Early postnatal discharge from hospital for healthy mothers and term infants (Review)

Brown S, Small R, Argus B, Davis PG, Krastev A

This is a reprint of a Cochrane review, prepared and maintained by The Cochrane Collaboration and published in *The Cochrane Library* 2009, Issue 3

http://www.thecochranelibrary.com

TABLE OF CONTENTS

[Intervention Review]

Early postnatal discharge from hospital for healthy mothers and term infants

Stephanie Brown[1], Rhonda Small[2], Brenda Argus[3], Peter G Davis[4], Ann Krastev[1]

[1]Healthy Mothers Healthy Families Research Group, Murdoch Childrens Research Institute, Parkville, Australia. [2]Mother and Child Health Research , La Trobe University, Melbourne, Australia. [3]Newborn Research Centre, Royal Women's Hospital, Parkville, Australia. [4]Department of Paediatrics, Royal Women's Hospital, Parkville, Australia

Contact address: Stephanie Brown, Healthy Mothers Healthy Families Research Group, Murdoch Childrens Research Institute, Level 1, 369 Royal Pde, Parkville, Victoria, 3052, Australia. stephanie.brown@mcri.edu.au. (Editorial group: Cochrane Pregnancy and Childbirth Group.)

Cochrane Database of Systematic Reviews, Issue 3, 2009 (Status in this issue: *Unchanged*)

DOI: 10.1002/14651858.CD002958
This version first published online: 22 July 2002 in Issue 3, 2002.
Last assessed as up-to-date: 30 November 2008. (Help document - Dates and Statuses explained)

This record should be cited as: Brown S, Small R, Argus B, Davis PG, Krastev A. Early postnatal discharge from hospital for healthy mothers and term infants. *Cochrane Database of Systematic Reviews* 2002, Issue 3. Art. No.: CD002958. DOI: 10.1002/14651858.CD002958.

ABSTRACT

Background

Length of postnatal hospital stay has declined dramatically in the past thirty years. There is ongoing controversy concerning whether staying less time in hospital is harmful or beneficial.

Objectives

The objective of this review was to assess the safety, impact and effectiveness of a policy of early discharge for healthy mothers and term infants, with respect to the health and well-being of mothers and babies, satisfaction with postnatal care, overall costs of health care and broader impacts on families.

Search strategy

We searched the Cochrane Pregnancy and Childbirth Group's Trials Register (December 2008), the Cochrane Central Register of Controlled Trials (*The Cochrane Library* 2008, Issue 1), MEDLINE (1966 to December 2007), CINAHL (1982 to December 2007) and reference lists of articles.

Selection criteria

Randomized trials comparing early discharge from hospital of healthy mothers and term infants, of greater than or equal to 2500 grams, with standard care in the settings in which trials were conducted.

Data collection and analysis

Trial quality was assessed and data were abstracted independently by at least two review authors.

Main results

Ten trials (involving 4489 women) were identified . There was substantial variation in the definition of 'early discharge', and the extent of antenatal preparation and midwife home care following discharge offered to women in intervention and control groups.

Six trials recruited and randomized women in pregnancy, four randomized women following childbirth. Post randomization exclusions were high. Non-compliance with allocated treatment was frequent.

No statistically significant differences in infant or maternal readmissions were found in eight trials reporting data on these outcomes. Five trials showed either no significant difference or results favouring early discharge for the outcome of maternal depression, although only three used a well-validated standardized instrument. The results of eight trials showed that breastfeeding rates did not differ significantly between the early discharge group and the control group receiving standard care.

Authors' conclusions

The pooled trials have inadequate power to detect increases in rare outcomes, such as infant and maternal mortality or readmissions.

Policies of earlier postnatal discharge of healthy mothers and term infants do not appear to have adverse effects on breastfeeding or maternal depression when accompanied by a policy of offering women at least one nurse-midwife home visit post discharge.

Large well-designed trials of early discharge programs incorporating process evaluation to assess the uptake of co-interventions, and using standardized approaches to outcome assessment are needed.

PLAIN LANGUAGE SUMMARY

Early postnatal discharge from hospital for healthy mothers and term infants

The length of time women spend in hospital after childbirth has fallen dramatically in many countries over the past 30 years. This review of trials compared the policy of early discharge after childbirth with standard length of stay and care at the time.

Early postnatal discharge of healthy mothers and term infants does not appear to have adverse effects on breastfeeding or maternal depression. However, the quality of the studies was generally poor. There are still too few participants in trials to determine the impact of early discharge on rare events, such as infant mortality. Further research is needed.

BACKGROUND

Since the 1970s, and earlier in some Western countries, there has been a steady decline in the length of time mothers spend in hospital after giving birth. From a standard hospital lying-in period of between eight to 14 days in the 1950s (Rush 1989), length of postnatal hospital stay for an uncomplicated vaginal birth in Australia, Canada, United Kingdom, United States and Sweden is now around two to three days or less. In parts of the United States, hospital stays of 12 to 24 hours for uncomplicated vaginal births, and 48 to 72 hours for uncomplicated caesarean births had become standard by the mid 1990s (Braveman 1995; Declerq 1997). Concern about possible adverse outcomes of early discharge led the United States Congress to pass legislation in 1996 mandating that private insurers cover postnatal stays of at least 48 hours after a vaginal birth and 96 hours after a caesarean section. However, four years later, the majority of newborn term infants were still being discharged 'early' (Lansky 2006).

There has been considerable controversy surrounding the question of whether earlier discharge of mothers and babies is safe. The possibility that stays of shorter duration might be associated with a range of adverse outcomes for mothers and babies has been debated since the late 1950s when the first reported randomized trial of early postnatal discharge was conducted (Hellman 1962). The list of potential negative consequences of earlier discharge of mothers and babies is long. Possible adverse outcomes include: delays in detecting and treating infant and maternal morbidity, greater occurrence of breastfeeding problems leading to earlier weaning, decreased maternal confidence due to lack of professional support, less maternal satisfaction with postnatal hospital care, higher prevalence of maternal depression, and increased infant and maternal readmissions (Braveman 1995; Britton 1994). Population-based studies assessing the relationship between length of postnatal hospital stay and breastfeeding initiation and duration in Australia and Sweden have found no association (Brown 2004; Waldenström 2004), whereas a Californian study found that women who left hospital earlier than the standard length of stay of two nights for a vaginal birth, and four nights for a caesarean section, were at a slightly increased risk of ceasing breastfeeding earlier (Heck 2003). A series of papers appearing in the journal Pediatrics in 1995 raised concerns about early discharge leading to an increase in the number of infants developing severe hyperbilirubinemia (Catz 1995; MacDonald 1995; Maisels 1995; Seidman 1995). However, each

of these reports was based on individual case series involving very small numbers of cases, with no adequate comparison group for assessing the contribution early discharge may have made. Several large retrospective cohort studies have investigated neonatal readmissions of infants discharged early (Edmonson 1997; Liu 1997; Liu 2000). Another large retrospective cohort study using routinely collected data for births in Washington State between 1989 and 1990 found that newborns discharged before 30 hours of age had a significantly higher rate of mortality in the first month of life, and in the first year of life, than those newborns who stayed in hospital longer (Malkin 2000).

However, not all commentators have viewed stays of shorter duration as necessarily having negative consequences for mothers and babies. Shorter length of stay has been promoted in settings such as birth centres as being consistent with a move away from an illness orientation in maternity care towards a more family-centred approach (Rush 1989; Waldenström 1987). From this perspective, earlier discharge of mothers and babies affords many potential advantages. These include: the opportunity for all family members to be together as they get to know the baby, contributing to improved bonding, greater involvement of the father and less sibling rivalry (Britton 1994); the possibility that mothers may obtain more rest and sleep in their own home environment where they are not exposed to constant interruptions and noise associated with hospital routines (Rush 1989); decreased exposure of the mother and the infant to nosocomial infections (Hellman 1962); enhanced maternal confidence in caring for the baby in the home environment (Rush 1989); and potentially fewer breastfeeding problems due to less conflicting advice and less exposure of the infant to the artificial schedules imposed in the hospital environment (Hellman 1962). As more than one commentator has pointed out, the potential advantages of shorter postnatal hospital stays are in many respects the mirror image of the adverse outcomes identified by those with concerns for the safety of mothers and babies.

The concept of 'early discharge' for mothers and babies implies there is an accepted standard length of time for women to stay in hospital after giving birth. In practice, definitions of what constitutes 'early discharge' vary in different countries according to what has been the standard pattern of care in the past. In Australia, a five to seven day stay was the norm until the mid 1990s (Day 1997), but in most other Western countries a shorter length of postnatal hospital stay had become standard well before this time (Braveman 1995; Rush 1989). As a result of these variations in practice, a length of stay of less than three days postpartum, that would have been considered standard in the late 1980s in countries such as the United States and United Kingdom, at the same time point in history would have been considered 'early discharge' in a country like Australia. This variation is reflected in the published literature on early discharge, with study participants discharged as early as 12 hours postpartum and as late as three to four days after the birth being considered in the early discharge category (Brown 1998; Carty 1990; Winterburn 2000).

Another factor which makes comparisons between studies conducted in different countries problematic is the extent to which earlier discharge is accompanied by co-interventions, for example, varying levels of antenatal preparation and post-discharge support. A recent Canadian randomized trial comparing planned early discharge (within 36 hours of the birth) with standard care (consisting of discharge within 48 to 72 hours) specified in the study protocol that women in the 'early discharge' group would receive a home visit or telephone call from an obstetric nurse within 48 hours of the birth, and on days three, five and 10 postpartum (Gagnon 1997). The level of primary care support available to postnatal women once they leave hospital irrespective of the timing of discharge also varies considerably between countries. In the United Kingdom women are visited by a community midwife for at least the first 10 days postpartum as part of routine midwifery care (UKCC 1993), and access to medical care from a general practitioner is universal and free at the point of service. Most women receive about seven midwife home visits in the first 10 to 14 days (MacArthur 2002). This high level of service provision is possibly the reason there has been much less concern about the impact of earlier discharge of mothers and babies in the United Kingdom than in countries such as the United States where access to primary care post discharge from hospital is limited (Declerq 1997). A recent population-based study of postnatal care provided to healthy newborns conducted in 19 US states found that 11% to 49% of newborn infants discharged 'early' did not receive a follow-up home visit within one week postpartum (Lansky 2006). To date we have not been able to locate studies documenting interventions relating to the timing of postnatal discharge of healthy mothers with term infants in countries outside Europe and North America.

Several systematic reviews of early postnatal discharge have been published (CETS 1997; Beck 1991; Braveman 1995; Grullon 1997; Margolis 1995; Norr 1987). The most rigorous and comprehensive of these reviews are those by Grullon and the Conseil d'Evaluation des Technologies de la Santé du Quebec (CETS). Both consider the effects on neonatal and maternal morbidity, maternal and infant readmissions, women's views of care and the issue of cost. Braveman provides a critical review of the early discharge literature with respect to infant outcomes (Braveman 1995). Several reviewers have deemed formal meta-analysis of the published randomized trials of early discharge inappropriate because of poor trial quality, and disparate exposures (length of stay, extent of midwifery home follow-up) and outcome measures (ways of assessing maternal and infant health problems, satisfaction with care, impact on the family and on fathers, cost, etc).

The only review of early postnatal discharge which includes a quantitative synthesis is the Canadian review undertaken by the Conseil d'Evaluation des Technologies de la Sante du Quebec. This review which incorporates both randomized and non-randomized studies concluded that a link between early discharge and neonatal

and maternal morbidity could be neither confirmed nor ruled out (CETS 1997). Braveman came to a similar conclusion commenting that "early discharge of newborns and mothers affects virtually the entire medically low risk population at a vulnerable time of life but has not been subjected to the same standard of evidence for safety and efficacy required of drugs and devices" (Braveman 1995).

While there are a number of other published reviews on this topic, the continuing reduction of length of postnatal stay in a number of countries and absence of clear evidence regarding safety, potential benefits for families, and costs associated with earlier postnatal discharge warrant the publication of a systematic review assessing current evidence from randomized trials.

OBJECTIVES

The primary objectives of this review are to determine whether a policy of early postnatal discharge is safe for healthy mothers and term infants, and to assess the effectiveness of a policy of early postnatal discharge in terms of important maternal, infant and paternal health and related outcomes.

Specific objectives are:

1. To identify whether a policy of early postnatal discharge increases:

- infant readmissions to hospital;
- duration of infant readmissions;
- attendances at hospital casualty or emergency departments for infant health issues;
- contacts with health care professionals regarding infant health issues post discharge.

2. To identify whether a policy of early postnatal discharge increases:

- maternal readmissions to hospital;
- duration of maternal readmissions;
- attendances at hospital casualty or emergency departments for maternal health issues;
- contacts with health care professionals regarding maternal health issues post discharge.

3. To identify whether a policy of early postnatal discharge increases maternal fatigue, depression, and physical health problems after the birth.

4. To identify whether a policy of early postnatal discharge increases maternal anxiety about caring for the baby after discharge from hospital.

5. To identify whether a policy of early postnatal discharge increases the occurrence of breastfeeding problems, and/or decreases the duration of breastfeeding.

6. To identify whether a policy of early postnatal discharge increases the amount of conflicting advice women receive regarding breastfeeding.

7. To compare the views of women in settings implementing a policy of early postnatal discharge with women in settings not implementing a policy of early postnatal discharge regarding satisfaction with postnatal care in hospital, satisfaction with length of postnatal hospital stay and satisfaction with postnatal care following discharge.

8. To identify whether a policy of early postnatal discharge increases paternal anxiety about caring for the infant, and/or decreases paternal involvement with the infant.

9. To identify whether a policy of early postnatal discharge increases the costs of pregnancy and postnatal care, including the costs of postnatal care in hospital and the costs of health care and practical support following discharge.

METHODS

Criteria for considering studies for this review

Types of studies

All trials in which women or caregivers or institutions are randomized to different policies in relation to the timing of postnatal discharge of healthy mothers and term infants.

Types of participants

Women who give birth in hospital to a healthy infant of at least 2,500 grams at term (37 to 42 weeks) who are deemed eligible for 'early discharge'.

