Continuous support for women during childbirth (Review)

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ABSTRACT

Background
Historically, women have been attended and supported by other women during labour. However, in recent decades in hospitals worldwide, continuous support during labour has become the exception rather than the routine. Concerns about the consequent dehumanization of women's birth experiences have led to calls for a return to continuous support by women for women during labour.

Objectives
Primary: to assess the effects, on mothers and their babies, of continuous, one-to-one intrapartum support compared with usual care. Secondary: to determine whether the effects of continuous support are influenced by: (1) routine practices and policies in the birth environment that may affect a woman's autonomy, freedom of movement and ability to cope with labour; (2) whether the caregiver is a member of the staff of the institution; and (3) whether the continuous support begins early or later in labour.

Search strategy
We searched the Cochrane Pregnancy and Childbirth Group's Trials Register (February 2007).

Selection criteria
All published and unpublished randomized controlled trials comparing continuous support during labour with usual care.

Data collection and analysis
We used standard methods of the Cochrane Collaboration Pregnancy and Childbirth Group. All authors participated in evaluation of methodological quality. One author and a research assistant independently extracted the data. We sought additional information from the trial authors. We used relative risk for categorical data and weighted mean difference for continuous data to present the results.

Main results
Sixteen trials involving 13,391 women met inclusion criteria and provided usable outcome data. Primary comparison: women who had continuous intrapartum support were likely to have a slightly shorter labour, were more likely to have a spontaneous vaginal birth and less likely to have intrapartum analgesia or to report dissatisfaction with their childbirth experiences. Subgroup analyses: in general, continuous intrapartum support was associated with greater benefits when the provider was not a member of the hospital staff, when it began early in labour and in settings in which epidural analgesia was not routinely available.

Authors' conclusions
All women should have support throughout labour and birth.

PLAIN LANGUAGE SUMMARY

Continuous support in labour increased the chance of a spontaneous vaginal birth, had no identified adverse effects and women were more satisfied

Historically women have been attended and supported by other women during labour and birth. However in many countries these days, as more women are giving birth in hospital rather than at home, continuous support during labour has become the exception rather than the norm. This has raised concerns about the consequent dehumanization of women's childbirth experiences. Modern obstetric care frequently subjects women to institutional routines, which may have adverse effects on the progress of labour. Supportive care during labour may involve emotional support, comfort measures, information and advocacy. These may enhance normal labour processes as well as women's feelings of control and competence, and thus reduce the need for obstetric intervention. The review of studies included 16 trials, from 11 countries, involving over 13,000 women in a wide range of settings and circumstances. Women who received continuous labour support were more likely to give birth 'spontaneously', i.e. give birth with neither caesarean nor vacuum nor forceps. In addition, women were less likely to use pain medications, were more likely to be satisfied, and had slightly shorter labours. In general, labour support appeared to be more effective when it was provided by women who were not part of the hospital staff. It also appeared to be more effective when commenced early in labour. No adverse effects were identified.

BACKGROUND

The first version of this Cochrane Review was published in 1995 (Hodnett 2003) when the first systematic reviews in the Cochrane Collaboration Pregnancy and Childbirth Group Module were converted to the Cochrane Review format. Thus a formal Cochrane Protocol was never published. The Review author, Ellen Hodnett, had completed a trial of labour support (Hodnett 2002a) with a sample size larger than the entire sample in the prior version of the original Review. As a protection against bias, she sought co-authors who were blind to the results of the new trial and who had special expertise that would enhance the quality of the Review. Discussions among the authors led to decisions to modify the background and methods. The authors decided that the best approach would be to write a new Protocol for the Review. The new Protocol was submitted through the peer review process of the Cochrane Pregnancy and Childbirth Group and then developed into the present Review.

Historically and cross-culturally, women have been attended and supported by other women during labour and birth. However, since the middle of the 20th century, in many countries (in both high-income and low- and middle-income countries) as the majority of women gave birth in hospital rather than at home, continuous support during labour has become the exception rather than the routine. Concerns about the consequent dehumanization of women's birth experiences have led to calls for a return to continuous, one-to-one support by women for women during labour (Klaus 2002). Common elements of this care include emotional support (continuous presence, reassurance and praise), information about labour progress and advice regarding coping techniques, comfort measures (comforting touch, massage, warm baths/showers, promoting adequate fluid intake and output) and advocacy (helping the woman articulate her wishes to others).

Two complementary theoretical explanations have been offered for the effects of labour support on childbirth outcomes. Both explanations hypothesize that labour support enhances labour physiology and mothers' feelings of control and competence, reducing reliance on medical interventions. The first theoretical explanation considers possible mechanisms when companionship during labour is used in stressful, threatening and disempowering clinical birth environments (Hofmeyr 1991). During labour women may be uniquely vulnerable to environmental influences; modern obstetric care frequently subjects women to institutional routines, high rates of intervention, unfamiliar personnel, lack of privacy and other conditions that may be experienced as harsh. These conditions may have an adverse effect on the progress of labour and on the development of feelings of competence and confidence; this may in turn impair adjustment to parenthood and establishment of breastfeeding, and increase the risk of depression. This process may to some extent be buffered by the provision of support and companionship during labour.

The second theoretical explanation does not focus on a particular type of birth environment. Rather, it describes two pathways - enhanced passage of the fetus through the pelvis and soft tissues, as well as decreased stress response - by which labour support may reduce the likelihood of operative birth and subsequent complications, and enhance women's feelings of control and satisfaction with their childbirth experiences (Hodnett 2002a). Enhanced fetopelvic relationships may be accomplished by encouraging mobility and effective use of gravity, supporting women to assume their preferred positions and recommending specific positions for specific situations. Studies of the relationships among fear and anxiety, the stress response and pregnancy complications have shown that anxiety during labour is associated with high levels of the stress hormone epinephrine in the blood, which may in turn lead to abnormal fetal heart rate patterns in labour, decreased uterine contractility, a longer active labour phase with regular well-established contractions and low Apgar scores (Lederman 1978; Lederman 1981). Emotional support, information and advice, comfort measures and advocacy may reduce anxiety and fear and associated adverse effects during labour.

Recently continuous support has been viewed as a form of pain relief, specifically, as an alternative to epidural analgesia (Dickinson 2002), because of concerns about the deleterious effects of epidural analgesia on labour progress (Anim-Somuah 2005).

Many labour and birth interventions routinely involve, or increase the likelihood of, co-interventions to monitor, prevent or treat adverse effects, in a "cascade of interventions". Continuous, one-to-one support has the potential to limit this cascade and therefore to have a broad range of different effects, in comparison to usual care. For example, if continuous support leads to reduced use of epidural analgesia, it may in turn involve less use of electronic fetal monitoring, intravenous drips, synthetic oxytocin, drugs to combat hypotension, bladder catheterization, vacuum extraction or forceps, episiotomy and less morbidity associated with these, and may increase mobility during labour and spontaneous birth (Caton 2002).

A systematic review examining factors associated with women's satisfaction with the childbirth experience suggests that continuous support can make a substantial contribution to this satisfaction. When women evaluate their experience, four factors predominate: the amount of support from caregivers, the quality of relationships with caregivers, being involved with decision-making and having high expectations or having experiences that exceed expectations (Hodnett 2002a).

Clarification of the effects of continuous support during labour, overall and within specific circumstances, is important in light of public and social policies and programs that encourage this type of care. For example, the Congress in Uruguay passed a law in 2001 decreeing that all women have the right to companionship during labour. In several low- and middle-income countries (including China, South Africa, Tanzania and Zimbabwe), the Better Births Initiative promotes labour companionship as a core element of care for improving maternal and infant health (WHO 2002).

In North America, the services of women with special training in labour support have become available. Most commonly known as doula (a Greek word for 'handmaiden'), this new member of the caregiver team may also be called a labour companion, birth companion, labour support specialist, labour assistant or birth assistant. A number of North American organizations offer doula training, certification and professional support; and an estimated 35,000 people have received this training to date (P Simkin, personal communication). Some North American hospitals have begun to sponsor doula services. In recent national surveys of childbearing women in the United States, 3% to 5% of respondents indicated that they had used doula services during their most recent labours (Declercq 2002; Declercq 2006). An association for doulas has recently been established in the UK (McGinnis 2001). Efforts to make doula services available are also occurring in countries such as Australia, Bermuda, Brazil, China, the Czech Republic, Israel and South Africa.

Questions have arisen about the ability of employees (such as nurses or midwives) to provide effective labour support, in the context of modern institutional birth environments (Hodnett 1997). For example, nurses and midwives often have simultaneous responsibility for more than one labouring woman, spend a large proportion of time managing technology and keeping records and begin or end work shifts in the middle of women's labours. They may lack labour support skills or may work in short-staffed environments. In addition to questions about the impact of the type of provider of labour support, there are other questions about the effectiveness of support, including its impact under a variety of environmental conditions, and whether its effects are mediated by when continuous support begins (early versus active labour).

Childbearing women, policy-makers, payers of health services, health professionals and facilities and those who provide labour support all need evidence about the effects of continuous support, overall and under specific conditions.

OBJECTIVES

The primary objective was to assess the effects, on mothers and their babies, of continuous, one-to-one intrapartum support compared with usual care, in any setting. Secondary objectives were to determine whether the effects of continuous support are influenced by:
(1) routine practices and policies in the birth environment that may affect a woman's autonomy, freedom of movement and ability to cope with labour, including:
(a) policies about the presence of support people of the woman's own choosing;
(b) epidural analgesia; and
(c) continuous electronic fetal monitoring;
(2) whether the caregiver is a member of the staff of the institution (and thus has additional loyalties or responsibilities, or both); and
(3) whether the continuous support begins early or later in labour.

CRITERIA FOR CONSIDERING STUDIES FOR THIS REVIEW

Types of studies

All controlled trials comparing continuous labour support by either a familiar or unfamiliar person (with or without healthcare professional qualifications) with usual care, in which there was random allocation to treatment and control groups, were considered for inclusion in the Review.

Types of participants

Pregnant women, in labour.

Types of intervention

The form of care that was evaluated was continuous presence and support during labour and birth. The person providing the support could have qualifications as a healthcare professional (nurse, midwife) or training as a doula or childbirth educator, or be a family member, friend or stranger with no special training in labour

support. The control group received usual care, as defined by the trialists. In all cases, 'usual care' did not involve continuous intrapartum support, but it could involve other measures, such as routine epidural analgesia, to help women to cope with labour.

Types of outcome measures

Theoretically continuous support can have many diverse physiological and psychosocial effects (both short- and long-term), and therefore a large number of outcomes were considered. The outcomes fall into the following categories: labour events, birth events, neonatal events, immediate maternal psychological outcomes and longer-term maternal outcomes. The outcomes included:

(A) Labour events
(1) Amniotomy (artificial rupture of membranes);
(2) synthetic oxytocin;
(3) use of electronic fetal monitoring;
(4) epidural analgesia;
(5) any analgesia/anaesthesia (pain medication);
(6) severe pain;
(7) labour length.

(B) Birth events
(8) Caesarean birth;
(9) operative vaginal birth (vacuum extraction or forceps);
(10) spontaneous vaginal birth;
(11) episiotomy;
(12) perineal trauma (defined as episiotomy or laceration requiring suturing).

(C) Newborn events
(13) Low five-minute Apgar score (as defined by trial authors);
(14) low cord pH (as defined by trial authors);
(15) admission to special care nursery;
(16) prolonged newborn hospital stay.

(D) Immediate maternal psychological outcomes
(17) Feeling tense, anxious during labour;
(18) negative rating of/negative feeling about the experience;
(19) perceived difficulty in coping with labour;
(20) perceived low control during labour.

(E) Longer-term maternal outcomes
(21) Postpartum depression;
(22) low self-esteem in the postpartum period;
(23) anxiety in the postpartum period;
(24) difficulty mothering;
(25) less than full breastfeeding;
(26) prolonged perineal pain;
(27) pain during sexual intercourse;
(28) urinary incontinence;
(29) faecal incontinence;
(30) poor relationship with partner.

SEARCH METHODS FOR IDENTIFICATION OF STUDIES

See: Cochrane Pregnancy and Childbirth Group methods used in reviews.

We searched the Cochrane Pregnancy and Childbirth Group's Trials Register by contacting the Trials Search Co-ordinator (February 2007).

The Cochrane Pregnancy and Childbirth Group's Trials Register is maintained by the Trials Search Co-ordinator and contains trials identified from:
(1) quarterly searches of the Cochrane Central Register of Controlled Trials (CENTRAL);
(2) monthly searches of MEDLINE;
(3) handsearches of 30 journals and the proceedings of major conferences;
(4) weekly current awareness search of a further 36 journals plus monthly BioMed Central email alerts.

Details of the search strategies for CENTRAL and MEDLINE, the list of handsearched journals and conference proceedings, and the list of journals reviewed via the current awareness service can be found in the 'Search strategies for identification of studies' section within the editorial information about the Cochrane Pregnancy and Childbirth Group.

Trials identified through the searching activities described above are given a code (or codes) depending on the topic. The codes are linked to review topics. The Trials Search Co-ordinator searches the register for each review using these codes rather than keywords.

We did not apply any language restrictions.

METHODS OF THE REVIEW

We evaluated trials under consideration for methodological quality and appropriateness for inclusion, without consideration of their results. We processed included trial data as described in Higgins 2005. Quality scores for allocation concealment were assigned to each trial, where A = adequate, B = unclear, C = clearly inadequate. Studies rated as a C were eliminated. Wherever necessary, we requested unpublished data from the trial authors. For all data analyses in this Review, we entered data based on the principle of intention to treat. To be included in a given comparison, outcome data had to be available for at least 80% of those who were randomized.

In trials in which some participants had interventions such as analgesia and synthetic oxytocin prior to enrolment, only those interventions which occurred after randomization were included in the data tables.

Where several measures of dissatisfaction were included in a single trial, we selected the measure of the outcome that was most serious and was most congruent with the particular concept. Six trials reported on aspects of women's views about their childbirth experiences. We combined 'low perceived control during labour' with other indicators of negative ratings of the birth experience, such as difficulty in coping with labour, for a combined outcome, 'dissatisfaction with/negative rating of the childbirth experience'.

We double-entered the data and compared the results until we achieved 100% agreement.

We planned and completed five a priori subgroup analyses. The five subgroup analyses were as follows.

(A) Three subgroup analyses that concern characteristics of the childbirth environment
(1) Trials in settings in which women were permitted to be accompanied by one or more support persons of their own choosing versus trials in which accompaniment was not permitted;
(2) trials conducted in settings in which epidural analgesia was available versus trials in settings in which it was unavailable;
(3) trials in which there was a policy of routine electronic fetal heart rate monitoring versus trials in settings in which continuous electronic fetal monitoring was not routine.

(B) One subgroup analysis that concerns characteristics of the providers of labour support
(4) Trials in which the caregivers were employees of the institution, compared to trials in which the caregivers were not staff members.

(C) One subgroup analysis that concerns differences in the timing of onset of continuous support
(5) Trials in which continuous labour support began prior to the onset of active labour, trials in which women were enrolled after the onset of active labour and trials in which women were enrolled at both early and active labour.

Because few of the trial reports contained all of the information needed for the above subgroup analyses, the trial authors were contacted in an attempt to verify the presence/absence of routine electronic fetal monitoring (EFM), the presence/absence of epidural analgesia and timing of onset of continuous support. Some studies included in the primary comparisons were excluded from the subgroup analyses concerning the use of EFM because their status regarding EFM use was unknown. For tests of differences between these subgroups, the overall analysis was recalculated by including only the studies in which EFM use was known.

The prespecified subgroup analyses were restricted to the following outcomes:
(1) analgesia/anaesthesia;
(2) ways of giving birth (caesarean, operative vaginal and spontaneous);
(3) low five-minute Apgar score (as defined by trial authors);
(4) dissatisfaction with or negative views of the childbirth experience; and
(5) postpartum depression.

We combined studies using relative risks as the measure of effect size for binary outcomes. Weighted mean differences were used for most continuous outcome measures. Where trials used different ways of measuring the same outcome, we used standardised mean differences. We analyzed scores from rating scales either as continuous variables, if the scale was sufficiently long for this to be reasonable, or converted to dichotomous variables. We used fixed-effect meta-analysis for combination of studies if the trials were sufficiently similar in their design and interventions that a fixed-effect summary would be meaningful. When there were differences between the trials that were likely to lead to differences in their treatment effects, we used random-effects meta-analysis. We performed tests for heterogeneity, and when heterogeneity was identified, either by a significant result ($P < 0.1$) or obvious inconsistency of the effect sizes of the trials in the analysis, random-effects analysis was preferred.

When significant heterogeneity was present within one subgroup analysis in a comparison, we used the random-effects model for both subgroups. We investigated causes of heterogeneity by the prespecified subgroup analyses. We investigated biases in the studies included in the analyses by means of funnel plots. We used chi-squared tests for differences between subgroups, using the method suggested by Deeks 2001, to determine if the subgroup analyses explained any variation among trials.

Additional information from secondary reports and correspondence with the principal investigator about one trial (Dickinson 2002) led to uncertainties about whether the two study groups differed in the provision of continuous support. Therefore we decided to perform sensitivity analyses, in which we compared study results with and without including the trial.

DESCRIPTION OF STUDIES

Please *see* 'Characteristics of included studies' table. While 17 trials met inclusion criteria, one trial (Thomassen 2003) provided no usable outcome data and will not be described here, but details are provided in the 'Characteristics of included studies' table.

All 16 trials that provided usable outcome data were conducted in hospitals. The trials were conducted in Australia, Belgium, Botswana, Canada, Finland, France, Greece, Guatemala, Mexico, South Africa and the United States, under widely disparate hospital conditions, regulations and routines. There was remarkable consistency in the descriptions of continuous support across all trials. In all instances the intervention included continuous or nearly continuous presence, at least during active labour. Fourteen of the 16 trials that provided usable outcome data (all except Cogan 1988

and Dickinson 2002) also included specific mention of comforting touch and words of praise and encouragement.

In 10 trials (Breart - Belgium; Breart - France; Campbell 2006; Cogan 1988; Dickinson 2002; Gagnon 1997; Hemminki 1990a; Hemminki 1990b; Hodnett 1989; Hodnett 2002a), hospital policy permitted women to be accompanied by their husbands/partners or other family members during labour, while in the other six trials, no additional support people were allowed. Epidural analgesia was routinely available in all but four trials (Breart - Greece; Hofmeyr 1991; Klaus 1986; Madi 1999). Electronic fetal heart rate monitoring was not routine in four trials (Hofmeyr 1991; Klaus 1986; Langer 1998; Madi 1999). In nine trials (Campbell 2006; Cogan 1988; Dickinson 2002; Gagnon 1997; Hemminki 1990a; Hemminki 1990b; Hodnett 1989; Hodnett 2002a; Kennell 1991) electronic fetal monitoring was used routinely. We were unsuccessful in obtaining information about the use of electronic fetal monitoring for three trials (Breart - Belgium; Breart - France; Breart - Greece).

While the form of care that was evaluated was always described as continuous one-to-one support, the timing of onset of support varied. In five trials (Cogan 1988; Dickinson 2002; Hodnett 1989; Klaus 1986; Madi 1999) the support began prior to the onset of active labour; in six trials (Gagnon 1997; Hemminki 1990a; Hemminki 1990b; Hofmeyr 1991; Kennell 1991; Langer 1998) the support began in active labour; and in five trials (Breart - Belgium; Breart - France; Breart - Greece; Campbell 2006; Hodnett 2002a) the support could begin in either early or active labour.

In addition, the persons providing the support intervention varied in their experience, qualifications and relationship to the labouring women. In eight trials (Breart - Belgium; Breart - France; Breart - Greece; Dickinson 2002; Gagnon 1997; Hemminki 1990a; Hemminki 1990b; Hodnett 2002a) the support was provided by a member of the hospital staff, for example, a midwife, student midwife or nurse. In the remaining eight trials the providers were not members of the hospital staff; they were women with or without special training (Hodnett 1989; Hofmeyr 1991; Kennell 1991; Klaus 1986): a childbirth educator (Cogan 1988), retired nurses (Langer 1998) or a female relative or friend (Campbell 2006; Madi 1999). With the exception of the latter two trials (Campbell 2006; Madi 1999) all studies evaluated support by a woman who was not part of the childbearing woman's existing social network. One of the two trials of support by a female relative or friend (Campbell 2006) provided two, two-hour training sessions about labour support to the support person. We found no controlled trials that have evaluated effects of husbands or partners as providers of labour support.

METHODOLOGICAL QUALITY

Allocation concealment: Hodnett 2002a used a central, computerized randomization service accessed by telephone. In 13 trials (Breart - Belgium; Breart - France; Breart - Greece; Campbell 2006; Dickinson 2002; Gagnon 1997; Hemminki 1990a; Hemminki 1990b; Hofmeyr 1991; Kennell 1991; Klaus 1986; Langer 1998; Madi 1999) randomization was by sealed, opaque envelopes. Two trials used methods that were centrally controlled but not concealed (Cogan 1988; Hodnett 1989). One trial (Thomassen 2003) did not describe the method of random assignment.

Performance bias: neither those providing nor receiving care could be blinded to the presence/absence of a person providing continuous support. Hodnett 2002a provided evidence to discount contamination and co-intervention as serious threats to validity. Attrition bias: outcome data were not included in a meta-analysis if there was more than 20% loss to follow up; based on this criterion, one trial (Thomassen 2003) provided no usable outcome data. In the trials which sought participants' evaluations of their birth experiences (Breart - Belgium; Breart - France; Hofmeyr 1991; Hodnett 2002a; Kennell 1991), efforts were made to reduce response bias, through use of an interviewer blinded to the woman's group allocation or self-administered questionnaires.

RESULTS

Sixteen trials involving 13,391 women met the criteria for inclusion in this Review and provided usable outcome data. The relative risks (RR) and confidence intervals (CI) reported below reflect our a priori decisions regarding use of random-effects versus fixed-effect analyses.

Main comparison: continuous support versus usual care - all trials

Thirty outcomes were considered. Between 1 and 16 trials contributed to the analyses of each outcome. Because of the large number of outcomes, the following summary of results is restricted to data collected and reported in at least four trials involving at least 1000 women. Please refer to the meta-analyses graphs for the full results.

Women who had continuous, one-to-one support during labour were less likely to:
(1) have regional analgesia/anaesthesia (seven trials, n = 10,648; RR 0.92, 95% CI 0.85 to 0.99);
(2) have any analgesia/anaesthesia (12 trials, n = 11,651; RR 0.89, 95% CI 0.82 to 0.96);
(3) have an instrumental vaginal birth (15 trials, n = 13,357; RR 0.89, 95% CI 0.82 to 0.96);
(4) have a caesarean birth (16 trials, n = 13,391; RR 0.91, 95% CI 0.83 to 0.99);
(5) report dissatisfaction with or negative rating of the childbirth experience (six trials, n = 9824; RR 0.73, 95% CI 0.65 to 0.83); and
(6) they were more likely to have a spontaneous vaginal birth (15 trials, n = 13,357; RR 1.07, 95% CI 1.04 to 1.12).

Continuous support was also associated with a slightly shorter labour length (10 trials, n = 10,922; weighted mean difference -0.43 hours, 95% CI -0.83 to -0.04).

Using the same criteria as above, i.e. at least four trials involving at least 1000 women, continuous support was not associated with decreased likelihood of:
(1) synthetic oxytocin during labour (ten trials, n = 11,2566; RR 0.94, 95% CI 0.84 to 1.05);
(2) low five-minute Apgar scores (eight trials, n = 11,295; RR 0.72, 95% CI 0.51 to 1.02);
(3) admission of the newborn to a special care nursery (four trials, n = 8239; RR 0.94, 95% CI 0.82 to 1.09); or
(4) postpartum reports of severe labour pain (four trials, n = 2497; RR 0.97, 95% CI 0.77 to 1.23).

There were two other outcomes that are noteworthy because, although reported in fewer than four trials, the data came from more than 1000 women. The meta-analysis of two trials (Hodnett 2002a; Langer 1998) indicates that continuous support was associated with a reduced likelihood that women will report feeling low levels of personal control during labour and birth (n = 7639; RR 0.79, 95% CI 0.67 to 0.94). There was a slight decrease in the use of electronic fetal monitoring (EFM) in the continuous support group in a North American trial (Hodnett 2002a; n = 6915; RR 0.95, 95% CI 0.92 to 0.97).

There remains relatively little information about the effects of continuous intrapartum support on mothers' and babies' health and well-being in the postpartum period. Perineal trauma, other neonatal outcomes, relationship with partner and urinary and faecal incontinence were assessed in one to three trials each, involving between 189 and 7639 women, and no statistically significant differences were found. No data suitable for incorporation into this Review were available for low cord pH, prolonged perineal pain, postpartum anxiety or pain during sexual intercourse. Hodnett 2002a found that continuous support was not associated with a significantly reduced likelihood of postpartum depression (n = 6915; RR 0.89, 95% CI 0.75 to 1.05). However, the South African trial (Hofmeyr 1991) achieved a remarkable 79% follow up under extremely difficult conditions, and the results (while not included in the meta-analyses because loss to follow up was more than 20%) suggest important longer-term benefits of continuous support when it is provided in a resource-poor environment, including reduced likelihood of postpartum depression and anxiety, improved self-esteem, increased confidence in mothering and greater likelihood of successful breastfeeding.

