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EUROPEAN PERSPECTIVES

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Midwives' perception of intrapartum risk in England, Belgium and France

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Abstract The second half of the last century saw remarkable changes in the delivery of maternity care services, with the introduction of antibiotics and safe anaesthesia. This was associated with a continued decrease in maternal and perinatal mortality and some were quick to establish a cause-and-effect relationship. However, this was challenged by statisticians and technological developments have also been challenged later by some, though embraced by others. An initial study of midwives' practice and perception of risk had demonstrated not only a slight link between higher intrapartum intervention rate and higher perception of risk but also an over-pessimistic evaluation of the chances of normal women to progress normally and an over-optimistic risk perception of the outcomes associated with interventions. Known variations in obstetric practice and caesarean section rates suggested that this study might benefit from replication in other European Union member states. The replication of the initial English study aimed at comparing the intrapartum care provided by midwives in the Belgian Flanders and the French regions of Alsace and Lorraine, as well as their intrapartum risk perception for the outcomes of spontaneous labour of nulliparous women suitable for midwifery-led care. A survey by questionnaire was administered to midwives in England, Belgium and France. In England, the midwives were selected on the basis that they worked in maternity units that made their maternity data available centrally on an annual basis. This enabled the analysis of the level of intrapartum interventions for healthy nulliparous women suitable for midwifery-led care and the subsequent comparison of the level of recommended intrapartum care and risk perception by midwives working in maternity units classified as either "lower" or "higher" intrapartum intervention units. The opportunities to replicate the study in Belgium and France were limited to the survey of midwives' recommended intrapartum care and perception of risk, without the comparison of the actual intrapartum care and outcomes of the maternity units where they practise. All midwives working in the 11 relevant maternity units in England were surveyed. In Belgium, midwives attending the annual Flemish midwives' conference were surveyed, whereas in France the collaboration of two midwifery schools meant that all midwives involved in intrapartum care in two regions – Alsace and Lorraine – were surveyed. The computerised St Mary's Maternity Information System data were subjected to systematic data reduction to analyse the data of healthy Caucasian women at term of a healthy pregnancy and in spontaneous labour. The remaining data were then subjected to descriptive statistics to examine the rate of various intrapartum interventions and to establish an intrapartum score that was used to categorise maternity units as either "lower" or "higher" intrapartum intervention units (Mead and Kornbrot, *Midwifery* 20(1):61–71, 2004). The midwives' surveys were subjected to descriptive statistical analysis. Major differences in midwifery practice were observed in the three countries: English midwives were more likely to monitor the maternal condition than French and Belgian midwives but less likely to use continuous electronic fetal monitoring, restrict maternal nutrition or recommend epidural analgesia. They were also generally

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more pessimistic about women's ability to progress normally in labour. If the variations in methods of delivery observed in England parallel those of France and Belgium, the midwives in all three countries systematically overestimated the benefits of intrapartum intervention and, in particular, epidural analgesia. There are major differences in midwifery practice and in obstetric outcomes in these three countries. It is unlikely that the practices alone can explain the variations in outcomes and, in particular, the differences in caesarean section rates. More research is necessary to examine how the health care systems, perception of risk and attitudes to risk aversion may affect midwifery and obstetric practices and maternity services outcomes.

Keywords Intrapartum care · Midwifery-led care · Risk perception · Midwives · UK · Belgium · France

Background

The industrialised world has experienced a paradoxical situation since the end of the second world war: the improved health status for the majority of the population but an increased medicalisation of the physiological nature of pregnancy for a steadily rising number of women whose pregnancy is perfectly normal and therefore suitable for midwifery-led care and even home birth, should this be the choice of the mother. The maternal and perinatal mortality rates have seen significant improvements throughout western Europe in that period. These were at some point theoretically associated with the increased medicalisation of childbirth and, in the UK, resulted in the recommendation that all women should deliver in a hospital [1], but this was soundly challenged [2]. Specific intrapartum interventions, e.g. induction of labour [3, 4], electronic fetal monitoring [5–7] and epidural analgesia [8, 9], have been the topic of multiple randomised controlled trials that have measured their potential benefits to women or their infants. But there is now strong evidence that this medicalisation has been associated with increased intrapartum interventions, e.g. induction and/or augmentation of labour [10], electronic fetal monitoring [11] and epidural analgesia [12–14], and a rise in abnormal deliveries [12, 15].