Types of interventions

A policy of early postnatal discharge from hospital for healthy mothers and infants born at term where 'early discharge' refers to discharge that is earlier than standard care in the setting in which the intervention is implemented.

Types of outcome measures

Primary infant outcomes

1. Proportion of infants readmitted for neonatal morbidity (including jaundice, dehydration, infections) within seven days, and within the first 28 days after the birth.

Secondary infant outcomes

2. Duration of infant readmissions for infants readmitted within seven days, and within the first 28 days after the birth.
3. Total duration of infant hospitalisation over the first 28 days.
4. Proportion of infants attending hospital casualty or emergency department within seven days, and the first 28 days after the birth.
5. Number of contacts with health professionals regarding infant health issues within seven days, and the first 28 days after the birth.

Primary maternal outcomes

6. Proportion of women readmitted for complications related to childbirth (including postpartum haemorrhage, retained products of conception, infection, postpartum psychosis) in the first six weeks after the birth.
7. Proportion of women scoring above the cut-off score indicating probable depression on a well-validated standardized instrument for measuring depression at six to eight weeks, three months and six months after the birth.
8. Proportion of women breastfeeding (exclusively or partially) at six weeks, 12 weeks and six months after the birth.

Secondary maternal outcomes

9. Duration of readmissions for women readmitted within first six weeks after the birth.
10. Total duration of maternal hospitalisation over the first six weeks after the birth.
11. Proportion of women attending hospital casualty or emergency department within first six weeks after the birth.
12. Number of contacts with health professionals regarding maternal health issues within the first six weeks after the birth.
13. Proportion of women reporting tiredness or exhaustion in the first six weeks after the birth.
14. Proportion of women reporting physical health problems (including perineal pain, perineal infection, breast soreness, breast infection, caesarean wound pain, caesarean wound infection) in the first six weeks after the birth.
15. Proportion of women reporting that they lacked confidence about caring for their baby in the first month and the first six months after being discharged from hospital.
16. Proportion of women reporting infant feeding problems in the first four weeks after the birth.
17. Proportion of women reporting they received conflicting advice regarding breastfeeding in the first four weeks after birth.
18. Proportion of women who express dissatisfaction with their postnatal care in hospital.
19. Proportion of women who perceive their length of hospital stay as too short.
20. Proportion of women who perceive their length of hospital stay as too long.
21. Proportion of women who express dissatisfaction with their postnatal care in the first month and first six months following discharge from hospital.

Paternal outcomes

22. Proportion of fathers reporting that they lacked confidence about caring for their baby in the first month and the first six months after the baby came home from hospital.
23. Proportion of fathers reporting a high level of involvement with their baby in the first month and in the first six months after the birth.

Economic outcomes

24. Costs of pregnancy check-ups including booking-in and pre-admission visits.
25. Costs of hospital care in the period immediately following the birth up to the time of discharge.
26. Costs of postnatal care following discharge from hospital in the period up to six weeks after the birth, including community midwife, lactation consultant, general practice, specialist and outpatient visits; readmissions to hospital; attendances at day-stay programs; in-patient stays in mother and baby units.
27. Costs of practical support following discharge from hospital in the period up to six weeks after the birth, including paid and unpaid home help, care of the baby and of siblings.

Search methods for identification of studies

Electronic searches

We searched the Cochrane Pregnancy and Childbirth Group's Trials Register by contacting the Trials Search Co-ordinator (December 2008).

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. weekly searches of MEDLINE;
3. handsearches of 30 journals and the proceedings of major conferences;
4. weekly current awareness alerts for a further 44 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 'Specialized Register' section within the editorial information about the Cochrane Pregnancy and Childbirth Group.

Trials identified through the searching activities described above are each assigned to a review topic (or topics). The Trials Search Co-ordinator searches the register for each review using the topic list rather than keywords.

In addition, we searched CENTRAL (*The Cochrane Library* 2008, Issue 1), MEDLINE (1966 to December 2007) and CINAHL (1982 to December 2007). See Appendix 1 for search terms used. In the previous version of the review, we also searched the Effective Practice and Organisation of Care Review Group's Trials Register (December 2001) and EMBASE (1988 to 1993). See Appendix 2 for details.

Searching other resources

We also searched the reference lists of all retrieved articles.
We did not apply any language restrictions.

Data collection and analysis

Selection of studies

Assessment of trials for potential inclusion in the review was performed independently and unblinded by a minimum of two review authors, without consideration of the results. We resolved any differences of opinion by discussion until we reached a consensus.

Data extraction and management

Data extraction was performed independently by a minimum of two review authors using a predesigned data extraction form. Any discrepancies were resolved through discussion.

Assessment of methodological quality of included studies

The methodological quality of included trials was assessed according to criteria in the Cochrane Handbook for Systematic Reviews of Interventions (Higgins 2008).

(1) Selection bias (randomisation and allocation concealment)

We have assigned codes using the following criteria:
(A) adequate concealment of allocation, such as telephone randomisation, consecutively numbered sealed opaque envelopes;
(B) unclear whether adequate concealment of allocation, such as list or table used, sealed envelopes, or study does not report any concealment approach;
(C) inadequate concealment of allocation, such as open list of random-number tables, use of case record numbers, dates of birth or days of week.

(2) Attrition bias (loss of participants, e.g. withdrawals, protocol deviations

We have assessed completeness of follow up using the following criteria:
(A) less than 5 % loss of participants
(B) 5% to 9.9% loss of participants
(C) 10% to 19.9% loss of participants
(D) 20% or higher loss of participants.

(3) Performance bias (blinding of participants, caregivers, and outcome assessment)

We have assessed blinding using the following criteria:
(1) blinding of participants (yes, no, unclear);
(2) blinding of caregiver (yes, no, unclear):
(3) blinding of outcome assessment (yes, no, unclear).

Measures of intervention effect

Statistical analyses were performed using the Review Manager Software (RevMan 2008).

Categorical data

Categorical data (eg proportion of women readmitted in first six weeks, proportion of women depressed) were analysed using risk ratios (RR) with 95% confidence intervals.

Continuous data

For continuous data (duration of infant hospitalization in first 28 days), we used the mean difference (MD) with 95% confidence intervals.

Assessment of heterogeneity

We used the I^2 statistic to assess the heterogeneity of intervention effects. Analysis was undertaken using both fixed-effects and random-effects models. The results are reported for the random-effects analysis. This was deemed the more appropriate method for two reasons. First, there was considerable heterogeneity in what constituted 'early discharge' in the different times and settings in which the studies were conducted. Although this does not necessarily mean there would be statistical heterogeneity in intervention effects, it does make it more likely. Second, for consistency of reporting we chose the random-effects analysis given the moderate to significant statistical heterogeneity of effects (35% to 88%) found for several outcomes.

Sensitivity analyses

We planned sensitivity analyses for primary outcomes to explore the effect of trial quality. We conducted exploratory sensitivity analyses designed to test the robustness of the findings for the primary outcomes, using a range of assumptions about the outcomes for participants lost to follow-up in the intervention versus control arms (best to worst case scenarios: from 100% intervention participants having a poor outcome to 0%).

Subgroup analyses

We planned the following subgroup analyses for primary outcomes, but were unable to perform them in this version of the review:

- primiparous women versus multiparous women;
- method of birth (spontaneous vaginal birth/operative vaginal birth/elective caesarean section/emergency caesarean section);
- differing lengths of stay (< 24 hours, 24 < 48 hours,48 to 72 hours, >72 hours;
- 'early discharge' accompanied by co-interventions (antenatal preparation or not, midwife home visits or not).

RESULTS

Description of studies

See: Characteristics of included studies; Characteristics of excluded studies.

See Characteristics of included studies.

The trials included in this review compare 'early postnatal discharge' with standard length of hospital stay as defined in the time and place where they were conducted. Ten trials were undertaken between 1959 and 2001 (and published between 1962 and 2005) in North America, the United Kingdom, Spain, Sweden and Switzerland. Standard discharge policies in these settings varied greatly. Correspondingly, there is substantial heterogeneity in what constitutes 'early discharge' to the extent that a length of postnatal hospital stay defined as 'early discharge' in one study would have been a standard length of postnatal stay in other settings.

Ten trials of early postnatal discharge were identified. All are included in this review. The largest trial was published in 1962, and included 2257 women (Hellman 1962). The other nine trials were conducted between 1976 and 2001, and involved between 122 and 430 participants. In total 4489 women participated in trials included in this review. The study populations differed considerably between trials. Four trials recruited women after the birth. The other six trials recruited women in pregnancy. Most trials specified eligibility criteria designed to limit participation to women at lower risk of complications. One of the four trials that recruited women after they had given birth, recruited only women who had had an unplanned caesarean section. Follow-up of participants varied from three weeks to six months following childbirth.

In six trials randomization took place in pregnancy, usually between 30 and 38 weeks gestation (Boulvain 2004; Carty 1990; Gagnon 1997; Waldenström 1987; Winterburn 2000; Yanover 1976). Four trials - including the largest of the ten studies - randomized women immediately after the birth (Brooten 1994; Hellman 1962; Sainz Bueno 2005; Smith-Hanrahan 1995).

Definition of early discharge

The definition of 'early discharge' differs across the ten trials reflecting standard practice in the settings in which they were conducted. In five of the ten trials standard practice for length of postnatal hospital stay following normal childbirth was for women to be discharged after 48 hours (Gagnon 1997; Sainz Bueno 2005; Waldenström 1987; Winterburn 2000; Yanover 1976). In these studies 'early discharge' was defined as somewhere between six and 48 hours following childbirth. Only three trials encouraged women in the intervention group to leave hospital earlier than 24 hours after the birth (Sainz Bueno 2005; Yanover 1976; Winterburn 2000). In the study conducted by Smith-Hanrahan and colleagues, standard care was for women to stay in hospital for at least 60 hours after giving birth, and early discharge was defined as less than 60 hours (Smith-Hanrahan 1995). In the other four studies, the standard length of postnatal hospital stay was four or more days following the birth, and 'early discharge' ranged from 12 to less than 72 hours (Boulvain 2004; Brooten 1994; Carty 1990; Hellman 1962).

Inclusion criteria

In nine trials pre-randomization inclusion criteria were designed to select women at low medical risk (Boulvain 2004; Carty 1990; Gagnon 1997; Sainz Bueno 2005; Smith-Hanrahan 1995; Waldenström 1987; Winterburn 2000; Yanover 1976). Eight of these trials recruited both women having their first or subsequent children. The trial conducted by Winterburn and colleagues recruited only women having their first child and planning to breastfeed (Winterburn 2000). Yanover and colleagues specified a number of social eligibility criteria including a requirement that prospective parents currently live together, completion of the final year of high school by mothers, and willingness of fathers to attend prenatal classes (Yanover 1976). The one trial that was designed to select women at higher medical risk was the study by Brooten and colleagues that recruited women who had an unplanned caesarean section (Brooten 1994).

Risk of bias in included studies

See Characteristics of included studies.

Only five trials clearly documented steps taken to ensure allocation concealment (Boulvain 2004; Brooten 1994; Carty 1990; Gagnon 1997; Sainz Bueno 2005). Insufficient information is available to determine the adequacy of concealment prior to randomization for the other five trials. Hellman and colleagues allocated women to control status on the basis of a series of previously designated random numbers, but it is not clear how this was administered and whether informed consent of participants was sought (Hellman 1962).

The low participation rate in several trials limits the generalisability of the findings. Waldenström and colleagues report that out of

1604 women approached, 1440 declined to take part. The total number of women recruited and randomized was 164, or 10% of those approached (Waldenström 1987). Gagnon and colleagues invited 1354 women to participate, 938 met inclusion criteria at the time of recruitment, and 360 agreed to take part, ie 27% of those initially approached (Gagnon 1997). Boulvain and colleagues screened 3836 women: 2324 women met inclusion criteria and 460 women took part, ie 12% of those initially screened (Boulvain 2004). Carty and Bradley note that only 10% of 300 physicians who initially agreed to assist with recruitment actually referred women to the study (Carty 1990). Smith-Hanrahan and colleagues report a high participation rate (90%) from eligible women who consented to meet with a nurse researcher, but do not specify how many women declined to meet with the research nurse when they were approached on the postnatal ward (Smith-Hanrahan 1995). Other trials provide limited information about the number of women declining to participate.

It is not possible to blind participants or caregivers to allocation status for this intervention. It was unclear whether outcome assessment was blinded to allocation status in any of the included studies.

Post-randomization exclusions

Post-randomization 'exclusion' criteria were specified by three of the six studies that randomized women in pregnancy (Carty 1990; Gagnon 1997; Waldenström 1987). They included factors such as caesarean section, forceps, preterm birth, low birthweight and significant infant or maternal morbidity at the time of birth that might necessitate a longer length of stay. In the study conducted by Yanover and colleagues 10 couples did not attend prenatal classes and were deemed ineligible to continue in the trial (Yanover 1976). The proportion of women excluded by post-randomization criteria in these studies ranged from 24% (46/189) in the study by Carty and Bradley to 44% (159/360) in the study conducted by Gagnon and colleagues (Carty 1990; Gagnon 1997). Smith-Hanrahan and colleagues excluded from analysis 20 women randomized to the early discharge group who subsequently stayed longer; 18 of these women had infants requiring phototherapy for jaundice, one had a baby diagnosed with Down's syndrome, and one woman requested a longer stay (Smith-Hanrahan 1995). Women deemed not eligible for 'early discharge' after the birth were removed from further analyses of the data in each of these studies, ie analysis was not by intention to treat (Carty 1990; Gagnon 1997; Smith-Hanrahan 1995; Waldenström 1987; Yanover 1976).