The results of the subgroup analyses are presented below. For two reasons, the number of trials in each subgroup analysis varies: (1) the number of trials that reported any given outcome was highly variable (caesarean delivery was the only outcome reported in all 16 trials); and (2) we were unable to obtain information from all trialists about the routine use of EFM.

The text below does not present the results for postpartum depression. Since only one trial (Hodnett 2002a) reported data about postpartum depression from at least 80% of those originally enrolled, subgroup analyses related to this outcome were not possible.

Please refer to the meta analysis graphs, for individual subgroup analyses related to the outcome of low five-minute Apgar scores. Only one of 11 subgroup comparisons of low five-minute Apgar scores was statistically significant: In the three trials (n = 1201) in which the support people were not members of the hospital staff, RR 0.36, 95% CI 0.14 to 0.90. For low Apgar scores, the interaction tests revealed no evidence of any difference between subgroups.

Subgroup comparisons one to three: influences of variations in institutional policies and practices
Note: in all of the comparisons reported below, there were much larger numbers of participants, in settings in which (1) women were permitted to have support people of their own choosing with them in labour, compared to settings in which other support was not permitted; (2) in which epidural analgesia was routinely available, compared to when it was not routinely available; and (3) in which EFM was routine, compared to when EFM was not routine. The differing sample sizes should be taken into account, when results are interpreted.

Outcome: analgesia/anaesthesia
(1) Policies about whether women were permitted to have support people of their own choosing with them during labour and birth: in settings in which other support people were permitted (seven trials, n = 9752; RR 0.97, 95% CI 0.96 to 0.99) in settings in which other support people were not permitted (five trials, n = 1899; RR 0.72, 95% CI 0.49 to 1.05). The difference between subgroups was not statistically significant (chi squared = 3.33, P = 0.07).

(2) Availability of epidural analgesia: in settings in which epidural analgesia was routinely available (nine trials, n = 10,888; RR 0.90, 95% CI 0.84 to 0.97). In settings in which epidural analgesia was not routinely available (three trials, n = 763; RR 0.71, 95% CI 0.54 to 0.93). The effects of continuous support appeared to be stronger in settings in which epidural analgesia was not routinely available (chi squared = 7.19, P = 0.01).

(3) Use of routine electronic fetal monitoring: in settings in which EFM was routine (six trials, n = 8580; RR 0.88, 95% CI 0.79 to 0.99). In settings in which EFM was not routine (four trials, n = 1487; RR 0.82, 95% CI 0.61 to 1.11). The difference between subgroups was not statistically significant (chi squared = 0.24, P = 0.62).

Outcome: spontaneous vaginal birth
(1) Policies about whether women were permitted to have support people of their own choosing with them during labour and birth: in settings in which other support people were permitted (eight

trials, n = 10,889; RR 1.03, 95% CI 1.00 to 1.06). In settings in which other support was not permitted (six trials, n = 1468; RR 1.11, 95% CI 1.04 to 1.19). The effects of continuous support appeared to be stronger in settings in which other support was not permitted (chi squared = 9.89, P < 0.01).

(2) Availability of epidural analgesia: in settings in which epidural analgesia was routinely available (11 trials, n = 12,025; RR 1.06, 95% CI 1.02 to 1.11). In settings in which epidural analgesia was not routinely available (four trials, n = 1332; RR 1.10, 95% CI 1.01 to 1.20). The effects of continuous support appeared to be stronger in settings in which epidural analgesia was not routinely available (chi squared = 4.96, P = 0.03).

(3) Use of routine EFM: in settings in which EFM was routine (eight trials, n = 9717; RR 1.07, 95% CI 1.01 to 1.13). In settings in which EFM was not routine (four trials, n = 1487; RR 1.11, 95% CI 1.02 to 1.20). The effects of continuous support appeared to be stronger in settings in which EFM was not routine (chi squared = 6.28, P = 0.01).

Outcome: instrumental vaginal birth

(1) Policies about whether women were permitted to have support people of their own choosing with them during labour and birth: in the settings in which other support people were permitted (nine trials, n = 10,889; RR 0.90, 95% CI 0.84 to 0.97). In settings in which other support was not permitted (six trials, n = 2468; RR 0.68, 95% CI 0.42 to 1.10). The difference between subgroups was not statistically significant (chi squared = 1.25, P = 0.26).

(2) Availability of epidural analgesia: in the settings in which epidural analgesia was routinely available (11 trials, n = 12,025; RR 0.85, 95% CI 0.75 to 0.96). In the settings in which epidural analgesia was not routinely available (four trials, n = 1332; RR 0.77, 95% CI 0.43 to 1.38). There was no evidence of a difference in instrumental vaginal birth, based on availability of epidural analgesia (chi squared = 0.00, P = 1.00).

(3) Routine use of EFM: in the settings in which EFM was routine (eight trials, n = 9717; RR 0.84, 95% CI 0.69 to 1.01). In the settings in which EFM was not routine (four trials, n = 1487; RR 0.72, 95% CI 0.38 to 1.36). The difference between subgroups was not statistically significant (chi squared = 0.39, P = 0.53).

Outcome: caesarean birth

(1) Policies about whether women were permitted to have support people of their own choosing with them during labour and birth: in settings in which other support was permitted (10 trials, n = 10,923; RR 0.97, 95% CI 0.88 to 1.07). In settings in which other support was not permitted (six trials, n = 2468; RR 0.71, 95% CI 0.54 to 0.93). The effects of continuous support appeared to be stronger in settings which did not permit the presence of additional support people (chi squared = 4.83, P = 0.03).

(2) Availability of epidural analgesia: in settings in which epidural analgesia was routinely available (12 trials, n = 12,059; RR 0.95, 95% CI 0.86 to 1.04). In settings in which epidural analgesia was not routinely available (four trials, n = 1332; RR 0.62, 95% CI 0.41 to 0.95). The effects of continuous support appeared to be stronger in settings in which epidural analgesia was not routinely available (chi squared = 5.20, P = 0.02).

(3) Routine use of EFM: in settings in which EFM was routine (nine trials, n = 9751; RR 0.95, 95% CI 0.86 to 1.05). In settings in which EFM was not routine (four trials, n = 1487; RR 0.65, 95% CI 0.41 to 1.04). The difference between subgroups was not statistically significant (chi squared = 2.63, P = 0.10).

Outcome: dissatisfaction with/negative views of childbirth experience

(1) Policies about whether women were permitted to have support people of their own choosing with them during labour and birth: in settings in which women were permitted other support (three trials, n = 8499; RR 0.83, 95% CI 0.67 to 1.02). In settings in which other support was not permitted (three trials, n = 1325; RR 0.67, 95% CI 0.58 to 0.78). The difference between subgroups was not statistically significant (chi squared = 3.09, P = 0.08).

(2) Availability of epidural analgesia: in settings in which epidural analgesia was routine (five trials, n = 9635; RR 0.77, 95% CI 0.67 to 0.88). Only one trial (n = 189) in a setting without epidural analgesia reported data about women's views (RR 0.55, 95% CI 0.42 to 0.72). The effects of continuous support may be stronger in settings in which epidural analgesia was not routinely available (chi squared = 4.68, P = 0.03).

(3) Use of routine EFM: two trials (n = 7327) were conducted in settings with routine EFM; RR 0.75, 95% CI 0.61 to 0.92. Two trials (n = 913) were conducted in settings in which EFM was not routine; RR 0.69, 95% CI 0.58 to 0.82. The difference between subgroups was not statistically significant (chi squared = 0.52, P = 0.47).

Subgroup comparison four: impact of type of provider

Outcome: analgesia/anaesthesia

When the providers of continuous support were members of the staff of the institution (six trials, n = 9152; RR 0.97, 95% CI 0.95 to 0.99). When the providers of support were not staff members (six trials, n = 2499; RR 0.80, 95% CI 0.66 to 0.97). The effects of continuous support appear to be stronger when the provider was not a member of the staff (chi squared = 3.82, P = 0.05).

Outcome: spontaneous vaginal birth

When the providers of continuous support were members of the staff (eight trials, n = 10,713; RR 1.03, 95% CI 1.01 to 1.06). When the providers of support were not staff members (seven trials, n = 3244; RR 1.10, 95% CI 1.05 to 1.14). The effects of continuous support appeared to be stronger when the provider was not a member of the staff (chi squared = 9.14, P = 0.01).

Outcome: instrumental vaginal birth

When the providers of continuous support were members of the staff (eight trials, n = 10,713; RR 0.92, 95% CI 0.85 to 0.99). When the providers of support were not staff members (seven trials, n = 2644; RR 0.59, 95% CI 0.44 to 0.79). The effects of continuous support appeared to be stronger when the provider was not a member of the staff (chi squared = 7.21, P = 0.01).

Outcome: caesarean birth

A significant reduction in the likelihood of caesarean birth was only seen in the eight trials (n = 2678) in which the support providers were not members of the staff (RR 0.80, 95% CI 0.68 to 0.95). In the other eight trials (n = 10,713; RR 0.95, 95% CI 0.86 to 1.06). The difference between subgroups was not statistically significant (chi squared = 1.92, P = 0.17).

Outcome: dissatisfaction with/negative rating of childbirth experience

When the providers of continuous support were members of the staff (three trials, n = 8499; RR 0.83, 95% CI 0.67 to 1.02). When the providers of support were not staff members (three trials, n = 1325; RR 0.67, 95% CI 0.58 to 0.78). The difference between subgroups was not statistically significant (chi squared = 3.09, P = 0.08).

Subgroup comparison five: impact of timing of onset of continuous support

Outcome: analgesia/anaesthesia

When continuous support began before active labour (two trials, n = 574; RR 0.61, 95% CI 0.30 to 1.26). When continuous support could begin in either early or active labour (four trials, n = 9099) , RR 0.96, 95% CI 0.92 to 1.00. When continuous support began in active labour (six trials, n = 1978; RR 0.85, 95% CI 0.70 to 1.04). The effects of continuous support appeared to be stronger when support began before labour became active (chi squared = 11.20, P < 0.01).

Outcome: spontaneous vaginal birth

When continuous support began before active labour (four trials, n = 1711; RR 1.16, 95% CI 1.08 to 1.24). When continuous support could begin in either early or active labour (five trials, n = 9668; RR 1.02, 95% CI 1.00 to 1.05). When continuous support began in active labour (six trials, n = 1978; RR 1.07, 95% CI 1.02 to 1.13). The effects of continuous support appear to be stronger when support began before labour became active (chi squared = 17.09, P < 0.001).

Outcome: instrumental vaginal birth

When continuous support began before active labour (four trials, n = 1711; RR 0.76, 95% CI 0.53 to 1.07). When continuous support could begin in either early or active labour (five trials, n = 9668; RR 0.89, 95% CI 0.79 to 1.01). When continuous support began in active labour (six trials, n = 1978; RR 0.82, 95% CI 0.52 to 1.30). The differences among subgroups were not statistically significant (chi squared = 0.92, P = 0.63).

Outcome: caesarean birth

When continuous support began before active labour (five trials, n = 1745; RR 0.71, 95% CI 0.56 to 0.90). When continuous support could begin in either early or active labour (five trials, n = 9668; RR 0.99, 95% CI 0.89 to 1.11). When continuous support began in active labour (six trials, n = 1978; RR 0.81, 95% CI 0.67 to 0.99). The difference between subgroups was statistically significant (chi squared = 6.40, P = 0.04), favouring support that began before labour became active.

Outcome: dissatisfaction with/negative rating of childbirth experience

No trials in which continuous support began in early labour reported information about women's views of their childbirth experiences. Only six trials included data suitable for incorporation in this subgroup analysis. In three trials (n = 8499) in which continuous support could begin in early or active labour (RR 0.83, 95% CI 0.67 to 1.02). In three trials (n = 1325) in which continuous support began in active labour (RR 0.67, 95% CI 0.58 to 0.78). The difference between the two subgroups was not statistically significant (chi squared = 3.09, P = 0.21).

Sensitivity analyses

The sensitivity analyses, in which Dickinson 2002 results were excluded, did not materially change the conclusions of any of the comparisons.

DISCUSSION

This Review summarizes results of 16 trials involving 13,391 women, that took place in 11 countries under a wide variety of circumstances. The methodological quality of the 16 trials was good to excellent. All trials involved continuous one-to-one support provided by women with a variety of experiences, through having given birth themselves and/or through education and practice as nurses, midwives, doulas or childbirth educators.

In the primary comparison, women who experienced continuous one-to-one support during labour were more likely to give birth without using analgesia or anesthesia, more likely to have a spontaneous vaginal birth and less likely to report dissatisfaction with their childbirth experiences; in addition their labours tended to be slighter shorter in length. The trial reports do not list any adverse effects, and none are plausible. This form of care appears to confer important benefits without attendant risks. The results of earlier versions of this Review prompted organizations in Canada, the UK and the USA to issue practice guidelines, advocating continuous support (AWHONN 2002; MIDIRS 1999; SOGC 1995). The results of the primary comparison in the current Review offer continued justification for these practice guidelines.

The subgroup analyses should be interpreted with caution, but consistent patterns suggest that the effectiveness of continuous intrapartum support may be enhanced or reduced by policies in the birth setting, type of provider and timing of onset of support.

We chose three aspects of the birth environment - routine use of electronic fetal monitoring, availability of epidural analgesia and policies about the presence of additional support people of the woman's own choosing - as proxies for environmental conditions that may mediate the effectiveness of labour support. This Review cannot answer questions about the mechanisms whereby settings with epidural analgesia limit the effectiveness of labour support. The impact of epidural analgesia may be direct (Anim-Somuah 2005) or indirect, as part of the 'cascade of interventions' described in the Background. These results raise questions about the ability of labour support to act as a buffer against adverse aspects of routine medical interventions. In contrast, labour support appears to be effective in reducing the adverse consequences of the fear and distress associated with labouring alone in an unfamiliar environment. A report of a qualitative component of one of the included trials (Langer 1998), aptly titled "Alone, I wouldn't have known what to do", provides further justification for this argument.

A major finding of this Review is that effects of continuous labour support appear to vary by type of provider. The reduction in operative birth and the increase in spontaneous birth were lower in magnitude when women received support from women whose training, role or identity, or both, involved responsibilities that extended beyond labour support (that is, members of the staff of the institution), compared to women who were cared for by women whose training, role or identity, or both focused on labour support (that is, women who were not part of the staff and were there solely to provide support). This Review cannot answer questions about the reasons why support provided by non-staff members was generally more effective than support by institutional staff. Divided loyalties, additional duties besides labour support, self-selection and the constraints of institutional policies and routine practices may all have played a role. Childbirth environments influence the healthcare professionals who work in them as well as the women who labour and give birth in them.

This Review provides evidence of a dose-response phenomenon: a strong and prolonged 'dose' of continuous support may be most effective. Continuous labour support appears to be more effective when it is provided by caregivers who are not employees of an institution (and thus have no obligation to anyone other than the labouring woman) and who have an exclusive focus on this task. Continuous labour support that begins earlier in labour appears to be more effective than support that begins later in labour.

AUTHORS' CONCLUSIONS

Implications for practice

Continuous support during labour should be the norm, rather than the exception. All women should be allowed and encouraged to have support people with them continuously during labour. In general, continuous support from a caregiver during labour appears to confer the greatest benefits when the provider is not an employee of the institution, when epidural analgesia is not routinely used, and when support begins in early labour.

Policy makers and hospital administrators in high income countries who wish to effect clinically important reductions in inappropriately high caesarean rates should be cautioned that continuous support by nurses or midwives may not achieve this goal, in the absence of other changes to policies and routines. In many settings, the labour ward functions according to a risk-oriented, technology-dominated approach to care. Institutional staff are unlikely to be able to offer labouring women benefits comparable to non-staff members, in the absence of fundamental changes in the organization and delivery of maternity care. Changes to the content of health professionals' education and to the core identity of professionals may also be important. Policy makers and administrators must look at system reform and rigorous attention to evidence-based use of interventions that were originally developed to diagnose or treat problems and are now used routinely during normal labours.

Every effort should be made to ensure that women's birth environments are empowering, nonstressful, afford privacy, communicate respect and are not characterized by routine interventions that add risk without clear benefit.

In most areas of the world at this time, childbearing women have limited access to trained doulas. Where available, costs of doula services are frequently borne by childbearing families and may be a barrier to access. It may be possible to increase access to one-to-one continuous labour support worldwide by encouraging women to invite a family member or friend to commit to being present at the birth and assuming this role. A comprehensive guidebook for designated companions is available for those with good English literacy (Simkin 2001). The 'Better Births Initiative' is a structured motivational program which promotes humane, evidence-based care during labour. The program focuses on promoting labour companionship and avoiding unproven interventions such as routine starvation, supine position and routine episiotomy. The educational materials for the Better Births Initiative (including a slide presentation on evidence-based care in labour and a video presentation on childbirth companions) are available in the World Health Organization Reproductive Health Library (www.rhlibrary.com), which is distributed free of charge to health workers in resource-poor countries and for a nominal cost in resource-rich countries, in English, Spanish, French and Chinese. The selection of Cochrane Reviews in the Reproductive Health Library includes this Review of continuous labour support.

Implications for research

There remains relatively little information about the effects of continuous intrapartum support on mothers' and babies' health and well-being in the postpartum period. The trials in resource-constrained countries were relatively small, and additional, large

trials may be required in such settings, where the cost of providing continuous support may compete with other resource priorities. Particular attention should be paid to outcomes that have been under-researched in resource-poor settings, but are causes of significant morbidity, including urinary and faecal incontinence, pain during intercourse, prolonged perineal pain and depression. All trials should include economic analyses of the relative costs and benefits.

Questions remain about the best approach to ensuring effective continuous support, under varying conditions. Comparisons of different models of continuous support would be helpful. All comparisons of different models of the provision of support should include cost-effective analyses.

POTENTIAL CONFLICT OF INTEREST

Ellen Hodnett was the principal investigator for two labour support trials. Justus Hofmeyr was the principal investigator for one labour support trial. Carol Sakala is Director of Programs for Childbirth Connection, a maternity care quality organization which promotes continuous labour support.

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REFERENCES

References to studies included in this review

Breart - Belgium *{published data only}*

* Breart G, Garel M, Mlika-Cabanne N. Evaluation of different policies of management of labour for primiparous women. Trial B: Results of the continuous professional support trial. In: KaminskiM editor(s). *Evaluation in pre-, peri-, and post-natal care delivery systems*. Paris: INSERM, 1992:57–68.

Breart G, Mlika-Cabane N, Kaminski M. The evaluation of different policies for the management of labour. Proceedings of 3rd European Health Services Research Meeting; 1991 Dec 13-14; London, UK. 1991.

Breart G, Mlika-Cabane N, Kaminski M, Alexander S, Herruzo-Nalda A, Mandruzzato P, et al. Evaluation of different policies for the management of labour. *Early Human Development* 1992;**29**:309–12.

Breart G, Mlika-Cabane N, Thornton J, Trakas D, Alexander S, Mandruzzato P, et al. European trials on artificial rupture of membranes and professional support during labour. *Journal of Perinatal Medicine* 1992;**20**(Suppl 1):37.

Breart - France *{published data only}*

* Breart G, Garel M, Mlika-Cabanne N. Evaluation of different policies of management of labour for primiparous women. Trial B: Results of the continuous professional support trial. In: KaminskiM editor(s). *Evaluation in pre-, peri-, and post-natal care delivery systems*. Paris: INSERM, 1992:57–68.

Breart G, Mlika-Cabane N, Kaminski M. The evaluation of different policies for the management of labour. Proceedings of 3rd European Health Services Research Meeting; 1991 Dec 13-14; London, UK. 1991.

Breart G, Mlika-Cabane N, Kaminski M, Alexander S, Herruzo-Nalda A, Mandruzzato P, et al. Evaluation of different policies for the management of labour. *Early Human Development* 1992;**29**:309–12.

Breart G, Mlika-Cabane N, Thornton J, Trakas D, Alexander S, et al. European trials on artificial rupture of membranes and professional support during labour. *Journal of Perinatal Medicine* 1992;**20**(Suppl 1):37.

Breart - Greece *{published data only}*

* Breart G, Garel M, Mlika-Cabanne N. Evaluation of different policies of management of labour for primiparous women. Trial B: Re-

sults of the continuous professional support trial. In: KaminskiM editor(s). *Evaluation in pre-, peri-, and post-natal care delivery systems*. Paris: INSERM, 1992:57–68.

Breart G, Mlika-Cabane N, Kaminski M. The evaluation of different policies for the management of labour. Proceedings of 3rd European Health Services Research Meeting; 1991 Dec 13-14; London, UK. 1991.

Breart G, Mlika-Cabane N, Kaminski M, Alexander S, Herruzo-Nalda A, Mandruzzato P, et al. Evaluation of different policies for the management of labour. *Early Human Development* 1992;**29**:309–12.

Breart G, Mlika-Cabane N, Thornton J, Trakas D, Alexander S, et al. European trials on artificial rupture of membranes and professional support during labour. *Journal of Perinatal Medicine* 1992;**20**(Suppl 1):37.

Campbell 2006 *{published and unpublished data}*
Campbell DA, Lake MF, Falk M, Backstrand JR. A randomized control trial of continuous support in labor by a lay doula. *Journal of Obstetric, Gynecologic, and Neonatal Nursing* 2006;**35**(4):456–64.

Cogan 1988 *{published and unpublished data}*
Cogan R, Spinnato JA. Social support during premature labor: effects on labor and the newborn. *Journal of Psychosomatic Obstetrics and Gynaecology* 1988;**8**:209–16.

Dickinson 2002 *{published and unpublished data}*
Dickinson JE, Paech MJ, McDonald SJ, Evans SF. Maternal satisfaction with childbirth and intrapartum analgesia in nulliparous labour. *Australian and New Zealand Journal of Obstetrics and Gynaecology* 2003;**43**:463–8.

* Dickinson JE, Paech MJ, McDonald SJ, Evans SF. The impact of intrapartum analgesia on labour and delivery outcomes in nulliparous women. *Australian and New Zealand Journal of Obstetrics and Gynaecology* 2002;**42**(1):59–66.

Henderson JJ, Dickinson JE, Evans SF, McDonald SJ, Paech MJ. Impact of intrapartum epidural analgesia on breast-feeding duration. *Australian and New Zealand Journal of Obstetrics and Gynaecology* 2003;**43**:372–7.

Gagnon 1997 *{published and unpublished data}*
Gagnon A, Waghorn K. One-to-one nurse labor support of nulliparous women stimulated with oxytocin. *Journal of Obstetric, Gynecologic and Neonatal Nursing* 1999;**28**:371–6.

* Gagnon A, Waghorn K, Covell C. A randomized trial of one-to-one nurse support of women in labor. *Birth* 1997;**24**:71–7.

Hemminki 1990a *{published data only}*
Hemminki E, Virta AL, Koponen P, Malin M, Kojo-Austin H, Tuimala R. A trial on continuous human support during labor: feasibility, interventions and mothers' satisfaction. (Trial A - Pilot study with volunteered midwifery students). *Journal of Psychosomatic Obstetrics and Gynaecology* 1990;**11**:239–50.

Hemminki 1990b *{published data only}*
Hemminki E, Virta AL, Koponen P, Malin M, Kojo-Austin H, Tuimala R. A trial on continuous human support during labor: feasibility, interventions and mothers' satisfaction. (Trial A - Pilot study with volunteered midwifery students). *Journal of Psychosomatic Obstetrics and Gynaecology* 1990;**11**:239–50.

Hodnett 1989 *{published and unpublished data}*
Hodnett ED, Osborn RW. A randomized trial of the effects of monitrice support during labor: mothers' views two to four weeks postpartum. *Birth* 1989;**16**:177–83.

Hodnett ED, Osborn RW. Effects of continuous intrapartum professional support on childbirth outcomes. *Research in Nursing and Health* 1989;**12**:289–97.

Hodnett 2002 *{published and unpublished data}*
* Hodnett ED, Lowe NK, Hannah ME, Willan AR, Stevens B, Weston JA, et al. Effectiveness of nurses as providers of birth labor support in North American hospitals. A randomized controlled trial. *JAMA* 2002;**288**(11):1373–81.

Muir HA, Hodnett ED, Hannah ME, Lowe NK, Willan AR, Stevens B, et al. The influence of continuous labor support on the choice of analgesia, ambulation and obstetric outcome [abstract]. *Anesthesiology* 2002;**96**(Suppl 1):P44.

Hofmeyr 1991 *{published and unpublished data}*
Chalmers B, Wolman WL, Hofmeyr GJ, Nikodem C. Companionship in labour: effect on the mother-infant relationship. Proceedings of the International Conference on Primary Care Obstetrics and Perinatal Health; 1991; Utrecht, The Netherlands. 1991:50.

Chalmers B, Wolman WL, Hofmeyr GJ, Nikodem C. Companionship in labour and the mother-infant relationship: preliminary report of a randomised trial. Proceedings of the 9th Conference on Priorities in Perinatal Care; 1990 March; Johannesburg, South Africa. 1990: 139–41.

Gulmezoglu AM, Chalmers BE, Nikodem VC, Wolman WL, Hofmeyr GJ. Companionship in labour: do the personality characteristics of labour supporters influence effectiveness?. Proceedings of the 11th Conference on Priorities in Perinatal Care in South Africa; 1992 March; Caledon, South Africa. 1992:115–6.

Hofmeyr GJ, Nikodem C, Gulmezoglu M, Wolman WL. Companionship to modify the clinical birth environment: long-term effects on mother and child. Proceedings of the 11th Conference on Priorities in Perinatal Care in South Africa; 1992 March; Caledon, South Africa. 1992:113–4.

