williams
C du V Florey
S A Ogston

and Obstetrics and
Gynaecology

N B Patel
P W Howie

University of Dundee,
Ninewells Hospital and
Medical School,
Dundee DD1 9SY

Department of
Obstetrics and
Gynaecology, Saint
Mary's Hospital for
Women and Children,
Whitworth Park,
Manchester
V R Tindall

Correspondence to:
Dr Williams.

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Table 1 Reasons for exclusion of 2875 women from the study. Number of citations and percentage

Reason	Number	%	Reason	Number	%
Induced labour	1346	41.7	Haemoglobin <10 g/dl at booking	54	1.7
Antenatal admission (over 24 hours)	788	24.4	Multiple pregnancy	44	1.4
Age <16 or >35 y	206	6.4	≥3 consecutive spont. abortions	43	1.3
Previous surgery on reproductive tract	185	5.7	Cardiac disease	27	0.8
Booking weight <45 or >100 kg	143	4.4	Insulin dependent diabetes mellitus	19	0.6
Breech /transverse / oblique lie at presentation	142	4.4	Known substance misuse	16	0.5
Other severe medical disease	134	4.1	Renal disease	10	0.3
Essential hypertension*	65	2.0	Isoimmunisation	7	0.2

*Essential hypertension when complicating pregnancy includes all pregnancy induced hypertension, ICD9: 642.

rates of intervention on which to base sample size calculations, a sample of 4040 women was considered appropriate to give adequately precise estimates of the major interventions. To minimise the workload, each hospital was asked to collect information about intrapartum interventions for 40 consecutive primigravid deliveries that met the entry criteria. One hundred and one hospital maternity units ($101 \times 40 = 4040$) were randomly selected and invited to take part in the study.

ENTRY CRITERIA

Primigravidas were entered into the study at the onset of their labour if they were delivering in hospital after an uneventful antenatal period, at ≥ 37 weeks of pregnancy and with the fetal head presenting. As the aim of the study was to establish baseline data of intrapartum interventions and monitoring, the exclusion criteria were chosen to exclude foreseeable intrapartum complications (table 1). Information was collected also about primigravid women who did not meet the entry criteria, so that the proportion of all primigravidas included in the study could be estimated. Each hospital was asked to record details for consecutive deliveries of primigravidas, on either an abstraction form or exclusion form, until 40 abstraction forms had been completed.

PROVISION FOR HOSPITALS WITHDRAWING

In the event of a hospital being unable or unwilling to take part in the study a reserve list was compiled by using the remainder of the hospitals from the randomly ordered sampling frame.

DATA COLLECTION AND ANALYSIS

Data were collected from February 1993 until January 1994. Demographic characteristics and data about the amount and degree of intervention for each stage of labour were collected by midwives using a specifically devised abstraction form. The data form was seven pages and has been published in full elsewhere.³ To minimise recall bias, the forms were designed to be completed prospectively. Information was collected about several intrapartum interventions: fetal monitoring, artificial rupture of the membranes, augmentation of labour, pain relief, caesarean section, type of delivery, episiotomy, and vaginal examinations. The number of vaginal examinations performed is related to the duration of labour.⁴ All women have a vaginal examination upon arrival on the ward to determine the state of labour. Thereafter most textbooks, if they make

a recommendation, suggest that further examinations should be made at intervals of roughly 3–4 hours.^{5–7} Using this criterion we calculated the minimum expected number of vaginal examinations for each woman by dividing the length of each woman's labour by 4 and by adding one extra examination to account for the vaginal examination performed on arrival. We compared the expected number with the observed number of vaginal examinations she received. We also collected information about the position of women at delivery, and information about the condition of the infant at birth.

Incomplete abstraction forms were returned for amendment to the originating hospital. A system was set up to identify duplicate abstraction forms. When duplicates were suspected, copies of both forms were returned for amendment. Abstraction forms were entered by date of admission to allow any in excess of the required 40 to be excluded from the analysis.