Protocol violations and withdrawals

Not all of the included trials provide information regarding the extent to which women opted not to comply with randomization, choosing either to go home early when they had been randomized to standard care, or to stay longer when randomized to early discharge. Three trials reported substantial non-compliance, with differential cross-over between intervention and control groups. Winterburn and colleagues report that 74% of women randomized to early discharge (90/121) stayed in hospital for longer than planned, with a much smaller proportion of those randomized to a longer stay (16%, 20/127) leaving hospital early (Winterburn 2000). In the trial conducted by Smith-Hanrahan and colleagues 43% of women randomized to the control group (29/67) were subsequently sent home early because of bed shortages (Smith-Hanrahan 1995). Boulvain and colleagues report that 50% of women in the early discharge group (114/229) stayed in hospital longer than planned, and 27.7% of women randomized to a longer stay left hospital earlier than planned (64/231) (Boulvain 2004). Carty and Bradley note that 10 women (5% of those randomized) did not comply with group allocation, but do not specify whether non-compliance was differential between groups (Carty 1990). Gagnon and colleagues report that 21 women withdrew (6% of women randomized), 18 of these from the intervention group (Gagnon 1997). Waldenström and colleagues report 13 withdrawals from the early discharge group (8% of women randomized) (Waldenström 1987). Yanover reports that six women lost interest in the study and withdrew (5% of women randomized) (Yanover 1976).

Loss to follow-up

Loss to follow-up from factors other than post-randomization exclusion or non-compliance with the intervention was relatively low in the trials providing this information. Six trials report no loss to follow-up (Smith-Hanrahan 1995) or loss to follow-up of less than 4% (Boulvain 2004; Carty 1990; Gagnon 1997; Waldenström 1987; Winterburn 2000). Yanover reports loss to follow-up of 12% (15/128) (Yanover 1976). Sainz Bueno reports loss to follow-up of 10.9% (37/430) (Sainz Bueno 2005). The other two trials give no data for the number of women unable to be followed up (Brooten 1994; Hellman 1962).

Loss of participants from included trials occurred for a variety of reasons, including withdrawals, women failing to return questionnaires, protocol deviations and post-randomization exclusions. Relatively large numbers of women were excluded post randomization in five of the six trials that randomized women prior to the birth. Unfortunately, few trials undertook analysis retaining women who were deemed ineligible for early discharge as a result of events that occurred after randomisation.

Summary of post-randomization exclusions, withdrawals, and losses to follow up

Of the eight trials that reported data on postrandomization exclusions, withdrawals and loss to follow up, five had greater than 20% attrition of participants (range 30.7% to 51.4%) (Carty 1990; Gagnon 1997; Smith-Hanrahan 1995; Waldenström 1987; Yanover 1976). The other three trials reporting withdrawals and other losses, each had less than 5% attrition (Boulvain 2004: Sainz Bueno 2005; Winterburn 2000).

Co-interventions

There was substantial variation between trials in the extent and intensity of antenatal preparation and midwife home care following discharge offered to women in intervention and control groups. Two studies included antenatal home visits for women randomized to early discharge (Carty 1990; Waldenström 1987), and a third offered a prenatal 'preparation for discharge' class for women in both intervention and control arms of the study (Yanover 1976). Home visits by study nurses or nurse-midwives were made to women in the early discharge arms of all ten trials, although in the largest trial (Hellman 1962) study nurses were intended to collect information only and were requested not to provide actual nursing care or support. There was substantial variation in the nature and extent of nurse-midwife support specified in study protocols. Some trials offered a mixture of home visits and phone calls (Boulvain 2004; Brooten 1994; Gagnon 1997; Smith-Hanrahan 1995) while others included a home visit during pregnancy as well as home visits after the birth (Carty 1990; Waldenström 1987). Six trials restricted midwife home visits to the early discharge group (Brooten 1994; Sainz Bueno 2005; Smith-Hanrahan 1995; Waldenström 1987; Winterburn 2000; Yanover 1976). The other four trials provided a limited number of midwife home visits to women in the control group (Boulvain 2004; Carty 1990; Hellman 1962) or provided home visits on referral by a physician (Gagnon 1997). None of the studies provide detailed information about access to primary care services in the settings in which the studies were conducted.

Sample size and study power

Only six trials report sample size calculations (Boulvain 2004; Brooten 1994; Carty 1990; Gagnon 1997; Sainz Bueno 2005; Winterburn 2000), and in one of these post hoc calculations were based on interim analysis of trial data by a data monitoring committee (Winterburn 2000). None of the trials reporting power calculations took into account the impact of post-randomization exclusions, protocol deviations, withdrawals, or loss to follow-up in determining sample size. Several included studies had very limited power to assess differences in relation to reported outcomes.

Effects of interventions

This review has a number of specific objectives, each of which is considered in turn below. Principal outcomes were infant readmissions for neonatal morbidity, maternal readmissions for complications related to childbirth, maternal depression and breastfeeding. Eight trials report data on maternal readmissions (Boulvain 2004; Brooten 1994; Carty 1990; Hellman 1962; Sainz Bueno 2005; Smith-Hanrahan 1995; Waldenström 1987; Winterburn 2000). Each of these trials also report data on infant readmissions, with the exception of the study conducted by Carty 1990. Five trials include data on maternal emotional well-being (Boulvain 2004; Brooten 1994; Carty 1990; Sainz Bueno 2005; Waldenström 1987) and eight provide information on breastfeeding (Boulvain 2004; Carty 1990; Gagnon 1997; Hellman 1962; Sainz Bueno 2005; Smith-Hanrahan 1995; Waldenström 1987; Winterburn 2000).

1. Does a policy of early postnatal discharge increase infant readmissions and contacts with health services after leaving hospital?

No significant differences in infant readmissions were found in the seven trials that reported data on this outcome (Boulvain 2004; Brooten 1994; Hellman 1962; Sainz Bueno 2005; Smith-Hanrahan 1995; Waldenström 1987; Yanover 1976). The pooled risk ratio (RR) for infant readmissions occurring within three to eight weeks postpartum was 1.29 (95% confidence interval (CI) 0.60 to 2.79). The conclusion was unchanged when the one trial that recruited only women who had an unplanned caesarean section was excluded from the analysis (RR 1.74, 95% CI 0.88 to 3.45). It was not possible to conduct analyses restricted to readmissions occurring within seven days of the birth, or for readmissions within the first 28 days as no studies included sufficient detail to facilitate examining the data in this way. No trials included data on the duration of infant readmissions, or on the total duration of infant hospitalization (including the period immediately after the birth prior to discharge).

Brooten and colleagues found no significant difference between groups for infant 'acute care' visits in the first eight weeks postpartum among women recruited following an unplanned caesarean section (41%, 25/61 in the early discharge group versus 51%, 31/61 in standard care (RR 0.81, 95% CI 0.55 to 1.19). Most acute care visits (71%) in the first four weeks were for 'bilirubin monitoring' or 'routine care' (Brooten 1994). No other trials report data for visits to accident and emergency services. Only one trial collected information on contacts with health professionals for infant health problems in the first month (Gagnon 1997). No significant difference was observed between early discharge and standard care (15.4%, 12/78 versus 17.5%, 17/97, RR 0.88, 95% CI 0.45 to 1.73). Carty and Bradley report on the number of physician referrals made by study nurses visiting women after discharge (Carty 1990). The proportion of infants with problems in the first ten days after the birth prompting referral to a physician in the early discharge group was 4.3% (4/93), compared with 5.2% (2/38) in standard care (RR 0.82, 95% CI 0.16 to 4.28).

2. Does a policy of early postnatal discharge increase maternal readmissions and contacts with health services after leaving hospital?

The pooled estimate for maternal readmissions within three to six weeks postpartum for the eight trials that recorded information for this outcome was RR 1.10, 95% CI 0.51 to 2.40) (Boulvain 2004; Brooten 1994; Carty 1990; Hellman 1962; Sainz Bueno 2005; Smith-Hanrahan 1995; Waldenström 1987; Yanover 1976). The

conclusion was unchanged when the one trial that recruited only women who had an unplanned caesarean section was excluded from the analysis (RR 1.29, 95% CI 0.59 to 2.80). No trials report data on the duration of maternal readmissions or on the total duration of hospitalisation of mothers in the first six weeks after the birth.

Only one trial collected information on acute care visits for maternal health issues (Brooten 1994). Fewer visits were made by mothers in the early discharge group in the trial which recruited women following an unplanned caesarean section: 9.8% of women in the early discharge group (6/61) made a total of 11 visits compared with 21% of women randomized to standard care (13/61) who made a total of 23 visits (RR 0.46, 95% CI 0.19 to 1.14).

No trials collected information on contacts with health professionals for maternal health problems in the first six weeks after the birth. Carty and Bradley report on the number of physician referrals for maternal health issues made by study nurses visiting women in the first ten days postpartum (Carty 1990). The proportion of mothers with problems prompting referral to a physician in the two early discharge groups was 5.3% (5/93) compared with 7.9% (3/38) in standard care (RR 0.68, 95% CI 0.17 to 2.71). Boulvain and colleagues report visits to gynaecologists in the first month. Fifteen per cent of women in the early discharge group (33/228) made one or more visits compared with 22% (48/231) in the comparison group (RR 0.70, 95%CI 0.47 to 1.10).

3. Does a policy of early postnatal discharge increase maternal health problems after the birth?

The five trials that assessed women's emotional well-being in the months after the birth used different methods of ascertainment. Two trials used validated instruments with known sensitivity or specificity for identifying probable maternal depression in the postnatal period. Boulvain and colleagues (Boulvain 2004) used the Edinburgh Postnatal Depression Scale (EPDS), Sainz Bueno (Sainz Bueno 2005) used the Hospital Anxiety and Depression Scale (HADS). The pooled estimate for maternal depression one month after birth combining data from these two trials was RR 0.56 (95%CI 0.21 to 1.51). Carty and colleagues report a significant difference in mean scores on the Beck Depression Inventory at one month postpartum favouring early discharge (Carty 1990). The mean score for women randomized to discharge within 24 hours of the birth was 4.5 (standard deviation (SD) 2.54) versus a mean score of 7.8 (SD 6.46) for women randomized to discharge four or more days after the birth ($p < 0.05$). Higher scores on this scale indicate poorer emotional well-being. It was not possible to pool data from this trial with data from studies conducted by Sainz Bueno et al and Boulvain and colleagues as there was insufficient information about raw data provided in the paper. There is also concern about the use of the Beck Depression Inventory in the postpartum period where it performs less well than the EPDS because of its inclusion of somatic items (Harris 1989). Brooten and colleagues state that they found no differences between early discharge and standard care using the Multiple Affect Adjective Checklist at eight weeks postpartum, but report no actual data for this outcome (Brooten 1994). Waldenström and colleagues assessed women's emotional well-being after the birth using a single item self-report measure that asked women to indicate if they had been depressed for two weeks or longer at any stage in the first six weeks after the birth (Waldenström 1987). No difference was found between the early discharge and standard care groups. In the early discharge group 6% of women (3/50) reported depression lasting two weeks or longer compared with 9.2% of women (5/54) randomized to standard care.

Three trials reported data on tiredness and exhaustion in the first six weeks after the birth. Waldenström and colleagues compared mean values on a five-point scale that rated fatigue and alertness from 'very alert' to 'very tired' for the first 14 days postpartum. No statistically significant differences were found between groups, but women in both groups were most tired on the day following discharge (Waldenström 1987). Smith-Hanrahan and colleagues used a 10 centimetre visual analog scale with anchors ranging from zero (not tired, full of energy, peppy) to 10 (total exhaustion) with assessments at two to three days, one week and six weeks after the birth. No significant differences in mean scores were found between intervention and control groups (Smith-Hanrahan 1995). Sainz Bueno and colleagues report the increase in puerperal fatigue at one month compared with one week postpartum and found no differences between groups (Sainz Bueno 2005).

One trial reports data on other maternal physical health problems in the first six weeks postpartum (Sainz Bueno 2005) showing more pathology in the control group (22.9%) compared with the intervention group (17.9%).

4. Does a policy of early postnatal discharge increase maternal anxiety?

Only one trial assessed how confident mothers felt about caring for their baby in the first month after the birth (Carty 1990). Carty and Bradley used an eight-item scale to assess women's confidence about 'mothering' at one week postpartum and at one month postpartum. They report that at one week postpartum women randomized to very early discharge (12 to 24 hours) were significantly more confident about caring for their baby than women randomized to standard care (four days), with mean scores of 39.71 (SD 4.68) and 36.53 (SD 5.83) respectively ($p < 0.03$). The clinical importance of this difference is unclear and was not addressed in the trial report. Women randomized to discharge between 25 to 48 hours after the birth also reported greater confidence about caring for their baby (mean score 38.73, SD 5.12) but this difference was not statistically significant. At one month postpartum there were no statistically significant differences between groups.

5. Does a policy of early postnatal discharge increase breastfeeding problems, and/or decrease the duration

of breastfeeding?

The pooled estimate from eight trials that reported data on partial or exclusive breastfeeding at one month or two months postpartum indicated no significant difference between the early discharge group and the control group receiving standard care. Women in the early discharge group were no more or less likely not to be breastfeeding at follow-up in the first eight weeks postpartum (RR = 0.90, 95% CI 0.76 to 1.06) (Boulvain 2004; Carty 1990; Gagnon 1997; Hellman 1962; Sainz Bueno 2005; Smith-Hanrahan 1995; Waldenström 1987; Winterburn 2000). This includes women who did not commence breastfeeding, and women who had ceased breastfeeding at the point of follow-up.

This result needs to be interpreted taking into account the cultural and other factors affecting breastfeeding rates in the different settings and contexts in which the trials were conducted. In studies reporting data on breastfeeding in the first one to two months postpartum, the proportion of women breastfeeding ranged from 23% in the trial conducted in New York in the 1950s to 87% in the Swiss and Spanish trials.

Five trials do not provide detailed information about how breastfeeding was assessed (Boulvain 2004; Hellman 1962; Sainz Bueno 2005; Smith-Hanrahan 1995; Waldenström 1987). The other three trials each used different measures; one reports the proportion of women 'exclusively' breastfeeding (Carty 1990), another reports on women 'predominantly' breastfeeding (Gagnon 1997), and the third trial that recruited only women wanting to breastfeed groups together women who were exclusively or partially breastfeeding (Winterburn 2000).

Three trials collected information on infant feeding at six months postpartum (Waldenström 1987; Boulvain 2004; Sainz Bueno 2005). There was no significant difference between the early discharge and control groups in the proportion of women not breastfeeding at six months postpartum (pooled RR 0.92, 95% CI 0.80 to 1.05).