Hofmeyr GJ, Nikodem C, Gulmezoglu M, Wolman WL. Companionship to modify the clinical birth environment: long-term effects on mother and child. Proceedings of the 26th British Congress of Obstetrics and Gynaecology; 1992 July 7-10; Manchester, UK. 1992: 34.

Hofmeyr GJ, Nikodem VC, Chalmers BE, Kramer T. Clinically orientated care during labour reduces the chance of successful breastfeeding. Proceedings of the 10th Conference on Priorities in Perinatal Care in South Africa; 1991 March 12-15; Eastern Transvaal, South Africa. 1991:107–9.

Hofmeyr GJ, Nikodem VC, Mahomed K, Gulmezoglu AM, et al. Companionship to modify the clinical birth environment: no measurable effect on stress hormone levels. *Journal of Obstetrics and Gynaecology* 1995;**15**:178–81.

* Hofmeyr GJ, Nikodem VC, Wolman WL, Chalmers BE, Kramer T. Companionship to modify the clinical birth environment: effects on

progress and perceptions of labour, and breastfeeding. *British Journal of Obstetrics and Gynaecology* 1991;**98**:756–64.

Nikodem VC, Nolte AG, Wolman W, Gulmezoglu AM, Hofmeyr GJ. Companionship by a lay labour supporter to modify the clinical birth environment: long-term effects on mother and child. *Curationis* 1998;**21**(1):8–12.

Wolman WL, Chalmers B, Hofmeyr J, Nikodem VC. Postpartum depression and companionship in the clinical birth environment: a randomized, controlled study. *American Journal of Obstetrics and Gynecology* 1993;**168**:1388–93.

Kennell 1991 *{published and unpublished data}*

* Kennell J, Klaus M, McGrath S, Robertson S, Hinkley C. Continuous emotional support during labor in a US hospital. *JAMA* 1991; **265**:2197–201.

Kennell J, Klaus M, McGrath S, Robertson S, Hinkley C. Medical intervention: the effect of social support during labour. Proceedings of Annual Meeting of the American Pediatric Society/Society for Pediatric Research; 1988 May; USA. 1988.

Kennell J, McGrath S, Klaus M, Robertson S, Hinkley C. Labor support: what's good for the mother is good for the baby. *Pediatric Research* 1989;**25**:15A.

Klaus 1986 *{published and unpublished data}*

Klaus MH, Kennell JH, Robertson SS, Sosa R. Effects of social support during parturition on maternal and infant morbidity. *BMJ* 1986; **293**:585–7.

Langer 1998 *{published and unpublished data}*

Campero L, Garcia C, Diaz C, Ortiz O, Reynoso S, Langer A. "Alone, I wouldn't have known what to do": a qualitative study on social support during labor and delivery in Mexico. *Social Science and Medicine* 1998;**47**:395–403.

* Langer A, Campero L, Garcia C, Reynoso S. Effects of psychosocial support during labour and childbirth on breastfeeding, medical interventions, and mothers' wellbeing in a Mexican public hospital: a randomised clinical trial. *British Journal of Obstetrics and Gynaecology* 1998;**105**:1056–63.

Madi 1999 *{published and unpublished data}*

Madi BC, Sandall J, Bennett R, MacLeod C. Effects of female relative support in labor: a randomized controlled trial. *Birth* 1999;**26**:4–8.

Thomassen 2003 *{published data only}*

Thomassen P, Lundwall M, Wiger E, Wollin L, Uvnas-Moberg K. Lakartidningen. Doula--a new concept in obstetrics [Doula--ett nytt begrepp inom forlossningsvarden]. *Lakartidningen* 2003;**100** (51-52):4268–71.

References to studies excluded from this review

Bender 1968

Bender B. A test of the effects of nursing support on mothers in labor. *ANA Regional Clinical Conferences 1967 Philadelphia/Kansas City*. New York: Appleton-Century-Crofts, 1968:171–9.

Dalal 2006

Dalal R, Rathnakumar, Santamani. Birth companion and mother - a preliminary report [abstract]. 49th All India Congress of Obstetrics and Gynaecology; 2006 Jan 6-9; Kerala State, India. 2006:140.

Gordon 1999

Gordon NP, Walton D, McAdam E, Derman J, Gallitero G, Garrett L. Effects of providing hospital-based doulas in health maintenance organization hospitals. *Obstetrics & Gynecology* 1999;**93**:422–6.

Lindow 1998

Lindow SW, Hendricks MW, Thompson JW, van der Spuy ZM. The effect of emotional support on maternal oxytocin levels in labouring women. *European Journal of Obstetrics & Gynecology and Reproductive Biology* 1998;**79**:127–9.

McGrath 1999

McGrath S, Kennell J, Suresh M, Moise K, Hinkley C. Doula support vs epidural analgesia: impact on cesarean rates. Pediatric Research 1999; Vol. 45, issue 4:16A.

Orenstein 1998

Manning Orenstein G. A birth intervention: the therapeutic effects of doula support versus Lamaze preparation on first-time mothers' working models of caregiving. *Alternative Therapies in Medicine* 1998; **4**(4):73–81.

Pinheiro 1996

Pinheiro RT, Sousa PLR, Horta B, de Souza RM, de Sousa MGR, de Sousa FR. Male and female young doulas - effective on labour? [abstract]. Xth World Congress of Psychiatry; 1996 August 23-28; Madrid, Spain. 1996.

Scott 1999

Scott KD, Klaus PH, Klaus MH. The obstetrical and postpartum benefits of continuous support during childbirth. *Journal of Women's Health & Gender-Based Medicine* 1999;**8**(10):1257–64.

Sosa 1980

Sosa R, Kennell J, Klaus M, Urrutia J. The effect of a supportive woman on mothering behavior and the duration and complications of labor. *Pediatric Research* 1979;**13**:338.

* Sosa R, Kennell JH, Klaus MH, Robertson S, Urrutia J. The effect of a supportive companion on perinatal problems, length of labor, and mother-infant interaction. *New England Journal of Medicine* 1980; **303**:597–600.

Trueba 2000

Trueba G, Contreras C, Velazco MT, Lara EG, Martinez HB. Alternative strategy to decrease cesarean section: support by doulas during labor. *Journal of Perinatal Education* 2000;**9**(2):8–13.

Tryon 1966

Tryon PA. Use of comfort measures as support during labor. *Nursing Research* 1966;**15**(2):109–18.

Zhang 1996

Zhang CL, Yu ZJ, Feng AH. Study of psychological nursing to ease pain during labour. *Chinese Journal of Nursing* 1996;**31**(6):311–3.

References to studies awaiting assessment

Kopplin 2000

Kopplin E, Torres-Pereyra J, Peña V, Salinas R. Impact of psychosocial supports during childbirth: the decrease of caesarean and bonuses of the process. *Pediatric Research* 2000;**47**:834.

Additional references

Anim-Somuah 2005

Anim-Somuah M, Smyth R, Howell C. Epidural versus non-epidural or no analgesia in labour. *Cochrane Database of Systematic Reviews* 2005, Issue 4. Art. No.: CD000331. DOI: 10.1002/14651858.CD000331.pub2.

AWHONN 2002

Association of Women's Health, Obstetric, Neonatal Nurses. Professional nursing support of laboring women. http://www.awhonn.org (accessed 2002).

Caton 2002

Caton D, Corry MP, Frigoletto FD, Hopkins DP, Lieberman E, Mayberry L, et al. The nature and management of labor pain: executive summary. *American Journal of Obstetrics and Gynecology* 2002;**186** (5):S1–S15.

Declercq 2002

Declercq ER, Sakala C, Corry MP, Applebaum S, Risher P. *Listening to mothers: report of the first national US survey of women's childbearing experiences*. New York: Maternity Center Association, October 2002.

Declercq 2006

Declercq GD, Sakala C, Corry MP, Applebaum S. *Listening to mothers: report of the second national U.S. survey of women's childbearing experiences*. New York: Childbirth Connection, 2006.

Deeks 2001

Deeks JJ, Altman DG, Bradburn MJ. Statistical methods for examining heterogeneity and combining results from several studies in meta-analysis. In: EggerM, Davey SmithG, AltmanDG editor(s). *Systematic reviews of health care: meta-analysis in context*. London: BMJ Books, 2001.

Higgins 2005

Higgins JPT, Green S, editors. Cochrane Handbook for Systematic Reviews of Interventions 4.2.5 [updated May 2005]. In: The Cochrane Library, Issue 3, 2005. Chichester, UK: John Wiley & Sons, Ltd.

Hodnett 1997

Hodnett E. Are nurses effective providers of labor support? Should they be? Can they be?. *Birth* 1997;**24**:78–80.

Hodnett 2002a

Hodnett ED. Pain and women's satisfaction with the experience of childbirth: a systematic review. *American Journal of Obstetrics and Gynecology* 2002;**186**(5):S160–S172.

Klaus 2002

Klaus MH, Kennell JH, Klaus PH. *The doula book: how a trained labor companion can help you have a shorter, easier and healthier birth*. 2nd Edition. Cambridge, MA: Perseus Books, 2002.

Lederman 1978

Lederman RP, Lederman E, Work BA, Jr, McCann DS. The relationship of maternal anxiety, plasma catecholamines, and plasma cortisol to progress in labor. *American Journal of Obstetrics and Gynecology* 1978;**132**(5):495–500.

Lederman 1981

Lederman E, Lederman RP, Work BA, Jr, McCann DS. Maternal psychological and physiologic correlates of fetal-newborn health status. *American Journal of Obstetrics and Gynecology* 1981;**139**(8):956–8.

McGinnis 2001

McGinnis S. On being a doula. *MIDIRS Midwifery Digest* 2001;**11** (3):362–4.

MIDIRS 1999

MIDIRS and the NHS Centre for Reviews and Dissemination. Support in labour: informed choice for professionals leaflet. Midwives Information and Resource Service 1999.

Simkin 2001

Simkin P. *The birth partner: everything you need to know to help a woman through childbirth*. 2nd Edition. Boston: Harvard Common Press, 2001.

SOGC 1995

Society of Obstetricians and Gynaecologists of Canada. SOGC policy statement: fetal health surveillance in labour. SOGC News 1995: 41–5.

WHO 2002

Effective Care Research Unit and the Reproductive Health Research Unit. Better Births Initiative. WHO Reproductive Health Library (Issue 5, 2002) Geneva: WHO.

References to other published versions of this review

Hodnett 2003

Hodnett ED, Gates S, Hofmeyr G J, Sakala. Continuous support for women during childbirth. *Cochrane Database of Systematic Reviews* 2003, Issue 3. Art. No.: CD003766. DOI: 10.1002/14651858.CD003766.

* *Indicates the major publication for the study*

TABLES

Characteristics of included studies

Study	Breart - Belgium
Methods	RCT, random allocation by sealed, opaque envelopes, prepared by the co-ordinating centre.
Participants	3 trials are reported separately, within 1 publication. Participants were nulliparous, healthy, in spontaneous labour, term, with singleton vertex presentations.

Characteristics of included studies (*Continued*)

	Trial in Belgium: n = 264.
Interventions	Permanent presence of a midwife compared to varying degrees of presence. Fathers were allowed to be present.
Outcomes	Oxytocin, epidural analgesia, labour length, mode of birth, Apgar scores, mothers' views of their experiences.
Notes	
Allocation concealment	A – Adequate

Study	**Breart - France**
Methods	See Breart - Belgium.
Participants	See Breart - Belgium. Trial in France: n = 1320.
Interventions	See Breart - Belgium. Fathers were allowed to be present.
Outcomes	See Breart - Belgium.
Notes	
Allocation concealment	A – Adequate

Study	**Breart - Greece**
Methods	See Breart - Belgium.
Participants	See Breart - Belgium. Trial in Greece: n = 569.
Interventions	See Breart - Belgium. Fathers/family members were not permitted to be present.
Outcomes	See Breart - Belgium, except that mothers' views were not reported.
Notes	
Allocation concealment	A – Adequate

Study	**Campbell 2006**
Methods	RCT. Randomization involved opening consecutively- numbered, sealed opaque envelopes containing computer-generated random assignments. After obtaining consent, a research assistant opened the envelope containing the group assignment.
Participants	600 nulliparous, low-income, under-insured pregnant women between 12 and 38 weeks' gestation who were considered low risk, with no contraindications to labour, who had a female friend or relative willing to act as their lay doula, in addition to support people of their own choosing,and were booked for delivery at a hospital in New Jersey, USA.
Interventions	Doula group: support people of their own choosing plus continuous support by a female friend or relative who had had 2, 2-hour sessions about labour support. The training sessions were conducted for nearly all of the lay doulas when the participants were 34-36 weeks' gestation. Control group: support people of their own choosing.
Outcomes	Labour length, epidural analgesia, oxytocin augmentation, cervical dilation at epidural insertion, length of second stage labour, caesarean birth, 1-min Apgar > 6, 5-min Apgar > 6.
Notes	14 women (9 in the doula group and 5 in the control group) were lost to follow up.
Allocation concealment	B – Unclear

Study	**Cogan 1988**
Methods	RCT. Admitting nurse telephoned research assistant who "randomly assigned the women" to the study groups.

Characteristics of included studies (*Continued*)

Participants	34 women (primigravidas and multigravidas) at 26-37 weeks' gestation in 2 Texas hospitals. They were in early, uncomplicated preterm labour.
Interventions	Support provided by a Lamaze childbirth preparation instructor compared to usual intermittent nursing care. Support included continuous presence, acting as a liaison with hospital staff, providing information, and teaching relaxation and breathing measures. Family members allowed to be present.
Outcomes	Fetal distress, caesarean birth, artificial oxytocin, labour length, Apgar scores, neonatal intensive care.
Notes	
Allocation concealment	B – Unclear

Study	**Dickinson 2002**
Methods	RCT. Randomization on presentation in the labour and delivery unit, "by selection from a blocked group of eight sealed opaque envelopes, replenished from blocks of 12." Prospective stratification for spontaneous or induced labour.
Participants	992 nulliparous women at term, cephalic fetal presentation, cervical dilatation < 5 cm, in a hospital in Perth, Western Australia.
Interventions	Group 1: continuous physical and emotional support by midwifery staff, and women were encouraged to use pharmacologic and nonpharmacologic alternatives to epidural analgesia. Group 2: continuous midwifery support was not provided and women were encouraged to have epidural analgesia as their primary method of pain relief in labour.
Outcomes	Labour length (expressed as median and interquartile range), epidural analgesia, mode of delivery, 5 min Apgar Score < 7, arterial cord pH.
Notes	The stated purpose was to compare the effects of intrapartum analgesic techniques on labour outcomes. Continuous midwifery support was conceptualized as an analgesic technique. Both groups had access to opioids and nitrous oxide. No data were presented about the number of women who used no pharmacologic analgesia. Because the type of analgesia used was a measure of compliance rather than an outcome, no data on analgesic outcomes are included in this Review. Uncertain effects of performance bias. Secondary report indicates very similar reports of satisfaction with midwifery support in the 2 groups, but trial author confirmed that the amount and nature of support did differ. Effects on breastfeeding were not analysed by treatment group and thus the results could not be included in the Review. Satisfaction data were not reported in a usable form for the meta-analyses in this Review.
Allocation concealment	A – Adequate

Study	**Gagnon 1997**
Methods	RCT. Participants were recruited after admission to the delivery suite. Group assignments were in sequentially numbered, sealed, opaque envelopes. Nurses were hired to provide the experimental intervention; they had a 30-hour training program and quarterly refresher workshops. The training program included critical reviews of the literature concerning the effects of intrapartum medical and nursing practices, as well as discussions of stress and pain management techniques.
Participants	413 women admitted to an intrapartum unit at a tertiary care teaching hospital in Montreal, Canada, were randomly allocated to experimental (n = 209) or control (n = 204) groups. All but 3 in the experimental group and 6 in the control group were accompanied by a spouse, relative or friend during labor. All participants were nulliparous, with singleton fetuses, > 37 weeks' gestation, and in labour.
Interventions	Group 1: one-to-one nursing care from on-call nurses who had been hired and trained for the study, from randomization until 1 hour postbirth. The nurse provided the usual nursing care plus physical comfort, emotional support, and instruction on relaxation and coping techniques. The nurse took meal breaks and brief rest breaks. Women in the comparison group received usual nursing care by the regular unit staff, consisting of intermittent support and monitoring.

Characteristics of included studies (*Continued*)

Outcomes	Caesarean birth, caesarean birth for cephalopelvic disproportion or failure to progress, postrandomization artificial oxytocin augmentation, postrandomization analgesia/anaesthesia, instrumental vaginal delivery (forceps or vacuum extraction), NICU admission, perineal trauma, mean duration of labour postrandomization, postpartum urinary catheterization.
Notes	The participants had been admitted to the unit for an average of 5 hours (SD = 4 hours) prior to randomization. 36 women in the experimental group and 41 in the control group had epidural analgesia prior to randomization. 55 women in the experimental group and 45 in the control group had intravenous oxytocin augmentation of labour prior to randomization. Mean duration of labour postrandomization was 9.2 hours (SD = 4.3).
Allocation concealment	A – Adequate

Study	**Hemminki 1990a**
Methods	Two RCTs reported in the same publication. Random allocation in both trials was by sealed opaque envelopes.
Participants	Healthy nulliparous and parous women in labour at a hospital in Finland. 80 women were enrolled in Trial A.
Interventions	Trial A: in 1987, support by midwifery students, who were also responsible for other routine intrapartum care, compared to the usual routine care. The students were not specially trained in support. Over 70% of fathers were present.
Outcomes	Labour length, medical interventions, complications (mother and baby), pharmacologic pain relief, method of birth, mothers' evaluations of their experiences.
Notes	
Allocation concealment	A – Adequate

Study	**Hemminki 1990b**
Methods	See Hemminki 1990a.
Participants	See Hemminki 1990a. 161 women were enrolled in Trial B.
Interventions	Trial B: in 1988, support by a new group of midwifery students. The students were permitted to leave their participants to witness other interventions and deliveries. Slightly less than 70% of fathers were present.
Outcomes	See Hemminki 1990a.
Notes	
Allocation concealment	A – Adequate

Study	**Hodnett 1989**
Methods	RCT. Research assistant telephoned project staff member who used computer-generated table of random numbers.
Participants	145 nulliparous women in the last trimester of a healthy pregnancy, booked for delivery at a Toronto, Canada, hospital.
Interventions	Support provided by a monitrice (community 'lay' midwife or midwifery apprentice) compared to usual hospital care, defined as the intermittent presence of a nurse. Support described as including physical comfort measures, continuous presence, information, emotional support, and advocacy. The monitrice met with the woman twice in the latter weeks of pregnancy, to discuss her birth plans. Comparable prenatal attention was provided to the controls. All but 1 woman also had husbands or partners present during labour. Support began in early labour at home or in hospital and continued through delivery.
Outcomes	Intrapartum interventions, perceived control, method of delivery.
Notes	All participants blinded to the intervention. Control participants received prenatal and postpartum support (after the end of data collection); experimental participants received prenatal and intrapartum support.

	Because of > 20% loss to follow up on most outcomes, the only usable outcomes were method of delivery.
Allocation concealment	C – Inadequate

Study	**Hodnett 2002**
Methods	Multi-centre RCT with prognostic stratification for parity and centre. Women were randomized when staff member telephoned the computerized, centrally-controlled randomization system at the data co-ordinating centre.
Participants	6915 nulliparous and parous women in labour at 13 hospitals in the USA and Canada. Eligibility criteria: live singleton fetus or twins, no contraindications to labour, in labour. Women were excluded if gestational age was < 34 weeks or if they were so high risk that a 1:1 patient-nurse ratio was medically necessary.
Interventions	Continuous support from staff labour and delivery nurses who had volunteered for and received a 2-day training workshop in labour support, compared to usual intrapartum nursing care, defined as intermittent support from a nurse who had not received labour support training. Prior to the trial, the support nurses had opportunities to practice their skills. They also had opportunities to continue learning from each other and the labour support trainer, throughout the trial. The nurses with training were part of the regular staffing complement of the unit and they provided care to the continuous support group but not to the usual care group.
Outcomes	Intrapartum interventions, method of birth, immediate complications (mother or baby), complications (mother or baby) in the first 6-8 weeks' postpartum, perceived control, postpartum depression, breastfeeding at 6-8 weeks, relationship with partner and with baby, likes and dislikes about birth experience and future preferences for labour support.
Notes	
Allocation concealment	A – Adequate

Study	**Hofmeyr 1991**
Methods	RCT, randomization by sealed, opaque envelopes.
Participants	189 nulliparous women in active labour at a community hospital serving low-income women in South Africa.
Interventions	Support by carefully trained, volunteer lay women, for at least several hours (supporters not expected to remain after dark), compared to intermittent care on a busy ward. Husbands/family members were not permitted.
Outcomes	Intrapartum interventions, method of birth, complications (mother and baby), anxiety, pain, mothers' perceptions of labour, breastfeeding.
Notes	The report by Wolman 1993 is a further report of the Hofmeyr trial.
Allocation concealment	A – Adequate

Study	**Kennell 1991**
Methods	RCT plus a retrospective non-random additional control group. Random assignment by sealed, opaque envelopes.
Participants	412 nulliparous women aged 13-34, with singleton, term, healthy pregnancies, many not English-speaking, in active labour at a public hospital in Texas which provides care for low-income patients.
Interventions	Continuous support by a doula compared to routine intermittent presence of a nurse. Family members were not allowed to be present.
Outcomes	Analgesia/anaesthesia, labour length, artificial oxytocin use, method of birth, complications (mother and baby), neonatal health, number of women who rated their experience as negative.
Notes	The description of the setting, the participants, and the type of care echo developing world conditions. This review is restricted to comparisons of the outcomes of the participants who were randomly assigned.

	In instances in which outcome data (such as analgesia/anaesthesia use) in the published report were only provided for subgroups, the primary author was contacted and he provided complete outcome data for all women who were originally randomized.
Allocation concealment	A – Adequate

Study	**Klaus 1986**
Methods	RCT, randomized via sequentially numbered, sealed opaque envelopes. The pool of envelopes contained more assignments to the control group. Of the 465 women enrolled in the study, 48 were excluded, leaving 249 in the control group and 168 in the experimental group. Unpublished data on the excluded women were provided by the author, thereby permitting intention-to-treat analyses.
Participants	465 healthy nulliparous women in labour at the Social Security Hospital in Guatemala.
Interventions	Continuous emotional and physical support by a doula compared to usual hospital routines (described as no consistent support). No family members permitted to be present.
Outcomes	Labour length, use of artificial oxytocin, method of birth, problems during labour and birth, fetal distress, Apgar scores, transfer to neonatal intensive care nursery.
Notes	Mother-infant pairs were excluded when the mother developed a serious complication requiring special care, if the baby's weight was below 5.5 lbs or above 8 lbs, if there were twins or congenital malformations. Because labour length data were only available for 48.4% of the sample (225 of 465), the labour length comparison in this Review excludes the data from Klaus 1986.
Allocation concealment	A – Adequate

Study	**Langer 1998**
Methods	RCT. Randomization was centrally controlled, with sealed, opaque envelopes containing computer-generated random numbers. 20/361 in the intervention group and 36/363 controls were lost to follow up at the 1-month postdelivery.
Participants	724 women admitted for delivery at a large social security hospital in Mexico City, who met the following criteria: singleton fetus, no previous vaginal delivery, < 6 cm cervical dilatation, and no indications for an elective caesarean delivery.
Interventions	Group 1: continuous support from 1 of 10 women who had received doula training (6 were retired nurses), throughout labour, birth, and the immediate postpartum period. Support included: emotional support, information, physical comfort measures, social communication, ensuring immediate contact between mother and baby after birth, and offering advice about breastfeeding during a single brief session postnatally. Women in the comparison group received 'routine care'. Partners and family members were not permitted.
Outcomes	The main outcomes were exclusive and full breastfeeding at 1 month postpartum. Other outcomes included labour length, epidural anaesthesia, forceps birth, caesarean birth, meconium staining, and Apgar scores, as well as mothers' perceived control during childbirth, anxiety, pain, satisfaction, and self-esteem.
Notes	
Allocation concealment	A – Adequate

Study	**Madi 1999**
Methods	RCT, randomization by opaque, numbered, sealed envelopes that were shuffled in the woman's presence. No exclusions postrandomization.
Participants	109 Black Botswana, mean age 19 years, 80% unmarried, mostly students, who had met the following criteria: nulliparous, in labour, pregnancy at term, no history of pregnancy complications, cephalic presentation, normal spontaneous labour with cervical dilation 1-6 cm, female relative present who was willing to remain with the woman for the duration of labour.