Some very specific aspects of care have been challenged, e.g. episiotomy [16] and limited success has been achieved in reducing this practice in some countries. However, in many other areas, a cause for concern remains because, despite best evidence on the unnecessary nature of some practices [17], these continue to be widely practised, e.g. hospitalisation, continuous fetal monitoring, denying nutrition and frequent vaginal examinations. Some are indeed questioning the link between increased unnecessary intervention and a stagnation if not a slight increase in maternal mortality [18, 19].

The differences in midwifery and obstetric practice have usually demonstrated improved maternal and perinatal outcomes, for normal and abnormal pregnancies when the main responsibility for the care rested on midwives rather than on obstetricians [20–23]. Information on the differences in midwifery practice for the care of women suitable for midwifery-led care is not readily available. An initial study undertaken in four neighbouring English maternity units demonstrated wide variations in the intrapartum care of these women [24].

Research undertaken by psychologists has demonstrated a link between practice, uncertainty, discounting of unspecified possibilities and risk aversion [25–28]. The adoption of a risk aversion approach means that even when the patients present with diseases that fit their classic description, the practitioners still resort to excessive testing and attempts at treating putative diagnoses occur all too frequently, leading to errors [29, 30]. It is relatively easy to see how such a theory might be applied to obstetric practice, both by obstetricians and midwives. The lack of sound evidence as a basis for the recommended practice of systematic hospital birth without randomised controlled trials indeed resulted in obstetrics in the UK being awarded the wooden spoon in the mid-1970s [31]. There is still evidence of excessive monitoring or surveillance, during the antenatal period, e.g. routine antenatal vaginal examinations and cytology, multiple ultrasounds but insufficient urine testing [32–34], and in labour, e.g. systematic starvation of women, excessive vaginal examination, continuous fetal monitoring and hospitalisation [35, 36].

Studies on risk perception, uncertainty and error have mainly been undertaken with physicians and none could be identified for midwives. However, the findings of these medical studies and the wide variations in midwifery practice for women suitable for midwifery-led care suggested the hypothesis that midwives working in higher intrapartum intervention units might have a higher perception of intrapartum risk than midwives working in lower intervention units. An initial study tested this hypothesis in England. It included two main components: the analysis of the 1998 St Mary's Maternity Information System (SMMIS) computerised data of 35,367 deliveries from 11 maternities who used the SMMIS database and returned their data to a central research department. A systematic data reduction procedure enabled the analysis of only healthy Caucasian women with a singleton healthy pregnancy, in spontaneous labour at term, and the comparison of the intrapartum interventions between these 11 maternity units. A scoring system was developed to categorise the maternity units into either "lower intrapartum intervention units" or "higher intrapartum intervention units" [37].

The second part of the study was a survey by questionnaire, based on the standardised scenario of a woman suitable for midwifery-led care, and which elicited information on two main areas: (1) reported observations and care on admission and during the first stage of labour and (2) perception of risk for various outcomes at the point of admission in spontaneous labour and during the first stage of labour, given various situations: no interventions, artificial rupture of membranes (ARM), electronic fetal monitoring and epidural [38].

In the light of the variations in midwifery practice throughout Europe [39], an exploration of midwives'

perception of intrapartum risk in countries other than England was worthy of investigation. Invitations to take part in midwifery conferences were accepted on the basis that joint research could be undertaken. This led to the replication of the study, i.e. midwives' reported care and perception of intrapartum risk in Belgium (Flanders) and France (northeast region).

This paper reports the differences in practice and perception of intrapartum risk for women suitable for midwifery-led care in England (London and Hertfordshire), Belgium (Flanders) and France (northeast).

Design

An extensive questionnaire based on a standardised scenario of a healthy nulliparous woman in spontaneous labour at term of a healthy singleton pregnancy was developed for the English study to compare midwives' perception of intrapartum risk for healthy nulliparous women in higher and lower intervention units. One single sentence of the whole questionnaire provided the opportunity to explore the potential changes in midwifery practice for three types of women:

Woman A
: She does not have a birth plan and states that she wishes to rely on the midwife's best judgement for her care during labour.