Two trials reported data on infant feeding problems (Boulvain 2004; Hellman 1962). The pooled estimate indicates no significant difference between the early discharge group and control group (RR=0.89, 95% CI 0.43 to1.86), but there was significant heterogeneity (>50%) in the results for these two studies, with the recent study by Boulvain and colleagues reporting a statistically significant reduction in infant feeding problems among women in the early discharge group (Boulvain 2004).

6. Does a policy of early postnatal discharge lead to women receiving a greater amount of conflicting advice regarding breastfeeding?

No trials reported data for this outcome. One trial reported on conflicting advice regarding postnatal care more generally, with no significant differences between the groups (Intervention:83/229, 39% versus Control: 93/231, 43%, RR 0.90, 95% CI 0.71 to 1.14) (Boulvain 2004).

7. Does a policy of early postnatal discharge influence women's satisfaction with postnatal care in hospital and following discharge?

Eight out of the ten trials undertook some form of assessment of women's views of postnatal care. Five trials collected information regarding women's views of care in hospital after the birth (Brooten 1994; Carty 1990; Gagnon 1997; Hellman 1962; Waldenström 1987). The two recent trials collected information on women's satisfaction with postnatal care in the first four to six weeks (Boulvain 2004; Sainz Bueno 2005). In the review protocol we specified that data on women's views of care would be abstracted from trials in the form of the proportion of women dissatisfied with care. Commonly, information on women's views of care is collected via questions using five or seven point scales (ratings of 'very satisfied' to 'very dissatisfied'). An a priori decision was taken to classify responses of less than 'very satisfied' as indicating a level of dissatisfaction or that some aspect of care could have been better. Comparisons of proportions were prespecified in the protocol rather than comparison of mean scores because of the difficulty of assessing the clinical significance of small statistically significant mean differences for this outcome.

There were four trials that reported data on women's views of postnatal care in the format specified in the protocol (Boulvain 2004; Hellman 1962; Sainz Bueno 2005; Waldenström 1987). We have pooled the results for three of these trials. The study conducted by Hellman et al was excluded because of the likelihood that the allocation methods itself may have influenced women's views of care. Hellman et al randomly selected controls to receive standard care, and compared these women with a much larger cohort 'allocated' to 'early discharge' (Hellman 1962). It is not clear whether women's informed consent to the new form of care was sought, or what proportion of women were deemed ineligible. Hellman notes that a major reason for conducting the study was a shortage of cots (Hellman 1962). The pooled estimate from the three included studies gave a RR of 0.60 (95% CI 0.36 to 1.00). There is significant heterogeneity evident in the three trials included in this analysis with the results of two studies clearly favouring early discharge (Waldenström 2004; Sainz Bueno 2005). It is of note that in the study by Waldenstrom et al only 10% of those women approached consented to take part, and participants differed in several important respects from non-participants, including having a tendency to be more negative about care in hospital at trial entry (Waldenström 1987). In the Spanish trial there was differential loss to follow-up between early discharge and standard care (41/213, 19.2% versus 92/217, 42.4%).

The three trials that report data for this outcome in the form of mean scores all found greater satisfaction with postnatal care among women randomized to early discharge (Brooten 1994; Carty 1990; Gagnon 1997). Carty and Bradley measured satisfaction with postnatal care using a 22-item questionnaire specially developed for the trial (Carty 1990). Questions were formatted using a five-point Likert scale giving a total possible score of 110.

The mean score for women randomized to leave hospital 12 to 24 hours after the birth was 96.97, SD 11.25 compared with a mean of 80.45, SD 20.96 among women in the group randomized to discharge on day four (p < 0.0009). Women randomized to leaving hospital 25 to 48 hours after the birth gave intermediate ratings of care (mean 91.55, SD 16.58). Brooten and colleagues used the La Monica-Oberst Patient Satisfaction Scale to assess women's views of postnatal care in hospital following an unplanned caesarean section (Brooten 1994). The mean score among women in the early discharge group was 187, SD 18 versus 165, SD 25 in the group randomized to standard care. Gagnon and colleagues found greater satisfaction in the early discharge group based on a single question that asked about satisfaction with postnatal care in the first ten days postpartum (Gagnon 1997). Pre-coded responses to this question were in the form of a five-point scale from 'very satisfied' to 'very dissatisfied'. The mean score in the early discharge group was 3.6, SD 0.7 compared with 3.0, SD 1.0 in the group randomized to standard care (mean difference 0.6, 95% CI 0.3 to 0.9).

Only one trial asked women to provide an assessment of their length of stay (Yanover 1976). Very few women in the trial conducted by Yanover and colleagues thought their length of stay too short (2/41 in the early discharge group and 1/41 in the group randomized to standard care (RR 2.00, 95% CI 0.19 to 21.21). Slightly fewer women in the early discharge group thought their stay 'too long' (5/41 in the early discharge group versus 9/41 in the standard care group (RR 0.56, 95% CI 0.20 to 1.52)).

No trials included measures specifically focusing on women's views of postnatal care after they left hospital.

8. Does a policy of early postnatal discharge increase fathers' anxiety about caring for their baby, or decrease their involvement with the infant?

The Swedish trial is the only study to report data on fathers' involvement in infant care. Waldenström and colleagues found that fathers' involvement was higher in the first few days after the birth in the early discharge group, both among first-time fathers and those having their second or a subsequent child (Waldenström 1987). First-time fathers in the early discharge group spent an average of 183 minutes per day with their baby in the first two to four days, compared with 71 minutes for the control group (t = 4.5, P < 0.001). Fathers with two or more children spent an average of 89 minutes with the new baby in the early discharge group, compared with 44 minutes in the control group (t = 2.9, P < 0.01). These differences were no longer apparent at two and six weeks after the birth.

No trials included assessment of fathers' anxiety about caring for their infant after discharge.

9. Does a policy of early postnatal discharge increase the costs of pregnancy and postnatal care?

No trials reported data on costs of pregnancy check-ups. The two more recent trials collected data on the cost of hospitalisation and community care post-discharge (Sainz Bueno 2005, Boulvain 2004). In both trials the cost of hospitalisation was lower in the early discharge group. In the Spanish trial the mean cost of hospitalisation in the early discharge group was US$382.22 compared with US$647.67 in the standard care group (Sainz Bueno 2005). In the study conducted by Boulvain et al, the mean cost of hospitalisation in the early discharge group was 5218 CHF (Swiss Francs) compared with 6772 CHF in the standard care group. In one trial the combined costs of community care and maternal and neonatal readmissions was higher in the early discharge group, and in the other costs were higher in the standard care group. Sainz Bueno and colleagues found that the combined cost of community care (including maternal and neonatal consultations and telephone calls) and maternal and neonatal readmissions was lower in the early discharge group (mean US$125.24 versus US$153.90), reflecting the higher number of maternal readmissions in the control group. The standard deviations for group means were not reported. Boulvain and colleagues report no significant mean differences in costs for maternal and neonatal readmissions or in-hosptial outpatient care between the early discharge and standard care groups, but significantly higher mean costs for community care (including midwifery, medical and allied health care) in the early discharge group (528 CHF, SD=267) compared with the standard care group (234 CHF, SD=273). Combining all these postnatal care costs, the mean costs were 932 CHF in the early discharge group compared with 481 CHF in the standard care group. Boulvain et al also measured non-medical costs attributable to health care in the first six weeks after birth (travel to health care providers, childcare support for siblings) and also the costs associated with loss of income if a partner required time off work. They found no differences between the groups in these non-medical and indirect costs. Finally, Boulvain et al report that the total mean costs were significantly lower in the early discharge group (7798 CHF, SD=6419) compared with the standard care group (9019 CHF, SD=4345) (Boulvain 2004).

One other trial, that of Brooten et al involving women who had an unplanned caesarean section, provides some data on costs (Brooten 1994). They found that hospitalisation charges (including labour ward charges) were significantly less in the early discharge group (intervention group mean of US$7648 versus control group mean of US$10,971). When charges were added for nurse-specialist visits (in hospital and at home), home caregiver charges, acute care visits (following discharge) and rehospitalisation charges, the difference between the intervention and control groups remained statistically significant. The intervention group mean was US$8,164 compared with a control group mean of US$11,490 (mean difference = $3,326, P < 0.01). The standard deviations for group means were not reported.

Senstitivity analyses

Exploratory sensitivity analyses conducted to investigate the impact of a range of assumptions about differences in outcomes between intervention and control arms for participants lost to follow-up demonstrated robustness in the findings with regard to depression and breastfeeding. The findings with regard to maternal and infant re-admissions were much less robust to differing assumptions, as might be expected given the rarity of these outcomes.

Sub-group analyses

Given the small number of participants in most trials it was not possible to undertake planned sub-group analyses comparing different policies with respect to early discharge (differing lengths of stay), accompanying co-interventions (antenatal preparation or not, midwife home visits or not), primiparous versus multiparous women or vaginal versus operative births.

DISCUSSION

Assessing trial quality

A number of factors compromise the quality of the 10 trials included in this review. Several trials report very low rates of recruitment of women approached to take part. The possibility of recruitment favouring women who either have no preference with regard to the length of time spent in hospital after the birth, or whose preference is for a short stay is therefore high. Post-randomization exclusions from participation in 'early discharge' (i.e. cross-over) in trials reporting this information account for a relatively large proportion of women randomized (24% to 44% of women). This is inevitable if randomization takes place in pregnancy, since many of the factors that may preclude a shorter length of postnatal hospital stay cannot be predicted in advance. A potential problem with post-randomization cross-over is that any effects associated with the intervention (early discharge) may be diluted by women who remain in hospital longer than planned. None of the trials that reported power calculations appeared to have taken this into account when determining sample size. In addition, seven trials reported overall loss to follow greater than 20% (range 30.7% to 51.4%).

Assessing the nature of the intervention

The rationale for considering the 10 included trials as a group was that all studies were comparing policies of early discharge with standard care in the setting in which they were conducted. The trials were conducted at different times and places in the Canada, Spain, Switzerland, the United Kingdom and the United States. Standard care in these settings varied substantially, and the trials were therefore designed to evaluate very different policies of 'early discharge'. In all cases 'early discharge' was accompanied by some level of antenatal and/or post-discharge co-intervention. The extent to which opportunities for antenatal preparation and postnatal domiciliary midwife support were taken up by trial participants is poorly reported in the published accounts of the trials.

Maternal and infant health outcomes

The fact that no differences are apparent in the pooled data for infant and maternal readmissions is reassuring, especially as higher rates of readmission might be expected for mothers and infants returning home sooner after the birth. The information collected regarding contacts with health services in the period immediately following discharge in the 10 trials is very variable. Making comparisons between studies is problematic because of the different levels of primary and specialist support available in different settings.

Although all of the included trials asked participants to complete some form of follow-up questionnaire, only six incorporated measures of maternal physical and psychological health. Concern that early discharge might contribute to higher prevalence of maternal depression is not substantiated by the findings, although only two of the trials used an instrument validated for assessing depression in the postnatal period. The impact of selecting women with a preference for shorter hospital stay cannot be discounted as a factor influencing these results and the finding of Carty and Bradley, that women in the early discharge group report greater confidence in the first week at home.

The pooled results of the eight studies which report data on breastfeeding for over 3800 women indicate that timing of discharge for healthy mothers of term infants does not influence the proportion of women breasfeeding at one to two months postpartum.

Although a number of trials incorporated measures of women's views of postnatal care, it is difficult to make comparisons between studies because of the different instruments and styles of reporting utilised in different trials. An important component of postnatal care is the support and reassurance that caregivers provide regarding care of the infant, settling techniques, infant feeding, maternal health and recovery, and the transition from hospital to home. Most trials included assessments of women's satisfaction with postnatal care in hospital, and one incorporated questions regarding length of stay. Surprisingly, none of the trials included separate measures of women's views about the availability or quality of postnatal care after discharge.

Economic outcomes

Comparison of the costs associated with a policy of early postnatal discharge with standard care needs to take into account hospital

costs, primary care support for women and infants following discharge from hospital (including midwife home visits, telephone follow-up, and other contacts with health professionals), and the costs to women and families of practical support required in the days immediately following the birth.

There were just three trials that provided any data on costs and these were difficult to compare due to different methods used and different costs measured. Costs of practical support post-discharge were not measured in any of the trials, although one trial did measure costs to families associated with attendance for health care (travel, childcare for siblings and time off work for partners). All three trials found that measured costs were lower in the early discharge group.

AUTHORS' CONCLUSIONS

Implications for practice

The pooled trials have inadequate power to detect increases in rare outcomes, such as infant mortality and readmissions.

Policies of earlier postnatal discharge of healthy mothers and term infants do not appear to have adverse effects on breastfeeding or maternal depression when accompanied by a policy of offering women at least one nurse-midwife home visit post discharge.

Methodological limitations of included trials mean that some caution is required in drawing conclusions based on pooled estimates. There were no significant differences between the groups for any outcomes. Trends favouring the early discharge group were observed for all maternal and infant outcomes with the exception of maternal and infant readmissions, which favoured the standard care group.

In all ten trials included in this review early discharge was accompanied by some level of post-discharge nursing or midwifery support. In practice, policies promoting shorter length of stay may not always be implemented with accompanying primary care support in the days following discharge. It remains unclear how important home midwifery or nursing support is to the safety and acceptability of early discharge programs.

Implications for research

Given the limitations of the evidence to support the practice of early postnatal discharge, there continues to be a need for large well-designed trials of this intervention to inform current practice. Future studies should be large enough to detect important differences taking into account the likelihood of attrition resulting from post-randomization exclusions, protocol deviations (crossover) and withdrawals. Process evaluation to assess the nature and uptake of any co-interventions is of critical importance. Use of standardized approaches to outcome assessment would greatly improve the capacity to interpret results and compare the findings of future studies.

ACKNOWLEDGEMENTS

Our thanks to Caroline Crowther, Judith Lumley and Lyn Watson for comments on the review protocol, and Judith Lumley for comments on the original review.

As part of the pre-publication editorial process, this updated review has been commented on by a peer (an editor) and the Pregnancy and Childbirth Group's Statistical Adviser.