Interventions	Continuous presence of female relative (usually her mother) in addition to usual hospital care was compared to usual hospital care, which involved staff:patient ratios of 1:4, and no companions permitted during labour.
Outcomes	Spontaneous vaginal birth, vacuum extraction, caesarean birth, analgesia, amniotomy, artificial oxytocin during labour, Apgar scores (1- and 5-min).
Notes	
Allocation concealment	A – Adequate

Study	**Thomassen 2003**
Methods	RCT, no details regarding method of random assignment. Participants were randomized during pregnancy.
Participants	144 women booked for delivery at a Swedish hospital.
Interventions	Continuous presence by a doula who had met the woman during pregnancy, compared to usual care.
Outcomes	Emergency caesarean birth and epidural analgesia.
Notes	No usable outcome data, due to serious risk of attrition bias. Outcomes are reported for 55/72 (76%) of the intervention group and 46/72 (64%) of the control group. Reason for the 41 "dropouts" were preterm birth, induction, or caesarean section "for medical reasons", and participant withdrawal. No numbers are given for individual reasons, or by group, but it is clear that some "dropouts" were prior to labour and others were during labour. Unfortunately the trial author reported that the information about randomization method and outcomes of those lost to follow up is no longer available.
Allocation concealment	B – Unclear

min: minutes
NICU: neonatal intensive care unit
RCT: randomized controlled trial
SD: standard deviation

Characteristics of excluded studies

Study	**Reason for exclusion**
Bender 1968	2 studies are reported, n = 12 in the first study and n = 30 in the second. Neither one was an RCT. Both employed alternate allocation that was neither centrally controlled nor concealed. The researcher delivered the intervention and collected outcome data. In the first study the researcher also enrolled participants. No usable outcome data are reported.
Dalal 2006	Not an RCT. 100 randomly-selected mothers who had a birth companion were compared to 50 randomly-selected mothers who did not have one. Mothers were matched for age and socioeconomic status.
Gordon 1999	30% of those enrolled were excluded postrandomization, 73/232 in the doula group and 69/246 in the control group. A letter was sent to the first author, asking for data on the excluded participants that would permit an intent-to-treat analysis. If and when a response is received, the trial report will be evaluated again.
Lindow 1998	Support was not continuous, and was quite brief in duration. 16 women in active labour were randomized to either 1 hour with a supportive companion or 1 hour without. The only outcome was maternal oxytocin level for 16 minutes postsupport or control period.
McGrath 1999	An abstract. Insufficient details to permit evaluation of the quality of the trial, and insufficient details regarding results. Thus far, attempts to locate a full report of the trial have been unsuccessful.
Orenstein 1998	Not a randomized trial. Women chose to either have a doula or have Lamaze preparation for childbirth.
Pinheiro 1996	An abstract of a paper presented at the Xth World Congress of Psychiatry in Madrid, 1996. Preliminary results were reported. Efforts to locate a published report of the full trial have been unsuccessful. The abstract provides insufficient details regarding methods, to permit evaluation of the quality of the trial. The purpose was to compare

Characteristics of excluded studies (*Continued*)

	the effectiveness of female vs male doulas vs routine care without doulas. The doulas were medical and psychology students.
Scott 1999	Not a trial. A review of selected studies of intrapartum support.
Sosa 1980	Strong evidence of selection bias. "A woman was removed from the study if labor was false or prolonged; if fetal distress necessitated an intervention such as oxytocin, caesarean delivery, or forceps"; or if the infant was asphyxiated or ill at birth, etc. "If a woman was removed, her group assignment was inserted at random into the pool of unused assignments. Women were enrolled in the study until there were 20 in the control group and 20 in the experimental group." The total study sample of 127 mothers includes 95 in the control group and 32 in the experimental group. Thus assignment was not random.
Trueba 2000	Direct contact with investigator revealed that randomization was not used. On arrival at the hospital, women were asked if they wanted to have a doula. If they accepted, a doula was assigned to them. Also support was not continuous throughout active labour for most women, since admission to the labour ward (and assignment of a doula) did not usually occur until 8 cm.
Tryon 1966	Not an RCT. "After a random start, the matched groups were alternately assigned to experimental and control groups." Women who developed severe complications in labour (number not specified), such as fetal distress, were dropped from the study.
Zhang 1996	Not a trial of continuous one-to-one support. On admission to the labour ward, women received instruction about normal labour, nonpharmacological methods to ease pain, and how to push in second stage, from a team of physicians and nurses. Support was continuous, depending on the women's needs, but not one-to-one.

RCT: randomised controlled trial

vs: versus

ANALYSES

Comparison 01. Continuous support versus usual care - all trials

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Amniotomy	2	298	Relative Risk (Random) 95% CI	0.78 [0.43, 1.43]
02 Synthetic oxytocin during labour	10	11256	Relative Risk (Random) 95% CI	0.94 [0.84, 1.05]
03 Regional analgesia/anaesthesia	7	10648	Relative Risk (Random) 95% CI	0.92 [0.85, 0.99]
04 Any analgesia/anaesthesia	12	11651	Relative Risk (Random) 95% CI	0.89 [0.82, 0.96]
05 Electronic fetal monitoring	1	6915	Relative Risk (Fixed) 95% CI	0.95 [0.92, 0.97]
06 Labour length	10	10922	Weighted Mean Difference (Random) 95% CI	-0.43 [-0.83, -0.04]
07 Spontaneous vaginal birth	15	13357	Relative Risk (Random) 95% CI	1.07 [1.04, 1.12]
08 Instrumental vaginal birth	15	13357	Relative Risk (Fixed) 95% CI	0.89 [0.82, 0.96]
09 Caesarean birth	16	13391	Relative Risk (Fixed) 95% CI	0.91 [0.83, 0.99]
10 Episiotomy	1	6915	Relative Risk (Fixed) 95% CI	0.97 [0.90, 1.05]
11 Perineal trauma	2	7328	Relative Risk (Fixed) 95% CI	0.99 [0.95, 1.03]
12 Low 5-minute Apgar score	8	11295	Relative Risk (Fixed) 95% CI	0.72 [0.51, 1.02]
13 Low cord pH	0	0	Relative Risk (Random) 95% CI	Not estimable
14 Admission to special care nursery	4	8239	Relative Risk (Fixed) 95% CI	0.94 [0.82, 1.09]
15 Prolonged neonatal hospital stay	1	412	Relative Risk (Fixed) 95% CI	0.61 [0.37, 1.01]
16 Postpartum report of severe labour pain	4	2497	Relative Risk (Random) 95% CI	0.97 [0.77, 1.23]
17 Postpartum report of difficulty in coping with labour	1	189	Relative Risk (Fixed) 95% CI	0.55 [0.42, 0.72]

18 Postpartum report of low control during labour	2	7639	Relative Risk (Fixed) 95% CI	0.79 [0.67, 0.94]
19 Postpartum report of high anxiety during labour	3	1773	Relative Risk (Random) 95% CI	0.88 [0.43, 1.78]
20 Dissatisfaction with/negative views of birth experience	6	9824	Relative Risk (Fixed) 95% CI	0.73 [0.65, 0.83]
21 Prolonged perineal pain	0	0	Relative Risk (Random) 95% CI	Not estimable
22 Difficulty mothering	1	6915	Relative Risk (Random) 95% CI	1.03 [0.95, 1.11]
23 Not breastfeeding at 1-2 months postpartum	2	7639	Relative Risk (Fixed) 95% CI	1.06 [0.99, 1.13]
24 Postpartum depression	1	6915	Relative Risk (Fixed) 95% CI	0.89 [0.75, 1.05]
25 Postpartum anxiety/tension	0	0	Relative Risk (Random) 95% CI	Not estimable
26 Low postpartum self-esteem	1	724	Relative Risk (Fixed) 95% CI	1.07 [0.82, 1.40]
27 Poor relationship with partner postpartum	1	6915	Relative Risk (Fixed) 95% CI	1.00 [0.80, 1.23]
28 Pain during sexual intercourse	0	0	Relative Risk (Random) 95% CI	Not estimable
29 Postpartum urinary incontinence	1	6915	Relative Risk (Fixed) 95% CI	0.93 [0.81, 1.06]
30 Postpartum faecal incontinence	1	6915	Relative Risk (Fixed) 95% CI	0.89 [0.64, 1.24]

Comparison 02. Continuous support during labour versus usual care - variations in institutional policies and practices

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Use of analgesia/anaesthesia			Relative Risk (Random) 95% CI	Subtotals only
02 Spontaneous vaginal birth			Relative Risk (Random) 95% CI	Subtotals only
03 Instrumental vaginal birth			Relative Risk (Random) 95% CI	Subtotals only
04 Caesarean birth			Relative Risk (Random) 95% CI	Subtotals only
05 Low 5-minute Apgar score			Relative Risk (Random) 95% CI	Subtotals only
06 Dissatisfaction with/negative views of childbirth experience			Relative Risk (Fixed) 95% CI	Subtotals only
07 Postpartum depression			Relative Risk (Fixed) 95% CI	Subtotals only

Comparison 03. Continuous support during labour versus usual care - variations in type of provider

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Use of analgesia/anaesthesia			Relative Risk (Random) 95% CI	Subtotals only
02 Spontaneous vaginal birth			Relative Risk (Fixed) 95% CI	Subtotals only
03 Instrumental vaginal birth			Relative Risk (Fixed) 95% CI	Subtotals only
04 Caesarean birth			Relative Risk (Fixed) 95% CI	Subtotals only
05 Low 5-minute Apgar score			Relative Risk (Fixed) 95% CI	Subtotals only
06 Dissatisfaction with/negative views of childbirth experience			Relative Risk (Fixed) 95% CI	Subtotals only
07 Postpartum depression			Relative Risk (Fixed) 95% CI	Subtotals only

Comparison 04. Continuous support during labour versus usual care - variations in timing of onset of support

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Use of analgesia/anaesthesia			Relative Risk (Random) 95% CI	Subtotals only
02 Spontaneous vaginal birth			Relative Risk (Fixed) 95% CI	Subtotals only
03 Instrumental vaginal birth			Relative Risk (Random) 95% CI	Subtotals only
04 Caesarean birth			Relative Risk (Fixed) 95% CI	Subtotals only
05 Low 5-minute Apgar score			Relative Risk (Fixed) 95% CI	Subtotals only
06 Dissatisfaction with/negative views of childbirth experience			Relative Risk (Fixed) 95% CI	Subtotals only
07 Postpartum depression			Relative Risk (Fixed) 95% CI	Subtotals only

INDEX TERMS

Medical Subject Headings (MeSH)

*Delivery, Obstetric [methods; nursing]; *Labor, Obstetric; Midwifery; Obstetrical Nursing; Randomized Controlled Trials

MeSH check words

Female; Humans; Pregnancy

COVER SHEET

Title	Continuous support for women during childbirth
Authors	Hodnett ED, Gates S, Hofmeyr GJ, Sakala C
Contribution of author(s)	Ellen Hodnett wrote the initial draft of the protocol and entered the data. Carol Sakala wrote the initial draft of the Discussion. Simon Gates wrote the initial draft of the statistical methods and provided statistical advice for the Protocol and Review. All review authors participated in all aspects of the preparation of the protocol and in writing the text of the Review. All authors participated in the update of the Review.
Issue protocol first published	2002/3
Review first published	2003/3
Date of most recent amendment	22 May 2007
Date of most recent SUBSTANTIVE amendment	18 April 2007
What's New	February 2007 Search updated. Two new trials identified. We excluded one (Dalal 2006) and included the other (Campbell 2006). The Results section was updated accordingly. With the exception of the outcome of labour length, there were no substantive changes in results or conclusions of the Review. Minor edits were made throughout. Additional text was added to the Discussion. April 2006 Search updated. One 'awaiting assessment' trial was assessed and included (Thomassen 2003).
Date new studies sought but none found	Information not supplied by author
Date new studies found but not yet included/excluded	Information not supplied by author

Date new studies found and included/excluded	28 February 2007
Date authors' conclusions section amended	Information not supplied by author
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Editorial group code	HM-PREG

GRAPHS AND OTHER TABLES

Analysis 01.01. Comparison 01 Continuous support versus usual care - all trials, Outcome 01 Amniotomy

Review: Continuous support for women during childbirth

Comparison: 01 Continuous support versus usual care - all trials

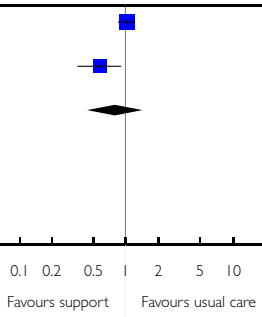
Outcome: 01 Amniotomy

Study	Continuous support n/N	Usual care n/N	Relative Risk (Random) 95% CI	Weight (%)	Relative Risk (Random) 95% CI
Hofmeyr 1991	66/92	69/97		56.6	1.01 [0.84, 1.21]
Madi 1999	16/53	30/56		43.4	0.56 [0.35, 0.91]
Total (95% CI)	145	153		100.0	0.78 [0.43, 1.43]

Total events: 82 (Continuous support), 99 (Usual care)

Test for heterogeneity chi-square=5.68 df=1 p=0.02 I^2 =82.4%

Test for overall effect z=0.79 p=0.4



Analysis 01.02. Comparison 01 Continuous support versus usual care - all trials, Outcome 02 Synthetic oxytocin during labour

Review: Continuous support for women during childbirth

Comparison: 01 Continuous support versus usual care - all trials

Outcome: 02 Synthetic oxytocin during labour

Study	Continuous support n/N	Usual care n/N	Relative Risk (Random) 95% CI	Weight (%)	Relative Risk (Random) 95% CI
Breart - Belgium	55/133	64/131		9.5	0.85 [0.65, 1.11]
Breart - France	383/656	371/664		17.7	1.04 [0.95, 1.15]
Breart - Greece	224/295	193/274		17.4	1.08 [0.98, 1.19]
Gagnon 1997	82/209	96/204		11.3	0.83 [0.67, 1.04]
Hodnett 2002	1040/3454	942/3461		18.5	1.11 [1.03, 1.19]
Hofmeyr 1991	16/92	17/97		2.9	0.99 [0.53, 1.85]
Kennell 1991	36/212	46/200		5.9	0.74 [0.50, 1.09]
Klaus 1986	4/186	37/279		1.2	0.16 [0.06, 0.45]
Madi 1999	7/53	17/56		1.8	0.44 [0.20, 0.96]
Campbell 2006	134/300	145/300		13.8	0.92 [0.78, 1.10]
Total (95% CI)	5590	5666		100.0	0.94 [0.84, 1.05]
Total events: 1981 (Continuous support), 1928 (Usual care)					
Test for heterogeneity chi-square=31.67 df=9 p=0.0002 I^2 =71.6%					
Test for overall effect z=1.08 p=0.3					

Analysis 01.03. Comparison 01 Continuous support versus usual care - all trials, Outcome 03 Regional analgesia/anaesthesia

Review: Continuous support for women during childbirth

Comparison: 01 Continuous support versus usual care - all trials

Outcome: 03 Regional analgesia/anaesthesia

Study	Continuous support n/N	Usual care n/N	Relative Risk (Random) 95% CI	Weight (%)	Relative Risk (Random) 95% CI
Breart - Belgium	55/133	62/131		5.6	0.87 [0.67, 1.15]
Breart - France	281/656	319/664		14.6	0.89 [0.79, 1.00]
Gagnon 1997	139/209	142/204		13.3	0.96 [0.84, 1.09]
Hodnett 2002	2331/3454	2406/3461		22.5	0.97 [0.94, 1.00]
Kennell 1991	47/212	94/200		5.0	0.47 [0.35, 0.63]
Langer 1998	295/361	303/363		19.6	0.98 [0.92, 1.05]
Campbell 2006	247/300	260/300		19.5	0.95 [0.89, 1.02]
Total (95% CI)	5325	5323		100.0	0.92 [0.85, 0.99]

Total events: 3395 (Continuous support), 3586 (Usual care)

Test for heterogeneity chi-square=26.47 df=6 p=0.0002 I^2 =77.3%

Test for overall effect z=2.36 p=0.02

Analysis 01.04. Comparison 01 Continuous support versus usual care - all trials, Outcome 04 Any analgesia/ anaesthesia

Review: Continuous support for women during childbirth

Comparison: 01 Continuous support versus usual care - all trials

Outcome: 04 Any analgesia/anaesthesia

Study	Continuous support n/N	Usual care n/N	Relative Risk (Random) 95% CI	Weight (%)	Relative Risk (Random) 95% CI
Breart - Belgium	55/133	62/131		5.4	0.87 [0.67, 1.15]
Breart - France	281/656	319/664		12.0	0.89 [0.79, 1.00]
Gagnon 1997	141/209	142/204		11.3	0.97 [0.85, 1.10]
Hemminki 1990a	25/41	23/38		3.6	1.01 [0.71, 1.44]
Hemminki 1990b	45/81	52/80		5.9	0.85 [0.66, 1.10]
Hodnett 2002	3077/3454	3159/3461		16.8	0.98 [0.96, 0.99]
Hofmeyr 1991	11/92	15/97		1.0	0.77 [0.37, 1.59]
Kennell 1991	93/212	150/200		9.1	0.58 [0.49, 0.69]

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Study	Continuous support n/N	Usual care n/N	Relative Risk (Random) 95% CI	Weight (%)	Relative Risk (Random) 95% CI
Klaus 1986	2/186	10/279		0.3	0.30 [0.07, 1.35]
Langer 1998	295/361	302/363		14.9	0.98 [0.92, 1.05]
Madi 1999	28/53	41/56		4.7	0.72 [0.53, 0.97]
Campbell 2006	247/300	260/300		14.9	0.95 [0.89, 1.02]
Total (95% CI)	5778	5873		100.0	0.89 [0.82, 0.96]
Total events: 4300 (Continuous support), 4535 (Usual care)					
Test for heterogeneity chi-square=52.14 df=11 p=<0.0001 I^2 =78.9%					
Test for overall effect z=3.02 p=0.003					

Analysis 01.05. Comparison 01 Continuous support versus usual care - all trials, Outcome 05 Electronic fetal monitoring

Review: Continuous support for women during childbirth

Comparison: 01 Continuous support versus usual care - all trials

Outcome: 05 Electronic fetal monitoring

Study	Continuous support n/N	Usual care n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Hodnett 2002	2590/3454	2741/3461		100.0	0.95 [0.92, 0.97]
Total (95% CI)	3454	3461		100.0	0.95 [0.92, 0.97]
Total events: 2590 (Continuous support), 2741 (Usual care)					
Test for heterogeneity: not applicable					
Test for overall effect z=4.16 p=0.00003					

Analysis 01.06. Comparison 01 Continuous support versus usual care - all trials, Outcome 06 Labour length

Review: Continuous support for women during childbirth

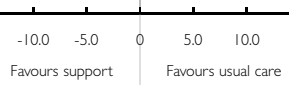
Comparison: 01 Continuous support versus usual care - all trials

Outcome: 06 Labour length

Study	Continuous support		Usual care		Weighted Mean Difference (Random)	Weight	Weighted Mean Difference (Random)
	N	Mean(SD)	N	Mean(SD)	95% CI	(%)	95% CI
Breart - Belgium	133	6.27 (5.37)	131	6.80 (4.07)		7.3	-0.53 [-1.68, 0.62]
Breart - France	656	6.77 (2.57)	664	7.07 (2.68)		17.2	-0.30 [-0.58, -0.02]
Breart - Greece	295	6.67 (3.75)	274	6.33 (3.92)		12.7	0.34 [-0.29, 0.97]
Gagnon 1997	209	9.10 (4.10)	204	9.40 (4.70)		10.1	-0.30 [-1.15, 0.55]
Hemminki 1990a	41	8.30 (6.20)	38	10.00 (6.80)		1.7	-1.70 [-4.58, 1.18]
Hemminki 1990b	81	7.60 (4.90)	80	9.20 (6.10)		4.1	-1.60 [-3.31, 0.11]
Hodnett 2002	3454	7.10 (4.40)	3461	6.90 (4.30)		18.0	0.20 [-0.01, 0.41]
Hofmeyr 1991	92	9.60 (3.93)	97	10.20 (4.92)		6.4	-0.60 [-1.87, 0.67]
Kennell 1991	212	7.40 (3.80)	200	8.40 (4.20)		10.9	-1.00 [-1.77, -0.23]
Campbell 2006	300	10.40 (4.30)	300	11.70 (4.80)		11.5	-1.30 [-2.03, -0.57]
Total (95% CI)	5473		5449			100.0	-0.43 [-0.83, -0.04]

Test for heterogeneity chi-square=33.07 df=9 p=0.0001 I^2 =72.8%

Test for overall effect z=2.16 p=0.03



Analysis 01.07. Comparison 01 Continuous support versus usual care - all trials, Outcome 07 Spontaneous vaginal birth

Review: Continuous support for women during childbirth

Comparison: 01 Continuous support versus usual care - all trials

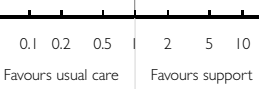
Outcome: 07 Spontaneous vaginal birth

Study	Continuous support n/N	Usual care n/N	Relative Risk (Random) 95% CI	Weight (%)	Relative Risk (Random) 95% CI
Breart - Belgium	97/133	87/131		4.1	1.10 [0.94, 1.29]
Breart - France	453/656	424/664		9.4	1.08 [1.00, 1.17]
Breart - Greece	215/295	194/274		7.1	1.03 [0.93, 1.14]
Dickinson 2002	280/499	239/493		6.0	1.16 [1.03, 1.30]
Gagnon 1997	132/209	127/204		4.5	1.01 [0.87, 1.18]
Hemminki 1990a	38/41	34/38		4.9	1.04 [0.90, 1.19]
Hemminki 1990b	76/81	72/80		8.0	1.04 [0.95, 1.14]
Hodnett 1989	47/72	42/73		1.8	1.13 [0.88, 1.47]
Hodnett 2002	2481/3454	2463/3461		14.0	1.01 [0.98, 1.04]
Hofmeyr 1991	74/92	76/97		4.7	1.03 [0.89, 1.19]
Kennell 1991	179/212	137/200		6.6	1.23 [1.10, 1.38]
Klaus 1986	172/186	225/279		10.0	1.15 [1.07, 1.23]
Langer 1998	264/361	254/363		8.0	1.05 [0.95, 1.15]
Madi 1999	48/53	40/56		3.2	1.27 [1.05, 1.53]
Campbell 2006	223/300	220/300		7.7	1.01 [0.92, 1.11]
Total (95% CI)	6644	6713		100.0	1.07 [1.04, 1.12]

Total events: 4779 (Continuous support), 4634 (Usual care)

Test for heterogeneity chi-square=29.60 df=14 p=0.009 I^2 =52.7%

Test for overall effect z=3.77 p=0.0002



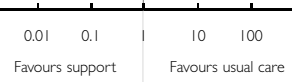
Analysis 01.08. Comparison 01 Continuous support versus usual care - all trials, Outcome 08 Instrumental vaginal birth

Review: Continuous support for women during childbirth

Comparison: 01 Continuous support versus usual care - all trials

Outcome: 08 Instrumental vaginal birth

Study	Continuous support n/N	Usual care n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Breart - Belgium	31/133	39/131		3.3	0.78 [0.52, 1.17]
Breart - France	163/656	204/664		17.2	0.81 [0.68, 0.96]
Breart - Greece	50/295	46/274		4.0	1.01 [0.70, 1.45]
Dickinson 2002	148/499	169/493		14.4	0.87 [0.72, 1.04]
Gagnon 1997	48/209	44/204		3.8	1.06 [0.74, 1.53]
Hemminki 1990a	3/41	1/38		0.1	2.78 [0.30, 25.59]
Hemminki 1990b	3/81	5/80		0.4	0.59 [0.15, 2.40]
Hodnett 1989	13/72	18/73		1.5	0.73 [0.39, 1.38]
Hodnett 2002	541/3454	561/3461		47.4	0.97 [0.87, 1.08]
Hofmeyr 1991	7/92	7/97		0.6	1.05 [0.38, 2.89]
Kennell 1991	16/212	37/200		3.2	0.41 [0.23, 0.71]
Klaus 1986	2/186	7/279		0.5	0.43 [0.09, 2.04]
Langer 1998	12/361	12/363		1.0	1.01 [0.46, 2.21]
Madi 1999	2/53	9/56		0.7	0.23 [0.05, 1.04]
Campbell 2006	13/300	22/300		1.9	0.59 [0.30, 1.15]
Total (95% CI)	6644	6713		100.0	0.89 [0.82, 0.96]
Total events: 1052 (Continuous support), 1181 (Usual care)					
Test for heterogeneity chi-square=20.16 df=14 p=0.13 I^2 =30.5%					
Test for overall effect z=3.12 p=0.002					



Analysis 01.09. Comparison 01 Continuous support versus usual care - all trials, Outcome 09 Caesarean birth

Review: Continuous support for women during childbirth

Comparison: 01 Continuous support versus usual care - all trials

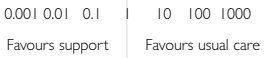
Outcome: 09 Caesarean birth

Study	Continuous support n/N	Usual care n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Breart - Belgium	5/133	5/131		0.6	0.98 [0.29, 3.32]
Breart - France	40/656	36/664		4.0	1.12 [0.73, 1.74]
Breart - Greece	30/295	34/274		4.0	0.82 [0.52, 1.30]
Cogan 1988	2/20	1/14		0.1	1.40 [0.14, 13.98]
Dickinson 2002	71/499	85/493		9.6	0.83 [0.62, 1.10]
Gagnon 1997	29/209	33/204		3.8	0.86 [0.54, 1.36]
Hemminki 1990a	0/41	3/38		0.4	0.13 [0.01, 2.49]
Hemminki 1990b	2/81	3/80		0.3	0.66 [0.11, 3.84]
Hodnett 1989	12/72	13/73		1.5	0.94 [0.46, 1.91]
Hodnett 2002	432/3454	437/3461		49.2	0.99 [0.87, 1.12]
Hofmeyr 1991	11/92	14/97		1.5	0.83 [0.40, 1.73]
Kennell 1991	17/212	26/200		3.0	0.62 [0.35, 1.10]
Klaus 1986	12/186	47/279		4.2	0.38 [0.21, 0.70]
Langer 1998	85/361	97/363		10.9	0.88 [0.68, 1.13]
Madi 1999	3/53	7/56		0.8	0.45 [0.12, 1.66]
Campbell 2006	55/300	53/300		6.0	1.04 [0.74, 1.46]
Total (95% CI)	6664	6727		100.0	0.91 [0.83, 0.99]