Woman B
: She has a birth plan and wishes to have minimum intervention, with preferably no artificial rupture of membranes and definitely no epidural.

Woman C
: She has a birth plan and wishes to have 'high-tech' care and supervision, including monitoring and an epidural. She is not quite so sure about artificial rupture of membranes.

The rest of the questionnaire was absolutely identical for all midwives surveyed in England.

The questionnaire took into consideration observations undertaken on admission and during the first stage of labour (e.g. temperature, pulse, blood pressure and urinalysis), as well as information about intrapartum care (e.g. nutrition in labour, use of vaginal examinations and methods of fetal monitoring). The second part of the questionnaire dealt with midwives' perception of risk on admission and during the first stage of labour, focussing specifically on maternal observations, fetal presentation, birth weight, length of labour, fetal oxygenation, use of epidural analgesia and method of delivery, given three distinct scenarios: no intervention, artificial rupture of membranes and epidural analgesia.

Interest from midwifery colleagues in Belgium (Flanders) and France led to the replication of the English study in their country so that the findings could be presented at their first available annual conferences. The initial questionnaire used in England was simplified to include only version woman A of the scenario where the pregnant woman relies on the midwife's best judgment. This decision was based on the finding that there had been no significant changes in the midwives' responses in England, except for a higher reported use of epidural and continuous fetal monitoring associated with scenario woman C. One section on the number of women whom midwives looked after during labour and helped in delivery was added for the Belgian questionnaire because of concerns previously raised on the ability of midwives to fulfil this role in Belgium [39]. This section was maintained in the French survey. The questionnaire was translated into Dutch (MR) and French (MM).

Sample

The midwives who had recent experience of intrapartum care were the target of this study in the three countries. This study had been passed by a multi-centre research ethics committee in England, but local research ethics committees and the maternity units made further specific demands. The sampling was therefore partly constrained by ethical, financial and practical considerations.

The initial English study linked the analysis of the SMMIS data with midwives' reported practice and perception of risk. Eleven maternity units using the SMMIS database and making their data centrally available annually had been selected for the study. In these units, 828 midwives were identified either by the researcher or the midwife in charge of the labour ward as having taken part in intrapartum care in the previous year. Depending on the requirements of the individual units, an envelope containing the questionnaire and a return envelope addressed to MM were given to each midwife or left in the labour ward. The questionnaires were collected in a central location in each unit for collection by MM at a given deadline date.

In Belgium and France, the local midwifery schools supported the printing, distribution and retrieval of the questionnaires. In Belgium, the questionnaires were given to midwives (275) and final-year student midwives (107) who had registered for their annual conference and were collected at their 2004 midwifery conference attended by MM. In France, two schools (Nancy and Strasbourg) collaborated with all the maternity units of the Lorraine and Alsace regions to identify 750 midwives involved in intrapartum care in 2005 and to get the questionnaires distributed and retrieved; all questionnaires were then sent back by MP and SH to MM for analysis.

Findings

The total number of completed questionnaires returned were: UK—249 midwives, Belgium—99 midwives and 26 students and France—270 midwives. It is possible that some midwives may not have gained access to the questionnaire they were meant to receive and the response rate calculated on the basis of the number of midwives who ought to have received it is therefore the lowest possible

Table 1 Admission observations (%)

Observations	England	Belgium	France
Temperature	96	51	93
Pulse	100	59	94
Blood pressure	100	98	100
Proteinuria	90	52	83
Glycosuria	81	34	77
Ketoniuria	74	13	49
Electronic fetal monitoring	73	89	99
Inform a doctor	4	80	19

response rate; it is likely that the response rate for each country is therefore slightly higher than that reported: England—249 of 828 (30%), Belgium —128 of 382 (34%) and France 270 of 750 (36%).

Admission and intrapartum care

Two main areas were examined: (1) the observations that the midwives reported they would undertake at the admission of this woman in labour and during the first stage of labour and (2) the intrapartum risk perception for nulliparous women suitable for midwifery-led care, given the following variations in care: no intervention, ARM and epidural.