REFERENCES

References to studies included in this review

Boulvain 2004 *{published data only}*

* Boulvain M, Perneger TV, Othenin-Girard V, Petrou S, Berner M, Irion O. Home-based versus hospital-based postnatal care: a randomised trial. *BJOG: an international journal of obstetrics and gynaecology* 2004;**111**:807–13.

Petrou S, Boulvain M, Simon J, Maricot P, Borst F, Perneger T, et al.Home-based care after a shortened hospital stay versus hospital-based care postpartum: an economic evaluation. *BJOG: an international journal of obstetrics and gynaecology* 2004;**111**:800–6.

Brooten 1994 *{published data only}*

Brooten D, Knapp H, Borucki L, Jacobsen B, Finkler S, Arnold L, et al.Early discharge and home care after unplanned cesarean birth: nursing care time. *Journal of Obstetric, Gynecologic and Neonatal Nursing* 1996;**25**(7):595–600.

* Brooten D, Roncoli M, Finkler S, Arnold L, Cohen A, Mennuti M. A randomized trial of early hospital discharge and home follow-up of women having caesarean birth. *Obstetrics & Gynecology* 1994; **84**(5):832–8.

Carty 1990 *{published data only}*

* Carty E, Bradley C. A randomized, controlled evaluation of early postpartum hospital discharge. *Birth* 1990;**17**(4):199–204.

Carty EM, Bradley CF. A randomized, controlled evaluation of early postpartum hospital discharge. *Breastfeeding Review* 1991;**2**(4):168–72.

Gagnon 1997 *{published data only}*

Gagnon A, Edgar L, Kramer M, Papageorgiou A, Waghorn K, Klein M. A randomized trial of a program of early postpartum discharge

with nurse visitation. *American Journal of Obstetrics and Gynecology* 1997;**176**(1):205–11.

Hellman 1962 ***{published data only}***

Hellman LM, Kohl SG. Early hospital discharge in obstetrics. *Lancet* 1962;**1**:227–33.

Sainz Bueno 2005 ***{published data only}***

Sainz Bueno JA, Romano MR, Teruel RG, Benjumea AG, Palacin AF, Gonzalez CA, Manzano MC. Early discharge from obstetrics-pediatrics at the Hospital de Valme, with domiciliary follow-up. *American Journal of Obstetrics and Gynecology* 2005;**193**(3 Pt 1):714–26.

Smith-Hanrahan 1995 ***{published data only}***

Smith-Hanrahan C, Deblois D. Postpartum early discharge: impact of maternal fatigue and functional ability. *Clinical Nursing Research* 1995;**4**(1):50–66.

Waldenström 1987 ***{published data only}***

Waldenström U. Early and late discharge: fathers' involvement in infant care. *Early Human Development* 1988;**17**:19–28.

Waldenström U. Early and late discharge after hospital birth: fatigue and emotional reactions in the postpartum period. *Journal of Psychosomatic Obstetrics and Gynaecology* 1988a;**8**:127–35.

Waldenström U. Early discharge with domiciliary visits and hospital care. *Scandinavian Journal of Caring Sciences* 1987;**1**:51–8.

* Waldenström U, Lindmark G. Early and late discharge after hospital birth. A comparative study of parental background characteristics. *Scandinavian Journal of Social Medicine* 1987;**15**:159–67.

Waldenström U, Sundelin C, Lindmark G. Early and late discharge after hospital birth: breastfeeding. *Acta Paediatrica Scandinavica* 1987;**76**:727–32.

Waldenström U, Sundelin C, Lindmark G. Early and late discharge after hospital birth. Health of mother and infant in the postpartum period. *Uppsala Journal of Medical Sciences* 1987;**92**:301–14.

Winterburn 2000 ***{published data only}***

Winterburn S, Fraser R. Does the duration of postnatal stay influence breast-feeding rates at one month in women giving birth for the first time? A randomized control trial. *Journal of Advanced Nursing* 2000; **32**(5):1152–7.

Yanover 1976 ***{published data only}***

Yanover MJ, Jones D, Miller MD. Perinatal care of low-risk mothers and infants. Early discharge with home care. *New England Journal of Medicine* 1976;**294**(13):702–5.

References to studies excluded from this review

Burnell 1982 ***{published data only}***

Burnell I, McCarthy M, Chamberlain GVP, Hawkins DF, Elbourne DR. Patient preference and postnatal hospital stay. *Journal of Obstetrics and Gynaecology* 1982;**3**:43–7.

Escobar 2001 ***{published data only}***

Escobar G, Braveman P, Ackerson L, Odouli R, Coleman-Phox K, Lieu T. Home visits vs. hospital-based group follow-up visits after early postpartum discharge [abstract no: 1111]. Pediatric Academic Societies Annual Meeting; 2001 April 28-May 1; Baltimore, USA. 2001.

Escobar GJ, Braveman PA, Ackerson L, Odouli R, Coleman-Phox K, Capra AM, et al.A randomized comparison of home visits and hospital-based group follow-up visits after early postpartum discharge. *Pediatrics* 2001;**108**:719–27.

Lieu 2000 ***{published data only}***

Lieu TA, Braveman PA, Escobar GJ, Fischer AF, Jensvold NG, Capra AM. A randomized comparison of home and clinic follow-up visits after early postpartum hospital discharge. *Pediatrics* 2000;**105**:1058–65.

McKeever 2002 ***{published data only}***

McKeever P, Stevens B, Miller K-L, MacDonell KW, Gibbins S, Guerriere D, et al.Home versus hospital breastfeeding support for newborns: a randomized controlled trial. *Birth* 2002;**29**(4):258–65. Stevens B, McKeever P, Coyte P, Daub S, Dunn M, Gibbins S, et al.The impact of home versus hospital support of breastfeeding on neonatal outcomes [abstract]. *Pediatric Research* 2001;**49 Suppl**(4): 261A.

Steel O'Connor 2003 ***{published data only}***

Steel O'Connor KO, Mowat DL, Scott HM, Carr PA, Dorland JL, Young Tai KF. A randomized trial of two public health nurse follow-up programs after early obstetrical discharge: an examination of breastfeeding rates, maternal confidence and utilization and costs of health services. *Canadian Journal of Public Health. Revue Canadienne de Sante Publique* 2003;**94**(2):98–103.

Thompson 1999 ***{published data only}***

Thompson JF, Roberts CL, Ellwood DA. Early discharge after childbirth: too late for a randomised controlled trial. *Birth* 1999;**26**(3): 192–5.

Additional references

Beck 1991

Beck C. Early postpartum discharge programs in the United States: a literature review and critique. *Women and Health* 1991;**17**(1):125–38.

Braveman 1995

Braveman P, Egeter S, Pearly M, Marchi K, Miller C. Early discharge of newborns and mothers: a critical review of the literature. *Pediatrics* 1995;**96**:716–26.

Britton 1994

Britton J, Britton H, Beebe S. Early discharge of the term newborn: a continuing dilemma. *Pediatrics* 1994;**94**:291–5.

Brown 1998

Brown S, Lumley J. Early obstetric discharge: does it make a difference to health outcomes?. *Paediatric and Perinatal Epidemiology* 1998;**12**:49–71.

Brown 2004

Brown S, Bruinsma F, Darcy M-A, Small R, Lumley J. Early discharge: no evidence of adverse outcomes in three consecutive population-based Australian surveys of recent mothers conducted in 1989, 1994 and 2000. *Paediatric and Perinatal Epidemiology* 2004;**18**:202–13.

Catz 1995

Catz C, Hanson JW, Simpson L, Yaffe SJ. Summary of a workshop: early discharge and neonatal hyperbilirubinemia. *Pediatrics* 1995; **96**:743–5.

CETS 1997

Conseil d'Evaluation des Technologies de la Sante du Quebec. *Evaluation of the risks and benefits of early postpartum discharge. Report*

submitted to the Minister of Health and Social Services of Quebec. Quebec: CETS, 1997.

Day 1997
Day P, Lancaster P, Huang J. *Australia's Mothers and Babies 1995*. Sydney: Australian Institute of Health and Welfare National Perinatal Statistics Unit, 1997.

Declerq 1997
Declerq E, Simmes D. The politics of 'drive-through deliveries': putting early postpartum discharge on the legislative agenda. *Milbank Quarterly* 1997;**75**:172–202.

Edmonson 1997
Edmonson MB, Stoddard JJ, Owens LM. Hospital readmission with feeding-related problems after early postpartum discharge of normal newborns. *JAMA* 1997;**278**:299–303.

Grullon 1997
Grullon KE, Grimes D. The safety of early postpartum discharge: a review and critique. *Obstetrics & Gynecology* 1997;**90**:860–5.

Harris 1989
Harris B. The use of rating scales to indentify postnatal depression. *British Journal of Psychiatry* 1989;**154**:813–817.

Heck 2003
Heck K, Schoendorf KC, Chavez GF, Braveman P. Does postpartum length of stay affect breastfeeding duration? A population-based study. *Birth* 2003;**30**:153–9.

Higgins 2008
Higgins JPT, Green S, editors. Cochrane Handbook for Systematic Reviews of Interventions Version 5.0.0 [updated February 2008]. The Cochrane Collaboration, 2008. Available from www.cochrane-handbook.org.

Lansky 2006
Lansky A, Barfield WD, Marchi KS, Egerter SA, Galbraith AA, Braveman PA. Early postnatal care among healthy newborns in 19 states: pregnancy risk assessment monitoring system, 2000. *Maternal and Child Health Journal* 2006;**10**:277–84.

Liu 1997
Liu LL, Clemens CJ, Shay DK, Davis RL, Novack AH. The safety of newborn early discharge. The Washington State experience. *JAMA* 1997;**278**:293–8.

Liu 2000
Liu S, Wen SW, McMillan D, Trouton K, Fowler D, McCourt C. Increased neonatal readmission rate associated with decreased length of hospital stay at birth in Canada. *Canadian Journal of Public Health* 2000;**91**:46–50.

MacArthur 2002
MacArthur C, Winter HR, Bick DE, Knowles H, Lilford R, Henderson C, et al.Effects of redesigned community postnatal care on women's health 4 months after birth: a cluster randomised controlled trial. *Lancet* 2002;**359**:378–85.

MacDonald 1995
MacDonald MG. Hidden risks: early discharge and bilirubin toxicity due to glucose 6-phosphate dehydrogenase deficiency. *Pediatrics* 1995;**96**:734–8.

Maisels 1995
Maisels MJ, Newman TB. Kernicterus in otherwise healthy, breastfed newborns. *Pediatrics* 1995;**96**:730–3.

Malkin 2000
Malkin JD, Garber S, Broder MS, Keeler E. Infant mortality and early postpartum discharge. *Obstetrics & Gynecology* 2000;**96**:183–8.

Margolis 1995
Margolis LH. A critical review of studies of newborn discharge timing. *Clinical Pediatrics* 1995;**34**:626–34.

Norr 1987
Norr KF, Nacion K. Outcomes of postpartum early discharge 1960-1986. A comparative review. *Birth* 1987;**14**:135–41.

RevMan 2008
The Cochrane Collaboration. Review Manager (RevMan). 5.0. Copenhagen, The Nordic Cochrane Centre: The Cochrane Collaboration, 2008.

Rush 1989
Rush J, Chalmers I, Enkin M. Care of the new mother and baby. In: Chalmers I, Enkin M, Keirse MJNC editor(s). *Effective care in pregnancy and childbirth*. Oxford: Oxford University Press, 1989: 1341–4.

Seidman 1995
Seidman DS, Stevenson DK, Ergaz Z, Gale R. Hospital readmission due to neonatal hyperbilirubinemia. *Pediatrics* 1995;**96**:727–9.

UKCC 1993
United Kingdom Central Council for Nursing, Midwifery and Health Visiting. *Midwives rules*. London: United Kingdom Central Council for Nursing, 1993.

Waldenström 2004
Waldenström U, Aarts C. Duration of breastfeeding and breastfeeding problems in relation to postpartum stay: a longitudinal cohort study of a national Swedish sample. *Acta Paediatrica* 2004;**93**:669–76.

* *Indicates the major publication for the study*

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Boulvain 2004

Methods	Randomisation: by telephone, using sealed envelopes. Recruitment and randomisation at >37 weeks gestation. Blinding: caregivers, women and outcome assessment unblinded. Follow-up to 6 months postpartum. Analysis: intention to treat. Loss to follow-up: 16/459 = 3.5% comprising 11 in early discharge arm and 5 in comparison arm. Duration: November 1998 to October 2000. Setting: Urban tertiary level hospital, Switzerland.
Participants	459 women recruited and randomised, 228 to early discharge and 231 to standard length of stay. Inclusion criteria: Primiparous and multiparous women at low risk of Caesarean section delivery and/or postnatal complications >37 weeks gestation. Exclusion criteria: Women with a strong preference for long or short length of stay; placenta praevia; pre-eclampsia; diabetes treated with insulin; medical complications of pregnancy requiring postnatal surveillance; past history of postnatal complications (e.g. postnatal depression); difficult socio-economic situation; multiple pregnancy; suspected intrauterine growth retardation or large infant for gestational age; fetal malformation or genetic disease. Characteristics: maternal age: I mean 29 years (SD 4.8), C mean 29 years (SD 5.5); primiparous I 60%, C 57%; married I 83%, C 82%; income <50,000 CHF I 27%, C 24%; tertiary education I 48%, C 49%; Swiss origin I 31%, C 30%; current smoker I 25%, C 17%, infant birthweight I 3420 (SD 435), C 3480 (SD 405).
Interventions	I: home based postnatal care with discharge planned for 24 < 48 hours following vaginal births and 72 < 84 hours after Caesarean section. C: hospital based postnatal care with discharge planned 4 to 5 days postpartum following vaginal births and 6 to 7 days postpartum following Caesarean sections. Co-intervention (I and C): minimum of 2 nurse home visits and 10 phone calls; number and timing determined by the family.
Outcomes	Infant readmissions within 28 days and in first 6 months postpartum. Maternal readmissions within 28 days and in first 6 months postpartum. Proportion of women depressed at 28 days postpartum. Proportion of women breastfeeding at 7 days and 28 days postpartum. Proportion of women reporting breastfeeding problems. Maternal satisfaction with postnatal care. Costs of hospital care post birth to discharge. Costs of postnatal care post discharge to 6 weeks postpartum.

