Cochrane
Library

Cochrane Database of Systematic Reviews

Early discharge with home support of gavage feeding for stable preterm infants who have not established full oral feeds (Review)

Collins CT, Makrides M, McPhee AJ

Collins CT, Makrides M, McPhee AJ.

Early discharge with home support of gavage feeding for stable preterm infants who have not established full oral feeds.

Cochrane Database of Systematic Reviews 2015, Issue 7. Art. No.: CD003743.

DOI: [10.1002/14651858.CD003743.pub2](https://doi.org/10.1002/14651858.CD003743.pub2).

www.cochranelibrary.com

Early discharge with home support of gavage feeding for stable preterm infants who have not established full oral feeds (Review)

Copyright © 2015 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.

WILEY

TABLE OF CONTENTS

HEADER	1
ABSTRACT	1
PLAIN LANGUAGE SUMMARY	2
BACKGROUND	3
OBJECTIVES	3
METHODS	3
RESULTS	5
DISCUSSION	8
AUTHORS' CONCLUSIONS	8
ACKNOWLEDGEMENTS	8
REFERENCES	9
CHARACTERISTICS OF STUDIES	10
DATA AND ANALYSES	11
Analysis 1.1. Comparison 1 Early discharge to home gavage programme versus later discharge on full sucking feeds, Outcome 1 Stopped any breast feeding by different times (proportion of infants).	13
Analysis 1.2. Comparison 1 Early discharge to home gavage programme versus later discharge on full sucking feeds, Outcome 2 Stopped fully breast feeding at different times (proportion of infants).	14
Analysis 1.3. Comparison 1 Early discharge to home gavage programme versus later discharge on full sucking feeds, Outcome 3 Weight gain (g/d) on discharge from home gavage programme (exp) or discharge from hospital (control).	14
Analysis 1.4. Comparison 1 Early discharge to home gavage programme versus later discharge on full sucking feeds, Outcome 4 Length of hospitalisation.	15
Analysis 1.5. Comparison 1 Early discharge to home gavage programme versus later discharge on full sucking feeds, Outcome 5 Infants with 1 or more hospital re-admissions.	15
Analysis 1.6. Comparison 1 Early discharge to home gavage programme versus later discharge on full sucking feeds, Outcome 6 Infants with 1 or more adverse events.	15
Analysis 1.7. Comparison 1 Early discharge to home gavage programme versus later discharge on full sucking feeds, Outcome 7 Parental satisfaction on discharge from home gavage programme (exp) or discharge from hospital (control).	16
Analysis 1.8. Comparison 1 Early discharge to home gavage programme versus later discharge on full sucking feeds, Outcome 8 Parental anxiety on discharge from home gavage programme (exp) or discharge from hospital (control).	16
Analysis 1.9. Comparison 1 Early discharge to home gavage programme versus later discharge on full sucking feeds, Outcome 9 Health service use post discharge from home gavage programme (exp) or from hospital (control).	17
WHAT'S NEW	17
HISTORY	18
CONTRIBUTIONS OF AUTHORS	18
DECLARATIONS OF INTEREST	18
SOURCES OF SUPPORT	18
INDEX TERMS	19

[Intervention Review]

Early discharge with home support of gavage feeding for stable preterm infants who have not established full oral feeds

Carmel T Collins^{1,2}, Maria Makrides^{1,3}, Andrew J McPhee^{2,4}

¹Child Nutrition Research Centre, Women's and Children's Health Research Institute, Women's and Children's Hospital and Flinders Medical Centre, Adelaide, Australia. ²Healthy Mothers, Babies and Children, South Australian Health and Medical Research Institute, Adelaide, Australia. ³Healthy Mothers, Babies and Children, South Australian Health and Medical Research Institute, Adelaide, Australia. ⁴Neonatal Medicine, Women's and Children's Hospital, North Adelaide, Australia

Contact address: Carmel T Collins, Child Nutrition Research Centre, Women's and Children's Health Research Institute, Women's and Children's Hospital and Flinders Medical Centre, 72 King William Road, Adelaide, South Australia, 5006, Australia. carmel.collins@health.sa.gov.au.

Editorial group: Cochrane Neonatal Group.

Publication status and date: New search for studies and content updated (no change to conclusions), published in Issue 7, 2015.

Citation: Collins CT, Makrides M, McPhee AJ. Early discharge with home support of gavage feeding for stable preterm infants who have not established full oral feeds. *Cochrane Database of Systematic Reviews* 2015, Issue 7. Art. No.: CD003743. DOI: [10.1002/14651858.CD003743.pub2](https://doi.org/10.1002/14651858.CD003743.pub2).

Copyright © 2015 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.

ABSTRACT

Background

Early discharge of stable preterm infants still requiring gavage feeds offers the benefits of uniting families sooner and reducing healthcare and family costs compared with discharge home when on full sucking feeds. Potential disadvantages of early discharge include increased care burden for the family and risk of complications related to gavage feeding.

Objectives

To determine the effects of a policy of early discharge of stable preterm infants with home support of gavage feeding compared with a policy of discharge of such infants when they have reached full sucking feeds.

We planned subgroup analyses to determine whether safety and efficacy outcomes are altered by the type of support received (outpatient visits vs home support) or by the maturity of the infants discharged (gestational age ≤ 28 weeks at birth or birth weight ≤ 1000 grams).

Search methods

We used the standard search strategy of the Cochrane Neonatal Review Group, together with searches of the Cochrane Central Register of Controlled Trials (CENTRAL; 2015, Issue 3), the Cumulative Index to Nursing and Allied Health Literature (CINAHL) (1982 to March 2015), EMBASE (1980 to March 2015) and MEDLINE (1950 to March 2015). We found no new trials.

Selection criteria

We included all randomised and quasi-randomised trials among infants born at < 37 weeks and requiring no intravenous nutrition at the point of discharge. Trials were required to compare early discharge home with gavage feeds and healthcare support versus later discharge home when full sucking feeds were attained.

Data collection and analysis

Two review authors independently assessed trial quality and extracted data. We conducted study authors for additional information. We performed data analysis in accordance with the standards of the Cochrane Neonatal Review Group.

Main results

We included in the review data from one quasi-randomised trial with 88 infants from 75 families. Infants in the early discharge programme with home gavage feeding had a mean hospital stay that was 9.3 days shorter (mean difference (MD) -9.3, 95% confidence interval (CI) -18.49 to -0.11) than that of infants in the control group. Infants in the early discharge programme also had lower risk of clinical infection during the home gavage period compared with those in the control group spending corresponding time in hospital (risk ratio 0.35, 95% CI 0.17 to 0.69). No significant differences were noted between groups in duration and extent of breast feeding, weight gain, re-admission within the first 12 months post discharge from the home gavage programme or from hospital, scores reflecting parental satisfaction or overall health service use.

Authors' conclusions

Experimental evidence on the benefits and risks for preterm infants of early discharge from hospital with home gavage feeding compared with later discharge upon attainment of full sucking feeds is limited to the results of one small quasi-randomised controlled trial. High-quality trials with concealed allocation, complete follow-up of all randomly assigned infants and adequate sample size are needed before practice recommendations can be made.