The questionnaire asked midwives to identify whether they would undertake the following observations on admission: temperature; pulse; blood pressure; urinalysis for protein, glucose and ketones; abdominal palpation and fetal heart monitoring with fetal stethoscope or electronic monitoring. The midwives were also asked if they would notify a medical practitioner of the admission. Marked differences were observed between the three countries: English and French midwives were more likely to undertake routine maternal observations than Belgian midwives, but the use of electronic fetal monitoring was more common in Belgium and France, and Belgian midwives generally informed a medical practitioner of the admission of a woman in labour whereas this was unusual in France and hardly done at all in England (see Table 1).

The midwives were then asked what observations they would undertake during the first stage of labour. Apart from the observations already identified for the admission procedure, they were also questioned about fetal monitoring and vaginal examinations. Major differences were again identified in the practice reported by midwives in the three countries. Belgian midwives reported undertaking the lowest rate of observations, but the differences in the rate of the observations of the temperature when membranes were ruptured spontaneously or artificially and the low level of urinalysis, in particular to detect ketonuria in Belgium and France, were surprising.

The midwives were asked if they would undertake vaginal examinations regularly or as and when necessary and, whatever their initial response, they were then asked how often these would generally be undertaken. The English midwives reported a four hourly routine, except for one unit where the routine was two hourly. In Belgium and France, the midwives who reported that they would undertake vaginal examinations when necessary were more likely to report a two hourly rather than an hourly rate, but when both one and two hourly rates were combined, the answers revealed that 87% of Belgian and 96% of French midwives reported one or two hourly examinations whereas 90% of the British midwives reported a four hourly routine (see Table 2).

The intrapartum care that midwives would recommend for these healthy women also varied significantly between the three countries. The rate of general observations was higher in England than in France and indeed very limited in Belgium. However, where urinalysis and, in particular, the detection of ketonuria were concerned, this was hardly

Table 2 Intrapartum observations and care (%)

Observations	England	Belgium	France
T°-intact membranes	75	6	29
T°-SRM	95	51	71
T°-ARM	94	45	51
Pulse	97	19	81
Blood pressure	97	59	91
Proteinuria	64	3	6
Glycosuria	56	2	4
Ketonuria	74	2	3
Vaginal examinations	(4 h) 90	(1 and 2 h) 87	(1 and 2 h) 96
Fetal monitoring			
Fetal stethoscope	40	22	–
Intermittent cardiotocography	57	7	44
Continuous cardiotocography	3	26	56
Nutrition			
Nil by mouth or water only	6	40	84
Any solid food	81	38	5

Table 3 Midwives' perception of risk on admission (%)

Condition	England		Belgium	France
	Intervention (−)	Intervention (+)		
Cephalic presentation	94	93	90	93
Breech presentation	5	5	8	6
Transverse lie	1	2	2	1
Head engaged	82	80	69	29
Birth weight 3–4 kg	75	75	71	72
Cardiotocography normal	83	82	79	82
Cardiotocography slightly abnormal	13	13	17	13
Cardiotocography pathological	4	5	5	5

undertaken by French and Belgium midwives despite a more common policy of nil by mouth or water only (see Table 2).

The major differences in fetal monitoring during the first stage of labour were also identified, with French midwives much more likely to opt for continuous monitoring than their English or Belgian colleagues (see Table 2).

Belgian and French midwives were asked how many women they had cared for in the previous 2 months and how many of those they had helped to deliver. A higher rate of intrapartum care supervision was associated with a higher rate of deliveries for French midwives, but not in Belgium where the majority of midwives had cared for women in labour but had undertaken either no delivery or a very small number of it. The main reason given was that doctors were undertaking the majority of normal deliveries.

Risk perception

The second part of the questionnaire asked midwives to identify the chances of various labour and delivery outcomes for 100 women similar to the woman presented in the standardised scenario, on admission and during the first stage of labour given three different levels of intervention: none, ARM or epidural.