Total events: 806 (Continuous support), 894 (Usual care)

Test for heterogeneity chi-square=16.69 df=15 p=0.34 I^2 =10.1%

Test for overall effect z=2.08 p=0.04



Analysis 01.10. Comparison 01 Continuous support versus usual care - all trials, Outcome 10 Episiotomy

Review: Continuous support for women during childbirth

Comparison: 01 Continuous support versus usual care - all trials

Outcome: 10 Episiotomy

Study	Continuous support n/N	Usual care n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Hodnett 2002	894/3454	919/3461		100.0	0.97 [0.90, 1.05]
Total (95% CI)	3454	3461		100.0	0.97 [0.90, 1.05]
Total events: 894 (Continuous support), 919 (Usual care)					
Test for heterogeneity: not applicable					
Test for overall effect z=0.63 p=0.5					

Analysis 01.11. Comparison 01 Continuous support versus usual care - all trials, Outcome 11 Perineal trauma

Review: Continuous support for women during childbirth

Comparison: 01 Continuous support versus usual care - all trials

Outcome: 11 Perineal trauma

Study	Continuous support n/N	Usual care n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Gagnon 1997	168/209	166/204		8.3	0.99 [0.90, 1.08]
Hodnett 2002	1828/3454	1860/3461		91.7	0.98 [0.94, 1.03]
Total (95% CI)	3663	3665		100.0	0.99 [0.95, 1.03]
Total events: 1996 (Continuous support), 2026 (Usual care)					
Test for heterogeneity chi-square=0.00 df=1 p=0.95 I^2 =0.0%					
Test for overall effect z=0.72 p=0.5					

Analysis 01.12. Comparison 01 Continuous support versus usual care - all trials, Outcome 12 Low 5-minute Apgar score

Review: Continuous support for women during childbirth

Comparison: 01 Continuous support versus usual care - all trials

Outcome: 12 Low 5-minute Apgar score

Study	Continuous support n/N	Usual care n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Breart - Belgium	3/133	4/131		5.5	0.74 [0.17, 3.24]
Breart - France	4/656	11/664		14.9	0.37 [0.12, 1.15]
Breart - Greece	6/295	8/274		11.3	0.70 [0.24, 1.98]
Dickinson 2002	4/499	8/493		11.0	0.49 [0.15, 1.63]
Hodnett 2002	30/3476	25/3473		34.2	1.20 [0.71, 2.03]
Hofmeyr 1991	4/92	6/97		8.0	0.70 [0.20, 2.41]
Kennell 1991	1/212	2/200		2.8	0.47 [0.04, 5.16]
Campbell 2006	1/300	9/300		12.3	0.11 [0.01, 0.87]
Total (95% CI)	5663	5632		100.0	0.72 [0.51, 1.02]

Total events: 53 (Continuous support), 73 (Usual care)

Test for heterogeneity chi-square=8.57 df=7 p=0.28 I^2 =18.3%

Test for overall effect z=1.82 p=0.07

Analysis 01.14. Comparison 01 Continuous support versus usual care - all trials, Outcome 14 Admission to special care nursery

Review: Continuous support for women during childbirth

Comparison: 01 Continuous support versus usual care - all trials

Outcome: 14 Admission to special care nursery

Study	Continuous support n/N	Usual care n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Gagnon 1997	15/209	10/204		2.9	1.46 [0.67, 3.18]
Hodnett 2002	246/3476	254/3473		72.4	0.97 [0.82, 1.15]
Kennell 1991	69/212	71/200		20.8	0.92 [0.70, 1.20]
Klaus 1986	3/186	17/279		3.9	0.26 [0.08, 0.89]
Total (95% CI)	4083	4156		100.0	0.94 [0.82, 1.09]

Total events: 333 (Continuous support), 352 (Usual care)

Test for heterogeneity chi-square=5.57 df=3 p=0.13 I^2 =46.2%

Test for overall effect z=0.80 p=0.4

Analysis 01.15. Comparison 01 Continuous support versus usual care - all trials, Outcome 15 Prolonged neonatal hospital stay

Review: Continuous support for women during childbirth

Comparison: 01 Continuous support versus usual care - all trials

Outcome: 15 Prolonged neonatal hospital stay

Study	Continuous support n/N	Usual care n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Kennell 1991	22/212	34/200		100.0	0.61 [0.37, 1.01]
Total (95% CI)	212	200		100.0	0.61 [0.37, 1.01]
Total events: 22 (Continuous support), 34 (Usual care)					
Test for heterogeneity: not applicable					
Test for overall effect z=1.93 p=0.05					

Analysis 01.16. Comparison 01 Continuous support versus usual care - all trials, Outcome 16 Postpartum report of severe labour pain

Review: Continuous support for women during childbirth

Comparison: 01 Continuous support versus usual care - all trials

Outcome: 16 Postpartum report of severe labour pain

Study	Continuous support n/N	Usual care n/N	Relative Risk (Random) 95% CI	Weight (%)	Relative Risk (Random) 95% CI
Breart - Belgium	51/133	44/131		22.0	1.14 [0.83, 1.58]
Breart - France	24/656	21/664		11.3	1.16 [0.65, 2.06]
Hofmeyr 1991	53/92	76/97		29.9	0.74 [0.60, 0.90]
Langer 1998	261/361	248/363		36.7	1.06 [0.96, 1.16]
Total (95% CI)	1242	1255		100.0	0.97 [0.77, 1.23]
Total events: 389 (Continuous support), 389 (Usual care)					
Test for heterogeneity chi-square=11.00 df=3 p=0.01 I^2 =72.7%					
Test for overall effect z=0.22 p=0.8					

Analysis 01.17. Comparison 01 Continuous support versus usual care - all trials, Outcome 17 Postpartum report of difficulty in coping with labour

Review: Continuous support for women during childbirth

Comparison: 01 Continuous support versus usual care - all trials

Outcome: 17 Postpartum report of difficulty in coping with labour

Study	Continuous support n/N	Usual care n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Hofmeyr 1991	38/92	73/97		100.0	0.55 [0.42, 0.72]
Total (95% CI)	92	97		100.0	0.55 [0.42, 0.72]
Total events: 38 (Continuous support), 73 (Usual care)					
Test for heterogeneity: not applicable					
Test for overall effect z=4.37 p=0.00001					

Analysis 01.18. Comparison 01 Continuous support versus usual care - all trials, Outcome 18 Postpartum report of low control during labour

Review: Continuous support for women during childbirth

Comparison: 01 Continuous support versus usual care - all trials

Outcome: 18 Postpartum report of low control during labour

Study	Continuous support n/N	Usual care n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Hodnett 2002	96/3454	117/3461		47.6	0.82 [0.63, 1.07]
Langer 1998	98/361	129/363		52.4	0.76 [0.61, 0.95]
Total (95% CI)	3815	3824		100.0	0.79 [0.67, 0.94]
Total events: 194 (Continuous support), 246 (Usual care)					
Test for heterogeneity chi-square=0.18 df=1 p=0.67 I^2 =0.0%					
Test for overall effect z=2.68 p=0.007					

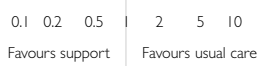
Analysis 01.19. Comparison 01 Continuous support versus usual care - all trials, Outcome 19 Postpartum report of high anxiety during labour

Review: Continuous support for women during childbirth

Comparison: 01 Continuous support versus usual care - all trials

Outcome: 19 Postpartum report of high anxiety during labour

Study	Continuous support n/N	Usual care n/N	Relative Risk (Random) 95% CI	Weight (%)	Relative Risk (Random) 95% CI
Breart - Belgium	33/133	25/131		33.4	1.30 [0.82, 2.06]
Breart - France	24/656	21/664		30.9	1.16 [0.65, 2.06]
Hofmeyr 1991	28/92	62/97		35.6	0.48 [0.34, 0.67]
Total (95% CI)	881	892		100.0	0.88 [0.43, 1.78]
Total events: 85 (Continuous support), 108 (Usual care)					
Test for heterogeneity chi-square=14.68 df=2 p=0.0006 I^2 =86.4%					
Test for overall effect z=0.36 p=0.7					



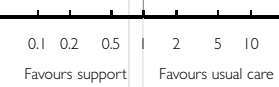
Analysis 01.20. Comparison 01 Continuous support versus usual care - all trials, Outcome 20 Dissatisfaction with/negative views of birth experience

Review: Continuous support for women during childbirth

Comparison: 01 Continuous support versus usual care - all trials

Outcome: 20 Dissatisfaction with/negative views of birth experience

Study	Continuous support n/N	Usual care n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Breart - Belgium	24/133	30/131		6.6	0.79 [0.49, 1.27]
Breart - France	30/656	35/664		7.7	0.87 [0.54, 1.40]
Hodnett 2002	96/3454	117/3461		25.7	0.82 [0.63, 1.07]
Hofmeyr 1991	38/92	73/97		15.6	0.55 [0.42, 0.72]
Kennell 1991	47/212	71/200		16.1	0.62 [0.46, 0.85]
Langer 1998	98/361	129/363		28.3	0.76 [0.61, 0.95]
Total (95% CI)	4908	4916		100.0	0.73 [0.65, 0.83]
Total events: 333 (Continuous support), 455 (Usual care)					
Test for heterogeneity chi-square=6.86 df=5 p=0.23 I^2 =27.1%					
Test for overall effect z=4.92 p<0.00001					



Analysis 01.22. Comparison 01 Continuous support versus usual care - all trials, Outcome 22 Difficulty mothering

Review: Continuous support for women during childbirth

Comparison: 01 Continuous support versus usual care - all trials

Outcome: 22 Difficulty mothering

Study	Continuous support n/N	Usual care n/N	Relative Risk (Random) 95% CI	Weight (%)	Relative Risk (Random) 95% CI
Hodnett 2002	873/3454	853/3461		100.0	1.03 [0.95, 1.11]
Total (95% CI)	3454	3461		100.0	1.03 [0.95, 1.11]
Total events: 873 (Continuous support), 853 (Usual care)					
Test for heterogeneity: not applicable					
Test for overall effect z=0.60 p=0.5					

Analysis 01.23. Comparison 01 Continuous support versus usual care - all trials, Outcome 23 Not breastfeeding at 1-2 months postpartum

Review: Continuous support for women during childbirth

Comparison: 01 Continuous support versus usual care - all trials

Outcome: 23 Not breastfeeding at 1-2 months postpartum

Study	Continuous support n/N	Usual care n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Hodnett 2002	1116/3454	1054/3461		96.7	1.06 [0.99, 1.14]
Langer 1998	34/361	36/363		3.3	0.95 [0.61, 1.48]
Total (95% CI)	3815	3824		100.0	1.06 [0.99, 1.13]
Total events: 1150 (Continuous support), 1090 (Usual care)					
Test for heterogeneity chi-square=0.23 df=1 p=0.63 I^2 =0.0%					
Test for overall effect z=1.58 p=0.1					

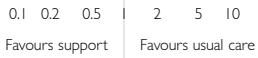
Analysis 01.24. Comparison 01 Continuous support versus usual care - all trials, Outcome 24 Postpartum depression

Review: Continuous support for women during childbirth

Comparison: 01 Continuous support versus usual care - all trials

Outcome: 24 Postpartum depression

Study	Continuous support n/N	Usual care n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Hodnett 2002	245/3454	277/3461		100.0	0.89 [0.75, 1.05]
Total (95% CI)	3454	3461		100.0	0.89 [0.75, 1.05]
Total events: 245 (Continuous support), 277 (Usual care)					
Test for heterogeneity: not applicable					
Test for overall effect z=1.43 p=0.2					



Analysis 01.26. Comparison 01 Continuous support versus usual care - all trials, Outcome 26 Low postpartum self-esteem

Review: Continuous support for women during childbirth

Comparison: 01 Continuous support versus usual care - all trials

Outcome: 26 Low postpartum self-esteem

Study	Continuous support n/N	Usual care n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Langer 1998	85/361	80/363		100.0	1.07 [0.82, 1.40]
Total (95% CI)	361	363		100.0	1.07 [0.82, 1.40]
Total events: 85 (Continuous support), 80 (Usual care)					
Test for heterogeneity: not applicable					
Test for overall effect z=0.48 p=0.6					

Analysis 01.27. Comparison 01 Continuous support versus usual care - all trials, Outcome 27 Poor relationship with partner postpartum

Review: Continuous support for women during childbirth

Comparison: 01 Continuous support versus usual care - all trials

Outcome: 27 Poor relationship with partner postpartum

Study	Continuous support n/N	Usual care n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Hodnett 2002	158/3454	159/3461		100.0	1.00 [0.80, 1.23]
Total (95% CI)	3454	3461		100.0	1.00 [0.80, 1.23]
Total events: 158 (Continuous support), 159 (Usual care)					
Test for heterogeneity: not applicable					
Test for overall effect z=0.04 p=1					

Analysis 01.29. Comparison 01 Continuous support versus usual care - all trials, Outcome 29 Postpartum urinary incontinence

Review: Continuous support for women during childbirth

Comparison: 01 Continuous support versus usual care - all trials

Outcome: 29 Postpartum urinary incontinence

Study	Continuous support n/N	Usual care n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Hodnett 2002	358/3454	387/3461		100.0	0.93 [0.81, 1.06]
Total (95% CI)	3454	3461		100.0	0.93 [0.81, 1.06]
Total events: 358 (Continuous support), 387 (Usual care)					
Test for heterogeneity: not applicable					
Test for overall effect z=1.10 p=0.3					

Analysis 01.30. Comparison 01 Continuous support versus usual care - all trials, Outcome 30 Postpartum faecal incontinence

Review: Continuous support for women during childbirth

Comparison: 01 Continuous support versus usual care - all trials

Outcome: 30 Postpartum faecal incontinence

Study	Continuous support n/N	Usual care n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Hodnett 2002	63/3454	71/3461		100.0	0.89 [0.64, 1.24]
Total (95% CI)	3454	3461		100.0	0.89 [0.64, 1.24]
Total events: 63 (Continuous support), 71 (Usual care)					
Test for heterogeneity: not applicable					
Test for overall effect z=0.69 p=0.5					

Analysis 02.01. Comparison 02 Continuous support during labour versus usual care - variations in institutional policies and practices, Outcome 01 Use of analgesia/anaesthesia

Review: Continuous support for women during childbirth

Comparison: 02 Continuous support during labour versus usual care - variations in institutional policies and practices

Outcome: 01 Use of analgesia/anaesthesia

Study	Continuous support n/N	Usual care n/N	Relative Risk (Random) 95% CI	Weight (%)	Relative Risk (Random) 95% CI
01 Other support permitted					
Breart - Belgium	55/133	62/131		0.3	0.87 [0.67, 1.15]
Breart - France	281/656	319/664		1.6	0.89 [0.79, 1.00]
Gagnon 1997	141/209	142/204		1.3	0.97 [0.85, 1.10]
Hemminki 1990a	25/41	23/38		0.2	1.01 [0.71, 1.44]
Hemminki 1990b	45/81	52/80		0.3	0.85 [0.66, 1.10]
Hodnett 2002	3077/3454	3159/3461		91.6	0.98 [0.96, 0.99]
Campbell 2006	247/300	260/300		4.7	0.95 [0.89, 1.02]
Subtotal (95% CI)	4874	4878		100.0	0.97 [0.96, 0.99]
Total events: 3871 (Continuous support), 4017 (Usual care)					
Test for heterogeneity chi-square=5.58 df=6 p=0.47 I^2 =0.0%					
Test for overall effect z=3.66 p=0.0003					
02 Other support not permitted					
Hofmeyr 1991	11/92	15/97		14.0	0.77 [0.37, 1.59]
Kennell 1991	93/212	150/200		27.5	0.58 [0.49, 0.69]

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Study	Continuous support n/N	Usual care n/N	Relative Risk (Random) 95% CI	Weight (%)	Relative Risk (Random) 95% CI
Klaus 1986	2/186	10/279		5.1	0.30 [0.07, 1.35]
Langer 1998	295/361	302/363		28.9	0.98 [0.92, 1.05]
Madi 1999	28/53	41/56		24.6	0.72 [0.53, 0.97]
Subtotal (95% CI)	904	995		100.0	0.72 [0.49, 1.05]
Total events: 429 (Continuous support), 518 (Usual care)					
Test for heterogeneity chi-square=43.23 df=4 p=<0.0001 I^2 =90.7%					
Test for overall effect z=1.73 p=0.08					
03 Epidural analgesia routinely available					
Breart - Belgium	55/133	62/131		5.5	0.87 [0.67, 1.15]
Breart - France	281/656	319/664		12.7	0.89 [0.79, 1.00]
Gagnon 1997	141/209	142/204		11.9	0.97 [0.85, 1.10]
Hemminki 1990a	25/41	23/38		3.6	1.01 [0.71, 1.44]
Hemminki 1990b	45/81	52/80		6.0	0.85 [0.66, 1.10]
Hodnett 2002	3077/3454	3159/3461		18.4	0.98 [0.96, 0.99]
Kennell 1991	93/212	150/200		9.5	0.58 [0.49, 0.69]
Langer 1998	295/361	302/363		16.2	0.98 [0.92, 1.05]
Campbell 2006	247/300	260/300		16.1	0.95 [0.89, 1.02]
Subtotal (95% CI)	5447	5441		100.0	0.90 [0.84, 0.97]
Total events: 4259 (Continuous support), 4469 (Usual care)					
Test for heterogeneity chi-square=43.54 df=8 p=<0.0001 I^2 =81.6%					
Test for overall effect z=2.63 p=0.009					
04 Epidural analgesia not routinely available					
Hofmeyr 1991	11/92	15/97		14.2	0.77 [0.37, 1.59]
Klaus 1986	2/186	10/279		3.3	0.30 [0.07, 1.35]
Madi 1999	28/53	41/56		82.6	0.72 [0.53, 0.97]
Subtotal (95% CI)	331	432		100.0	0.71 [0.54, 0.93]
Total events: 41 (Continuous support), 66 (Usual care)					
Test for heterogeneity chi-square=1.41 df=2 p=0.49 I^2 =0.0%					
Test for overall effect z=2.48 p=0.01					
05 Setting had routine EFM					
Gagnon 1997	141/209	142/204		18.6	0.97 [0.85, 1.10]
Hemminki 1990a	25/41	23/38		7.4	1.01 [0.71, 1.44]
Hemminki 1990b	45/81	52/80		11.3	0.85 [0.66, 1.10]
Hodnett 2002	3077/3454	3159/3461		24.4	0.98 [0.96, 0.99]
Kennell 1991	93/212	150/200		15.9	0.58 [0.49, 0.69]

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Study	Continuous support n/N	Usual care n/N	Relative Risk (Random) 95% CI	Weight (%)	Relative Risk (Random) 95% CI
Campbell 2006	247/300	260/300		22.5	0.95 [0.89, 1.02]
Subtotal (95% CI)	4297	4283		100.0	0.88 [0.79, 0.99]
Total events: 3628 (Continuous support), 3786 (Usual care)					
Test for heterogeneity chi-square=38.76 df=5 p=<0.0001 I^2 =87.1%					
Test for overall effect z=2.13 p=0.03					
06 Setting did not have routine EFM					
Hofmeyr 1991	11/92	15/97		13.1	0.77 [0.37, 1.59]
Klaus 1986	2/186	10/279		3.8	0.30 [0.07, 1.35]
Langer 1998	295/361	302/363		49.3	0.98 [0.92, 1.05]
Madi 1999	28/53	41/56		33.9	0.72 [0.53, 0.97]
Subtotal (95% CI)	692	795		100.0	0.82 [0.61, 1.11]
Total events: 336 (Continuous support), 368 (Usual care)					
Test for heterogeneity chi-square=7.69 df=3 p=0.05 I^2 =61.0%					
Test for overall effect z=1.28 p=0.2					

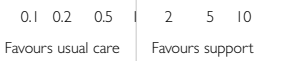
Analysis 02.02. Comparison 02 Continuous support during labour versus usual care - variations in institutional policies and practices, Outcome 02 Spontaneous vaginal birth

Review: Continuous support for women during childbirth

Comparison: 02 Continuous support during labour versus usual care - variations in institutional policies and practices

Outcome: 02 Spontaneous vaginal birth

Study	Continuous support n/N	Usual care n/N	Relative Risk (Random) 95% CI	Weight (%)	Relative Risk (Random) 95% CI
01 Other support permitted					
Breart - Belgium	97/133	87/131		2.9	1.10 [0.94, 1.29]
Breart - France	453/656	424/664		11.7	1.08 [1.00, 1.17]
Dickinson 2002	280/499	239/493		5.0	1.16 [1.03, 1.30]
Gagnon 1997	132/209	127/204		3.3	1.01 [0.87, 1.18]
Hemminki 1990a	38/41	34/38		3.8	1.04 [0.90, 1.19]
Hemminki 1990b	76/81	72/80		8.3	1.04 [0.95, 1.14]
Hodnett 1989	47/72	42/73		1.1	1.13 [0.88, 1.47]
Hodnett 2002	2481/3454	2463/3461		56.1	1.01 [0.98, 1.04]



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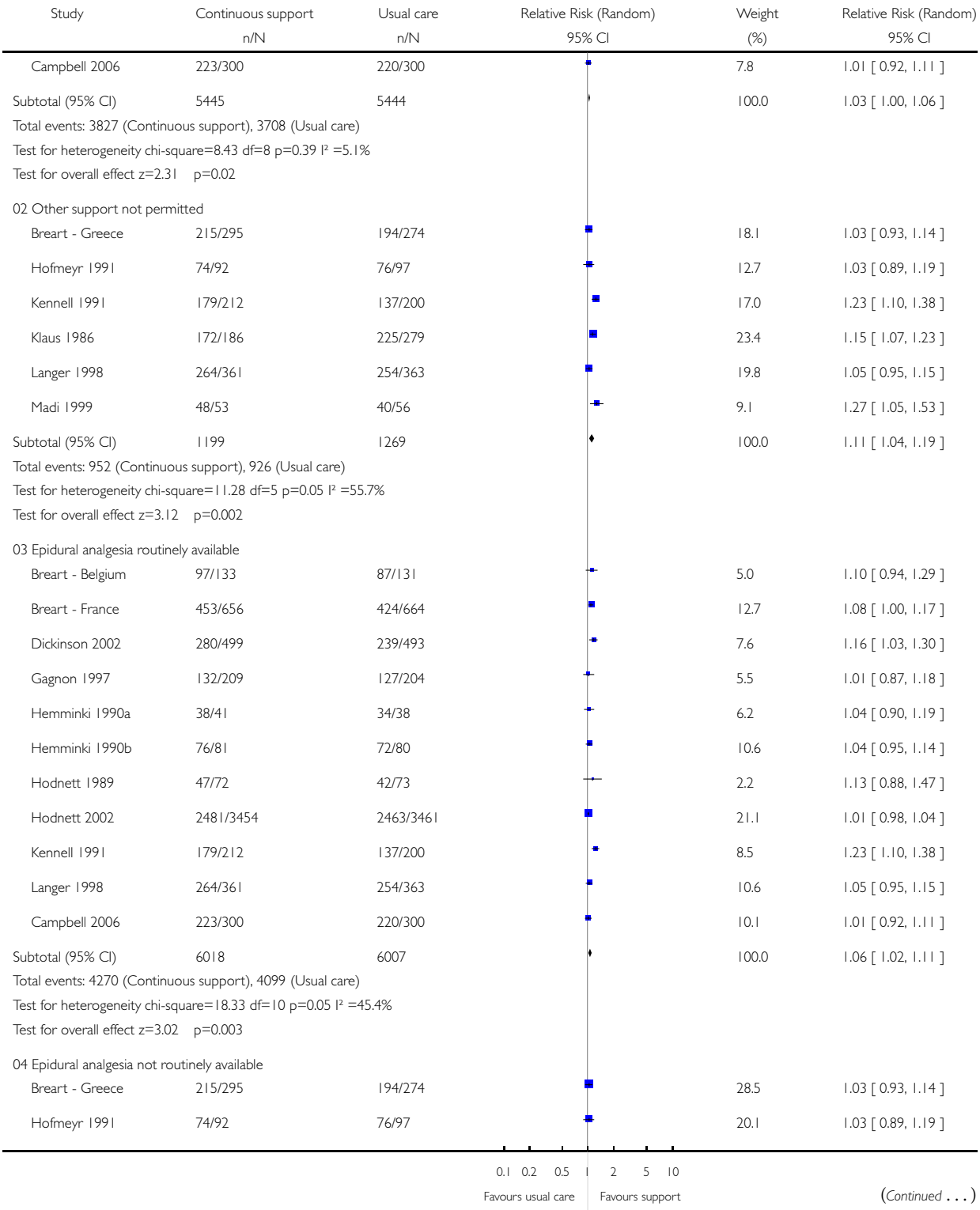