PLAIN LANGUAGE SUMMARY

Early discharge with home support of gavage feeding for stable preterm infants who have not established full oral feeds

Review question: Does a policy of early discharge of stable preterm infants with home support of gavage feeding compared with a policy of discharge of such infants when they have reached full sucking feeds lead to improvement in feeding, growth and other clinical outcomes?

Background: Babies born preterm (before 37 weeks) are not usually discharged from hospital until they are able to suck all their feeds. Early discharge of babies who are stable but still need gavage (tube) feeds could unite families sooner and might reduce costs. These babies could graduate to full sucking feeds at home with some professional support. However, this practice could present a burden for the family and might increase complications during the transition from tube feeding.

Study characteristics: Data from one quasi-randomised trial with 88 infants from 75 families were included in the review.

Key results: Infants in the early discharge programme with home gavage feeds had a mean hospital stay that was approximately nine days shorter than that of infants in the control group. Infants in the early discharge programme also had lower risk of clinical infection during the home gavage period compared with infants in the control group during the corresponding time in hospital. No significant differences were observed between groups in duration and extent of breast feeding, weight gain, re-admission within the first 12 months post discharge from the home gavage programme or from hospital, scores reflecting parental satisfaction or health service use.

Conclusions: Evidence is needed regarding the effects of early home discharge for preterm babies who are stable but still need gavage (tube) feeds.

BACKGROUND

Description of the condition

A commonly accepted criterion for discharge of physiologically stable preterm infants is that gavage (tube) feeds are no longer required (AAP 1998). The last one to two weeks of hospitalisation for stable infants is used primarily for providing gavage feeds during their transition to full sucking feeds, along with education and support for parents.

Reducing length of hospitalisation for preterm infants has been suggested to have positive emotional and psychological benefits for the family (Laddem 1992) and for the infant's development (Casiro 1993). Randomised controlled trials have shown that 'early discharge' of physiologically stable preterm infants based on a set weight criterion is safe and cost-effective (Lefebvre 1982; Brooten 1986; Casiro 1993; Cruz 1997). However, to be eligible for inclusion in these studies, infants had to be gaining weight satisfactorily on full sucking feeds.

Description of the intervention

Discharge of physiologically stable preterm infants who still need gavage feeds has been reported (Evans 1988; Wakefield 1994; Evanochko 1996; Swanson 1997; Sturm 2005; Meerlo-Habing 2009). This model of care is based on the premise that graduation to full sucking feeds can be undertaken successfully at home with appropriate healthcare support. Potential benefits of this model of care are that uniting the family earlier may have a positive impact on the infant's development, and costs for the health service and for the family may be reduced. Potential disadvantages arise from the increased burden on the family associated with this higher level of care and possible complications associated with gavage feeding, for example, growth failure and aspiration pneumonia.

All home gavage feeding programmes provide some form of follow-up until gavage feeding is no longer required and weight gain is adequate. The types of healthcare support described include outpatient clinic visits with hospital- and/or parent-initiated telephone calls (Evans 1988; Evanochko 1996; Sturm 2005); home visits as considered necessary by the nurse or as requested by the mother (Meerlo-Habing 2009); healthcare worker-initiated telephone calls; and 24-hour emergency phone contact for parents (Wakefield 1994; Swanson 1997; Sturm 2005; Meerlo-Habing 2009).

How the intervention might work

All studies investigating growth outcomes reported that early discharge with home gavage feeding for stable preterm infants led to adequate weight gain (Evans 1988; Wakefield 1994; Evanochko 1996; Swanson 1997; Sturm 2005). Additionally, Meerlo-Habing 2009 showed increased duration of breast feeding, with relative risk of breast feeding cessation before six months reduced for those infants discharged early (adjusted risk ratio (RR) 0.67, 95% confidence interval (CI) 0.43 to 1.05). Only one study reported infants requiring re-admission (Sturm 2005). Swanson 1997 reported a reduction in hospital stay of 9.3 days from the birth weight category average, and Sturm 2005 a reduction of 7.4 days. All anecdotal (Evans 1988; Wakefield 1994; Evanochko 1996; Swanson 1997) and survey responses from parents (Sturm 2005) regarding home gavage feeding programmes were positive.

However, the studies were small and uncontrolled, with poorly defined outcomes.

Why it is important to do this review

It is important that the safety of early discharge with home gavage feeding for stable preterm infants has been established. It is also important for researchers to establish the effect on the family of this increased level of care.

OBJECTIVES

To determine the effects of a policy of early discharge of stable preterm infants with home support of gavage feeding compared with a policy of discharge of such infants when they have reached full sucking feeds.

We planned subgroup analyses to determine whether safety and efficacy outcomes are altered by the type of support received (outpatient visits vs home support) or by the maturity of the infants discharged (gestational age ≤ 28 weeks at birth or birth weight ≤ 1000 grams).

METHODS

Criteria for considering studies for this review

Types of studies

All trials using random or quasi-random patient allocation.

Types of participants

Infants born at less than 37 weeks' gestation and requiring no intravenous supplementation at the point of discharge. Infants requiring supplemental oxygen may be included.

Types of interventions

Early discharge home with gavage feeds and healthcare support versus later discharge home when full sucking feeds are attained. Studies that did not include any aspect of home support for home gavage feeding were excluded.

Types of outcome measures

Primary outcomes

Primary efficacy outcomes

Feeding and growth outcomes as assessed by:

- number of days to reach full sucking feeds;
- breast feeding prevalence (any and fully) on discharge and at three months and six months post discharge. To be defined as fully breast feeding, no other liquid or solid was given to the infant apart from vitamins, minerals, water, juice or ritualistic feeds given infrequently (Labbok 1990);
- weight gain;
- length of hospitalisation (days); and
- neurodevelopmental outcome at 12 months.

Primary safety outcomes

Re-admission defined as:

- rehospitalisation during the period of home gavage feeding; or

- rehospitalisation (excluding home gavage period) in the first year post discharge.

Adverse events

- Milk aspiration - on radiological assessment.
- Infection during period of gavage feeding.
- Death within the first year post discharge.

Secondary outcomes

Parental satisfaction

- Parental satisfaction as measured by self report, including assessment of key elements of such programmes (e.g. education).

Cost

- Cost comparison from trial entry to discharge from hospital or home support for both hospital and family. For the home gavage group, cost of home support (home visits, phone calls). For those discharged on full sucking feeds, cost of extra hospital stay, cost to parents of visiting (e.g. travel costs).

Health service use

- Other health service use post discharge from hospital or home support (includes visits to physician, outpatient clinic or emergency department).

Search methods for identification of studies

We initially planned the search strategy to be centred around gavage tube feeding and early discharge. However, it was necessary to broaden the search to include all trials of early discharge programmes for preterm infants, as gavage feeding may have been included as one component of an early discharge programme.

We used the standard search strategy of the Cochrane Neonatal Review Group.