At the point of admission, the midwives were asked to identify the likelihood of various outcomes: fetal presentation, engagement of the fetal head, birth weight and fetal oxygenation. The likelihood of a breech presentation at term in the SMMIS database was 2–3%, yet this was identified as 5–8% in the three countries, with the Belgian and French midwives being slightly more pessimistic than their English colleagues. The likelihood of finding the fetal

Table 4 Intrapartum risk perception (mean %)

Outcome	England		Belgium	France
	Intervention (−)	Intervention (+)		
No intervention				
Delivery <12 h	66	63	77	85
Continuous cardiotocography	56	60	53	100
Mild/severe hypoxia	18	17	17	19
Requesting epidural	46	61	63	75
Spontaneous vaginal delivery	72	66	81	80
Forceps/ventouse	16	22	14	13
Emergency caesarean	12	12	5	7
ARM				
Delivery <12 h	76	68	83	91
Continuous cardiotocography	53	60	56	100
Mild/severe hypoxia	22	21	21	21
Requesting epidural	50	65	69	77
Spontaneous vaginal delivery	71	64	78	79
Forceps/ventouse	17	23	16	14
Emergency caesarean	12	13	6	7
Epidural				
Delivery <12 h	59	54	83	90
Continuous cardiotocography	91	82	90	100
Mild/severe hypoxia	22	23	25	22
Spontaneous vaginal delivery	57	51	69	75
Forceps/ventouse	29	34	23	18
Emergency caesarean	14	15	8	7

head engaged in the pelvis was highest in England, slightly lower in Belgium and much lower in France at a very low rate of 29%. The estimation of the birth weight matched the SMMIS findings. Although the actual results of the quality of fetal oxygenation were not readily available, the midwives' estimations were very close in the three countries, yet it seems unlikely that about one fifth of the fetuses of healthy women at term of a healthy pregnancy would have an abnormal fetal heart rate on admission in spontaneous labour (see Table 3).

The perception of intrapartum risks for healthy nulliparous women, given three variations in the scenario (no intervention, ARM and epidural) also revealed significant differences between the three countries. The actual outcome figures were not readily available for healthy nulliparous women suitable for midwifery-led care, but it is worth bearing in mind that the Belgian and French overall caesarean section rates were lower than in the UK [40, 41]. The Belgian and French midwives were generally more optimistic than their British colleagues and thought that women were more likely to deliver within 12 h and to have a spontaneous vaginal delivery. However, there were some paradoxical findings: the midwives generally thought that an ARM would be associated with a shorter labour duration than either no intervention or with the use of an epidural. French midwives saw a slight increase in forceps/ventouse when an epidural was used, but no change in the emergency caesarean section rate. Belgium midwives indicated a very slight increase in abnormal deliveries with the use of an ARM and a slightly higher increase with the use of an epidural. English midwives identified practically no difference in delivery outcome between the "no intervention" and the "ARM" scenarios, but with a marked rise in instrumental vaginal deliveries if an epidural was used (see Table 4).

Discussion

These studies were undertaken at slightly different times (England 1998–2000, Belgium 2004 and France 2005), and the absence of random sampling procedures limit the extent to which the findings can be generalised. However, some of the observed differences were important and there is no evidence that the midwives who answered the questionnaires in any of the three countries were necessarily very different from their colleagues. The individual data of the women suitable for midwifery-led care in maternity units where midwives worked in Belgium and France were not available and, therefore, it is not possible to compare the actual rates of intervention and outcomes to the information provided by the respondents. The initial comparison made between midwives working in higher or lower intrapartum intervention units could not therefore be replicated in the Belgian and French studies. Nonetheless, the information provided by the midwives did enable the comparison of admission and intrapartum care and the midwives' perception of intrapartum risk in the three countries.

These surveys demonstrate that English midwives were more likely to undertake recommended observations for temperature, blood pressure and urinalysis, vaginal examination and fetal monitoring on admission and during the first stage of labour [17]. Some concerns must be raised regarding the low level of observations undertaken by midwives in Belgium and, in particular, the monitoring of blood pressure and the detection of ketonuria during labour. The restrictive approach to nutrition in Belgium, but more particularly in France, is also of some concern, particularly because caloric intake is associated with a reduction in the rate of ketosis [42] and potentially instrumental deliveries due to non-progression of labour, although it is also associated with an increased gastric content volume [43]. However, at a time when emergency caesarean sections are mostly undertaken with epidural analgesia, the risk of Mendelson's syndrome must be extremely low and one has to wonder about the number of women who would need to be starved in labour to prevent one such case. The increased rate of continuous monitoring by French midwives similarly suggests a much higher risk aversion approach to intrapartum care than in Belgium or in England. This would be worthy of further investigation.