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Study	Continuous support n/N	Usual care n/N	Relative Risk (Random) 95% CI	Weight (%)	Relative Risk (Random) 95% CI
Klaus 1986	172/186	225/279		36.9	1.15 [1.07, 1.23]
Madi 1999	48/53	40/56		14.5	1.27 [1.05, 1.53]
Subtotal (95% CI)	626	706		100.0	1.10 [1.01, 1.20]
Total events: 509 (Continuous support), 535 (Usual care)					
Test for heterogeneity chi-square=6.31 df=3 p=0.10 I^2 =52.4%					
Test for overall effect z=2.28 p=0.02					
05 Setting had routine EFM					
Dickinson 2002	280/499	239/493		11.6	1.16 [1.03, 1.30]
Gagnon 1997	132/209	127/204		8.9	1.01 [0.87, 1.18]
Hemminki 1990a	38/41	34/38		9.7	1.04 [0.90, 1.19]
Hemminki 1990b	76/81	72/80		14.9	1.04 [0.95, 1.14]
Hodnett 1989	47/72	42/73		3.8	1.13 [0.88, 1.47]
Hodnett 2002	2481/3454	2463/3461		24.0	1.01 [0.98, 1.04]
Kennell 1991	179/212	137/200		12.6	1.23 [1.10, 1.38]
Campbell 2006	223/300	220/300		14.5	1.01 [0.92, 1.11]
Subtotal (95% CI)	4868	4849		100.0	1.07 [1.01, 1.13]
Total events: 3456 (Continuous support), 3334 (Usual care)					
Test for heterogeneity chi-square=16.39 df=7 p=0.02 I^2 =57.3%					
Test for overall effect z=2.26 p=0.02					
06 Setting did not have routine EFM					
Hofmeyr 1991	74/92	76/97		18.8	1.03 [0.89, 1.19]
Klaus 1986	172/186	225/279		37.2	1.15 [1.07, 1.23]
Langer 1998	264/361	254/363		30.8	1.05 [0.95, 1.15]
Madi 1999	48/53	40/56		13.2	1.27 [1.05, 1.53]
Subtotal (95% CI)	692	795		100.0	1.11 [1.02, 1.20]
Total events: 558 (Continuous support), 595 (Usual care)					
Test for heterogeneity chi-square=5.86 df=3 p=0.12 I^2 =48.8%					
Test for overall effect z=2.52 p=0.01					

Analysis 02.03. Comparison 02 Continuous support during labour versus usual care - variations in institutional policies and practices, Outcome 03 Instrumental vaginal birth

Review: Continuous support for women during childbirth

Comparison: 02 Continuous support during labour versus usual care - variations in institutional policies and practices

Outcome: 03 Instrumental vaginal birth

Study	Continuous support n/N	Usual care n/N	Relative Risk (Random) 95% CI	Weight (%)	Relative Risk (Random) 95% CI
01 Other support permitted					
Breart - Belgium	31/133	39/131		3.6	0.78 [0.52, 1.17]
Breart - France	163/656	204/664		19.5	0.81 [0.68, 0.96]
Dickinson 2002	148/499	169/493		18.0	0.87 [0.72, 1.04]
Gagnon 1997	48/209	44/204		4.6	1.06 [0.74, 1.53]
Hemminki 1990a	3/41	1/38		0.1	2.78 [0.30, 25.59]
Hemminki 1990b	3/81	5/80		0.3	0.59 [0.15, 2.40]
Hodnett 1989	13/72	18/73		1.5	0.73 [0.39, 1.38]
Hodnett 2002	541/3454	561/3461		51.0	0.97 [0.87, 1.08]
Campbell 2006	13/300	22/300		1.3	0.59 [0.30, 1.15]
Subtotal (95% CI)	5445	5444		100.0	0.90 [0.84, 0.97]
Total events: 963 (Continuous support), 1063 (Usual care)					
Test for heterogeneity chi-square=7.83 df=8 p=0.45 I^2 =0.0%					
Test for overall effect z=2.61 p=0.009					
02 Other support not permitted					
Breart - Greece	50/295	46/274		29.0	1.01 [0.70, 1.45]
Hofmeyr 1991	7/92	7/97		13.7	1.05 [0.38, 2.89]
Kennell 1991	16/212	37/200		23.8	0.41 [0.23, 0.71]
Klaus 1986	2/186	7/279		7.4	0.43 [0.09, 2.04]
Langer 1998	12/361	12/363		18.0	1.01 [0.46, 2.21]
Madi 1999	2/53	9/56		8.0	0.23 [0.05, 1.04]
Subtotal (95% CI)	1199	1269		100.0	0.68 [0.42, 1.10]
Total events: 89 (Continuous support), 118 (Usual care)					
Test for heterogeneity chi-square=11.08 df=5 p=0.05 I^2 =54.9%					
Test for overall effect z=1.56 p=0.1					
03 Epidural analgesia routinely available					
Breart - Belgium	31/133	39/131		7.7	0.78 [0.52, 1.17]
Breart - France	163/656	204/664		20.7	0.81 [0.68, 0.96]
Dickinson 2002	148/499	169/493		20.1	0.87 [0.72, 1.04]

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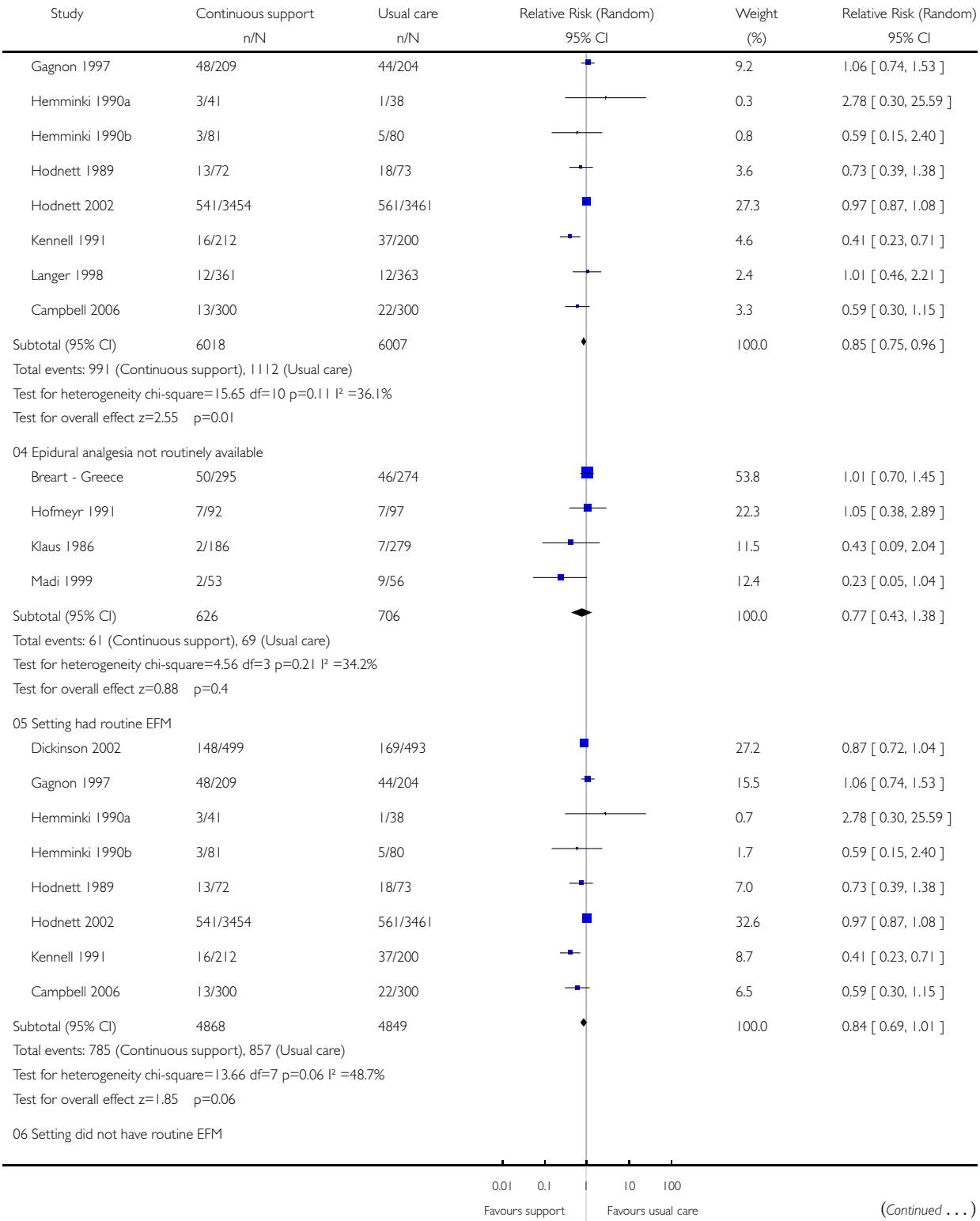

Study	Continuous support n/N	Usual care n/N	Relative Risk (Random) 95% CI	Weight (%)	Relative Risk (Random) 95% CI
Gagnon 1997	48/209	44/204		9.2	1.06 [0.74, 1.53]
Hemminki 1990a	3/41	1/38		0.3	2.78 [0.30, 25.59]
Hemminki 1990b	3/81	5/80		0.8	0.59 [0.15, 2.40]
Hodnett 1989	13/72	18/73		3.6	0.73 [0.39, 1.38]
Hodnett 2002	541/3454	561/3461		27.3	0.97 [0.87, 1.08]
Kennell 1991	16/212	37/200		4.6	0.41 [0.23, 0.71]
Langer 1998	12/361	12/363		2.4	1.01 [0.46, 2.21]
Campbell 2006	13/300	22/300		3.3	0.59 [0.30, 1.15]
Subtotal (95% CI)	6018	6007		100.0	0.85 [0.75, 0.96]
Total events: 991 (Continuous support), 1112 (Usual care)					
Test for heterogeneity chi-square=15.65 df=10 p=0.11 I^2 =36.1%					
Test for overall effect z=2.55 p=0.01					
04 Epidural analgesia not routinely available					
Breart - Greece	50/295	46/274		53.8	1.01 [0.70, 1.45]
Hofmeyr 1991	7/92	7/97		22.3	1.05 [0.38, 2.89]
Klaus 1986	2/186	7/279		11.5	0.43 [0.09, 2.04]
Madi 1999	2/53	9/56		12.4	0.23 [0.05, 1.04]
Subtotal (95% CI)	626	706		100.0	0.77 [0.43, 1.38]
Total events: 61 (Continuous support), 69 (Usual care)					
Test for heterogeneity chi-square=4.56 df=3 p=0.21 I^2 =34.2%					
Test for overall effect z=0.88 p=0.4					
05 Setting had routine EFM					
Dickinson 2002	148/499	169/493		27.2	0.87 [0.72, 1.04]
Gagnon 1997	48/209	44/204		15.5	1.06 [0.74, 1.53]
Hemminki 1990a	3/41	1/38		0.7	2.78 [0.30, 25.59]
Hemminki 1990b	3/81	5/80		1.7	0.59 [0.15, 2.40]
Hodnett 1989	13/72	18/73		7.0	0.73 [0.39, 1.38]
Hodnett 2002	541/3454	561/3461		32.6	0.97 [0.87, 1.08]
Kennell 1991	16/212	37/200		8.7	0.41 [0.23, 0.71]
Campbell 2006	13/300	22/300		6.5	0.59 [0.30, 1.15]
Subtotal (95% CI)	4868	4849		100.0	0.84 [0.69, 1.01]
Total events: 785 (Continuous support), 857 (Usual care)					
Test for heterogeneity chi-square=13.66 df=7 p=0.06 I^2 =48.7%					
Test for overall effect z=1.85 p=0.06					
06 Setting did not have routine EFM					

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Study	Continuous support n/N	Usual care n/N	Relative Risk (Random) 95% CI	Weight (%)	Relative Risk (Random) 95% CI
Hofmeyr 1991	7/92	7/97		29.1	1.05 [0.38, 2.89]
Klaus 1986	2/186	7/279		14.4	0.43 [0.09, 2.04]
Langer 1998	12/361	12/363		40.8	1.01 [0.46, 2.21]
Madi 1999	2/53	9/56		15.7	0.23 [0.05, 1.04]
Subtotal (95% CI)	692	795		100.0	0.72 [0.38, 1.36]
Total events: 23 (Continuous support), 35 (Usual care)					
Test for heterogeneity chi-square=3.87 df=3 p=0.28 I^2 =22.4%					
Test for overall effect z=1.02 p=0.3					

Analysis 02.04. Comparison 02 Continuous support during labour versus usual care - variations in institutional policies and practices, Outcome 04 Caesarean birth

Review: Continuous support for women during childbirth

Comparison: 02 Continuous support during labour versus usual care - variations in institutional policies and practices

Outcome: 04 Caesarean birth

Study	Continuous support n/N	Usual care n/N	Relative Risk (Random) 95% CI	Weight (%)	Relative Risk (Random) 95% CI
01 Other support permitted					
Breart - Belgium	5/133	5/131		0.7	0.98 [0.29, 3.32]
Breart - France	40/656	36/664		5.3	1.12 [0.73, 1.74]
Cogan 1988	2/20	1/14		0.2	1.40 [0.14, 13.98]
Dickinson 2002	71/499	85/493		12.1	0.83 [0.62, 1.10]
Gagnon 1997	29/209	33/204		4.8	0.86 [0.54, 1.36]
Hemminki 1990a	0/41	3/38		0.1	0.13 [0.01, 2.49]
Hemminki 1990b	2/81	3/80		0.3	0.66 [0.11, 3.84]
Hodnett 1989	12/72	13/73		2.0	0.94 [0.46, 1.91]
Hodnett 2002	432/3454	437/3461		65.7	0.99 [0.87, 1.12]
Campbell 2006	55/300	53/300		8.7	1.04 [0.74, 1.46]
Subtotal (95% CI)	5465	5458		100.0	0.97 [0.88, 1.07]
Total events: 648 (Continuous support), 669 (Usual care)					
Test for heterogeneity chi-square=4.23 df=9 p=0.90 I^2 =0.0%					
Test for overall effect z=0.62 p=0.5					

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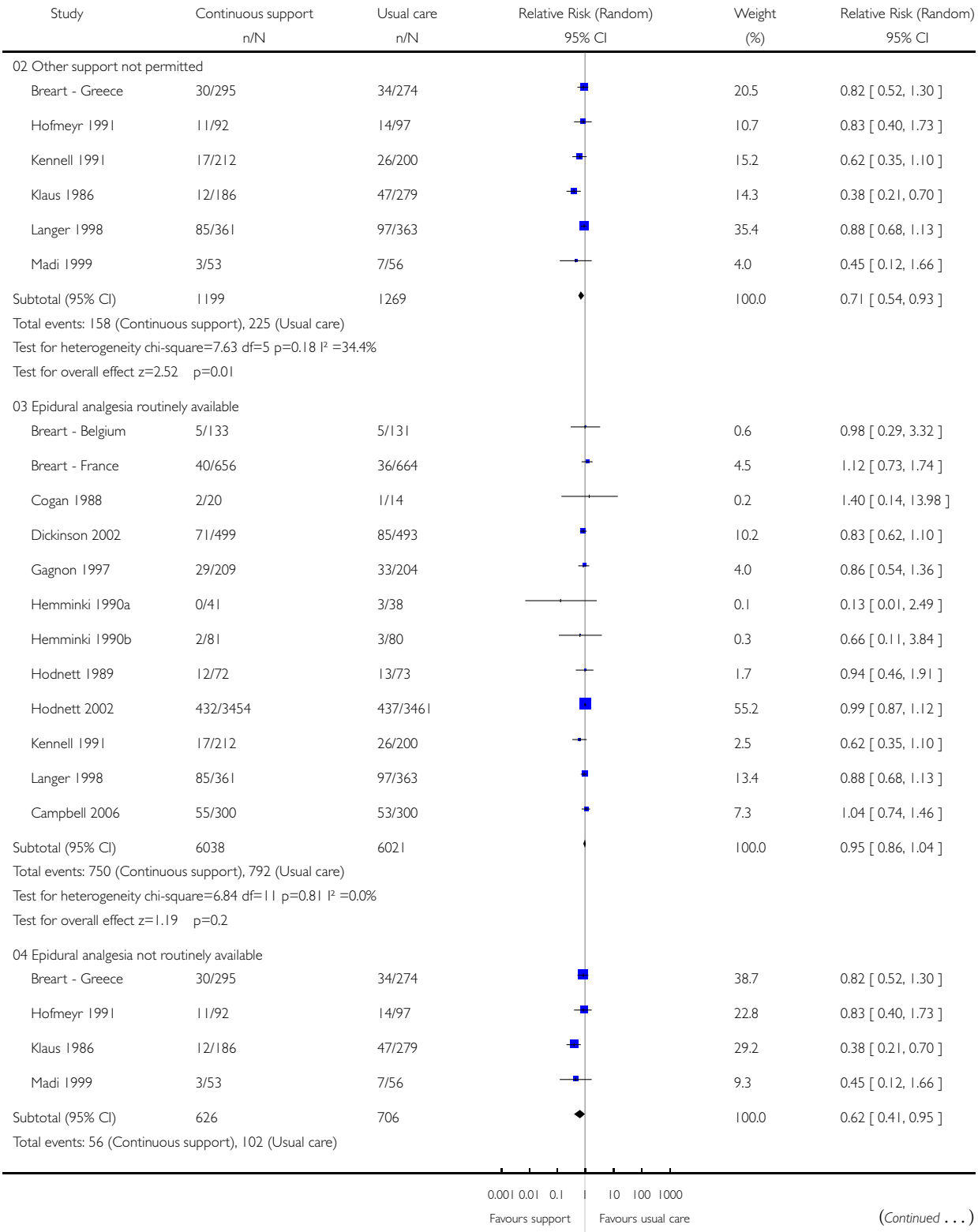

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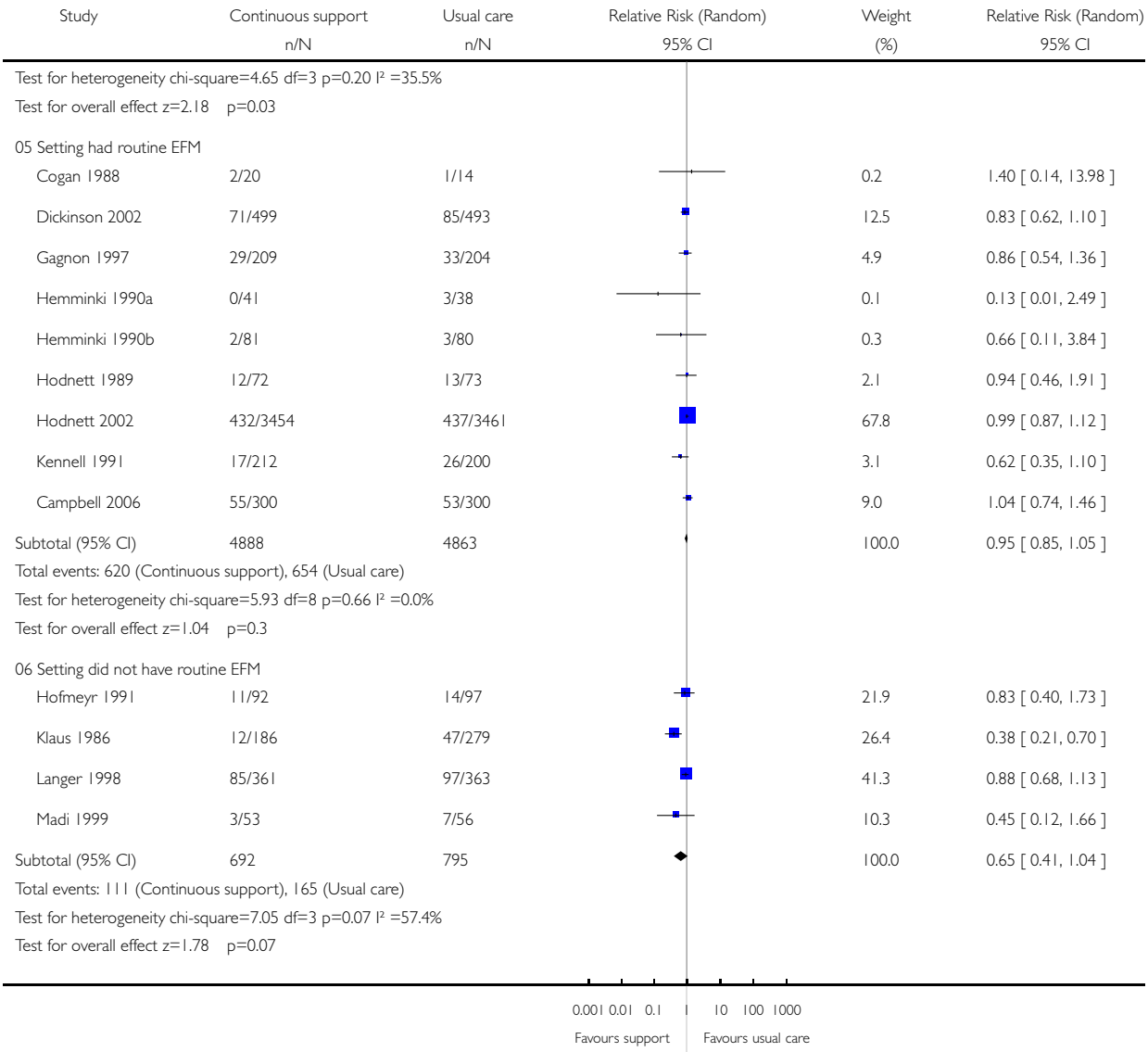
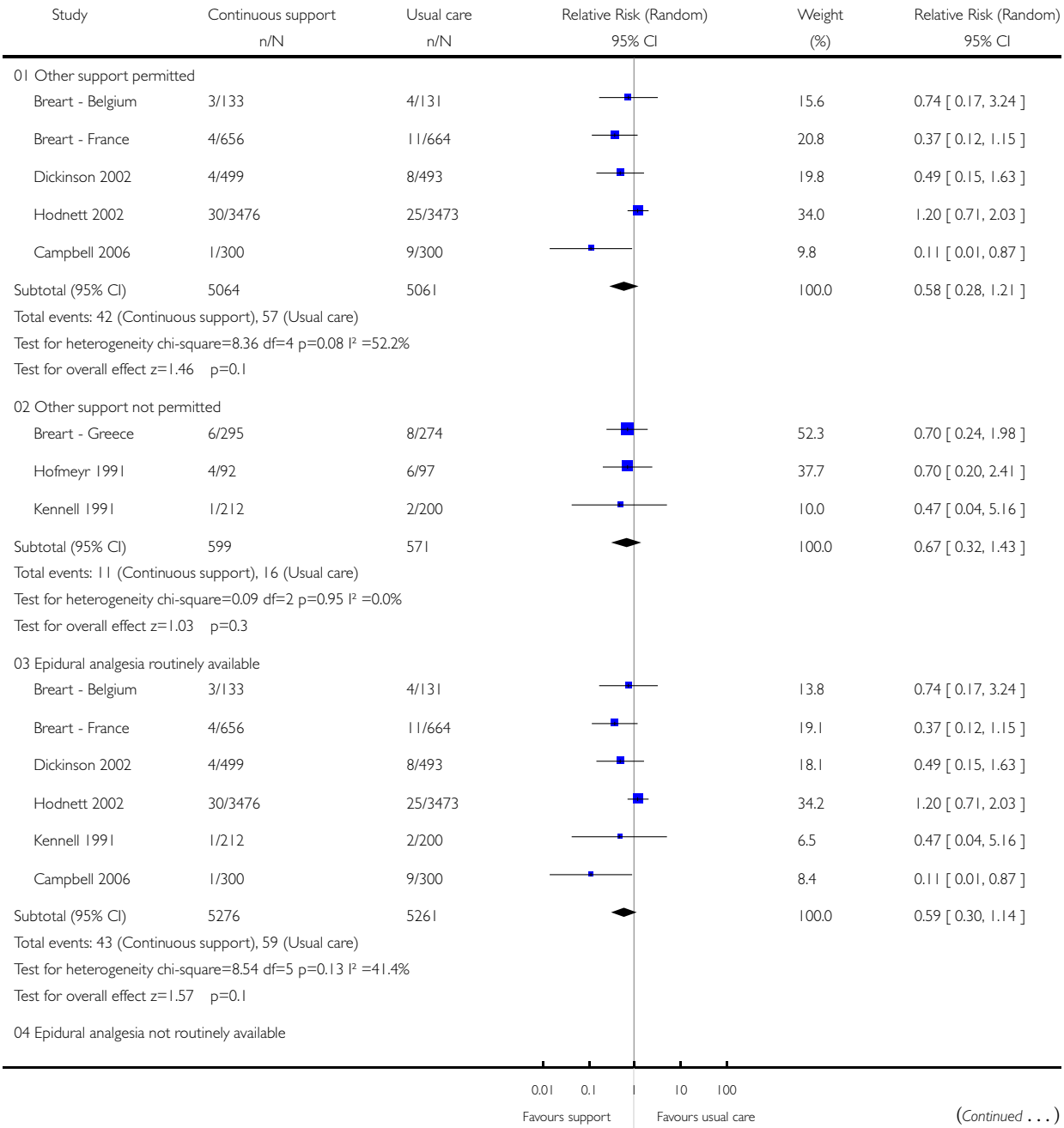


Analysis 02.05. Comparison 02 Continuous support during labour versus usual care - variations in institutional policies and practices, Outcome 05 Low 5-minute Apgar score

