An integrated review of the literature on demand feedings for preterm infants

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CRD summary
This review concluded that demand feeding is associated with some clinical improvements compared with other feeding regimens in pre-term infants, but the evidence was limited and further research is required. The authors’ conclusions seem appropriate given the limitations of the data but, since the review methods were not reported, it is not possible to assess the reliability of the results.

Authors’ objectives
To evaluate demand feeding in pre-term infants.

Searching
MEDLINE, CINAHL and PsycINFO were searched for the past 50 years using the reported search terms. In addition, reference lists were screened. Studies reported in the years before electronic indexing were identified by screening reference lists and specific journals with the help of a librarian. It was not reported whether any language restrictions were applied.

Study selection
Study designs of evaluations included in the review
Inclusion criteria were not specified with respect to the study design.

Specific interventions included in the review
Studies that evaluated the timing and manner of feeding were eligible for inclusion. Studies that evaluated types of formula, or compared cup versus bottle feeding or bottle versus breast-feeding, were excluded. The included studies evaluated the following types of feeding regimens: scheduled, semi-demand, strict demand, self-regulatory and ad libitum (details of the regimens were described in the review).

Participants included in the review
Studies of pre-term infants were eligible for inclusion. The primary studies included pre-term infants weighing, where reported, between 932 and 2,500 g; other studies included infants with a maximum gestational age between 32 and 37 weeks.

Outcomes assessed in the review
Inclusion criteria were not specified with respect to the outcomes. The included studies assessed weight gain, length of hospital stay, time to full oral feeding, calorie and volume intake, and behaviour.

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
The authors did not state that they formally assessed validity. However, aspects of methodological quality were noted in the text.

Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction. For each study, results data were extracted where possible.
Methods of synthesis
How were the studies combined?
The studies were described in order of publication date and combined, according to feeding regimens, in a narrative. Additional information was tabulated.

How were differences between studies investigated?
Differences between the studies were apparent from the tables and the text.

Results of the review
Seven studies (n=468) were included in the review: four randomised controlled trials (RCTs; n=262), one quasi-experimental study (n=145), one experimental study (n=36) and one study without a control group (n=25)

Methodological limitations of the studies included small sample sizes, the absence of statistical data, and incomplete description of the study sample (e.g. gestational age not reported, treatment groups not comparable at baseline, and high drop-out rates).

One quasi-experimental study (n=145) compared scheduled, semi-demand and strict demand feeding regimens. It reported that strict demand feeding was associated with the consumption of larger volumes of formula, increased weight gain over a shorter time period, and a significantly shorter hospital stay in comparison with the other regimens.

One study without a control group (n=25) reported that 20 infants successfully completed a programme of demand feeding and 5 infants failed.

One RCT (n=37) reported that demand-fed infants had significantly fewer feeds per day and feedings via gavage, and were discharged 6.2 days earlier than schedule-fed infants. The mean weight change was lower in demand-fed infants: 11.2 versus 14.6 g/day.

One RCT (n=74) compared self-regulatory feeding (feeding till tired plus non-nutritive sucking) with control (urged to take complete bottle once each shift using faster flow nipple). It reported that self-regulatory feeding was associated with significant improvement in behaviour measures, and the infants were more commonly asleep at the end of feeding and less frequently in a restless state. self-regulatory feeding was associated with significantly greater weight gain among lighter infants (<150 g): 24.4 versus 8.9 g/day (p<0.0003). There was no difference between treatments in weight gain among heavier infants (>1,500 g).

One RCT (n=29) reported that demand feeding was associated with a non-significantly increased weight gain, a lower calorie consumption per 24 hours, and a non-significant decrease in hospital stay (1 day less) in comparison with scheduled feeding.

One RCT (n=78) compared ad libitum feeding with scheduled feeding and factored in comparisons of two different formula caloric density. It reported no significant effect on weight change from the feeding regimen, calorie density, or an interaction between feeding regimen and caloric density. One RCT (n=81) compared semi-demand (infants assessed for hunger every 3 hours) with a control feeding regimen (gradually increasing oral feeds). It reported that semi-demand feeding was associated with a significant decrease in the time to full oral feeding (5 versus 10 days, p<0.001) and a significant decrease in the duration of hospital stay. There was no significant difference between regimens in the rate or amount of weight gain.

Authors' conclusions
Demand feeding was associated with some clinical improvements compared with other feeding regimens in pre-term infants, but the evidence was limited and further research is required.

CRD commentary
The review addressed a clear question but this was only defined in terms of the participants and intervention. Several relevant sources were searched but attempts to minimise publication and language bias were not reported. The methods
used to select studies and extract the data were not described, so it is not known whether any efforts were made to reduce reviewer errors and bias. Although no formal assessment of validity was reported, several relevant aspects of study quality were discussed for individual studies.

Given the differences between the studies, a narrative synthesis that took account of study quality was appropriate. Although the authors' conclusions appear appropriate given the apparent limitations of the data, the absence of reported review methods means that it is not possible to comment on the reliability of the results. The need for further research seems reasonable in view of the limitations of the identified studies.

**Implications of the review for practice and research**

**Practice:** The authors stated that demand feeding should only be considered for growing pre-term infants without other relevant morbidities. Measures used to ensure demand feeding is safe could include a maximum time limit between feeds (i.e. 4 hours), calculation of the minimum fluid and calorie requirement, regular monitoring of growth, and measurement of blood glucose where indicated. Demand feeding regimens should be designed by multidisciplinary teams and only instituted where there are adequate resources.

**Research:** The authors stated the need for further well-designed controlled studies to evaluate and compare the safety and efficacy of different feeding regimens (including scheduled, semi-demand and strict demand feeding regimens) in various populations of pre-term infants (including infants with other medical problems in neonatal intensive care units). Outcomes could include combinations of infant-sensitive outcomes such as weight gain, behaviour state, feeding performance, hypoglycaemia, time taken to transfer to full bottle feeding, and length of hospital stay. There is also a need to determine the gestational age and other characteristics of infants who are most appropriate for demand feeding. It would also be useful to identify interventions that would encourage nurses and parents to recognise early hunger cues, and interventions that re-enforce the infants' ability to express hunger.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract
contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.