All three groups of midwives identified that labour would be more likely to be completed within 12 h if an ARM was performed than if labour progressed without intervention. This suggests an understanding of the randomised controlled trials that have demonstrated a shorter labour with ARM than without it [44]; however, the midwives in the three countries generally failed to identify an increase in caesarean section rates identified in such trials [44], though this has not been verified by others [45, 46].

The retrospective study of the SMMIS data of 4,677 nulliparous women in England demonstrated a marked decrease in spontaneous vaginal deliveries when an epidural was used and a very significant rise in instrumental deliveries and emergency caesarean sections. A rise in intervention was associated with larger babies and longer labours, but healthy nulliparous women in spontaneous labour who did not have an epidural (2,506—54%) had a lower emergency caesarean section rate than those who had an epidural (1.4 vs 19.6%; OR 17.235, CI 95% 12.145–24.450). The differences observed between retrospective and randomised controlled studies suggest that the degree of control that exists potentially in the context of controlled studies may not reflect the actual situation of everyday labour wards.

There are no immediate explanations for the generally higher intrapartum risk perception between English midwives and their colleagues. The English midwives had been shown to be too pessimistic in their perceptions of the likelihood of normal outcomes if labour progressed without intervention or with an ARM only but to be too optimistic when labour progressed with an epidural [38]. Their Belgian and French colleagues were more realistic in their perception of the outcomes associated with no intervention or only ARM but were more optimistic when labour progressed with an epidural. Even when bearing in mind

that the rates of caesarean section are slightly lower in Belgium and France, this degree of optimism, particularly for emergency caesarean sections, is probably misplaced. Further studies identifying the rate of caesarean sections associated with epidural for healthy nulliparous women in spontaneous labour at term would be useful to identify the degree of potential discrepancy between reality and midwives' perception of risk.

However, questions must be raised about why, despite much higher rates of epidural use, Belgian and French women have lower caesarean section rates than their English counterparts. The differences in the health systems of the three countries (health care costs, rates of physicians and specialists per 1,000 inhabitants, availability of specialist medical practitioners within the primary health care sector, initial and continuing training and education of obstetricians and gynaecologists, rate of women accessing the private sector for obstetric care, continuity of care by the obstetricians/gynaecologists and women's expectations) are just some of the areas that are worthy of exploration as they may provide some explanations for the observed differences.

Conclusions

This study confirmed some of the findings of a previous study undertaken in England but also demonstrated wide variations in the intrapartum care provided by midwives to healthy women in spontaneous labour. These findings demonstrate that some practices are not in line with international recommendations of four hourly observations of temperature, blood pressure and vaginal examination [17].

The study also supports the findings of previous studies undertaken within the European Union (EU) that the practice of midwives in Belgium is restricted [39, 47] and probably does not conform to the requirements of the EU directives on the activities of the midwife, in particular where midwives reported that they did not undertake normal deliveries because these were the prerogative of doctors [48]. This has implications for the training of midwives and medical specialists in Europe, particularly if the proposed requirement of 100 normal deliveries, of 40 forceps/ventouse and 40 caesarean sections for trainee obstetricians [49] goes ahead.

Further research is necessary to identify whether the midwives' risk perception matches that of obstetricians, whether the obstetricians are or not involved in the care of healthy women suitable for midwifery-led care and whether risk aversion might be one of the main mechanisms at play when deciding on the optimum intrapartum monitoring and care strategies not only by both midwives and obstetricians but also by other colleagues, in particular anaesthetists.