Review: Continuous support for women during childbirth

Comparison: 02 Continuous support during labour versus usual care - variations in institutional policies and practices

Outcome: 05 Low 5-minute Apgar score



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Study	Continuous support n/N	Usual care n/N	Relative Risk (Random) 95% CI	Weight (%)	Relative Risk (Random) 95% CI
Breart - Greece	6/295	8/274		58.2	0.70 [0.24, 1.98]
Hofmeyr 1991	4/92	6/97		41.8	0.70 [0.20, 2.41]
Subtotal (95% CI)	387	371		100.0	0.70 [0.32, 1.55]
Total events: 10 (Continuous support), 14 (Usual care)					
Test for heterogeneity chi-square=0.00 df=1 p=0.99 I^2 =0.0%					
Test for overall effect z=0.88 p=0.4					
05 Setting had routine EFM					
Dickinson 2002	4/499	8/493		28.6	0.49 [0.15, 1.63]
Hodnett 2002	30/3476	25/3473		43.5	1.20 [0.71, 2.03]
Kennell 1991	1/212	2/200		12.5	0.47 [0.04, 5.16]
Campbell 2006	1/300	9/300		15.5	0.11 [0.01, 0.87]
Subtotal (95% CI)	4487	4466		100.0	0.57 [0.22, 1.52]
Total events: 36 (Continuous support), 44 (Usual care)					
Test for heterogeneity chi-square=6.52 df=3 p=0.09 I^2 =54.0%					
Test for overall effect z=1.12 p=0.3					
06 Setting did not have routine EFM					
Hofmeyr 1991	4/92	6/97		100.0	0.70 [0.20, 2.41]
Subtotal (95% CI)	92	97		100.0	0.70 [0.20, 2.41]
Total events: 4 (Continuous support), 6 (Usual care)					
Test for heterogeneity: not applicable					
Test for overall effect z=0.56 p=0.6					

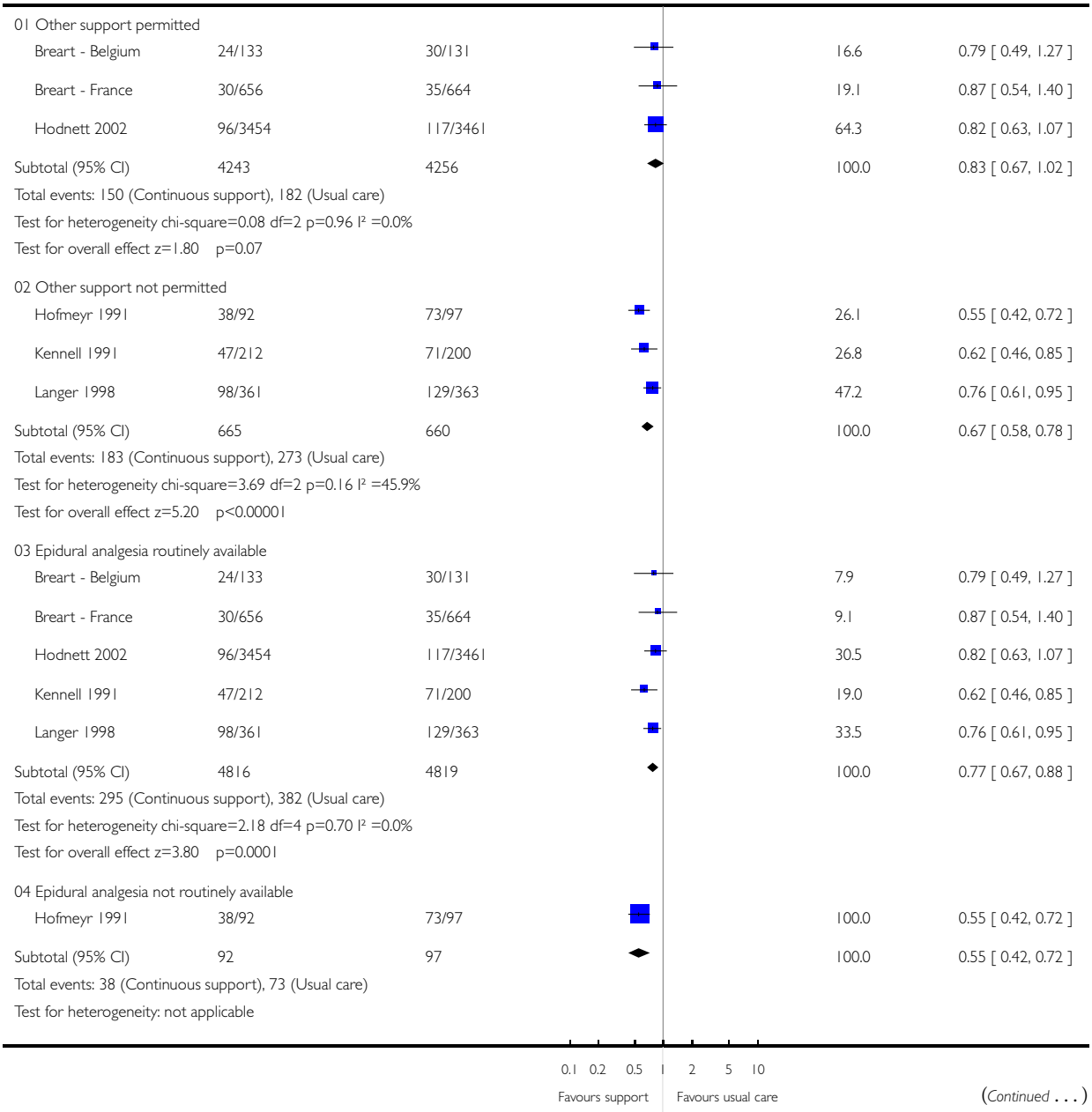
Analysis 02.06. Comparison 02 Continuous support during labour versus usual care - variations in institutional policies and practices, Outcome 06 Dissatisfaction with/negative views of childbirth experience

Review: Continuous support for women during childbirth

Comparison: 02 Continuous support during labour versus usual care - variations in institutional policies and practices

Outcome: 06 Dissatisfaction with/negative views of childbirth experience

Study	Continuous support n/N	Usual care n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
01 Other support permitted					
Breart - Belgium	24/133	30/131		16.6	0.79 [0.49, 1.27]
Breart - France	30/656	35/664		19.1	0.87 [0.54, 1.40]
Hodnett 2002	96/3454	117/3461		64.3	0.82 [0.63, 1.07]
Subtotal (95% CI)	4243	4256		100.0	0.83 [0.67, 1.02]
Total events: 150 (Continuous support), 182 (Usual care)					
Test for heterogeneity chi-square=0.08 df=2 p=0.96 I^2 =0.0%					
Test for overall effect z=1.80 p=0.07					
02 Other support not permitted					
Hofmeyr 1991	38/92	73/97		26.1	0.55 [0.42, 0.72]
Kennell 1991	47/212	71/200		26.8	0.62 [0.46, 0.85]
Langer 1998	98/361	129/363		47.2	0.76 [0.61, 0.95]
Subtotal (95% CI)	665	660		100.0	0.67 [0.58, 0.78]
Total events: 183 (Continuous support), 273 (Usual care)					
Test for heterogeneity chi-square=3.69 df=2 p=0.16 I^2 =45.9%					
Test for overall effect z=5.20 p<0.00001					
03 Epidural analgesia routinely available					
Breart - Belgium	24/133	30/131		7.9	0.79 [0.49, 1.27]
Breart - France	30/656	35/664		9.1	0.87 [0.54, 1.40]
Hodnett 2002	96/3454	117/3461		30.5	0.82 [0.63, 1.07]
Kennell 1991	47/212	71/200		19.0	0.62 [0.46, 0.85]
Langer 1998	98/361	129/363		33.5	0.76 [0.61, 0.95]
Subtotal (95% CI)	4816	4819		100.0	0.77 [0.67, 0.88]
Total events: 295 (Continuous support), 382 (Usual care)					
Test for heterogeneity chi-square=2.18 df=4 p=0.70 I^2 =0.0%					
Test for overall effect z=3.80 p=0.0001					
04 Epidural analgesia not routinely available					
Hofmeyr 1991	38/92	73/97		100.0	0.55 [0.42, 0.72]
Subtotal (95% CI)	92	97		100.0	0.55 [0.42, 0.72]
Total events: 38 (Continuous support), 73 (Usual care)					
Test for heterogeneity: not applicable					



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Study	Continuous support n/N	Usual care n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Test for overall effect z=4.37 p=0.00001					
05 Setting had routine EFM					
Hodnett 2002	96/3454	117/3461		61.5	0.82 [0.63, 1.07]
Kennell 1991	47/212	71/200		38.5	0.62 [0.46, 0.85]
Subtotal (95% CI)	3666	3661		100.0	0.75 [0.61, 0.92]
Total events: 143 (Continuous support), 188 (Usual care)					
Test for heterogeneity chi-square=1.75 df=1 p=0.19 I^2 =42.8%					
Test for overall effect z=2.81 p=0.005					
06 Setting did not have routine EFM					
Hofmeyr 1991	38/92	73/97		35.6	0.55 [0.42, 0.72]
Langer 1998	98/361	129/363		64.4	0.76 [0.61, 0.95]
Subtotal (95% CI)	453	460		100.0	0.69 [0.58, 0.82]
Total events: 136 (Continuous support), 202 (Usual care)					
Test for heterogeneity chi-square=3.59 df=1 p=0.06 I^2 =72.1%					
Test for overall effect z=4.29 p=0.00002					

Analysis 02.07. Comparison 02 Continuous support during labour versus usual care - variations in institutional policies and practices, Outcome 07 Postpartum depression

Review: Continuous support for women during childbirth

Comparison: 02 Continuous support during labour versus usual care - variations in institutional policies and practices

Outcome: 07 Postpartum depression

Study	Continuous support n/N	Usual care n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
01 Other support permitted					
Hodnett 2002	245/3454	277/3461		100.0	0.89 [0.75, 1.05]
Subtotal (95% CI)	3454	3461		100.0	0.89 [0.75, 1.05]
Total events: 245 (Continuous support), 277 (Usual care)					
Test for heterogeneity: not applicable					
Test for overall effect z=1.43 p=0.2					
02 Other support not permitted					
Subtotal (95% CI)	0	0		0.0	Not estimable
Total events: 0 (Continuous support), 0 (Usual care)					
Test for heterogeneity: not applicable					

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Study	Continuous support n/N	Usual care n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
Test for overall effect: not applicable					
03 Epidural analgesia routinely available					
Hodnett 2002	245/3454	277/3461		100.0	0.89 [0.75, 1.05]
Subtotal (95% CI)	3454	3461		100.0	0.89 [0.75, 1.05]
Total events: 245 (Continuous support), 277 (Usual care)					
Test for heterogeneity: not applicable					
Test for overall effect z=1.43 p=0.2					
04 Epidural analgesia not routinely available					
Subtotal (95% CI)	0	0		0.0	Not estimable
Total events: 0 (Continuous support), 0 (Usual care)					
Test for heterogeneity: not applicable					
Test for overall effect: not applicable					
05 Setting had routine EFM					
Hodnett 2002	245/3454	277/3461		100.0	0.89 [0.75, 1.05]
Subtotal (95% CI)	3454	3461		100.0	0.89 [0.75, 1.05]
Total events: 245 (Continuous support), 277 (Usual care)					
Test for heterogeneity: not applicable					
Test for overall effect z=1.43 p=0.2					
06 Setting did not have routine EFM					
Subtotal (95% CI)	0	0		0.0	Not estimable
Total events: 0 (Continuous support), 0 (Usual care)					
Test for heterogeneity: not applicable					
Test for overall effect: not applicable					

Analysis 03.01. Comparison 03 Continuous support during labour versus usual care - variations in type of provider, Outcome 01 Use of analgesia/anaesthesia

Review: Continuous support for women during childbirth

Comparison: 03 Continuous support during labour versus usual care - variations in type of provider

Outcome: 01 Use of analgesia/anaesthesia

Study	Continuous support n/N	Usual care n/N	Relative Risk (Random) 95% CI	Weight (%)	Relative Risk (Random) 95% CI
01 Support people were hospital staff					
Breart - Belgium	55/133	62/131		0.6	0.87 [0.67, 1.15]
Breart - France	281/656	319/664		3.2	0.89 [0.79, 1.00]
Gagnon 1997	141/209	142/204		2.6	0.97 [0.85, 1.10]
Hemminki 1990a	25/41	23/38		0.4	1.01 [0.71, 1.44]
Hemminki 1990b	45/81	52/80		0.7	0.85 [0.66, 1.10]
Hodnett 2002	3077/3454	3159/3461		92.5	0.98 [0.96, 0.99]
Subtotal (95% CI)	4574	4578		100.0	0.97 [0.95, 0.99]
Total events: 3624 (Continuous support), 3757 (Usual care)					
Test for heterogeneity chi-square=5.08 df=5 p=0.41 I^2 =1.6%					
Test for overall effect z=2.65 p=0.008					
02 Support people were not hospital staff					
Hofmeyr 1991	11/92	15/97		5.7	0.77 [0.37, 1.59]
Kennell 1991	93/212	150/200		22.7	0.58 [0.49, 0.69]
Klaus 1986	2/186	10/279		1.6	0.30 [0.07, 1.35]
Langer 1998	295/361	302/363		26.8	0.98 [0.92, 1.05]
Madi 1999	28/53	41/56		16.6	0.72 [0.53, 0.97]
Campbell 2006	247/300	260/300		26.7	0.95 [0.89, 1.02]
Subtotal (95% CI)	1204	1295		100.0	0.80 [0.66, 0.97]
Total events: 676 (Continuous support), 778 (Usual care)					
Test for heterogeneity chi-square=43.24 df=5 p=<0.0001 I^2 =88.4%					
Test for overall effect z=2.31 p=0.02					

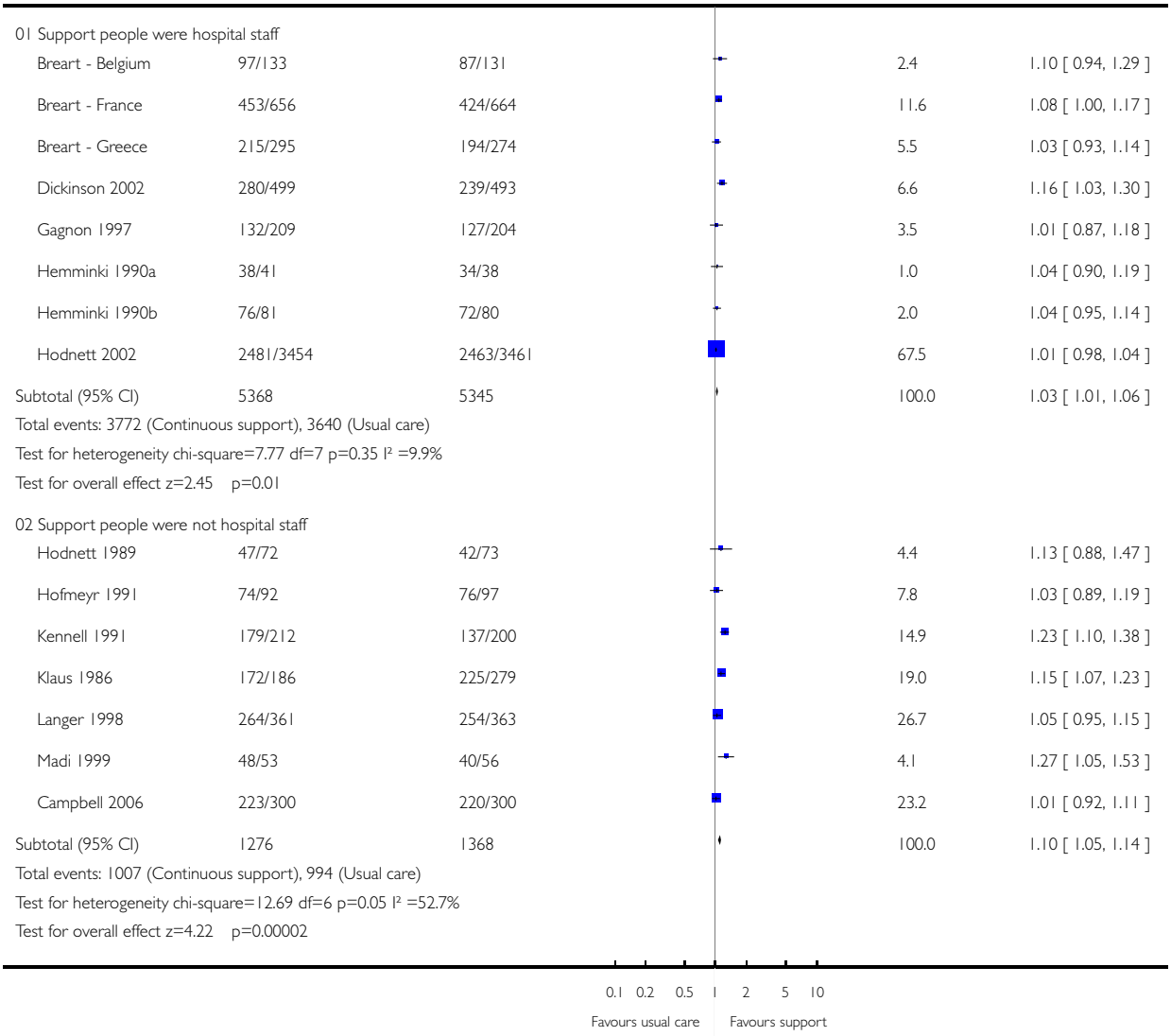
Analysis 03.02. Comparison 03 Continuous support during labour versus usual care - variations in type of provider, Outcome 02 Spontaneous vaginal birth

Review: Continuous support for women during childbirth

Comparison: 03 Continuous support during labour versus usual care - variations in type of provider

Outcome: 02 Spontaneous vaginal birth

Study	Continuous support n/N	Usual care n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
01 Support people were hospital staff					
Breart - Belgium	97/133	87/131		2.4	1.10 [0.94, 1.29]
Breart - France	453/656	424/664		11.6	1.08 [1.00, 1.17]
Breart - Greece	215/295	194/274		5.5	1.03 [0.93, 1.14]
Dickinson 2002	280/499	239/493		6.6	1.16 [1.03, 1.30]
Gagnon 1997	132/209	127/204		3.5	1.01 [0.87, 1.18]
Hemminki 1990a	38/41	34/38		1.0	1.04 [0.90, 1.19]
Hemminki 1990b	76/81	72/80		2.0	1.04 [0.95, 1.14]
Hodnett 2002	2481/3454	2463/3461		67.5	1.01 [0.98, 1.04]
Subtotal (95% CI)	5368	5345		100.0	1.03 [1.01, 1.06]
Total events: 3772 (Continuous support), 3640 (Usual care)					
Test for heterogeneity chi-square=7.77 df=7 p=0.35 I^2 =9.9%					
Test for overall effect z=2.45 p=0.01					
02 Support people were not hospital staff					
Hodnett 1989	47/72	42/73		4.4	1.13 [0.88, 1.47]
Hofmeyr 1991	74/92	76/97		7.8	1.03 [0.89, 1.19]
Kennell 1991	179/212	137/200		14.9	1.23 [1.10, 1.38]
Klaus 1986	172/186	225/279		19.0	1.15 [1.07, 1.23]
Langer 1998	264/361	254/363		26.7	1.05 [0.95, 1.15]
Madi 1999	48/53	40/56		4.1	1.27 [1.05, 1.53]
Campbell 2006	223/300	220/300		23.2	1.01 [0.92, 1.11]
Subtotal (95% CI)	1276	1368		100.0	1.10 [1.05, 1.14]
Total events: 1007 (Continuous support), 994 (Usual care)					
Test for heterogeneity chi-square=12.69 df=6 p=0.05 I^2 =52.7%					
Test for overall effect z=4.22 p=0.00002					



Analysis 03.03. Comparison 03 Continuous support during labour versus usual care - variations in type of provider, Outcome 03 Instrumental vaginal birth

Review: Continuous support for women during childbirth

Comparison: 03 Continuous support during labour versus usual care - variations in type of provider

Outcome: 03 Instrumental vaginal birth

Study	Continuous support n/N	Usual care n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
01 Support people were hospital staff					
Breart - Belgium	31/133	39/131		3.7	0.78 [0.52, 1.17]
Breart - France	163/656	204/664		18.9	0.81 [0.68, 0.96]
Breart - Greece	50/295	46/274		4.5	1.01 [0.70, 1.45]
Dickinson 2002	148/499	169/493		15.9	0.87 [0.72, 1.04]
Gagnon 1997	48/209	44/204		4.2	1.06 [0.74, 1.53]
Hemminki 1990a	3/41	1/38		0.1	2.78 [0.30, 25.59]
Hemminki 1990b	3/81	5/80		0.5	0.59 [0.15, 2.40]
Hodnett 2002	541/3454	561/3461		52.3	0.97 [0.87, 1.08]
Subtotal (95% CI)	5368	5345		100.0	0.92 [0.85, 0.99]
Total events: 987 (Continuous support), 1069 (Usual care)					
Test for heterogeneity chi-square=6.12 df=7 p=0.53 I^2 =0.0%					
Test for overall effect z=2.13 p=0.03					
02 Support people were not hospital staff					
Hodnett 1989	13/72	18/73		16.1	0.73 [0.39, 1.38]
Hofmeyr 1991	7/92	7/97		6.1	1.05 [0.38, 2.89]
Kennell 1991	16/212	37/200		34.3	0.41 [0.23, 0.71]
Klaus 1986	2/186	7/279		5.0	0.43 [0.09, 2.04]
Langer 1998	12/361	12/363		10.8	1.01 [0.46, 2.21]
Madi 1999	2/53	9/56		7.9	0.23 [0.05, 1.04]
Campbell 2006	13/300	22/300		19.8	0.59 [0.30, 1.15]
Subtotal (95% CI)	1276	1368		100.0	0.59 [0.44, 0.79]
Total events: 65 (Continuous support), 112 (Usual care)					
Test for heterogeneity chi-square=6.83 df=6 p=0.34 I^2 =12.2%					
Test for overall effect z=3.58 p=0.0003					

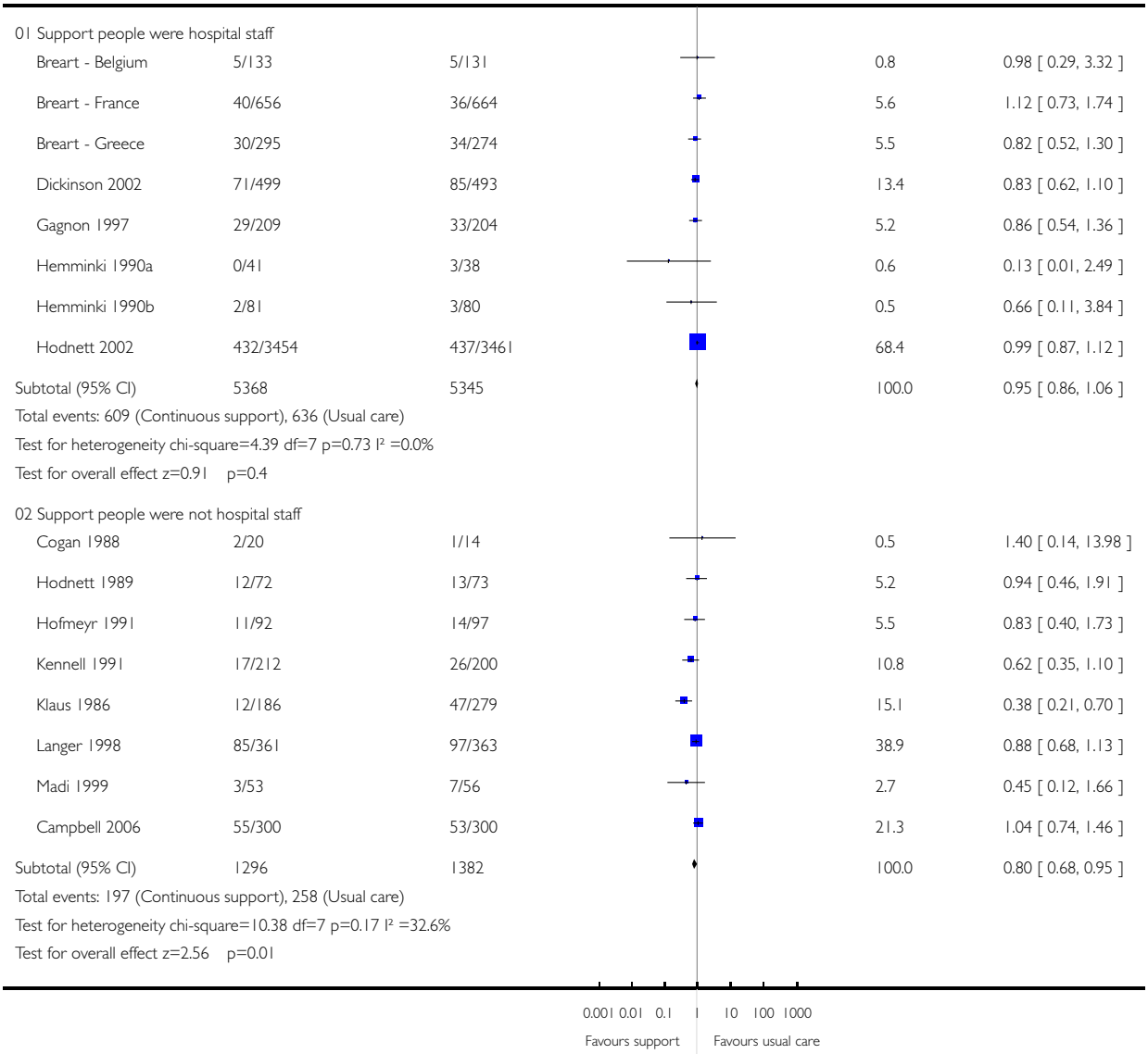
Analysis 03.04. Comparison 03 Continuous support during labour versus usual care - variations in type of provider, Outcome 04 Caesarean birth