We undertook literature searches of the Cochrane Central Register of Controlled Trials (CENTRAL; 2015, Issue 3), Cumulative Index to Nursing and Allied Health Literature (CINAHL) (1982 to March 31, 2015), EMBASE (1980 to March 31, 2015) and MEDLINE (1982 to March 31, 2015) databases. We used the free-text terms 'early discharge', 'hospital in the home', 'random\$', 'gavage', 'gavage feed \$' and 'tube feed\$'. The Medical Subject Heading (MeSH) terms used included 'patient discharge', 'home care services', 'home nursing', 'length of stay', 'enteral nutrition', 'randomised controlled trials', 'random allocation', 'double-blind method', 'single-blind method' and 'clinical trials'. We did not restrict the search by language. We found no new trials in the updated search.

Data collection and analysis

We used standard methods of The Cochrane Collaboration ([Higgins 2011](#)) and the Cochrane Neonatal Review Group.

Selection of studies

We excluded studies if it was apparent from the abstract that they did not meet the inclusion criteria as assessed by one review author (CTC). When uncertainty surrounded inclusion of the study, we retrieved the full text. Two review authors (CTC, MM) independently assessed the full-text articles for inclusion. If

disagreement between review authors about the studies to be included could not be resolved by discussion, we sought assistance from the third review author.

Data extraction and management

Once we agreed on trials for inclusion, we assessed the methodology of the trials. We extracted data onto hard copy data sheets. CTC and MM assessed data extraction and quality.

Assessment of risk of bias in included studies

We used the standard methods of the Neonatal Review Group to assess the methodological quality of included trials.

Review authors independently assessed risk of bias for each study using the criteria outlined in the *Cochrane Handbook for Systematic Reviews of Interventions* ([Higgins 2011](#)).

We assessed the methodological quality of studies by using the following criteria.

- **Sequence generation (checking for possible selection bias):** For each included study, we categorised the method used to generate the allocation sequence as:
 - * low risk (any truly random process, e.g. random number table; computer random number generator);
 - * high risk (any non-random process, e.g. odd or even date of birth; hospital or clinic record number); or
 - * unclear risk.
- **Allocation concealment (checking for possible selection bias):** For each included study, we categorised the method used to conceal the allocation sequence as:
 - * low risk (e.g. telephone or central randomisation; consecutively numbered sealed opaque envelopes);
 - * high risk (open random allocation; unsealed or non-opaque envelopes; alternation; date of birth); or
 - * unclear risk.
- **Blinding (checking for possible performance bias):** For each included study, we categorised the methods used to blind study participants and personnel from knowledge of which intervention a participant received. Blinding was assessed separately for different outcomes or classes of outcomes. We categorised the methods as:
 - * low risk, high risk or unclear risk for participants;
 - * low risk, high risk or unclear risk for personnel; and
 - * low risk, high risk or unclear risk for outcome assessors.
- **Incomplete outcome data (checking for possible attrition bias through withdrawals, dropouts, protocol deviations):** For each included study and for each outcome, we described the completeness of data including attrition and exclusions from the analysis. We noted whether attrition and exclusions were reported, the numbers included in the analysis at each stage (compared with the total randomly assigned participants), reasons for attrition or exclusion when reported and whether missing data were balanced across groups or were related to outcomes. When sufficient information was reported or supplied by the trial authors, we re-included missing data in the analyses. We categorised methods as:
 - * low risk (< 20% missing data);
 - * high risk (≥ 20% missing data); or
 - * unclear risk.

- **Selective reporting bias:** For each included study, we described how we investigated the possibility of selective outcome reporting bias and what we found. We assessed the methods as:
 - * low risk (when it was clear that all of the study's prespecified outcomes and all expected outcomes of interest to the review had been reported);
 - * high risk (when not all of the study's prespecified outcomes had been reported; one or more reported primary outcomes were not prespecified; outcomes of interest were reported incompletely and so cannot be used; study failed to include results of a key outcome that would have been expected to have been reported); or
 - * unclear risk.
- **Other sources of bias:** For each included study, we described important concerns that we had about other possible sources of bias (e.g. whether a potential source of bias was related to the specific study design; whether the trial was stopped early because of some data-dependent process). We assessed whether each study was free of other problems that could put it at risk of bias as:
 - * low risk;
 - * high risk; or
 - * unclear risk.

We requested additional information from [Gibson 1998](#) on outcome data for the subgroup of infants discharged home with gavage feeding. We requested additional information from [Örtenstrand 1999](#) on breast feeding outcomes; blinding of outcome assessment; length of hospitalisation; and health service use. We requested verification of the inclusion criterion concerning feeding status for three trials ([Dillard 1973](#); [Davies 1979](#); [Puerto 1993](#)).

Measures of treatment effect

We used the standard methods of the Neonatal Review Group.

We performed statistical analyses using Review Manager software ([Revman 2012](#)). We analysed dichotomous data using risk ratio (RR), risk difference (RD) and number needed to treat for an additional beneficial outcome (NNTB) or number needed to treat for an additional harmful outcome (NNTH). We reported 95% confidence intervals (CIs) for all estimates.

We used mean difference (MD) with 95% confidence intervals for outcomes measured on a continuous scale.

Dealing with missing data

For included studies, we noted levels of attrition. If we had concerns regarding the impact of including studies with high levels of missing data in the overall assessment of treatment effect, we planned to explore this concern using sensitivity analysis.

We analysed all outcomes on an intention-to-treat basis (i.e. we included in the analyses all participants randomly assigned to each group). The denominator for each outcome in each trial was the number randomly assigned minus any participants whose outcomes were known to be missing.

Assessment of heterogeneity

We planned to examine heterogeneity between trials by inspecting the forest plots and quantifying the impact of heterogeneity using the I^2 statistic. If noted, we planned to explore possible

causes of statistical heterogeneity using a prespecified subgroup analysis (e.g. differences in study quality, participants, intervention regimens, outcome assessments).

Assessment of reporting biases

We planned to assess possible publication bias and other biases using symmetry/asymmetry of funnel plots.

For included trials that were recently performed (and therefore prospectively registered), we planned to explore possible selective reporting of study outcomes by comparing primary and secondary outcomes in the reports versus primary and secondary outcomes proposed at trial registration, using the websites www.clinicaltrials.gov and www.controlled-trials.com. If we found such discrepancies, we planned to contact the primary investigators to obtain missing outcome data on outcomes prespecified at trial registration.

Data synthesis

When meta-analysis was judged as appropriate, we planned to conduct the analysis using Review Manager software (RevMan 2011), as supplied by The Cochrane Collaboration. We planned to use the Mantel-Haenszel method for estimates of typical risk ratio and risk difference. For analysis of continuous measures, we planned to use the inverse variance method.

We planned to use the fixed-effect model for all meta-analyses.

Subgroup analysis and investigation of heterogeneity

We planned subgroup analyses to determine whether safety and efficacy outcomes were altered by the type of support received (e.g. outpatient visits vs home support) or by the maturity of the infants (gestational age ≤ 28 weeks at birth or birth weight ≤ 1000 grams).

Sensitivity analysis

We planned sensitivity analyses to explore the effect of trial quality on important outcomes in the review. Where there was risk of bias associated with a particular aspect of study quality (e.g. inadequate allocation concealment), we explored this by sensitivity analysis.