Boulvain 2004 (*Continued*)

Notes	Significant non-compliance in I group; mean length of stay I 65 hours, C 106 hours.	
Risk of bias		
Item	**Authors' judgement**	**Description**
Adequate sequence generation?	Unclear	Insufficient information in the report to assess whether sequence generation was adequate.
Allocation concealment?	Yes	Adequate.
Blinding? All outcomes	No	Adequate for participants and personnel - blinding not feasible. Inadequate for outcome assessors.
Incomplete outcome data addressed? All outcomes	Yes	Adequate - loss to follow-up = 3.5%.
Free of selective reporting?	Yes	
Free of other bias?	Yes	
High risk of bias?	No	

Brooten 1994

Methods	Method of randomization: sealed envelopes, recruitment and randomisation 24 hours post caesarean section. Blinding: caregivers and women unblinded, blinding of outcome assessment unclear. Loss to follow-up: not reported Analysis: by intention to treat. Follow-up: 8 weeks postpartum. Duration: August 1988 to January 1991. Setting: Urban tertiary-level hospital, US.
Participants	122 recruited and randomised, 61 to early discharge and 61 to standard stay. Inclusion criteria: unplanned caesarean delivery in hospital, English speaking; healthy mother and infant (range: 2270 to 4680g; 36 to 43 weeks gestation). Characteristics: Maternal age: early mean 29 (SD 6), standard 28 (SD 6); Marital status: early 67% married, standard 56% married; Income (<$10,000) early 29%, standard 33%. Education (< high school) early 15%, standard 21%. 'Race' (African American and 'non-white') early 53%, standard 61%. Birthweight: early mean 3305 g (SD 483), standard 3440 g (SD 572).

Brooten 1994 (*Continued*)

	Gestation: early mean 39 weeks (SD 1.5), standard 39 weeks (SD 1.7).
Interventions	I: discharge 'earlier than usual' (mean stay of 3.6 days); C: discharge according to 'routine hospital practice' (mean stay of 4.8 days). Co-interventions: I had minimum of two home visits post discharge, plus 10 phone calls to 8 weeks, plus women had phone number to nurse and physician. C had no routine follow-up care at home post discharge.
Outcomes	Infant and maternal re-admissions. Infant and maternal acute care visits. Maternal satisfaction with care. Proportion of infants immunized. Mean cost per woman for care from birth to discharge and for post discharge care.
Notes	Women in standard care considered ready for discharge if: ambulatory, voiding, tolerating normal diet, passing flatus, experiencing normal uterine involution, afebrile for 24 hours, uncomplicated wound healing, removal of sutures and an adequate blood count. Women in early group had same criteria except: staple removal and afebrile status for at least 24 hours. If women in early group did not meet these criteria, they were not discharged early but still received co-interventions and were analysed with early group.

Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Unclear	Insufficient information in the report to assess whether sequence generation was adequate.
Allocation concealment?	Yes	Adequate.
Blinding? All outcomes	No	Adequate for participants and personnel - blinding not feasible. Unclear for outcome assessors.
Incomplete outcome data addressed? All outcomes	Unclear	Loss to follow-up not reported.
Free of selective reporting?	Yes	
Free of other bias?	Yes	

Carty 1990

Methods	Method of randomization: sealed envelopes placed on file prior to home visit at 38 weeks. Recruitment and randomisation at 37 weeks gestation. Blinding: caregivers, women and outcome assessment unblinded. Follow-up to one month postpartum (most outcomes). Loss to follow-up: 58/189 (30.7%), including 46 post-randomisation exclusions, 10 not compliant with randomisation outcome, 2 withdrawals; 97/131 returned one month questionnaires. Analysis: not intention to treat. Duration: not reported. Setting: Urban tertiary-level hospital, Canada.
Participants	189 women randomised: 44 women to 12 to 24 hrs, 49 women to 25 to 48 hrs; 38 women to 4 days: Inclusion criteria: normal labour and hospital birth. Exclusion criteria: CS, forceps delivery. Participants were 53% primiparous; mean maternal age 30.2 (SD 3.8); 93% married or living with partner; 58% combined family income >$40,000; 65% completed junior college or university; 95% 'Caucasian'; mean paternal age 32.9 (SD 5.5). No significant group differences found on demographic characteristics (but no data provided by group).
Interventions	Three groups, discharge at: 12 to 24 hours, 25 to 48 hours or 4 days. Co-interventions: • 12 to 24 hrs - 1 home visit by nurse antenatally; five home visits post discharge; • 25 to 48 hours - one antenatal home visit; 3 home visits post discharge; • 4 days - one home visit antenatally; one home visit post discharge.
Outcomes	Infant and maternal re-admissions. Maternal depression, anxiety and confidence. Maternal satisfaction with nursing care. Breastfeeding at one month postpartum. Referrals to physicians for maternal and infant health issues.
Notes	Mean length of stay: 12 to 24 hrs:1.12 days (SD 0.4). 25 to 48 hrs: 2.06 days (SD 0.6). 4 days: 4.03 days (SD 0.7). Study nurses participated in two weeks special training for the early discharge program.

Risk of bias

Item	Authors' judgement	Description

Carty 1990 (*Continued*)

Adequate sequence generation?	Unclear	Insufficient information in the report to assess whether sequence generation was adequate.
Allocation concealment?	Yes	Adequate.
Blinding? All outcomes	No	Adequate for participants and personnel - blinding not feasible. Inadequate for outcome assessors.
Incomplete outcome data addressed? All outcomes	Yes	Inadequate - loss to follow-up 30.7%.
Free of selective reporting?	Yes	
Free of other bias?	Yes	
High risk of bias?	No	Majority of loss to follow-up as a result of post-randomisation exclusion of women having CS or operative vaginal birth, unlikely to bias outcomes.

Gagnon 1997

Methods	Method of randomization: sealed envelopes. Recruitment and randomisation at 32 to 38 weeks gestation. Blinding: caregivers, women and outcome assessment unblinded. Follow-up to one month postpartum. Loss to follow-up: 185/360 (51.4%); 159 post randomisation exclusions;21 withdrawals (18 early; 3 standard); 5 lost at follow-up (3 early; 2 standard). Analysis: not intention to treat. Duration: January to December 1990. Setting: Urban university hospital, Canada.
Participants	1354 women approached; 938 met inclusion criteria; 578 declined participation; 360 randomised - 183 to early discharge (I) and 177 to standard care (C). Final numbers analysed: 78 early, 97 standard. Inclusion criteria at randomisation: parity 0 to 4; normal pregnancy (no medical conditions, not breech); English, French or Spanish speaking. Characteristics of participants: Mean maternal age (SD): early 29.6 (4.7), standard 29.1 (5.3). Parity (% nullip): early 38%, standard 34%. Living with a partner: early 85.5%, standard 93.8%. % 'blue collar': early 21.8%, standard 16.5%. Mean years of maternal education (SD): early 13.8 (3.8), standard 14.0 (3.9).

Gagnon 1997 (*Continued*)

	% recent immigrants: early 14.7%, standard 24.7%. Mean birthweight (SD): early 3389g (419), standard 3496g (364). Mean gestation (SD): early 39.3 (1.3), standard 39.5 (1.1). Planned to breastfeed: early 70.5%, standard 54.6%. Smoking in pregnancy: early 23.1%,standard 9.3%.
Interventions	I: discharge planned for 6-36 hours. C: discharge at 48-72 hours. Co-interventions: I: one home visit or phone call from nurse antenatally, 2 post discharge home visits (3 and 5 days pp) plus 2 telephone calls (48 hrs, 10 days); C: post discharge follow-up "as determined by woman's and infant's physicians".
Outcomes	Breastfeeding. Infant health contacts post discharge. Maternal satisfaction with care to day 10 postpartum. Perceived maternal competency.
Notes	Significant non-compliance with early discharge allocation in the early group - mean length of stay 37.5 hours (26 women - 33% went home later than planned).

Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Unclear	Insufficient information in the report to assess whether sequence generation was adequate.
Allocation concealment?	Yes	Adequate.
Blinding? All outcomes	No	Adequate for participants and personnel - blinding not feasible. Inadequate for outcome assessors.
Incomplete outcome data addressed? All outcomes	Yes	Inadequate - loss to follow-up = 51.4%.
Free of selective reporting?	Yes	
Free of other bias?	Yes	

Gagnon 1997 (*Continued*)

High risk of bias?	Yes	Differential loss to follow-up (higher in the intervention group) and 33% non-compliance with allocation to ED introduces significant risk of bias, direction of bias unclear.

Hellman 1962

Methods	Method of randomization: 14% allocated post delivery to control status on the basis of a series of previously designated random numbers. Blinding: caregivers, women and outcome assessment unblinded. Follow-up to 3 weeks post partum. Loss to follow-up: not reported. Analysis: by intention to treat. Duration: 1 July 1959 to 30 June 1960. Setting: Urban hospital, New York, US.
Participants	2257 women participated in the trial: 1941 allocated early discharge; 316 to standard discharge. Inclusion criteria: hospital birth, mothers deemed eligible for early discharge, babies predominantly > 2500gms, baby gestation not specified. Exclusion criteria: caesarean section, stillbirth, no English. Characteristics of participants: Median age: early 23.6 yrs, standard 23.8 yrs. No living children: early 28%, standard 29%. Married: early 70%, standard 73%. Welfare/no income: early 16%, standard 13%. Ethnicity: Negro/Puerto Rican early 81%, standard 85%. Few details available on babies.
Interventions	I: discharge before 72 hrs. C: discharge after five days. Co-interventions: midwife home visits post discharge (3 in I, 2 in C) for examination of mother and baby and other data collection (not for 'helping' mothers).
Outcomes	Infant and maternal re-admissions within 3 weeks. Infants deaths. Proportion of women breastfeeeding at 3 weeks. Reported infant feeding problems. Proportion of women dissatisfied with hospital postnatal care. Proportion of women dissatisfied with length of stay. Proportion of fathers thinking stay too short. Proportion of fathers thinking stay too long. Limited cost data.

Hellman 1962 (*Continued*)

Notes		
Risk of bias		
Item	**Authors' judgement**	**Description**
Adequate sequence generation?	Unclear	Insufficient information in the report to assess whether sequence generation was adequate.
Allocation concealment?	Unclear	Unclear.
Blinding? All outcomes	Unclear	Adequate for participants and personnel - blinding not feasible. Inadequate for outcome assessors.
Incomplete outcome data addressed? All outcomes	No	Loss to follow-up not reported.
Free of selective reporting?	Yes	
Free of other bias?	Yes	
High risk of bias?	Unclear	Limited information regarding randomisation method and loss to follow-up makes if difficult to assess risk of bias.

Sainz Bueno 2005

Methods	Recruitment and randomisation in postnatal ward using opaque sealed envelopes for randomisation. Blinding: caregivers and women unblinded to intervention; blinding outcome assessment unclear. Follow-up to 6 months postpartum. Analysis by intention to treat. Loss to follow-up: 36/430 (8.4%), including 22 women who did not attend 7 to10 days pp follow-up; 14 women withdrew consent, see note regarding missing data for maternal satisfaction. Duration: April 1999 to April 2001. Setting: urban maternity hospital, Spain.
Participants	430 women recruited and randomised; 213 to early discharge and 217 to standard care Inclusion criteria: Primiparous and multiparous women deemed eligible for early discharge, =>37 weeks gestation with baby of appropriate weight for gestational age; vaginal birth; residence within 20km of the hospital. Characteristics: age > 30 years I 41.8%, C 41.1%; primiparous I 36.6%, C 37.8%; married I 97.2%, C 97.2%; completed secondary education I 22.5%, C 14.7%; infant

Sainz Bueno 2005 (*Continued*)

	birthweight I 3348 grams (SD 396), C 3335 grams (SD 372); gestation I 39.5 weeks (SD 1.13), C 39.5 weeks (SD 1.12); spontaneous vaginal birth I 87.8%, C 88.5%.
Interventions	I: discharge planned for < 24 hours. C: minimum stay of 48 hours. Co-intervention: I monitored at home for first 24 to 48 hours post discharge by qualified nurse; I and C attended visit in clinic at 7 to 10 days postpartum.
Outcomes	Infant readmissions in first 28 days. Maternal readmissions in first 28 days. Proportion depressed at 4 weeks postpartum. Proportion breastfeeding at 4 weeks, 12 weeks and 6 months postpartum. Proportion reporting maternal exhaustion at 7 to 10 days and 4 weeks postpartum. Proportion reporting physical health problems in first 6 months. Maternal satisfaction with postnatal care. Proportion of women saying length of stay too short. Costs of hospital care post birth; costs of maternal and infant readmissions; cost of maternal and neonatal consultations (post discharge).
Notes	Significant missing data for maternal satisfaction, with differential loss to follow-up I 17.8% missing, C 42% missing data.