References

1. Standing Maternity and Midwifery Advisory Committee CJP (1970) Domiciliary midwifery and maternity bed needs. HMSO, London
2. Tew M (1995) Safer childbirth? A critical history of maternity care, 2nd edn. Chapman & Hall, London
3. Boulvain M, Stan C, Irion O (2005) Membrane sweeping for induction of labour. Cochrane Database Syst Rev 2005(1): CD000451
4. Hofmeyr GJ (2001) Induction of labour with misoprostol. Curr Opin Obstet Gynecol 13(6):577–581
5. Noren H, Amer-Wahlin I, Hagberg H, Herbst A, Kjellmer I, Marsal K et al (2003) Fetal electrocardiography in labor and neonatal outcome: data from the Swedish randomized controlled trial on intrapartum fetal monitoring. Am J Obstet Gynecol 188(1):183–192
6. Amer-Wahlin I, Hellsten C, Noren H, Hagberg H, Herbst A, Kjellmer I et al (2001) Cardiotocography only versus cardiotocography plus ST analysis of fetal electrocardiogram for intrapartum fetal monitoring: a Swedish randomised controlled trial. Lancet 358(9281):534–538
7. Thacker S (1987) The efficacy of intrapartum electronic fetal monitoring. Am J Obstet Gynecol 156:24–30
8. Le Ray C, Carayol M, Jaquemin S, Mignon A, Cabrol D, Goffinet F (2005) Is epidural analgesia a risk factor for occiput posterior or transverse positions during labour? Eur J Obstet Gynecol Reprod Biol 123(1):22–26
9. Anim-Somuah M, Smyth R, Howell C (2005) Epidural versus non-epidural or no analgesia in labour. Cochrane Database Syst Rev 2005(4):CD000331
10. Rayburn W, Zhang J (2002) Rising rates of labor induction: present concerns and future strategies. Obstet Gynecol 100 (1):164–167
11. Martin C (1998) Electronic fetal monitoring: a brief summary of its development, problems and prospects. Eur J Obstet Gynecol Reprod Biol 78(2):133–140
12. Government Statistical Service (2002) NHS maternity statistics, 1998–1999 to 2000–2001, bulletin 2002/11. London, England
13. Chamberlain G, Wraight A, Steer P (eds) (1993) Pain and its relief in childbirth—the results of a national survey conducted by the National Birthday Trust. Churchill Livingstone, London
14. Harris J, Chapple J (2000) SMMIS in North Thames (West)—annual maternity figures 1998. Department of Epidemiology and Public Health, Imperial College School of Medicine, London
15. Macfarlane A, Mugford M (2000) Birth counts, statistics of pregnancy and childbirth, vol 1. The Stationery Office, London
16. Sleep J, Grant A (1987) West Berkshire perineal management trial: three year follow up. Br Med J (Clin Res Ed) 295 (6601):749–751
17. World Health Organization (1996) Care in normal birth: a practical guide. WHO, Geneva
18. Salanave B, Bouvier-Colle MH (1996) The likely increase in maternal mortality rates in the United Kingdom and in France until 2005. Paediatr Perinat Epidemiol 10(4):418–422
19. Schuitemaker NW (1999) Maternal mortality in Europe; present and future. Eur J Obstet Gynecol Reprod Biol 86 (2):129–130
20. Tucker JS, Hall MH, Howie PW, Reid ME, Barbour RS, Florey CdV et al (1996) Should obstetricians see women with normal pregnancies? A multicentre randomised controlled trial of routine antenatal care by general practitioners and midwives compared with shared care led by obstetricians. BMJ 312 (7030):554–559
21. Scheepers HC, Essed GG, Brouns F (1998) Aspects of food and fluid intake during labour. Policies of midwives and obstetricians in The Netherlands. Eur J Obstet Gynecol Reprod Biol 78(1):37–40