RESULTS

Description of studies

We identified 12 trials. We excluded seven trials of early discharge programmes because all infants were on full sucking feeds before discharge home ([Bhargava 1980](#); [Lefebvre 1982](#); [Brooten 1986](#); [Casiro 1993](#); [Charpak 1997](#); [Cruz 1997](#); [Finello 1998](#)). Feeding status on discharge home was not described in three trials ([Dillard 1973](#); [Davies 1979](#); [Puerto 1993](#)). The authors of these trials have confirmed that infants in their study were on full sucking feeds before discharge home ([Dillard 1973](#); [Davies 1979](#); [Puerto 1993](#)); therefore we excluded these trials. [Gibson 1998](#) conducted a randomised controlled trial of a home-supported early discharge programme. Infants were eligible for the study if birth weight was less than or equal to 1800 grams and gestational age was < 36 weeks at birth. Exclusion criteria included infants with congenital abnormalities, severe apnoea, neurological impairment, feeding intolerance, an unwilling or incapable caregiver, an unsafe home environment or lack of access to home care services. Infants in the experimental group were discharged home at approximately 1800 grams if certain clinical criteria were met, one of which was "infant

tolerating full feedings, either via gavage or nipple". Control group participants were discharged home according to routine hospital policy, including the requirement to be on full sucking feeds. The study authors have not reported the proportion of infants who received home gavage feeds; therefore, this study could not be included in the analysis. It may have been possible to include data from this study if the authors had provided separate subgroup analyses for the outcomes of those who were discharged home on gavage feeding; however, these data were not available from study authors.

In the study of Örténstrand 1999, most infants in the experimental group (80%) were discharged home while still requiring gavage feeds ($n = 36/45$). The inclusion criterion for this systematic review was 'early discharge home with gavage feeds and healthcare support versus later discharge home when full sucking feeds are attained'. Given the difficulty involved in locating studies specifically designed to assess home gavage feeding, we have decided to include this study, even though 20% (9/45) of the infants in the experimental group did not receive home gavage feeds. The nine infants who did not receive home gavage feeds were discharged to the programme and received home visits. They were discharged from the programme when the ordinary criteria for hospital discharge were met (i.e. clinically well and gaining weight satisfactorily on full sucking feeds). These nine infants were included in the analysis for this systematic review.

For the purposes of this review, we will refer to the experimental group as the home gavage programme.

This review, therefore, includes one quasi-randomised controlled clinical trial (Örténstrand 1999) as described in two publications.

Participants

This single-centre Swedish study involved 88 infants from 75 families (45 infants/40 families - experimental, 43 infants/35 families - control). Participants were preterm infants with a mean gestational age at birth of 31.4 weeks (standard deviation (SD) 2.8) in the experimental group and 32 weeks (SD 2.3) in the control group. A total of 70% (23/40) of mothers in the experimental group were primiparous, and 60% (21/35) in the control group. The experimental group included five pairs of twins (10/45; 22%), and the control group included eight pairs (16/43; 37%).

Interventions

This trial compared early discharge with home visits by a registered nurse for infants still requiring special care (mainly gavage feeds) versus standard care (discharge home when clinically well and gaining weight satisfactorily on full sucking feeds). Most of the infants in the early discharge group were discharged home while still requiring gavage feeds (36/45; 80%). Infants were discharged from the home programme when the ordinary criteria for hospital discharge were met (i.e. clinically well and gaining weight satisfactorily on full sucking feeds).

Study entry occurred when infants met the inclusion criteria listed in the table of included studies. On study entry, infants in the experimental group (allocated to the home programme) had a mean postmenstrual age of 35.9 weeks (SD 1.6) and infants in the control group (who remained in hospital) had a mean postmenstrual age of 35.6 weeks (SD 1.2).

Outcome measures and results

The end of the intervention was defined as discharge from the home gavage programme for the experimental group and as discharge from hospital for the control group. No significant differences in postmenstrual age were noted at the end of study intervention (experimental 38.7 weeks, control 38.6 weeks). The trial measured breast feeding outcomes, weight gain, rehospitalisation, infection (clinical signs), health problems, medications, home visits, telephone calls, visits to the neonatal ward, travelling time for the nurse, health service use during the first year post discharge, confidence in handling the baby, experiences related to care, experiences related to infant health and parental anxiety.

For further details, see the [Characteristics of included studies](#) table.

Risk of bias in included studies

Details of the methodological quality of the study are available in the [Characteristics of included studies](#) table.

- Randomisation: After discussion and consultation, the review authors agreed to accept the Örténstrand 1999 study as a quasi-randomised controlled trial. The nursery in the trial included two separate rooms with separate teams of nursing staff; the rooms were randomly designated as experimental or control. Allocation of infants to the control or experimental group was based on bed availability. Study authors reported that the unit was constantly busy, and the opportunity to choose between the rooms was "almost never an option" (Örténstrand 1999). To minimise the potential for the hospital nursing teams to affect outcomes, designation of the experimental room and the control room was changed after an eight-month period. Blinding of randomisation was classified as inadequate because of the potential for selection bias.
- Blinding of treatment: not possible.
- Exclusions after randomisation: 7% for primary outcomes, 14% for secondary outcomes.
- Blinding of outcome assessment: yes.

Effects of interventions

Early discharge to home gavage programme versus later discharge on full sucking feeds (comparison 01)

One study contributed data to this review (Örténstrand 1999).

Primary outcomes

Feeding and growth

Days to reach full sucking feeds

Not reported.

Breast feeding (Outcomes 1.1 and 1.2)

Breast feeding outcome data were reported only for those who completed one-year follow-up (experimental group $n = 41$, control group $n = 41$). No statistically significant differences were observed between experimental and control groups in the proportion of infants who had stopped any (full and partial) breast feeding at any time points. By the time of discharge from the home gavage programme (experimental) or discharge from hospital (control), 2/41 in the home gavage group and 4/41 in the control group had

stopped breast feeding (RR for stopping breast feeding 0.50, 95% CI 0.10 to 2.58). At three months post discharge from the home gavage programme (experimental) or post discharge from hospital (control), 8/41 of the home gavage group and 5/41 of the control group had stopped breast feeding (RR 1.60, 95% CI 0.57 to 4.48). At six months post discharge from the home gavage programme (experimental) or post discharge from hospital (control), 20/41 of the home gavage group and 12/41 of the control group had stopped breast feeding (RR 1.67, 95% CI 0.94 to 2.95).

The outcome fully breast feeding was compared with a combined outcome of partially breast feeding and not breast feeding. No significant differences were found in the proportion of infants not fully breast feeding in the home gavage group (experimental) compared with the control group at any time points. On discharge from the home gavage programme (experimental) or on discharge from hospital (control), 13/41 of the home gavage group and 10/41 of the control group were not fully breast feeding (RR for not fully breast feeding 1.30, 95% CI 0.64 to 2.62). At three months post discharge from the home gavage programme (experimental) or post discharge from hospital (control), 8/41 in the home gavage group (experimental) and 6/42 in the control group were not fully breast feeding (RR 1.33, 95% CI 0.51 to 3.50). At six months post discharge from the home gavage programme (experimental) or post discharge from hospital (control), 24/41 of the home gavage group (experimental) and 24/41 of the control group were not fully breast feeding (RR 1.00, 95% CI 0.69 to 1.44).