The variation of each intervention was assessed by computing the Wald χ^2 , adjusted for 11 potential risk factors: geographical location, size of hospital, whether the hospital was a teaching or non-teaching hospital, the woman's ethnic origin, age, social class, and duration of labour, whether the mother was single or living with a partner, and the infant's gestational age, birth weight and sex. The Wald χ^2 is generated using multiple logistic regression analysis on SPSS-PC, it closely approximates Pearson's χ^2 and is a specialised application of the χ^2 for logistic regression.⁸

Results

THE SAMPLE

Four hospitals withdrew immediately because of commitments to other studies and were replaced by selecting the next four eligible hospitals from the sampling frame. Three hospitals withdrew at a very late stage and there was insufficient time to replace them and collect information about 40 deliveries; 98 hospitals (97%) participated in the study. The staff at one hospital said that they would only be able to return 10 forms; thus the maximum denominator was 3890 ($97 \times 40 + 10$) abstraction forms. In all 3388 forms were returned but 228 were excluded because the women did not meet the entry criteria. The 228 forms were excluded for one of three reasons: 95 delivered in a GP unit, 73 were outwith the age range, and 60 had a gestation of <37 weeks. Information about these 228 women was not included in the analysis of women excluded from the study (see next paragraph). They had been

Table 2 Summary of intrapartum interventions during labour. (The varying denominators reflect missing information unless otherwise indicated)

Intervention	Incidence of procedures	%
Fetal monitoring		
Pinard/Doppler	1147/3160 (36%) women had Pinard/Doppler monitoring	
Cardiotocograph monitoring	No cardiotocograph monitoring	142/3150 5
	Baseline	203/3150 6
	Intermittent	323/3150 10
	Continuous	1455/3150 46
	Baseline + intermittent	141/3150 4
	Baseline + continuous	229/3150 7
	Intermittent + continuous	557/3150 18
	Baseline, intermittent, continuous	100/3150 3
Scalp electrode/pH	Scalp electrode	917/3085 30
	Fetal scalp pH	19/3085 1
	Both of these	93/3085 3
Vaginal examinations	The expected and observed numbers of vaginal examinations were calculated for each woman using the criterion of one examination every four hours starting from the onset of the first stage	
	expected number of examinations	552/2816* 20
	fewer examinations than expected	242/2816 9
	more examinations than expected	2022/2816 72
Artificial rupture of membranes	1674/3160 (53%) women had artificial rupture of membranes (ARM). Of these, ARM was performed at a dilatation of:	
	<3 cm	67/1674 4
	3–4 cm	500/1674 30
	5–8 cm	798/1674 48
	9 cm	114/1674 7
	10 cm	121/1674 7
	missing data	74/1674 4
Augmentation of labour	1188/3160 (37.5%) women had augmented labour. Of these augmentation was by:	
	ARM	149/1188 13
	Drugs	715/1188 60
	ARM + drugs	163/1188 14
	Other	161/1188 14
Pain relief	None	105/3160 3
	Intramuscular + inhaled analgesia	863/3160 27
	Inhaled analgesia	322/3160 10
	Intramuscular	291/3160 9
	Spinal/epidural	219/3160 7
	Intramuscular, inhaled analgesia + TENS	193/3160 6
	Intramuscular, spinal/epidural + TENS	186/3160 6
	Intramuscular, spinal/epidural	139/3160 4
	Inhaled analgesia + TENS	114/3160 4
	Other combinations	728/3160 23
Type of delivery	Spontaneous vaginal delivery	2338/3160 74
	Forceps	442/3160 14
	Ventouse	164/3160 5
	Caesarean section	193/3160 6
Episiotomy and tears	Just under one half of the women had an episiotomy (46%)	
	Episiotomy	1255/3160 40
	Episiotomy with perineal and other tears	199/3160 6
	Perineal and other tears	1172/3160 37

*Only 20 of 3160 women had no vaginal examinations. However, a further 324 women had missing information about the precise timing of their stage of labour — this information was needed for calculating the expected number of vaginal examinations. The denominator was thus 3160–344=2816.

mistakenly classified as eligible and thus a full abstraction form, rather than an exclusion form, had been completed. We therefore had none of the additional information about why they were excluded, which would have been available if an exclusion form had been completed. A total of 3160 forms were suitable for analysis, which provided information about 81% of the sample (3160 of 3890). The mean number of forms returned per hospital was 32, range 1–40. Only 13 hospitals returned 40 forms.