Risk of bias

Item	**Authors' judgement**	**Description**
Adequate sequence generation?	Unclear	Insufficient information in the report to assess whether sequence generation was adequate.
Allocation concealment?	Yes	A - Adequate.
Blinding? All outcomes	Unclear	Adequate for participants and personnel - blinding not feasible. Unclear for outcome assessors.
Incomplete outcome data addressed? All outcomes	Yes	Adequate for primary outcomes - loss to follow-up = 8.5%. Inadequate for secondary outcomes - differential missing data for maternal satisfaction with care (17.8% for I, and 42% for C).
Free of selective reporting?	Yes	
Free of other bias?	Yes	

High risk of bias?	No	Low risk of bias for primary outcomes; differential missing data for secondary outcomes introduces significant risk of bias potentially favouring C

Smith-Hanrahan 1995

Methods	Method of randomization: unclear. Recruitment and randomisation: on admission to postnatal unit post birth. Blinding: caregivers and women unblinded; outcome assessment - blinding unclear. Follow-up to six weeks postpartum. Loss to follow-up: 44/125 (35.2%); all post-randomisation exclusions. Analysis: not intention to treat. Duration: not reported. Setting: Tertiary teaching hospital, eastern Canada.
Participants	139 women approached; 125 agreed and randomised, 58 to early and 67 to standard stay. Inclusion criteria: English or French speaking; another adult present at home at least 12 hours/day for 1st two days post discharge; no major obstetrical complications at any stage; no prolonged mother-infant separation in hospital (24hrs+); medical follow-up plan before discharge; no complications in infant: 2,500-4,500gms; good colour/activity level; vital signs normal; voided and stooled; feeding established. Characteristics of participants: Maternal age: early mean 29.5 (SD 4.5), standard mean 29.3 (SD 4.63). Parity: early 37.1% primiparous, standard 58.7% primiparous. Marital status: early 97.1% married, standard 95.7% married. All vaginal births. Income - % >40,000+: early 74.1%, standard 55%. Completed college/university education: early 73.5%, standard 54.6%. % not of Canadian/US nationality: early 39.5%, standard 23.5%.
Interventions	I: early discharge: before 60 hrs. C: discharge: after stay of 60 hrs or more. Co-inteventions: No antenatal preparation for discharge in either group. Early group received telephone call from nurse within 24 hours of discharge leading to a decision to visit or continue to consult by phone; also received phone number for postnatal follow-up service which could be called at any time; followed by usual pediatric and obstetric office visits. Standard discharge group received traditional follow-up post discharge - visit to paediatric office at 2 weeks and obstetric office visit at 6 weeks.

Smith-Hanrahan 1995 (*Continued*)

Outcomes	Infant and maternal re-admissions to 6 weeks pp. Proportion of women breastfeeding at 6 weeks. Maternal fatigue intensity score at 2 to 3 days pp, 1 week pp and 6 weeks pp.
Notes	29 women allocated to standard care were sent home early due to bed shortages. The authors analyse outcomes for this group separately from the early and standard care groups. For the purposes of this review analyses have been done re-combining these 29 women with the standard care group, to approximate more closely an intention to treat analysis.

Risk of bias

Item	**Authors' judgement**	**Description**
Adequate sequence generation?	Unclear	Insufficient information in the report to assess whether sequence generation was adequate.
Allocation concealment?	Unclear	B - Unclear.
Blinding? All outcomes	Unclear	Adequate for participants and personnel - blinding not feasible. Unclear for outcome assessors.
Incomplete outcome data addressed? All outcomes	Yes	Inadequate - loss to follow-up = 35.2%.
Free of selective reporting?	Yes	
Free of other bias?	Yes	
High risk of bias?	No	Overall risk of bias is low; loss to follow-up as a result of post-randomization exclusions unlikely to bias results.

Waldenström 1987

Methods	Method of randomization: unclear. Recruitment and randomisation at 30 weeks gestation. Blinding: women and caregivers not blinded; blinding of outcome assessment - unclear. Follow-up: women to 6 weeks; infants to 6 months. Loss to follow-up: 60/164 (36.6%); 47 post-randomisation exclusions; 13 withdrawals in early discharge group; 100% response to six week questionnaires. Analysis: not intention to treat. Duration: March 1984 to June 1985. Setting: Teaching hospital, Uppsala, Sweden.
Participants	1604 women eligible at 30 weeks: 1440 refused to take part; 164 women recruited and randomised: 85 women to 24 to 48 hrs: 79 to >48 hrs; final numbers analysed: 50 early, 54 standard. Inclusion criteria: pregnancy and birth free from significant complications; vaginal delivery; singleton; gestational age >37 weeks, birthweight >=3000g, Apgar >=7 at 5 min; and no significant infant or maternal morbidity in first 24 hours. Characteristics of participants: mean maternal age: early 28, standard 27. Proportion primiparous: early 20%, standard 30%. Maternal university education: early 28%, standard 19%. Mean birthweight: early 3658g, standard 3481g. In comparison with non-participants, trial participants had less education, were more 'family-oriented' and confident about parenthood, and more negative about care in hospital.
Interventions	I: discharge 24 to 48 hours. C: discharge >48 hours. Co-interventions: Early group - nurse home visit 4 weeks before term; visit to hospital on day 5 for paediatric examination; daily nurse home visits for 3 to 4 days post discharge. Standard group: traditional hospital care and no home visits post-discharge.
Outcomes	Infant and maternal re-admissions within 6 and 8 weeks pp respectively. Maternal depressed mood in first 6 weeks. Breastfeeding at 2 and 6 months. Maternal fatigue in first 14 days. Maternal satisfaction with care.
Notes	Mean length of stay at time of study was 6 days; but shorter in standard discharge group where mean stay was 4.1 nights. Women who 'crossed over' were treated differently in early and standard groups: 13 women excluded because they went home later than allocation, whereas 5 women allocated to standard discharge who went home early (but without home visits), were retained in analysis.
Risk of bias	

Waldenström 1987 (*Continued*)

Item	Authors' judgement	Description
Adequate sequence generation?	Unclear	Insufficient information in the report to assess whether sequence generation was adequate.
Allocation concealment?	Unclear	B - Unclear.
Blinding? All outcomes	Unclear	Adequate for participants and personnel - blinding not feasible. Unclear for outcome assessors.
Incomplete outcome data addressed? All outcomes	Yes	Inadequate - loss to follow-up = 36.6%.
Free of selective reporting?	Yes	
Free of other bias?	Yes	
High risk of bias?	Unclear	Majority of loss to follow-up as a result of post-randomisation exclusions; withdrawals from ED arm introduces risk of bias potentially favouring C.

Winterburn 2000

Methods	Method of randomization: via 'selecting sealed envelopes'; process unclear. Recruitment and randomisation in third trimester at hospital parentcraft classes with partners present. Blinding: women and caregivers not blinded; unclear for outcome assessment. Analysis: by intention to treat and on basis of actual length of stay. Loss to follow-up: 7/255 (2.7%). Follow-up: to one month pp. Duration: February 1996 to June 1998. Setting: large teaching hospital, north of England.
Participants	255 women recruited, 248 completed study. 121 randomized to early discharge (only 31 experienced a short stay, 90 went home late); 127 to standard discharge (107 experienced a long stay, 20 went home early). Inclusion criteria: first time mothers wanting to breastfeed and with no preference about length of hospital stay; no specified early discharge criteria. Charactersitics of participants: No information about socio-demographic characteristics.
Interventions	I: hospital stay of 6 to 48 hours. C: hospital stay of >48 hours. Co-interventions:

Winterburn 2000 (*Continued*)

	community midwife home visits to support breastfeeding (number of visits and over what time period not specified).
Outcomes	Proportion of women breastfeeding.
Notes	Major limitation due to crossover of study participants - in both directions, resulting in only 51 women experiencing early discharge and 197 experiencing standard discharge. Unclear whether home visits offered to all women who went home <48 hours, regardless of allocated group status.

Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Unclear	Insufficient information in the report to assess whether sequence generation was adequate.
Allocation concealment?	Unclear	B - Unclear.
Blinding? All outcomes	Unclear	Adequate for participants and personnel - blinding not feasible. Unclear for outcome assessors.
Incomplete outcome data addressed? All outcomes	Yes	Adequate - loss to follow-up = 2.7%.
Free of selective reporting?	Yes	
Free of other bias?	Yes	
High risk of bias?	No	

Yanover 1976

Methods	Method of randomization: unclear. Recruitment and randomisation in pregnancy (timing not clear). Blinding: women, caregivers and outcome assessment unblinded. Analysis: by intention to treat. Loss to follow-up: 40/128 (31.3%) including 25 post-randomisation exclusions (15 medical status changed before delivery, 10 did not attend prenatal classes); 15 further lost to follow-up (5 moved, 6 non-responders to questionnaire at 6 weeks pp and 4 others). Duration: not reported. Setting: Kaiser Permanente Medical Centre, San Francisco, US.

Yanover 1976 (*Continued*)

Participants	362 women screened; 271 interviewed; 128 recruited and randomised; 40 did not complete participation. Final groups:early 44, standard 44; questionnaire data on 41 from each group. Inclusion criteria: parity 0 or 1; maternal age 19 to 35; low medical risk; at least 12th grade education; father willing to attend prenatal classes; prospective parents living together; adequate English; living within 32 km of hospital; and assessment of mother and infant as eligible for early discharge (range of pre-specified criteria). Charactersitics of participants: No differences between groups on maternal age, race, father's occupation, planned pregnancy duration of marriage, time to conceive, maternal and paternal education, presence of another child at home, maternal preferences for infant feeding, prenatal education or natural childbirth; BUT no data given.
Interventions	I: discharge from 12 to 48 hours pp (12 were discharged later than 48 hours); median stay in I:26 hours, range =12-86 hours. C: discharge at >48 hours pp (5 discharged at <48 hours); median stay = 68 hours, range = 31 to 167 hours. Co-interventions: nursing staff intensively trained for early discharge; prospective parents in early group attended prenatal early discharge preparation classes; daily home visits through 4th day pp. C: received prenatal education; paediatric visit at 2 weeks pp; and an obstetric visit at 6 weeks.
Outcomes	Infant and maternal re-admissions to 6 weeks pp. Maternal views about length of hospital stay.
Notes	Highly selected study participants; crossover a problem.

Risk of bias

Item	**Authors' judgement**	**Description**
Adequate sequence generation?	Unclear	Insufficient information in the report to assess whether sequence generation was adequate.
Allocation concealment?	Unclear	B - Unclear.
Blinding? All outcomes	No	Adequate for participants and personnel - blinding not feasible. Inadequate for outcome assessors.
Incomplete outcome data addressed? All outcomes	Yes	Inadequate - loss to follow-up = 31.3%.
Free of selective reporting?	Yes	

Yanover 1976 (*Continued*)

Free of other bias?	Yes	
High risk of bias?	Yes	Cross-over between I and C, and withdrawals introduce high risk of bias, direction of bias unclear.

C = control
CS = caesarean section
hrs = hours
I = intervention
min = minutes
pp = postpartum
SD = standard deviation

Characteristics of excluded studies *[ordered by study ID]*

Burnell 1982	Data are provided by actual length of stay, not by trial allocation.
Escobar 2001	Women participating in this trial were randomised to home visits or hospital-based group follow-up visits after early obstetric discharge, i.e. randomisation was not used to compare early with longer length of stay.
Lieu 2000	Women participating in this trial were randomised to home visits or hospital-based group follow-up visits after early obstetric discharge, i.e. randomisation was not used to compare early with longer length of stay.
McKeever 2002	This trial reports on 101 term and 37 near-term mother-newborn pairs randomised to early discharge with nurse home support or standard care. Data on breastfeeding and satisfaction with care are reported for 75 of the mothers of term infants, with outcome assessment at 5 to 12 days postpartum. The study was excluded as no data on primary outcomes specified in the review protocol are reported.
Steel O'Connor 2003	Women participating in this trial were randomised to public health nurse follow-up or a screening telephone call after early obstetric discharge, i.e. randomisation was not used to compare early with longer length of stay.

(*Continued*)

Thompson 1999	This was a pilot study reporting data on compliance with randomisation allocation and postpartum exclusions. The study was excluded as no outcome data are reported.

DATA AND ANALYSES

Comparison 1. Early versus standard discharge

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Proportion of infants readmitted within eight weeks	7	3435	Risk Ratio (M-H, Random, 95% CI)	1.29 [0.60, 2.79]
2 Proportion of infants re-admitted within eight weeks (excluding CS - Brooten)	6	3313	Risk Ratio (M-H, Random, 95% CI)	1.74 [0.88, 3.45]
3 Proportion of women readmitted within six weeks	8	3509	Risk Ratio (M-H, Random, 95% CI)	1.10 [0.51, 2.40]
4 Proportion of women re-admitted within six weeks (excluding CS - Brooten)	7	3387	Risk Ratio (M-H, Random, 95% CI)	1.29 [0.59, 2.80]
5 Proportion of women probably depressed	3	993	Risk Ratio (M-H, Random, 95% CI)	0.66 [0.39, 1.12]
6 Proportion of women not breastfeeding in first eight weeks postpartum	8	3845	Risk Ratio (M-H, Random, 95% CI)	0.90 [0.76, 1.06]
7 Proportion of women reporting infant feeding problems	2	2405	Risk Ratio (M-H, Random, 95% CI)	0.89 [0.43, 1.86]
8 Proportion of women not breastfeeding at six months	3	973	Risk Ratio (M-H, Random, 95% CI)	0.92 [0.80, 1.05]
9 Proportion of women dissatisfied with postnatal care	3	841	Risk Ratio (M-H, Random, 95% CI)	0.60 [0.36, 1.00]
10 Proportion of women probably depressed (excluding non-standardised measures)	2	889	Risk Ratio (M-H, Random, 95% CI)	0.56 [0.21, 1.51]

Analysis 1.1. Comparison 1 Early versus standard discharge, Outcome 1 Proportion of infants readmitted within eight weeks.

Review: Early postnatal discharge from hospital for healthy mothers and term infants

Comparison: 1 Early versus standard discharge

Outcome: 1 Proportion of infants readmitted within eight weeks

Study or subgroup	Early discharge n/N	Standard discharge n/N	Risk Ratio M-H,Random,95% CI	Risk Ratio M-H,Random,95% CI
Sainz Bueno 2005	3/213	5/217		0.61 [0.15, 2.53]
Boulvain 2004	12/228	5/231		2.43 [0.87, 6.79]
Smith-Hanrahan 1995	0/35	0/46		0.0 [0.0, 0.0]
Brooten 1994	2/61	6/61		0.33 [0.07, 1.59]
Waldenstrm 1987	1/50	0/54		3.24 [0.13, 77.63]
Yanover 1976	2/44	0/44		5.00 [0.25, 101.25]
Hellman 1962	20/1818	2/333		1.83 [0.43, 7.80]
Total (95% CI)	**2449**	**986**		**1.29 [0.60, 2.79]**

Total events: 40 (Early discharge), 18 (Standard discharge)

Heterogeneity: $Tau^2 = 0.23$; $Chi^2 = 6.73$, df = 5 (P = 0.24); $I^2 = 26\%$

Test for overall effect: Z = 0.64 (P = 0.52)

Analysis 1.2. Comparison 1 Early versus standard discharge, Outcome 2 Proportion of infants re-admitted within eight weeks (excluding CS - Brooten).