Weight gain (Outcome 1.3)

Weight gain was assessed from trial entry until discharge from the home gavage programme (experimental), and from trial entry to discharge from hospital (control). No significant difference in weight gain was detected (MD -1.10 g/d, 95% CI -3.94 to 1.74).

Length of hospitalisation (Outcome 1.4)

Infants in the home gavage programme had a mean hospital stay that was 9.3 days shorter (MD -9.30, 95% CI -18.49 to -0.11) than that of infants in the control group. Infants in the home gavage programme spent a mean of 19.6 days (SD 9.2 days) in the home programme.

Hospital re-admission (Outcome 1.5)

During period of home gavage feeding

A total of 8/45 infants were rehospitalised nine times during the home gavage programme (two infants for jaundice, two for blood transfusion, one for inguinal herniorrhaphy and cryotherapy of retinopathy, one for observation before removal of the apnoea monitor, one for a skin condition and maternal anxiety and one for respiratory syncytial virus infection).

Neurodevelopmental outcome at 12 months

Not assessed.

Re-admission within first 12 months post discharge from home gavage programme or from hospital

Data on re-admissions post discharge from the home gavage programme or from hospital were reported only for those who completed one-year follow up (experimental group $n = 41$, control group $n = 41$). No significant differences were noted between groups in the proportion of infants who had one or more re-admissions during this period (RR 1.09, 95% CI 0.54 to 2.18). In all, 12/41 were

re-admitted 19 times in the home gavage group (median 0, range 0 to 5) and 11/41 were re-admitted 22 times in the control group (median 0, range 0 to 7).

Adverse events (Outcome 1.6)

Milk aspiration on radiological examination

Not reported.

Infection during period of home gavage and corresponding time in hospital

Infants in the home gavage programme had lower risk of infection during the home gavage period compared with those in the control group for the corresponding time in hospital (RR 0.35, 95% CI 0.17 to 0.69). In the home gavage group, 6/45 infants developed a respiratory infection and 2/45 developed conjunctivitis; in the control group, 16/43 infants developed a respiratory infection and six developed conjunctivitis. A total of 4/45 infants in the home gavage group required antibiotics versus 10/43 in the control group. Infection was clinically diagnosed without laboratory tests.

Death within the first 12 months post discharge

No significant difference in mortality was reported between groups (RR 0.32, 95% CI 0.01 to 7.62). One infant in the control group died of sudden infant death syndrome during the first 12 months post discharge.

Secondary outcomes

Satisfaction and anxiety (Outcomes 1.7 and 1.8)

Örtenstrand 1999 measured parental confidence in handling their infant by self report using Borg's category-ratio scale. A higher score indicates greater confidence. No significant differences were noted in the score for confidence of mothers (MD 0.40, 95% CI -0.66 to 1.46) or fathers (MD 0.60, 95% CI -0.45 to 1.65) in handling their baby at the time of discharge from the home gavage programme (experimental) or discharge from hospital at the corresponding time point (control).

Study authors also measured parental feelings of preparedness to take responsibility for the care of their infant by self report using Borg's category-ratio scale. A higher score indicates greater preparedness. Mothers on discharge from the home gavage programme scored higher on feeling prepared to take responsibility for the care of their baby compared with those in the control group, but this did not quite reach the conventional definition of statistical significance (MD 0.90, 95% CI -0.01 to 1.81). No significant differences between groups were observed in the scores of fathers (MD 0.30, 95% CI -0.73 to 1.33).

Parental anxiety was assessed by the State-Trait Inventory instrument. State anxiety is reported here because it refers to situational anxiety; a higher score indicates greater anxiety. No significant differences were observed in maternal (MD -2.30, 95% CI -5.49 to 0.89) or paternal (MD -1.80, 95% CI -4.60 to 1.00) state anxiety scores at discharge from the home gavage programme (experimental) compared with discharge from traditional hospital care (control).

Cost

Cost comparisons between groups were not undertaken in the included study (Örtenstrand 1999).

Health service use (Outcome 1.9)

Data on health service use post discharge from the home gavage programme or from hospital were reported only for those who completed one-year follow up (experimental group $n = 41$, control group $n = 41$). No significant differences were observed in the year post discharge from the home gavage programme (experimental) or from hospital (control) in the proportion of infants with one or more non-elective visits to general practitioners (RR 1.12, 95% CI 0.68 to 1.83), visits to paediatric outpatient clinics (RR 1.00, 95% CI 0.58 to 1.72) or visits to an emergency department (RR 0.88, 95% CI 0.62 to 1.26).

Planned subgroup analyses

We could not undertake planned subgroup analyses according to type of postdischarge support received or maturity of the infant because the required data were not available.

DISCUSSION

Evidence from this single included study shows that early discharge with home support of gavage feeding for stable preterm infants resulted in a reduction in length of hospital stay and a decrease in the proportion of infants with clinically diagnosed infection. The home gavage programme was not associated with any significant effect on duration or extent of breast feeding, weight gain, parental confidence and anxiety or health service use.

The included study made no cost comparisons from trial entry to discharge from home support versus traditional hospital care, but study authors did document the amount of support provided during the home gavage period. This was as follows.

- Days on home programme - mean 19.6 (SD 9.2).
- Visits per family - median 5, range 1 to 19.
- Nurse time (includes travel and visit) per family - mean 10.4 hours, range 1.8 to 38.9 hours.
- Telephone calls by nurse - mean 1.1 (SD 1.2) per family.
- Telephone calls by parents - mean 0.9 (SD 1.8) per family.
- Scheduled visits to neonatal ward - mean 1.7 (SD 0.9).
- Unscheduled weekday visits to neonatal ward - mean 0.3 (SD 0.7).
- Unscheduled weekend visits to neonatal ward - mean 0.1 (SD 0.4).

On face value, it would appear that costs to support an early discharge programme with home support for gavage feeding would be less than costs to support in-patient hospital care, but further work is necessary to adequately document and compare healthcare costs.

Although the single included study suggests that early discharge with home support of gavage feeding for stable preterm infants was a safe, manageable option for infant and family, and may even be beneficial, these results need to be interpreted with caution. The single trial in the review included a relatively small number of infants and was not adequately randomised. This may have resulted in a selection bias that makes it difficult to assess the true benefits and risks associated with the early discharge programme. Nevertheless, the positive findings warrant further examination in high-quality clinical trials with concealed allocation and adequate sample size.

AUTHORS' CONCLUSIONS

Implications for practice

Experimental evidence on the benefits and risks of early discharge with home gavage feeding of preterm infants compared with traditional hospital care is limited to the results of one small quasi-randomised controlled trial. Therefore, recommendations for practice cannot be made with confidence.

Implications for research

Trials are needed that include concealed random allocation, complete follow-up of all randomly assigned infants and adequate sample size to evaluate infection rates, feeding and growth, healthcare costs, impact on family, complications of gavage feeding and long-term developmental outcomes of preterm infants allocated to early discharge with home gavage feeding or traditional hospital care.