WOMEN EXCLUDED FROM THE STUDY

Ninety two hospitals (94%, 92 of 98) provided information about the women excluded from the study. The mean number of women excluded per hospital was 31, range 1–89. The overall ratio of included to excluded women was 1.05:1. Exclusion forms were received for

KEY POINTS

- Routine data are not available to evaluate the belief that there is too much intrapartum intervention.
- This survey is the first UK study to describe in detail the frequency of seven major intrapartum interventions.
- There is considerable geographical variation in the proportion of women receiving invasive fetal monitoring, episiotomy, vaginal examination, epidural analgesia, and syntocinon for the augmentation of labour.

2875 women and of these 592 of 2875 were excluded for more than one reason. The most frequently given reasons were induced labour (42%) and an antenatal admission of more than 24 hours (table 2). The reasons for exclusion did not vary appreciably between the hospitals for 13 of the 16 variables; the exceptions were for previous surgery on the reproductive tract, other severe medical disease, and essential hypertension. Three hospitals accounted for 31% of the cases of previous surgery; one hospital accounted for 23% of other severe medical disease; and two hospitals accounted for 19% of the essential hypertension. Of the 13 hospitals returning 40 completed forms, the mean number of excluded women was 41, range 0–89.

WOMEN INCLUDED IN THE STUDY

The majority of the sample of 3160 women included in the study were white (91%), in their 20s (66%), in social class II or III (44%), and lived with their partner (76%). The progression of labour was recorded on a partogram for the majority (90%) of women (table 2).

FETAL MONITORING

The survey asked about three principal methods of fetal monitoring: Pinard stethoscope or Doppler, cardiotocograph monitoring, and internal monitoring with fetal scalp electrode and fetal blood pH if required.

Cardiotocographic monitoring was classified as baseline use, intermittent use or continuous use. Because the abstraction form was completed prospectively and because the risks and needs of labour change, cardiotocographic monitoring could change from baseline use—through intermittent use—and finally be used continuously. Our abstraction form allowed for this progression and to maintain the detail of the information about the amount of cardiotocography performed, the data are presented in mutually exclusive categories (table 2). A little under three quarters of the women had continuous cardiotocographic monitoring. This was given because of: an abnormal intermittent external trace (28%), administration of epidural analgesia (21%), unit policy (11%), meconium staining of the amniotic fluid (15%) or in association with augmentation of labour (17%). Some women were monitored for more than one reason. A fetal scalp electrode was

used for over a quarter of the women in labour (table 2).

The mean overall proportion of women receiving restrictive monitoring (defined as: continuous external cardiotocograph trace, fetal scalp electrode or fetal scalp pH) during the first and second stages of labour were 58% and 48% respectively (fig 1). The regional proportions were significantly heterogeneous for both the first ($p=0.0027$) and second stages of labour ($p=0.0001$).

VAGINAL EXAMINATIONS

We compared the minimum expected number of vaginal examinations for each woman adjusted for the length of her labour with the number of examinations that she received. Nearly three quarters (72%) had more vaginal examinations than their expected numbers.

The proportion of all women having more than five vaginal examinations was 12%. The proportions varied significantly ($p=0.0001$) according to geographical region (fig 1).

ARTIFICIAL RUPTURE OF MEMBRANES AND AUGMENTATION OF LABOUR

Artificial rupture of membranes is not always used to expedite labour. For example, it is performed when there is a need to apply a fetal scalp electrode or it can be used because of maternal request. Just over one half of the women in our study had artificial rupture of their membranes. It was performed at varying degrees of cervical dilatation (table 2). The main reasons given for performing artificial rupture of membranes, irrespective of dilatation, were delay in progress (29%), policy of the unit (10%), doubt about fetal well being (9%), application of a scalp electrode, (7%) and for a combination of reasons (36%). The main components of this last category were maternal request (27%), the combination of doubt about fetal well being and need to apply a scalp electrode, (13%) and to expedite labour (9%). The proportion of women who received this intervention did not show appreciable geographical variation.

Figure 1 Percentage and 95% confidence intervals of women having various intrapartum interventions. (Note: to facilitate interpretation the y axes vary on each graph).

Over one third of the women (38%) had their labour augmented. Most commonly this was achieved by drugs (table 2). The UK mean proportion receiving drugs was 28% but there was significant ($p=0.0071$) geographical variation (fig 1).