Review: Early postnatal discharge from hospital for healthy mothers and term infants

Comparison: 1 Early versus standard discharge

Outcome: 2 Proportion of infants re-admitted within eight weeks (excluding CS - Brooten)

Study or subgroup	Early discharge n/N	Standard discharge n/N	Risk Ratio M-H,Random,95% CI	Risk Ratio M-H,Random,95% CI
Sainz Bueno 2005	3/213	5/217		0.61 [0.15, 2.53]
Boulvain 2004	12/228	5/231		2.43 [0.87, 6.79]
Smith-Hanrahan 1995	0/35	0/46		0.0 [0.0, 0.0]
Waldenstrm 1987	1/50	0/54		3.24 [0.13, 77.63]
Yanover 1976	2/44	0/44		5.00 [0.25, 101.25]
Hellman 1962	20/1818	2/333		1.83 [0.43, 7.80]
Total (95% CI)	**2388**	**925**		**1.74 [0.88, 3.45]**

Total events: 38 (Early discharge), 12 (Standard discharge)

Heterogeneity: $Tau^2 = 0.0$; $Chi^2 = 3.12$, df = 4 (P = 0.54); $I^2 = 0.0\%$

Test for overall effect: Z = 1.58 (P = 0.11)

Analysis 1.3. Comparison 1 Early versus standard discharge, Outcome 3 Proportion of women readmitted within six weeks.

Review: Early postnatal discharge from hospital for healthy mothers and term infants

Comparison: 1 Early versus standard discharge

Outcome: 3 Proportion of women readmitted within six weeks

Study or subgroup	Early discharge n/N	Standard discharge n/N	Risk Ratio M-H,Random,95% CI	Risk Ratio M-H,Random,95% CI
Sainz Bueno 2005	4/213	5/217		0.82 [0.22, 2.99]
Boulvain 2004	4/228	2/231		2.03 [0.37, 10.95]
Smith-Hanrahan 1995	0/35	0/46		0.0 [0.0, 0.0]
Brooten 1994	0/61	3/61		0.14 [0.01, 2.71]
Carty 1990	1/93	1/38		0.41 [0.03, 6.37]
Waldenstrm 1987	0/50	1/54		0.36 [0.01, 8.63]
Yanover 1976	0/44	0/44		0.0 [0.0, 0.0]
Hellman 1962	32/1778	2/316		2.84 [0.68, 11.81]
Total (95% CI)	**2502**	**1007**		**1.10 [0.51, 2.40]**

Total events: 41 (Early discharge), 14 (Standard discharge)

Heterogeneity: $Tau^2 = 0.05$; $Chi^2 = 5.25$, df = 5 (P = 0.39); $I^2 = 5\%$

Test for overall effect: Z = 0.25 (P = 0.81)

Analysis 1.4. Comparison 1 Early versus standard discharge, Outcome 4 Proportion of women re-admitted within six weeks (excluding CS - Brooten).

Review: Early postnatal discharge from hospital for healthy mothers and term infants

Comparison: 1 Early versus standard discharge

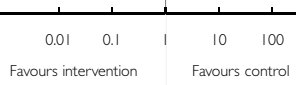
Outcome: 4 Proportion of women re-admitted within six weeks (excluding CS - Brooten)

Study or subgroup	Early discharge n/N	Standard discharge n/N	Risk Ratio M-H,Random,95% CI	Risk Ratio M-H,Random,95% CI
Sainz Bueno 2005	4/213	5/217		0.82 [0.22, 2.99]
Boulvain 2004	4/228	2/231		2.03 [0.37, 10.95]
Smith-Hanrahan 1995	0/35	0/46		0.0 [0.0, 0.0]
Carty 1990	1/93	1/38		0.41 [0.03, 6.37]
Waldenstrm 1987	0/50	1/54		0.36 [0.01, 8.63]
Yanover 1976	0/44	0/44		0.0 [0.0, 0.0]
Hellman 1962	32/1778	2/316		2.84 [0.68, 11.81]
Total (95% CI)	**2441**	**946**		**1.29 [0.59, 2.80]**

Total events: 41 (Early discharge), 11 (Standard discharge)

Heterogeneity: $Tau^2 = 0.0$; $Chi^2 = 3.30$, df = 4 (P = 0.51); $I^2 = 0.0\%$

Test for overall effect: Z = 0.64 (P = 0.52)



Analysis 1.5. Comparison 1 Early versus standard discharge, Outcome 5 Proportion of women probably depressed.

Review: Early postnatal discharge from hospital for healthy mothers and term infants

Comparison: 1 Early versus standard discharge

Outcome: 5 Proportion of women probably depressed

Study or subgroup	Early discharge n/N	Standard discharge n/N	Risk Ratio M-H,Random,95% CI	Weight	Risk Ratio M-H,Random,95% CI
Sainz Bueno 2005	2/213	8/217		12.0 %	0.25 [0.05, 1.19]
Boulvain 2004	16/228	21/231		73.0 %	0.77 [0.41, 1.44]
Waldenstrm 1987	3/50	5/54		15.0 %	0.65 [0.16, 2.57]
Total (95% CI)	**491**	**502**		**100.0 %**	**0.66 [0.39, 1.12]**

Total events: 21 (Early discharge), 34 (Standard discharge)

Heterogeneity: $Tau^2 = 0.0$; $Chi^2 = 1.74$, df = 2 (P = 0.42); $I^2 = 0.0\%$

Test for overall effect: Z = 1.54 (P = 0.12)

Analysis 1.6. Comparison 1 Early versus standard discharge, Outcome 6 Proportion of women not breastfeeding in first eight weeks postpartum.

Review: Early postnatal discharge from hospital for healthy mothers and term infants

Comparison: 1 Early versus standard discharge

Outcome: 6 Proportion of women not breastfeeding in first eight weeks postpartum

Study or subgroup	Early discharge n/N	Standard discharge n/N	Risk Ratio M-H,Random,95% CI	Weight	Risk Ratio M-H,Random,95% CI
Sainz Bueno 2005	23/213	35/217		8.7 %	0.67 [0.41, 1.09]
Boulvain 2004	25/227	35/229		9.1 %	0.72 [0.45, 1.16]
Winterburn 2000	35/121	33/127		11.6 %	1.11 [0.74, 1.67]
Gagnon 1997	35/78	59/97		17.4 %	0.74 [0.55, 0.99]
Smith-Hanrahan 1995	18/35	17/46		8.6 %	1.39 [0.85, 2.29]
Carty 1990	9/72	5/25		2.6 %	0.63 [0.23, 1.69]
Waldenstrm 1987	12/49	7/52		3.4 %	1.82 [0.78, 4.24]

(*Continued* . . .)

(. . . *Continued*)

Study or subgroup	Early discharge n/N	Standard discharge n/N	Risk Ratio M-H,Random,95% CI	Weight	Risk Ratio M-H,Random,95% CI
Hellman 1962	1650/1941	297/316		38.6 %	0.90 [0.87, 0.94]
Total (95% CI)	**2736**	**1109**		**100.0 %**	**0.90 [0.76, 1.06]**
Total events: 1807 (Early discharge), 488 (Standard discharge)					
Heterogeneity: Tau^2 = 0.02; Chi^2 = 11.41, df = 7 (P = 0.12); I^2 =39%					
Test for overall effect: Z = 1.28 (P = 0.20)					

Analysis 1.7. Comparison 1 Early versus standard discharge, Outcome 7 Proportion of women reporting infant feeding problems.

Review: Early postnatal discharge from hospital for healthy mothers and term infants

Comparison: 1 Early versus standard discharge

Outcome: 7 Proportion of women reporting infant feeding problems

Study or subgroup	Early discharge n/N	Standard discharge n/N	Risk Ratio M-H,Random,95% CI	Weight	Risk Ratio M-H,Random,95% CI
Boulvain 2004	47/227	76/229		51.3 %	0.62 [0.46, 0.85]
Hellman 1962	207/1683	25/266		48.7 %	1.31 [0.88, 1.94]
Total (95% CI)	**1910**	**495**		**100.0 %**	**0.89 [0.43, 1.86]**
Total events: 254 (Early discharge), 101 (Standard discharge)					
Heterogeneity: Tau^2 = 0.25; Chi^2 = 8.45, df = 1 (P = 0.004); I^2 =88%					
Test for overall effect: Z = 0.30 (P = 0.77)					

Analysis 1.8. Comparison 1 Early versus standard discharge, Outcome 8 Proportion of women not breastfeeding at six months.

Review: Early postnatal discharge from hospital for healthy mothers and term infants

Comparison: 1 Early versus standard discharge

Outcome: 8 Proportion of women not breastfeeding at six months

Study or subgroup	Early discharge n/N	Standard discharge n/N	Risk Ratio M-H,Random,95% CI	Weight	Risk Ratio M-H,Random,95% CI
Sainz Bueno 2005	119/213	141/217		42.6 %	0.86 [0.74, 1.00]
Boulvain 2004	142/220	137/215		47.0 %	1.01 [0.88, 1.17]
Waldenstrm 1987	21/49	32/59		10.4 %	0.79 [0.53, 1.18]
Total (95% CI)	**482**	**491**		**100.0 %**	**0.92 [0.80, 1.05]**

Total events: 282 (Early discharge), 310 (Standard discharge)

Heterogeneity: $Tau^2 = 0.01$; $Chi^2 = 3.08$, df = 2 (P = 0.21); $I^2 = 35\%$

Test for overall effect: Z = 1.19 (P = 0.23)

Analysis 1.9. Comparison 1 Early versus standard discharge, Outcome 9 Proportion of women dissatisfied with postnatal care.

Review: Early postnatal discharge from hospital for healthy mothers and term infants

Comparison: 1 Early versus standard discharge

Outcome: 9 Proportion of women dissatisfied with postnatal care

Study or subgroup	Early discharge n/N	Standard discharge n/N	Risk Ratio M-H,Random,95% CI	Weight	Risk Ratio M-H,Random,95% CI
Sainz Bueno 2005	99/172	111/125		39.1 %	0.65 [0.56, 0.75]
Boulvain 2004	31/217	31/223		30.4 %	1.03 [0.65, 1.63]
Waldenstrm 1987	14/50	47/54		30.5 %	0.32 [0.20, 0.51]
Total (95% CI)	**439**	**402**		**100.0 %**	**0.60 [0.36, 1.00]**

Total events: 144 (Early discharge), 189 (Standard discharge)

Heterogeneity: $Tau^2 = 0.17$; $Chi^2 = 12.80$, df = 2 (P = 0.002); $I^2 = 84\%$

Test for overall effect: Z = 1.95 (P = 0.052)

Analysis 1.10. Comparison 1 Early versus standard discharge, Outcome 10 Proportion of women probably depressed (excluding non-standardised measures).

Review: Early postnatal discharge from hospital for healthy mothers and term infants

Comparison: 1 Early versus standard discharge

Outcome: 10 Proportion of women probably depressed (excluding non-standardised measures)

Study or subgroup	Early discharge n/N	Standard discharge n/N	Risk Ratio M-H,Random,95% CI	Weight	Risk Ratio M-H,Random,95% CI
Sainz Bueno 2005	2/213	8/217		29.4 %	0.25 [0.05, 1.19]
Boulvain 2004	16/228	21/231		70.6 %	0.77 [0.41, 1.44]
Total (95% CI)	**441**	**448**		**100.0 %**	**0.56 [0.21, 1.51]**
Total events: 18 (Early discharge), 29 (Standard discharge)					
Heterogeneity: $Tau^2 = 0.27$; $Chi^2 = 1.74$, df = 1 (P = 0.19); $I^2 = 43\%$					
Test for overall effect: Z = 1.15 (P = 0.25)					

APPENDICES

Appendix 1. Search terms used for additional searching

This additional searching was carried out by the authors. Please contact authors for the full search strategy.
We searched CENTRAL (*The Cochrane Library* 2008, Issue 1) using search terms: postnatal care, postpartum, puerper*, childbirth, length of stay, discharge, hospitalization, and readmission.
We searched MEDLINE (1966 to 2007) using the MeSH and freetext terms: postnatal care, puerperium, length of stay, discharge, hospitalization.
We searched CINAHL (1982 to 2007) using the same freetext terms as for CENTRAL.

Appendix 2. Additional searching carried out for the previous version of the review

We searched the Effective Practice and Organisation of Care Review Group's Trials Register (EPOC) (December 2001) and EMBASE (1988 to 1993) using search terms: postnatal care, postpartum, puerper*, childbirth, length of stay, discharge, hospitalization, and readmission.

WHAT'S NEW

Last assessed as up-to-date: 30 November 2008.

1 December 2008	New search has been performed	Update. New search identified two additional studies for inclusion (Boulvain 2004; Sainz Bueno 2005). Two studies previously awaiting classification were excluded (Burnell 1982; Thompson 1999), and a further four studies were also excluded (Escobar 2001; Lieu 2000; McKeever 2002; Steel O'Connor 2003). Main results and conclusions remain unchanged.

HISTORY

Protocol first published: Issue 1, 2001

Review first published: Issue 3, 2002

19 August 2008	Amended	Converted to new review format.

CONTRIBUTIONS OF AUTHORS

Stephanie Brown and Rhonda Small undertook the background review of the literature. Stephanie Brown wrote the protocol with input from all review authors. Brenda Argus and Ann Krastev conducted the original literature search to identify trials. Each review author independently evaluated trials for quality and extracted data. Rhonda Small, Brenda Argus and Ann Krastev independently entered the data. Stephanie Brown wrote the text of the review with input from the other reviewers.

For this update (2008): Stephanie Brown and Rhonda Small updated the literature search, independently reviewed new trials, extracted and entered data and updated the text of the review. Brenda Argus, Ann Krastev and Peter Davis reviewed the manuscript.

DECLARATIONS OF INTEREST

None known.

SOURCES OF SUPPORT

Internal sources

- La Trobe University, Australia.
- Royal Women's Hospital, Melbourne, Australia.
- Murdoch Childrens Research Institute, Australia.

External sources

- No sources of support supplied

INDEX TERMS

Medical Subject Headings (MeSH)

*Length of Stay; *Postpartum Period

MeSH check words

Female; Humans; Infant; Pregnancy