ACKNOWLEDGEMENTS

The review authors would like to thank Ms Annica Örtenstrand ([Örtenstrand 1999](#)) for her generous contribution of unpublished data. The review authors would also like to thank Professor Robert Dillard ([Dillard 1973](#)), Professor David P Davies ([Davies 1979](#)) and Dr Carmen Pallás ([Puerto 1993](#)) for confirmation of their study inclusion criteria.

The review authors would like to thank Angela Falkenburg for reviewing the protocol from a parent's perspective; Karen Best for reviewing the protocol from a primary nurse perspective; and Philippa Middleton (Cochrane Pregnancy and Childbirth Reviewers' Group), David Henderson-Smart (formerly Australasian Regional Co-ordinator for the Cochrane Neonatal Review Group) and Jane Bell (formerly Research Officer, Australasian Co-ordinating Network for the Neonatal Review Group) for assistance with the first version of this review.

REFERENCES

References to studies included in this review

Örtenstrand 1999 {published and unpublished data}

* Örtenstrand A, Waldenström U, Winbladh B. Early discharge of preterm infants needing limited special care, followed by domiciliary nursing care. *Acta Paediatrica* 1999;**88**(9):1024-30.

Örtenstrand A, Winbladh B, Nordström G, Waldenström U. Early discharge of preterm infants followed by domiciliary nursing care: parents' anxiety, assessment of infant health and breastfeeding. *Acta Paediatrica* 2001;**90**(10):1190-5.

References to studies excluded from this review

Bhargava 1980 {published data only}

Bhargava SK, Kumari S, Bawa S, Choudhury P, Lall UB. Early discharge of infants with weight of 1800 g. or less. *Indian Pediatrics* 1980;**17**(5):425-9.

Brooten 1986 {published data only}

Brooten D, Kumar S, Brown LP, Butts P, Finkler SA, Bakewell-Sachs S, et al. A randomized clinical trial of early hospital discharge and home follow-up of very-low-birth-weight infants. *New England Journal of Medicine* 1986;**315**(15):934-9.

Casiro 1993 {published data only}

Casiro OG, McKenzie ME, McFayden L, Shapiro C, Seshia MM, MacDonald N, et al. Earlier discharge with community-based intervention for low birth weight infants: a randomized trial. *Pediatrics* 1993;**92**(1):128-34.

Charpak 1997 {published data only}

Charpak N, Ruiz-Peláez JG, Figueroa de CZ, Charpak Y. Kangaroo mother versus traditional care for newborn infants <=2000 grams: a randomized, controlled trial. *Pediatrics* 1997;**100**(4):682-8.

Cruz 1997 {published data only}

Cruz H, Guzman N, Rosales M, Bastidas J, Garcia J, Hurtado I, et al. Early hospital discharge of preterm very low birth weight infants. *Journal of Perinatology* 1997;**17**(1):29-32.

Davies 1979 {published and unpublished data}

Davies DP, Haxby V, Herbert S, McNeish AS. When should pre-term babies be sent home from neonatal units?. *The Lancet* 1979;**1**(8122):914-5.

Dillard 1973 {published and unpublished data}

Dillard RG, Korones SB. Lower discharge weight and shortened nursery stay for low-birth-weight infants. *The New England Journal of Medicine* 1973;**288**(3):131-3.

Finello 1998 {published data only}

Finello KM, Litton KM, deLemos R, Chan LS. Very low birth weight infants and their families during the first year of life: comparisons of medical outcomes based on after care services. *Journal of Perinatology* 1998;**18**(5):365-71.

Gibson 1998 {published data only}

Gibson E, Medoff-Cooper B, Nuamah IF, Gerdes J, Kirkby S, Greenspan J. Accelerated discharge of low birth weight infants from neonatal intensive care: a randomized, controlled trial. The Early Discharge Study Group. *Journal of Perinatology* 1998;**18**(6 Pt 2 Suppl):S17-S23.

Lefebvre 1982 {published data only}

Lefebvre F, Veilleux A, Bard H. Early discharge of low birthweight infants. *Archives of Disease in Childhood* 1982;**57**(7):511-3.

Puerto 1993 {published and unpublished data}

Martin Peurto MJ, Gomez Castillo E, Pascual Patrao M, Pallas Alonso C. Early discharge of low-birth-weight neonates. 5-year experience [Alta precoz en recién nacidos de bajo peso. Experiencia de 5 años]. *Anales Espanoles de Pediatría* 1993;**38**(1):20-4.

Additional references

AAP 1998

American Academy of Pediatrics. Committee on Fetus and Newborn. Hospital discharge of the high-risk neonate - proposed guidelines. *Pediatrics* 1998;**102**(2 Pt 1):411-7.

Evanochko 1996

Evanochko C, Jancs-Kelley S, Boyle R, Fox M, Molesky M, Byrne P. Facilitating early discharge from the NICU: the development of a home gavage program and neonatal outpatient clinic. *Neonatal Network* 1996;**15**(8):44.

Evans 1988

Evans ID. Tubefeeding newborn babies at home. *Journal of the Royal Army Medical Corps* 1988;**134**(3):149-50.

Higgins 2011

Higgins JPT, Green S (editors). Cochrane Handbook for Systematic Reviews of Interventions Version 5.1.0. The Cochrane Collaboration, 2011.

Labbok 1990

Labbok M, Krasovek K. Toward consistency in breastfeeding definitions. *Studies in Family Planning* 1990;**21**(4):226-30.

Laddem 1992

Laddem M, Damato E. Parenting and supportive programs. *NAACOG's Clinical Issues in Perinatal and Women's Health Nursing* 1992;**3**(1):174-87.

Meerlo-Habing 2009

Meerlo-Habing ZE, Kusters-Boes EA, Klip H, Brand PL. Early discharge with tube feeding at home for preterm infants is associated with longer duration of breast feeding. *Archives of Disease in Childhood. Fetal & Neonatal Edition* 2009;**94**(4):F294-7.

Revman 2012 [Computer program]

The Cochrane Collaboration. Review Manager (RevMan) [Computer program]. Version 5.3. Copenhagen: The Nordic Cochrane Centre: The Cochrane Collaboration, 2012.

Sturm 2005

Sturm LD. Implementation and evaluation for a home gavage program for preterm infants. *Neonatal Network* 2005;**24**(4):21-5.

Swanson 1997

Swanson SC, Naber MM. Neonatal integrated home care: nursing without walls. *Neonatal Network* 1997;**16**(7):33-8.

Wakefield 1994

Wakefield J, Ford L. Nasogastric tube feeding and early discharge. *Paediatric Nursing* 1994;**6**:18-9.

