



# Placing the bottle or breast in their premature hands: A review of cue-based feeding research



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## KEYWORDS

Cue-based feeding;  
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**Abstract** Infants in the Neonatal Intensive Care Unit (NICU) frequently experience a delay in the initiation of oral feedings, related either to illness or prematurity, and demonstrate greater difficulties transitioning from gavage to oral feedings. Given the demonstration of physiologic stability, these infants would benefit from a shorter length of stay which would minimize parental-infant separation and exposure to possible hospital-acquired infections. However, current practice is inconsistent, at best, and is based largely on both prior experiences and NICU culture rather than on evidence-based practices. A systematic review of the literature pertaining to a “cue-based” feeding approach that initiates and advances oral feedings in the premature population and the impact it has on length of stay, weight gain, and caregiver satisfaction was performed.

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## Introduction

In the Neonatal Intensive Care Unit (NICU), infants frequently experience a delay in the initiation of oral feedings, related either to illness or prematurity, and demonstrate greater difficulty transitioning from gavage to oral feedings (Rommel

et al., 2011). As recommended by the American Academy of Pediatrics, one of the discharge requirements for these infants include the ability for the infant to maintain full oral feedings sufficient to support proper weight gain and growth. Additionally, they suggest given the demonstration of physiologic stability, these infants would benefit from a shorter length of stay to minimize parental-infant separation and exposure to possible hospital-acquired infections (Committee on Fetus and Newborn, 2008).

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According to the Centers for Disease Control and Prevention (CDC), greater than 500,000 infants are born prematurely (approximately 1 in 8) and cost the US healthcare system over \$26 billion annually (Centers for Disease Control and Prevention, 2011). With such a large population of impact and given the current emphasis and benefits of decreasing an infant's length of stay in the NICU, a focus on interventions to promote earlier attainment of full oral feedings is warranted. A vast amount of research has focused largely on the physiologic development of the suck-swallow-breath pattern required for successful oral feedings and the gestational age at which these milestones are believed to be obtained (da Costa et al., 2010; Barlow, 2009; Amaizu et al., 2008). However, there is a new evidence-based approach to feeding infants that questions the traditional approach of initiating oral feedings at a specific gestational age and posits that oral feedings should begin based on a protocol surrounding individual "feeding cues."

The aim of this paper is to provide a systematic review of the literature available pertaining to a "cue-based" feeding approach for initiating and advancing oral feedings in the premature population. This paper will also review the impact this intervention has on gestational age of attainment of full oral feedings, parent satisfaction, and length of stay, and may serve as a foundation for protocol development and change.

## Methodology

A search of the Cochrane Database of Systematic Reviews was performed using the following search terms in combination and independently: cue based feeding, demand feeding, oral feeding, feeding cues, feeding readiness, and infant. This search returned one relevant systematic review, published in 2010, that discussed eight randomized controlled trials and had excluded articles including any other methodology. An additional literature analysis was executed using online databases CINAHL, MEDLINE, and PubMed with the previously listed search terms. The results were narrowed to articles published in the English language after 2003, not included in the aforementioned review that evaluated the effects of initiating or advancing oral feedings for premature infants based on feeding readiness cues. Using these exclusions, a total of eight articles, including randomized controlled trials, cohort studies, case studies and expert opinions were selected for additional evaluation.

## Terminology

For consistency of interpretation, the feeding methods evaluated under the umbrella of cue-based feeding will be based on the definitions categorized by Crosson and Pickler as described below (Crosson and Pickler, 2004) <sup>(p217)</sup>.

1. Ad libitum feeding: "Feeding is begun on infant cues of hunger and ended on infant cues of satisfaction of hunger, regardless of the time or volume taken."
2. Demand feeding: "Feeding is begun on infant cues of hunger and ended when total ordered feeding volume has been given."
3. Scheduled feeding: "Feedings are begun on a timed or scheduled basis without regard to infant status. Infants are awakened from sleep to feed."
4. Semidemand or modified ad libitum: Feeding is begun and ended on specified infant cues of hunger and volume of feeding is prescribed by providers, not determined by the infant."

## Review of the literature

In 2010, McCormick, Tosh, and McGuire published a review of eight randomized and quasi-randomized controlled trials (RCTs) comparing an experimental group of demand/ad libitum fed premature infants versus a control group of standard interval fed premature infants and the effect this intervention has on growth rates and length of hospitalization. The review defined premature infants as those born at less than 37 weeks and required they received at least partial gavage feedings for inclusion in the study. The review revealed that the studies performed did not measure outcomes over a sufficient period of time to evaluate effect on growth. While three of the studies demonstrated a statistically significant decrease in length of stay of two to four days, the remaining five studies did not produce congruent results. Additionally, the authors point out that the small sample sizes and variable study methodologies made it difficult to assess clinical significance and generalizability (McCormick et al., 2010). While this systematic review encompasses all the randomized controlled trials historically published pertaining to feeding interventions based on hunger cues, the researchers excluded numerous studies of a lower experimental hierarchy that may have clinical implications for implementing cue-based feeding protocols.

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