PAIN RELIEF

A small minority of women had no pain relief throughout labour (3%). For those receiving pain relief the most frequently (27%) used method was a combination of intramuscular and inhaled analgesia (table 2). Twenty eight per cent of women had spinal block or epidural analgesia.

The overall proportions of women receiving a spinal block or epidural analgesia for pain relief during the first and second stages of labour were 27% and 23% respectively. There was marked regional variation in pain relief ($p=0.0003$) during the second stage of labour only (fig 1).

TYPE OF DELIVERY

The majority of women had a spontaneous vaginal delivery (74%). Forceps delivery was required by 14% of the women, 5% had a ventouse delivery, and 6% had a caesarean section. None of these interventions showed significant geographical variation.

EPISIOTOMY AND TEARS

Just under one half of the women (46%) had an episiotomy and of these 6% also had perineal and other tears. Over one third (37%) had perineal or other tears in the absence of episiotomy. The proportion of women having an episiotomy showed significant ($p=0.0001$) regional variation (fig 1).

POSITION AT DELIVERY

Position at delivery was recorded for 2959 (94%) women. The three most common positions were dorsal (980 of 3160), sitting (967 of 3160), and lithotomy (579 of 3160).

THE BABY

There were no infant deaths in this sample. Information about mortality was missing on 11 forms but cross checking to information about the Apgar score suggested that the question had simply been missed out. Twelve babies were reported to have a congenital anomaly at birth. Apgar scores were recorded for 3119 of 3160 (99%) babies; 53% reached an Apgar score of 9 or 10 by one minute, a further 38% by five minutes, and a further 5% by 10 minutes.

Discussion

Most women consider the birth of their child to be a momentous occasion and the belief that this experience could be devalued through too much intervention was a major stimulus for this survey. However, this belief could not be substantiated because there were no national guidelines for the management of normal labour or routinely collected data on the process of intrapartum care.

This paper provides the first comprehensive description about the frequency of seven major intrapartum interventions routinely performed in the UK. There are two key findings. Several interventions seemed to be used more frequently than would be expected in a group of women who were selected because of their expected uneventful pregnancies, and, secondly, the proportions of women having certain interventions varied markedly according to geographical region of the UK.

In the absence of data from clinical trials it is impossible to substantiate the opinion that some of the interventions seem to be used too frequently. However, there is some information that lends support to the notion. For example, cardiotocographic monitoring is not recommended as routine for low risk women⁴ and its efficacy in routine use has been questioned.⁹⁻¹¹ It limits a woman's freedom of movement when used continuously and may interfere with her perception of comfort. Analysis of randomised controlled trials comparing continuous cardiotocography with intermittent auscultation¹² indicated that the risk of caesarean section and operative vaginal deliveries was significantly increased with continuous cardiotocography and that the risk was greatest in low risk pregnancies. Our low risk sample included a large number of women (74%) who had continuous cardiotocographic monitoring. That 5% of our sample had no form of cardiotocography is surprising, however, as a baseline cardiotocographic reading is recommended in most management protocols.¹³ Another example of a seemingly high usage of an intervention is augmentation of labour. Over a third of women (38%) in our study explicitly had their labour augmented and over a half had artificial rupture of membranes. While there is some overlap in the two percentages, as described in the results not all women had rupture of their membranes to expedite labour. These figures are considerably higher than the 4-25% quoted in many standard texts books.⁴ The definition of augmentation of labour in many publications seems rather imprecise and clear interpretation of our percentages is not possible. There is confusion also in the definitions of induction and augmentation and this may hinder the interpretation of the geographical variation of these procedures. However, most midwives assume induction is used to start labour whereas augmentation is used to augment a labour that has already started. We cannot be certain that the standard definitions were used by the midwives completing the abstraction forms, but cross checking about augmentation and the onset of the first stage of labour suggested that 99% of the women who had their labour augmented were in established labour.

The other main finding of the study was the considerable geographical variation in the proportion of women receiving five of the seven intrapartum interventions we investigated. The 18 regions used in our study were the standard health authority regions of England and, separately, the countries of Wales, Northern Ireland, and Scotland. The number of abstraction forms received for each region ranged from 35-340.