References to other published versions of this review
Collins 2003

Collins CT, Makrides M, McPhee AJ. Early discharge with home support of gavage feeding for stable preterm infants who have not established full oral feeds. *Cochrane Database of Systematic Reviews* 2003, Issue 4. [DOI: [10.1002/14651858.CD003743](https://doi.org/10.1002/14651858.CD003743)]

* Indicates the major publication for the study

CHARACTERISTICS OF STUDIES

Characteristics of included studies [ordered by study ID]
Örtenstrand 1999

Methods	Type of trial - quasi-randomised; blinding of randomisation - no (assigned on bed availability); blinding of treatment - no (not possible for participants or providers); complete follow-up - 7% attrition for primary outcomes and 14% for secondary outcomes; blinding of outcome assessment - yes	
Participants	Single-centre, Sweden; physiologically stable infants < 37 weeks at birth with anticipated need for special care for at least another week; no apnoeic episodes or apnoea medications; normal body temperature while in open cot; parents of oxygen-dependent infants able to handle equipment and monitoring; parents assessed as capable of caring for infants; read, write and understand Swedish. Excluded were triplets and quadruplets. Of 225 infants, 130 were not eligible, 95 were enrolled (48 infants - experimental, 47 infants - control) and 7 infants/6 families withdrew from the study; 88 infants (75 families) were analysed (45 infants/40 families - experimental, 43 infants/35 families - control); one-year follow-up - 82 infants/70 families were analysed (41 infants/37 families - experimental, 41 infant/33 families - control); EDG: 1 family could not be traced, 2 refused to participate; CG: SIDS × 1, 1 family refused to participate. Intention-to-treat analysis was undertaken	
Interventions	Experimental group: early discharge with domiciliary care home visits, gavage feeding at home by parents for 80% (36/45), continued on programme until infants met control group criteria for discharge home as assessed by neonatologist. Domiciliary visits provided by experienced registered nurse, available Monday to Friday 8 AM to 5 PM for scheduled and unscheduled home visits, available Monday to Friday out of hours by mobile phone, no home visits on weekends, parents could phone neonatal ward for help. Control group: discharged home when clinically well, on full bottle and/or breast feeds and gaining weight satisfactorily	
Outcomes	Breast feeding (exclusive and any) on discharge from domiciliary care or hospital, duration of breast feeding to 12 months after discharge; weight gain during period of domiciliary care; length of hospitalisation, rehospitalisation during period of domiciliary care; rehospitalisation during first year (from end of domiciliary care period or discharge form hospital); infection during period of domiciliary care; death within first year; health service use during first year post discharge; anxiety and confidence in handling the baby	
Notes		
Risk of bias		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Type of trial - quasi randomised

Örtenstrand 1999 *(Continued)*

Allocation concealment (selection bias)	High risk	Blinding of randomisation - no (assigned on bed availability)
Blinding (performance bias and detection bias) All outcomes	High risk	Blinding of treatment - no (not possible for participants or providers) Blinding of outcome assessment - yes
Incomplete outcome data (attrition bias) All outcomes	Low risk	Complete follow-up - 7% attrition for primary outcomes and 14% for secondary outcomes

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

Study	Reason for exclusion
Bhargava 1980	Inclusion criterion: full sucking feeds
Brooten 1986	Inclusion criterion: full sucking feeds
Casiro 1993	Inclusion criterion: full sucking feeds
Charpak 1997	Inclusion criterion: full sucking feeds
Cruz 1997	Inclusion criterion: full sucking feeds
Davies 1979	Inclusion criterion: full sucking feeds
Dillard 1973	Inclusion criterion: full sucking feeds
Finello 1998	Inclusion criterion: full sucking feeds
Gibson 1998	Randomised controlled trial of early discharge with some infants discharged home on gavage feeds; number not reported. Data requested from study author with no response
Lefebvre 1982	Inclusion criterion: full sucking feeds
Puerto 1993	Inclusion criterion: full sucking feeds

DATA AND ANALYSES
Comparison 1. Early discharge to home gavage programme versus later discharge on full sucking feeds

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Stopped any breast feeding by different times (proportion of infants)	1		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1.1 Discharge from home gavage programme (exp) or discharge from hospital (control)	1	82	Risk Ratio (M-H, Fixed, 95% CI)	0.5 [0.10, 2.58]
1.2 3 months post discharge from home gavage programme (exp) or post discharge from hospital (control)	1	82	Risk Ratio (M-H, Fixed, 95% CI)	1.6 [0.57, 4.48]
1.3 6 months post discharge from home gavage programme (exp) or post discharge from hospital (control)	1	82	Risk Ratio (M-H, Fixed, 95% CI)	1.67 [0.94, 2.95]
2 Stopped fully breast feeding at different times (proportion of infants)	1		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
2.1 Discharge from home gavage programme (exp) or discharge from hospital (control)	1	82	Risk Ratio (M-H, Fixed, 95% CI)	1.3 [0.64, 2.62]
2.2 3 months post discharge from home gavage programme (exp) or post discharge from hospital (control)	1	82	Risk Ratio (M-H, Fixed, 95% CI)	1.33 [0.51, 3.50]
2.3 6 months post discharge from home gavage programme (exp) or post discharge from hospital (control)	1	82	Risk Ratio (M-H, Fixed, 95% CI)	1.0 [0.69, 1.44]
3 Weight gain (g/d) on discharge from home gavage programme (exp) or discharge from hospital (control)	1	88	Mean Difference (IV, Fixed, 95% CI)	-1.10 [-3.94, 1.74]
4 Length of hospitalisation	1	88	Mean Difference (IV, Fixed, 95% CI)	-9.30 [-18.49, -0.11]
5 Infants with 1 or more hospital re-admissions	1		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
5.1 In 12 months post discharge (excluding home gavage period)	1	82	Risk Ratio (M-H, Fixed, 95% CI)	1.09 [0.54, 2.18]
6 Infants with 1 or more adverse events	1		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
6.1 Infection during home gavage programme/corresponding time in hospital	1	88	Risk Ratio (M-H, Fixed, 95% CI)	0.35 [0.17, 0.69]
6.2 Death within first year	1	88	Risk Ratio (M-H, Fixed, 95% CI)	0.32 [0.01, 7.62]
7 Parental satisfaction on discharge from home gavage programme (exp) or discharge from hospital (control)	1		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
7.1 Mother's confidence in handling baby (score)	1	70	Mean Difference (IV, Fixed, 95% CI)	0.40 [-0.66, 1.46]
7.2 Father's confidence in handling baby (score)	1	65	Mean Difference (IV, Fixed, 95% CI)	0.60 [-0.45, 1.65]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
7.3 Mother feels prepared to take responsibility of caring for baby (score)	1	70	Mean Difference (IV, Fixed, 95% CI)	0.90 [-0.01, 1.81]
7.4 Father feels prepared to take responsibility of caring for baby (score)	1	65	Mean Difference (IV, Fixed, 95% CI)	0.30 [-0.73, 1.33]
8 Parental anxiety on discharge from home gavage programme (exp) or discharge from hospital (control)	1		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
8.1 Mother's state anxiety score	1	72	Mean Difference (IV, Fixed, 95% CI)	-2.30 [-5.49, 0.89]
8.2 Father's state anxiety score	1	67	Mean Difference (IV, Fixed, 95% CI)	-1.80 [-4.60, 1.00]
9 Health service use post discharge from home gavage programme (exp) or from hospital (control)	1		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
9.1 Infants with 1 or more visits to general practitioner	1	82	Risk Ratio (M-H, Fixed, 95% CI)	1.12 [0.68, 1.83]
9.2 Infants with 1 or more visits to outpatient clinic	1	82	Risk Ratio (M-H, Fixed, 95% CI)	1.0 [0.58, 1.72]
9.3 Infants with 1 or more visits to hospital emergency department	1	82	Risk Ratio (M-H, Fixed, 95% CI)	0.88 [0.62, 1.26]

Analysis 1.1. Comparison 1 Early discharge to home gavage programme versus later discharge on full sucking feeds, Outcome 1 Stopped any breast feeding by different times (proportion of infants).