22. Oakley D, Murray M, Murtland T, Hayashi R, Andersen H, Mayes F et al (1996) Comparisons of outcomes of maternity care by obstetricians and certified nurse–midwives. Obstet Gynecol 88(5):823–829
23. Kamal P, Dixon-Woods M, Kurinczuk JJ, Oppenheimer C, Squire P, Waugh J (2005) Factors influencing repeat caesarean section: qualitative exploratory study of obstetricians' and midwives' accounts. BJOG 112(8):1054–1060
24. Mead M, O'Connor R, Kornbrot D (2000) A comparison of intrapartum care in four maternity units. Br J Midwifery 8 (11):709–715
25. Eddy D (1984) Variations in physician practice: the role of uncertainty. Health Aff 3(2):74–89
26. Tversky A, Fox C (1995) Weighing risk and uncertainty. Psychol Rev 102(2):269–283
27. Tversky A, Kahneman D (Psychological Review) Judgment under uncertainty: heuristics and biases. In: Kahneman D, Slovic P, Tversky A (eds) Judgment under uncertainty: heuristics and biases. Cambridge University Press, Cambridge, pp 3–20
28. Redelmeier DA, Tversky A (1990) Discrepancy between medical decisions for individual patients and for groups. N Engl J Med 322(16):1162–1164
29. Keljo D, Squires R (1996) Clinical problem-solving: just in time. New Engl J Med 334(1):46–48
30. McGoogan E (1984) The autopsy and clinical diagnosis. J R Coll Physicians Lond 18(4):240–243
31. Cochrane A (1979) 1931–1971: a critical review with particular reference to the medical profession. In: Teeling-Smith G (ed) Medicine for the year 2000. Office of Health and Economics, London
32. Kristensen FB, Andersen KV, Andersen AM, Hermann N, Knudsen VW, Nielsen HK (1995) Physical examinations and laboratory tests in antenatal care visits in Denmark. Do reported practice and current official guidelines concord with results of literature reviews? A nationwide study of the public scheme of shared antenatal care in general practice, centres of midwifery and hospital outpatients' clinics. Scand J Prim Health Care 13 (1):52–58
33. Lumbiganon P (1998) Appropriate technology: antenatal care. Int J Gynaecol Obstet 63(Suppl 1):S91–S95
34. Bergsjo P, Villar J (1997) Scientific basis for the content of routine antenatal care. II. Power to eliminate or alleviate adverse newborn outcomes; some special conditions and examinations. Acta Obstet Gynecol Scand 76(1):15–25
35. CNM Data Group 1996 (1999) Oral intake in labour—trends in midwifery practice. J Nurse-Midwifery 44(2):135–138
36. WHO (1985) Having a baby in Europe: report on a study. World Health Organization Regional Office for Europe, Copenhagen
37. Mead MM, Kornbrot D (2004) An intrapartum intervention scoring system for the comparison of maternity units' intrapartum care of nulliparous women suitable for midwifery-led care. Midwifery 20(1):15–26
38. Mead MM, Kornbrot D (2004) The influence of maternity units' intrapartum intervention rates and midwives' risk perception for women suitable for midwifery-led care. Midwifery 20(1):61–71
39. European Midwives Liaison Committee (1996) Activities, responsibilities and independence of midwives within the European Union, 1st edn. EMLC
40. Cammu H, Martens G, De Coen K, Van Mol C, Defoort P (2005) Perinatale activiteiten in Vlaanderen 2004. Studiecentrum voor Perinatale Epidemiologie, Brussels
41. WHO Euro (2004) European health for all database. WHO, Copenhagen
42. Scrutton MJL, Metcalfe GA, Lowy C, Seed PT, O'Sullivan G (1999) Eating in labour. A randomised controlled trial assessing the risks and benefits. Anaesthesia 54(4):329–334
43. Scheepers HCJ, Thans MCJ, Jong PA, Essed GGM, Cessie S, Kanhai HHH (2001) Eating and drinking in labor: the influence of caregiver advice on women's behavior. Birth 28(2):119–123
44. Fraser WD, Turcot L, Krauss I, Brisson-Carrol G (2000) Amniotomy for shortening spontaneous labour. Cochrane Database Syst Rev 2000(2):CD000015
45. Akoury HA, Brodie G, Caddick R, McLaughin VD, Pugh PA (1988) Active management of labor and operative delivery in nulliparous women. Am J Obstet Gynecol 158(2):255–258
46. O'Driscoll K, Meagher D, Robson M (2003) Active management of labour: the Dublin experience, 4th edn. Mosby, Edinburgh
47. Emons J, Luiten M (2001) Midwifery in Europe. The Netherlands
48. European Parliament, European Council (2005) Directive 2005/36/EC of the European Parliament and of the Council on the Recognition of Professional Qualifications. European Union, Brussels
49. Dunlop W (2006) Training the trainers. In: EBCOG (ed) 19th European congress of obstetrics and gynaecology. EBCOG, Turin