Review: Continuous support for women during childbirth

Comparison: 03 Continuous support during labour versus usual care - variations in type of provider

Outcome: 04 Caesarean birth

Study	Continuous support n/N	Usual care n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
01 Support people were hospital staff					
Breart - Belgium	5/133	5/131		0.8	0.98 [0.29, 3.32]
Breart - France	40/656	36/664		5.6	1.12 [0.73, 1.74]
Breart - Greece	30/295	34/274		5.5	0.82 [0.52, 1.30]
Dickinson 2002	71/499	85/493		13.4	0.83 [0.62, 1.10]
Gagnon 1997	29/209	33/204		5.2	0.86 [0.54, 1.36]
Hemminki 1990a	0/41	3/38		0.6	0.13 [0.01, 2.49]
Hemminki 1990b	2/81	3/80		0.5	0.66 [0.11, 3.84]
Hodnett 2002	432/3454	437/3461		68.4	0.99 [0.87, 1.12]
Subtotal (95% CI)	5368	5345		100.0	0.95 [0.86, 1.06]
Total events: 609 (Continuous support), 636 (Usual care)					
Test for heterogeneity chi-square=4.39 df=7 p=0.73 I^2 =0.0%					
Test for overall effect z=0.91 p=0.4					
02 Support people were not hospital staff					
Cogan 1988	2/20	1/14		0.5	1.40 [0.14, 13.98]
Hodnett 1989	12/72	13/73		5.2	0.94 [0.46, 1.91]
Hofmeyr 1991	11/92	14/97		5.5	0.83 [0.40, 1.73]
Kennell 1991	17/212	26/200		10.8	0.62 [0.35, 1.10]
Klaus 1986	12/186	47/279		15.1	0.38 [0.21, 0.70]
Langer 1998	85/361	97/363		38.9	0.88 [0.68, 1.13]
Madi 1999	3/53	7/56		2.7	0.45 [0.12, 1.66]
Campbell 2006	55/300	53/300		21.3	1.04 [0.74, 1.46]
Subtotal (95% CI)	1296	1382		100.0	0.80 [0.68, 0.95]
Total events: 197 (Continuous support), 258 (Usual care)					
Test for heterogeneity chi-square=10.38 df=7 p=0.17 I^2 =32.6%					
Test for overall effect z=2.56 p=0.01					



Analysis 03.05. Comparison 03 Continuous support during labour versus usual care - variations in type of provider, Outcome 05 Low 5-minute Apgar score

Review: Continuous support for women during childbirth

Comparison: 03 Continuous support during labour versus usual care - variations in type of provider

Outcome: 05 Low 5-minute Apgar score

Study	Continuous support n/N	Usual care n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
01 Support people were hospital staff					
Breart - Belgium	3/133	4/131		7.2	0.74 [0.17, 3.24]
Breart - France	4/656	11/664		19.4	0.37 [0.12, 1.15]
Breart - Greece	6/295	8/274		14.7	0.70 [0.24, 1.98]
Dickinson 2002	4/499	8/493		14.3	0.49 [0.15, 1.63]
Hodnett 2002	30/3476	25/3473		44.4	1.20 [0.71, 2.03]
Subtotal (95% CI)	5059	5035		100.0	0.83 [0.56, 1.22]
Total events: 47 (Continuous support), 56 (Usual care)					
Test for heterogeneity chi-square=4.67 df=4 p=0.32 I^2 =14.4%					
Test for overall effect z=0.95 p=0.3					
02 Support people were not hospital staff					
Hofmeyr 1991	4/92	6/97		34.6	0.70 [0.20, 2.41]
Kennell 1991	1/212	2/200		12.2	0.47 [0.04, 5.16]
Campbell 2006	1/300	9/300		53.3	0.11 [0.01, 0.87]
Subtotal (95% CI)	604	597		100.0	0.36 [0.14, 0.90]
Total events: 6 (Continuous support), 17 (Usual care)					
Test for heterogeneity chi-square=2.43 df=2 p=0.30 I^2 =17.8%					
Test for overall effect z=2.19 p=0.03					

Analysis 03.06. Comparison 03 Continuous support during labour versus usual care - variations in type of provider, Outcome 06 Dissatisfaction with/negative views of childbirth experience

Review: Continuous support for women during childbirth

Comparison: 03 Continuous support during labour versus usual care - variations in type of provider

Outcome: 06 Dissatisfaction with/negative views of childbirth experience

Study	Continuous support n/N	Usual care n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
01 Support people were hospital staff					
Breart - Belgium	24/133	30/131		16.6	0.79 [0.49, 1.27]
Breart - France	30/656	35/664		19.1	0.87 [0.54, 1.40]
Hodnett 2002	96/3454	117/3461		64.3	0.82 [0.63, 1.07]
Subtotal (95% CI)	4243	4256		100.0	0.83 [0.67, 1.02]
Total events: 150 (Continuous support), 182 (Usual care)					
Test for heterogeneity chi-square=0.08 df=2 p=0.96 I^2 =0.0%					
Test for overall effect z=1.80 p=0.07					
02 Support people were not hospital staff					
Hofmeyr 1991	38/92	73/97		26.1	0.55 [0.42, 0.72]
Kennell 1991	47/212	71/200		26.8	0.62 [0.46, 0.85]
Langer 1998	98/361	129/363		47.2	0.76 [0.61, 0.95]
Subtotal (95% CI)	665	660		100.0	0.67 [0.58, 0.78]
Total events: 183 (Continuous support), 273 (Usual care)					
Test for heterogeneity chi-square=3.69 df=2 p=0.16 I^2 =45.9%					
Test for overall effect z=5.20 p<0.00001					

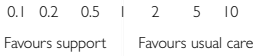
Analysis 03.07. Comparison 03 Continuous support during labour versus usual care - variations in type of provider, Outcome 07 Postpartum depression

Review: Continuous support for women during childbirth

Comparison: 03 Continuous support during labour versus usual care - variations in type of provider

Outcome: 07 Postpartum depression

Study	Continuous support n/N	Usual care n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
01 Support people were hospital staff					
Hodnett 2002	245/3454	277/3461		100.0	0.89 [0.75, 1.05]
Subtotal (95% CI)	3454	3461		100.0	0.89 [0.75, 1.05]
Total events: 245 (Continuous support), 277 (Usual care)					
Test for heterogeneity: not applicable					
Test for overall effect z=1.43 p=0.2					
02 Support people were not hospital staff					
Subtotal (95% CI)	0	0		0.0	Not estimable
Total events: 0 (Continuous support), 0 (Usual care)					
Test for heterogeneity: not applicable					
Test for overall effect: not applicable					



Analysis 04.01. Comparison 04 Continuous support during labour versus usual care - variations in timing of onset of support, Outcome 01 Use of analgesia/anaesthesia

Review: Continuous support for women during childbirth

Comparison: 04 Continuous support during labour versus usual care - variations in timing of onset of support

Outcome: 01 Use of analgesia/anaesthesia

Study	Continuous support n/N	Usual care n/N	Relative Risk (Random) 95% CI	Weight (%)	Relative Risk (Random) 95% CI
01 Support began before active labour					
Klaus 1986	2/186	10/279		18.5	0.30 [0.07, 1.35]
Madi 1999	28/53	41/56		81.5	0.72 [0.53, 0.97]
Subtotal (95% CI)	239	335		100.0	0.61 [0.30, 1.26]
Total events: 30 (Continuous support), 51 (Usual care)					
Test for heterogeneity chi-square=1.47 df=1 p=0.23 I^2 =31.9%					
Test for overall effect z=1.33 p=0.2					
02 Support began at any time in first stage labour					
Breart - Belgium	55/133	62/131		2.2	0.87 [0.67, 1.15]
Breart - France	281/656	319/664		10.1	0.89 [0.79, 1.00]
Hodnett 2002	3077/3454	3159/3461		64.1	0.98 [0.96, 0.99]

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Study	Continuous support n/N	Usual care n/N	Relative Risk (Random) 95% CI	Weight (%)	Relative Risk (Random) 95% CI
Campbell 2006	247/300	260/300		23.5	0.95 [0.89, 1.02]
Subtotal (95% CI)	4543	4556		100.0	0.96 [0.92, 1.00]
Total events: 3660 (Continuous support), 3800 (Usual care)					
Test for heterogeneity chi-square=4.32 df=3 p=0.23 I^2 =30.6%					
Test for overall effect z=2.03 p=0.04					
03 Support began in active labour					
Gagnon 1997	141/209	142/204		21.3	0.97 [0.85, 1.10]
Hemminki 1990a	25/41	23/38		13.4	1.01 [0.71, 1.44]
Hemminki 1990b	45/81	52/80		17.0	0.85 [0.66, 1.10]
Hofmeyr 1991	11/92	15/97		5.7	0.77 [0.37, 1.59]
Kennell 1991	93/212	150/200		19.9	0.58 [0.49, 0.69]
Langer 1998	295/361	302/363		22.8	0.98 [0.92, 1.05]
Subtotal (95% CI)	996	982		100.0	0.85 [0.70, 1.04]
Total events: 610 (Continuous support), 684 (Usual care)					
Test for heterogeneity chi-square=35.15 df=5 p=<0.0001 I^2 =85.8%					
Test for overall effect z=1.56 p=0.1					

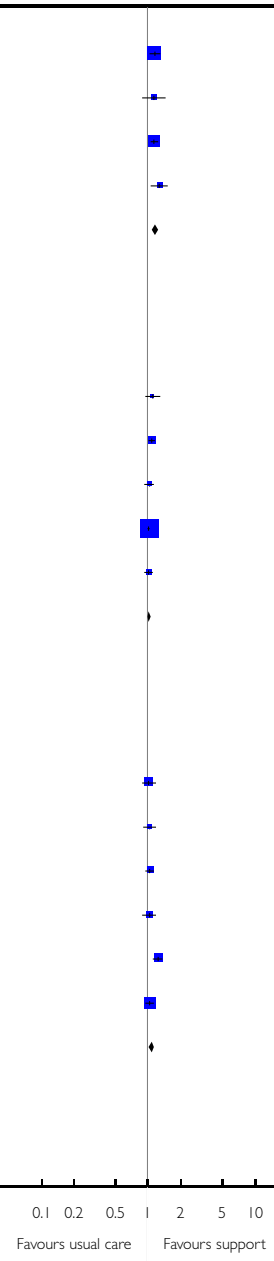
Analysis 04.02. Comparison 04 Continuous support during labour versus usual care - variations in timing of onset of support, Outcome 02 Spontaneous vaginal birth

Review: Continuous support for women during childbirth

Comparison: 04 Continuous support during labour versus usual care - variations in timing of onset of support

Outcome: 02 Spontaneous vaginal birth

Study	Continuous support n/N	Usual care n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
01 Support began before active labour					
Dickinson 2002	280/499	239/493		48.0	1.16 [1.03, 1.30]
Hodnett 1989	47/72	42/73		8.3	1.13 [0.88, 1.47]
Klaus 1986	172/186	225/279		35.9	1.15 [1.07, 1.23]
Madi 1999	48/53	40/56		7.8	1.27 [1.05, 1.53]
Subtotal (95% CI)	810	901		100.0	1.16 [1.08, 1.24]
Total events: 547 (Continuous support), 546 (Usual care)					
Test for heterogeneity chi-square=1.00 df=3 p=0.80 I^2 =0.0%					
Test for overall effect z=4.29 p=0.00002					
02 Support began at any time in first stage labour					
Breart - Belgium	97/133	87/131		2.6	1.10 [0.94, 1.29]
Breart - France	453/656	424/664		12.4	1.08 [1.00, 1.17]
Breart - Greece	215/295	194/274		5.9	1.03 [0.93, 1.14]
Hodnett 2002	2481/3454	2463/3461		72.6	1.01 [0.98, 1.04]
Campbell 2006	223/300	220/300		6.5	1.01 [0.92, 1.11]
Subtotal (95% CI)	4838	4830		100.0	1.02 [1.00, 1.05]
Total events: 3469 (Continuous support), 3388 (Usual care)					
Test for heterogeneity chi-square=3.58 df=4 p=0.47 I^2 =0.0%					
Test for overall effect z=1.68 p=0.09					
03 Support began in active labour					
Gagnon 1997	132/209	127/204		18.2	1.01 [0.87, 1.18]
Hemminki 1990a	38/41	34/38		5.0	1.04 [0.90, 1.19]
Hemminki 1990b	76/81	72/80		10.3	1.04 [0.95, 1.14]
Hofmeyr 1991	74/92	76/97		10.5	1.03 [0.89, 1.19]
Kennell 1991	179/212	137/200		20.0	1.23 [1.10, 1.38]
Langer 1998	264/361	254/363		36.0	1.05 [0.95, 1.15]
Subtotal (95% CI)	996	982		100.0	1.07 [1.02, 1.13]
Total events: 763 (Continuous support), 700 (Usual care)					
Test for heterogeneity chi-square=7.93 df=5 p=0.16 I^2 =36.9%					
Test for overall effect z=2.72 p=0.007					

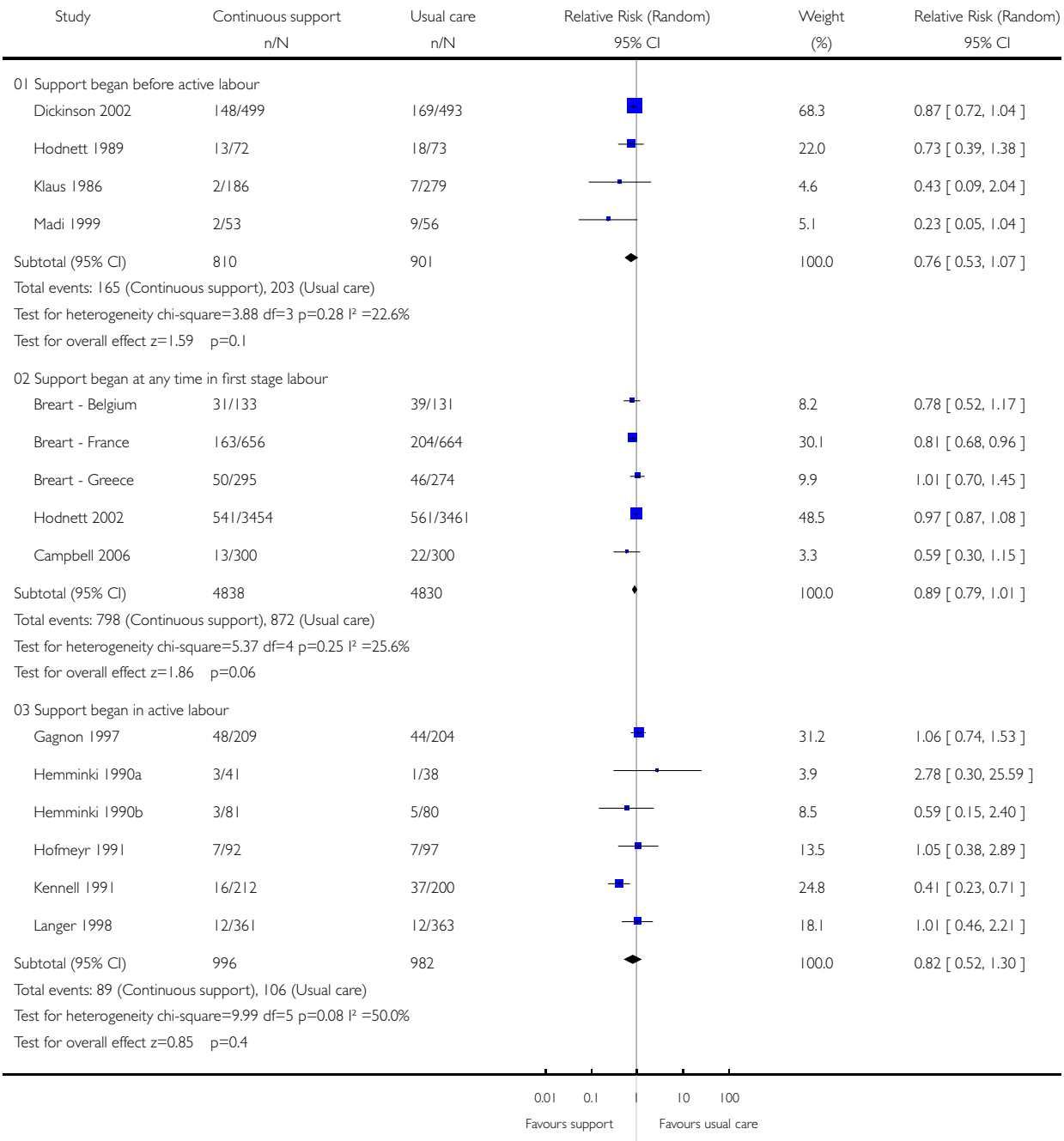


Analysis 04.03. Comparison 04 Continuous support during labour versus usual care - variations in timing of onset of support, Outcome 03 Instrumental vaginal birth

Review: Continuous support for women during childbirth

Comparison: 04 Continuous support during labour versus usual care - variations in timing of onset of support

Outcome: 03 Instrumental vaginal birth



Analysis 04.04. Comparison 04 Continuous support during labour versus usual care - variations in timing of onset of support, Outcome 04 Caesarean birth

Review: Continuous support for women during childbirth

Comparison: 04 Continuous support during labour versus usual care - variations in timing of onset of support

Outcome: 04 Caesarean birth

Study	Continuous support n/N	Usual care n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
01 Support began before active labour					
Cogan 1988	2/20	1/14		0.8	1.40 [0.14, 13.98]
Dickinson 2002	71/499	85/493		59.4	0.83 [0.62, 1.10]
Hodnett 1989	12/72	13/73		9.0	0.94 [0.46, 1.91]
Klaus 1986	12/186	47/279		26.1	0.38 [0.21, 0.70]
Madi 1999	3/53	7/56		4.7	0.45 [0.12, 1.66]
Subtotal (95% CI)	830	915		100.0	0.71 [0.56, 0.90]
Total events: 100 (Continuous support), 153 (Usual care)					
Test for heterogeneity chi-square=6.41 df=4 p=0.17 I^2 =37.6%					
Test for overall effect z=2.86 p=0.004					
02 Support began at any time in first stage labour					
Breart - Belgium	5/133	5/131		0.9	0.98 [0.29, 3.32]
Breart - France	40/656	36/664		6.3	1.12 [0.73, 1.74]
Breart - Greece	30/295	34/274		6.2	0.82 [0.52, 1.30]
Hodnett 2002	432/3454	437/3461		77.2	0.99 [0.87, 1.12]
Campbell 2006	55/300	53/300		9.4	1.04 [0.74, 1.46]
Subtotal (95% CI)	4838	4830		100.0	0.99 [0.89, 1.11]
Total events: 562 (Continuous support), 565 (Usual care)					
Test for heterogeneity chi-square=1.04 df=4 p=0.90 I^2 =0.0%					
Test for overall effect z=0.13 p=0.9					
03 Support began in active labour					
Gagnon 1997	29/209	33/204		18.9	0.86 [0.54, 1.36]
Hemminki 1990a	0/41	3/38		2.0	0.13 [0.01, 2.49]
Hemminki 1990b	2/81	3/80		1.7	0.66 [0.11, 3.84]
Hofmeyr 1991	11/92	14/97		7.7	0.83 [0.40, 1.73]
Kennell 1991	17/212	26/200		15.1	0.62 [0.35, 1.10]
Langer 1998	85/361	97/363		54.6	0.88 [0.68, 1.13]
Subtotal (95% CI)	996	982		100.0	0.81 [0.67, 0.99]
Total events: 144 (Continuous support), 176 (Usual care)					
Test for heterogeneity chi-square=2.84 df=5 p=0.72 I^2 =0.0%					
Test for overall effect z=2.05 p=0.04					

Analysis 04.05. Comparison 04 Continuous support during labour versus usual care - variations in timing of onset of support, Outcome 05 Low 5-minute Apgar score

Review: Continuous support for women during childbirth

Comparison: 04 Continuous support during labour versus usual care - variations in timing of onset of support

Outcome: 05 Low 5-minute Apgar score

Study	Continuous support n/N	Usual care n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
01 Support began before active labour					
Dickinson 2002	4/499	8/493		100.0	0.49 [0.15, 1.63]
Subtotal (95% CI)	499	493		100.0	0.49 [0.15, 1.63]
Total events: 4 (Continuous support), 8 (Usual care)					
Test for heterogeneity: not applicable					
Test for overall effect z=1.16 p=0.2					
02 Support began at any time in first stage labour					
Breart - Belgium	3/133	4/131		7.0	0.74 [0.17, 3.24]
Breart - France	4/656	11/664		19.1	0.37 [0.12, 1.15]
Breart - Greece	6/295	8/274		14.5	0.70 [0.24, 1.98]
Hodnett 2002	30/3476	25/3473		43.7	1.20 [0.71, 2.03]
Campbell 2006	1/300	9/300		15.7	0.11 [0.01, 0.87]
Subtotal (95% CI)	4860	4842		100.0	0.76 [0.52, 1.13]
Total events: 44 (Continuous support), 57 (Usual care)					
Test for heterogeneity chi-square=7.77 df=4 p=0.10 I^2 =48.5%					
Test for overall effect z=1.35 p=0.2					
03 Support began in active labour					
Hofmeyr 1991	4/92	6/97		73.9	0.70 [0.20, 2.41]
Kennell 1991	1/212	2/200		26.1	0.47 [0.04, 5.16]
Subtotal (95% CI)	304	297		100.0	0.64 [0.22, 1.92]
Total events: 5 (Continuous support), 8 (Usual care)					
Test for heterogeneity chi-square=0.08 df=1 p=0.77 I^2 =0.0%					
Test for overall effect z=0.79 p=0.4					

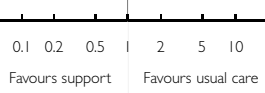
Analysis 04.06. Comparison 04 Continuous support during labour versus usual care - variations in timing of onset of support, Outcome 06 Dissatisfaction with/negative views of childbirth experience

Review: Continuous support for women during childbirth

Comparison: 04 Continuous support during labour versus usual care - variations in timing of onset of support

Outcome: 06 Dissatisfaction with/negative views of childbirth experience

Study	Continuous supportr n/N	Usual care n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
01 Support began before active labour					
Subtotal (95% CI)	0	0		0.0	Not estimable
Total events: 0 (Continuous supportr), 0 (Usual care)					
Test for heterogeneity: not applicable					
Test for overall effect: not applicable					
02 Support began at any time in first stage labour					
Breart - Belgium	24/133	30/131		16.6	0.79 [0.49, 1.27]
Breart - France	30/656	35/664		19.1	0.87 [0.54, 1.40]
Hodnett 2002	96/3454	117/3461		64.3	0.82 [0.63, 1.07]
Subtotal (95% CI)	4243	4256		100.0	0.83 [0.67, 1.02]
Total events: 150 (Continuous supportr), 182 (Usual care)					
Test for heterogeneity chi-square=0.08 df=2 p=0.96 I^2 =0.0%					
Test for overall effect z=1.80 p=0.07					
03 Support began in active labour					
Hofmeyr 1991	38/92	73/97		26.1	0.55 [0.42, 0.72]
Kennell 1991	47/212	71/200		26.8	0.62 [0.46, 0.85]
Langer 1998	98/361	129/363		47.2	0.76 [0.61, 0.95]
Subtotal (95% CI)	665	660		100.0	0.67 [0.58, 0.78]
Total events: 183 (Continuous supportr), 273 (Usual care)					
Test for heterogeneity chi-square=3.69 df=2 p=0.16 I^2 =45.9%					
Test for overall effect z=5.20 p<0.00001					



Analysis 04.07. Comparison 04 Continuous support during labour versus usual care - variations in timing of onset of support, Outcome 07 Postpartum depression

Review: Continuous support for women during childbirth

Comparison: 04 Continuous support during labour versus usual care - variations in timing of onset of support

Outcome: 07 Postpartum depression

Study	Continuous support n/N	Usual care n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
01 Support began before active labour					
Subtotal (95% CI)	0	0		0.0	Not estimable
Total events: 0 (Continuous support), 0 (Usual care)					
Test for heterogeneity: not applicable					
Test for overall effect: not applicable					
02 Support began at any time in first stage labour					
Hodnett 2002	245/3454	277/3461		100.0	0.89 [0.75, 1.05]
Subtotal (95% CI)	3454	3461		100.0	0.89 [0.75, 1.05]
Total events: 245 (Continuous support), 277 (Usual care)					
Test for heterogeneity: not applicable					
Test for overall effect z=1.43 p=0.2					
03 Support began in active labour					
Subtotal (95% CI)	0	0		0.0	Not estimable
Total events: 0 (Continuous support), 0 (Usual care)					
Test for heterogeneity: not applicable					
Test for overall effect: not applicable