Analysis 1.2. Comparison 1 Early discharge to home gavage programme versus later discharge on full sucking feeds, Outcome 2 Stopped fully breast feeding at different times (proportion of infants).

Analysis 1.3. Comparison 1 Early discharge to home gavage programme versus later discharge on full sucking feeds, Outcome 3 Weight gain (g/d) on discharge from home gavage programme (exp) or discharge from hospital (control).

Analysis 1.4. Comparison 1 Early discharge to home gavage programme versus later discharge on full sucking feeds, Outcome 4 Length of hospitalisation.

Analysis 1.5. Comparison 1 Early discharge to home gavage programme versus later discharge on full sucking feeds, Outcome 5 Infants with 1 or more hospital re-admissions.

Analysis 1.6. Comparison 1 Early discharge to home gavage programme versus later discharge on full sucking feeds, Outcome 6 Infants with 1 or more adverse events.

Study or subgroup	Home gavage n/N	Full sucking n/N	Risk Ratio M-H, Fixed, 95% CI	Weight	Risk Ratio M-H, Fixed, 95% CI
Heterogeneity: Not applicable Test for overall effect: $Z=0.71(P=0.48)$					
Favours home gavage 0.1 0.2 0.5 1 2 5 10 Favours full sucking					

Analysis 1.7. Comparison 1 Early discharge to home gavage programme versus later discharge on full sucking feeds, Outcome 7 Parental satisfaction on discharge from home gavage programme (exp) or discharge from hospital (control).

Study or subgroup	Home gavage		Full sucking		Mean Difference Fixed, 95% CI	Weight	Mean Difference Fixed, 95% CI
	N	Mean(SD)	N	Mean(SD)			
1.7.1 Mother's confidence in handling baby (score)							
Örtenstrand 1999	37	6.1 (2.1)	33	5.7 (2.4)		100%	0.4[-0.66,1.46]
Subtotal ***	37		33			100%	0.4[-0.66,1.46]
Heterogeneity: $\tau^2=0$; $\chi^2=0$, $df=0(P<0.0001)$; $I^2=100\%$ Test for overall effect: $Z=0.74(P=0.46)$							
1.7.2 Father's confidence in handling baby (score)							
Örtenstrand 1999	32	5.4 (2.2)	33	4.8 (2.1)		100%	0.6[-0.45,1.65]
Subtotal ***	32		33			100%	0.6[-0.45,1.65]
Heterogeneity: Not applicable Test for overall effect: $Z=1.12(P=0.26)$							
1.7.3 Mother feels prepared to take responsibility of caring for baby (score)							
Örtenstrand 1999	37	6.7 (2)	33	5.8 (1.9)		100%	0.9[-0.01,1.81]
Subtotal ***	37		33			100%	0.9[-0.01,1.81]
Heterogeneity: Not applicable Test for overall effect: $Z=1.93(P=0.05)$							
1.7.4 Father feels prepared to take responsibility of caring for baby (score)							
Örtenstrand 1999	32	5.5 (2.3)	33	5.2 (1.9)		100%	0.3[-0.73,1.33]
Subtotal ***	32		33			100%	0.3[-0.73,1.33]
Heterogeneity: Not applicable Test for overall effect: $Z=0.57(P=0.57)$ Test for subgroup differences: $\chi^2=0.87$, $df=1$ ($P=0.83$), $I^2=0\%$							
Favours full sucking -10 -5 0 5 10 Favours home gavage							

Analysis 1.8. Comparison 1 Early discharge to home gavage programme versus later discharge on full sucking feeds, Outcome 8 Parental anxiety on discharge from home gavage programme (exp) or discharge from hospital (control).

Study or subgroup	Home gavage		Full sucking		Mean Difference Fixed, 95% CI	Weight	Mean Difference Fixed, 95% CI
	N	Mean(SD)	N	Mean(SD)			
1.8.1 Mother's state anxiety score							
Örtenstrand 1999	39	27.8 (5.9)	33	30.1 (7.6)		100%	-2.3[-5.49,0.89]
Subtotal ***	39		33			100%	-2.3[-5.49,0.89]
Heterogeneity: Not applicable Test for overall effect: $Z=1.41(P=0.16)$							
Favours home gavage -10 -5 0 5 10 Favours full sucking

Analysis 1.9. Comparison 1 Early discharge to home gavage programme versus later discharge on full sucking feeds, Outcome 9 Health service use post discharge from home gavage programme (exp) or from hospital (control).

WHAT'S NEW

Date	Event	Description
31 March 2015	New search has been performed	This review updates the existing review, 'Early discharge with home support of gavage feeding for stable preterm infants who have not established full oral feeds' (Collins 2003). No new trials were identified.
31 March 2013	New citation required but conclusions have not changed	The search was updated in September 2013; no new trials were found. The search was updated in March 2015; no new trials were found.

Date	Event	Description
		One new case-control study was published (Meerlo-Habing 2009) and has been included in the Background section.

HISTORY

Protocol first published: Issue 3, 2002

Review first published: Issue 4, 2003

Date	Event	Description
14 February 2008	New search has been performed	<p>This review updates the existing review, 'Early discharge with home support of gavage feeding for stable preterm infants who have not established full oral feeds', first published in Issue 4, 2003, of the Cochrane Database of Systematic Reviews (Collins 2003).</p> <p>The search was updated in June 2007; no new trials were found.</p> <p>One new programme evaluation was published (Sturm 2005) and has been included in the Background section.</p>
18 January 2008	Amended	Converted to new review format.
14 July 2003	New citation required and conclusions have changed	Substantive amendments have been made.

CONTRIBUTIONS OF AUTHORS

CTC developed the protocol and wrote the review with contributions from MM and AJM. CTC and MM assessed articles for inclusion and extracted study data.

DECLARATIONS OF INTEREST

None known.

SOURCES OF SUPPORT

Internal sources

- Women's and Children's Health Research Institute and Discipline Paediatrics, The University of Adelaide, Women's & Children's Hospital, North Adelaide, SA, Australia.
- Neonatal Medicine, Women's & Children's Hospital, North Adelaide, SA, Australia.

External sources

- Salary for M Makrides was drawn from a National Health and Medical Research Council Senior Research Fellowship, Australia.
- Eunice Kennedy Shriver National Institute of Child Health and Human Development National Institutes of Health, Department of Health and Human Services, USA.

Editorial support for the Cochrane Neonatal Review Group has been funded with Federal funds from the Eunice Kennedy Shriver National Institute of Child Health and Human Development National Institutes of Health, Department of Health and Human Services, USA, under Contract No. HHSN275201100016C

INDEX TERMS

Medical Subject Headings (MeSH)

*Enteral Nutrition [adverse effects] [statistics & numerical data]; *Infant, Premature; *Length of Stay; *Patient Discharge; Randomized Controlled Trials as Topic; Time Factors

MeSH check words

Humans; Infant, Newborn