The regions returning few forms are typified in figure 1 by large confidence intervals around the proportions of interventions performed. Only augmentation of labour and type of delivery (instrumental, caesarean section, and spontaneous vaginal delivery) showed little variation. The use of episiotomy varied the most, ranging over 41 percentage points, from 26% in one part of the country to 67% in another. The use of invasive fetal monitoring ("invasive" as defined in this study includes continuous cardiotocography as well as placing a fetal scalp electrode and monitoring fetal scalp pH), vaginal examination, epidural analgesia, and syntocinon for the augmentation of labour also showed significant variation although to a lesser extent than episiotomy. The reasons for the variation in these interventions are unclear. Variation in the availability of an anaesthetist might explain the variation in the proportions receiving spinal block or epidural analgesia but this cannot explain the variation in the other procedures. Individual preference might also contribute to the variation because in the absence of guidelines, when to intervene is largely a matter of individual clinical judgement. If minimal intrapartum intervention for low risk women is considered a worthy goal then the development of guidelines might help to reduce the enormous geographical variation in the use of some of these interventions. As a prerequisite, clinical trials are needed to establish the optimum rates for many of the interventions. Trials have been undertaken for episiotomy.¹⁴ The results suggested that rates of above 40% could not be justified for primigravidas. Our study found only three regions in the UK that had rates of 40% or below.

There are three areas in which our study design might hinder interpretation of the data. Firstly, the ratio of included to excluded women suggested that our sample represented about 50% of primigravidas delivering in the UK. All abstraction forms returned to us were dated, which permitted a rudimentary check on whether consecutive primigravidas were reported from each hospital. The logistics of coordinating 97 participating hospitals precluded more formal monitoring of compliance. Although this percentage accords with the frequently quoted 40–50% of truly low risk primigravidas, there were clear differences in the completeness of some hospital's returns. The time and date data indicated that while most hospitals returned realistic numbers of excluded women, there were six hospitals that failed to return any forms for excluded women. Furthermore, in a busy obstetric ward it is highly probable that there was some interruption in recording. Secondly, the shortfall in numbers caused by the hospitals not returning 40 forms might have introduced bias. The collection of 81% of the possible total number of abstraction forms was excellent for this type of study in which a considerable burden was placed on the midwives, but it is theoretically possible that the 19% shortfall may have been very different from those returned. However, two facts suggest that this was not the case. Firstly, the 19% equates to 730 missing

abstraction forms. These were spread over all of the participating hospitals rather than being concentrated in a few. Secondly, the geographical variation was sufficiently large that any influence of the missing forms would be minimal. It could be argued that some of the missing data were about women with particularly quick and easy labours, requiring little intervention, and thus our sample might be biased towards women experiencing harder and longer labours. This seems unlikely. The abstraction forms were specifically designed to be completed as labour progressed. And, our sample included many women who had very short labours: 1% women whose three stages of labour were less than two hours, 5% whose labour was between 2–4 hours, and 12% whose labour was between 4–6 hours.¹⁰ We are unable to ascertain that the hospitals provided information on a consecutive number of primigravid deliveries as this would have required a level of monitoring and finance that was not feasible in a study of this size.

Thirdly, bias may have been introduced by our policy of excluding women who delivered in small units. Our reason for doing this was practical and some bias will have resulted. Women delivering in small units do so because they are deemed by their primary carer to be at low risk of antenatal and intrapartum complication. Exclusion of these women will probably therefore exaggerate the frequency of intervention observed in this study. However, we believe that the effect of bias on the overall results is likely to have been small as only 4.6% of women in the UK deliver in units delivering under 1000 births per annum.

Our study found evidence to suggest that there may be too much intrapartum intervention in six major procedures. Invasive fetal and external cardiotocographic monitoring, vaginal examinations, augmentation of labour by drugs, caesarean section, and the numbers of episiotomies all seem either more frequently performed than recommended or show wide geographical variation. All the procedures and interventions should be evidence based. To contribute to the evidence for intrapartum care clinical trials are needed to determine the optimum levels of all major intrapartum interventions so that clinical guidelines may be developed for obstetricians and midwives to apply in their practice. To enable national audit of the application of such guidelines, the quality of maternity outcome data that is held centrally needs to be improved. Currently, this is achieved to a high standard only in Scotland.

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