In-Hospital Formula Use Increases Early Breastfeeding Cessation Among First-Time Mothers Intending to Exclusively Breastfeed

Caroline J. Chantry, MD[1], Kathryn G. Dewey, PhD[2], Janet M. Peerson, MS[2], Erin A. Wagner, MS[3], and Laurie A. Nommsen-Rivers, PhD[3]

Objective To evaluate in-hospital formula supplementation among first-time mothers who intended to exclusively breastfeed and determined if in-hospital formula supplementation shortens breastfeeding duration after adjusting for breastfeeding intention.

Study design We assessed strength of breastfeeding intentions prenatally in a diverse cohort of expectant primiparae and followed infant feeding practices through day 60. Among mothers planning to exclusively breastfeed their healthy term infants for ≥1 week, we determined predictors, reasons, and characteristics of in-hospital formula supplementation, and calculated the intention-adjusted relative risk (ARR) of not fully breastfeeding days 30-60 and breastfeeding cessation by day 60 with in-hospital formula supplementation (n = 393).

Results Two hundred ten (53%) infants were exclusively breastfed during the maternity stay and 183 (47%) received in-hospital formula supplementation. The most prevalent reasons mothers cited for in-hospital formula supplementation were: perceived insufficient milk supply (18%), signs of inadequate intake (16%), and poor latch or breastfeeding (14%). Prevalence of not fully breastfeeding days 30-60 was 67.8% vs 36.7%, ARR 1.8 (95% CI, 1.4-2.3), in-hospital formula supplementation vs exclusively breastfed groups, respectively, and breastfeeding cessation by day 60 was 32.8% vs 10.5%, ARR 2.7 (95% CI, 1.7-4.5). Odds of both adverse outcomes increased with more in-hospital formula supplementation feeds (not fully breastfeeding days 30-60, $P = .003$ and breastfeeding cessation, $P = .011$).

Conclusions Among women intending to exclusively breastfeed, in-hospital formula supplementation was associated with a nearly 2-fold greater risk of not fully breastfeeding days 30-60 and a nearly 3-fold risk of breastfeeding cessation by day 60, even after adjusting for strength of breastfeeding intentions. Strategies should be sought to avoid unnecessary in-hospital formula supplementation and to support breastfeeding when in-hospital formula supplementation is unavoidable. *(J Pediatr 2014;164:1339-45)*.

See editorial, p 1256

Improving rates of breastfeeding exclusivity and duration are among national Healthy People 2020 goals,[1] as the myriad risks of non-exclusive or shortened breastfeeding for both mother and infant are generally dose-responsive.[2-4] Recommended maternity practices to support breastfeeding include provision of breastmilk substitutes only when medically indicated[5,6] (eg, neonatal hypoglycemia that does not respond to breastfeeding). Accordingly, The Joint Commission, which accredits and certifies health care organizations in the US, now includes exclusive breastmilk feeding among its evidence-based perinatal core measures with the target at 90% of term singletons being exclusively breastfed during the birth hospitalization.[7] Further, Healthy People 2020 newly targets reducing the proportion of breastfed newborns who receive formula supplements within the first 2 days of life to 14.2% from the baseline of 24.2% reported in 2007-09.[1]

The current high rates of in-hospital formula supplementation are of concern as multiple studies document that formula supplements during the maternity stay are associated with shortened durations of both exclusive[8-10] as well as 'any' breastfeeding.[10-13] For example, amongst 1907 mothers who intended to breastfeed for longer than 2 months surveyed in the Infant Feeding Practices Study II, exclusive breastfeeding during the hospital stay was associated with an aOR of 0.47 (0.34-0.64) for breastfeeding cessation before 6 weeks.[12] The study was limited, however, by measuring in-hospital breastfeeding exclusivity by maternal recall at 1 month postpartum.

It is unclear whether early formula supplementation is causally related to shortened breastfeeding duration. None of the aforementioned studies adjusted for strength of breastfeeding intentions, and some did not measure intention at all,[8,13] despite the fact that feeding intention has been demonstrated in previous

ARR	Adjusted relative risk
IFI	Infant Feeding Intentions
UCDMC	University of California Davis Medical Center

From the [1]Department of Pediatrics, University of California Davis Medical Center, Sacramento, CA; [2]Department of Nutrition, University of California Davis, Davis, CA; and [3]Department of Pediatrics, Cincinnati Children's Hospital Medical Center, Cincinnati, OH

Supported by Maternal and Child Health Research Branch Department of Health and Human Services (R40MC04294 [PI: K.D.]) and the National Institutes of Health (NIH 1R21HD063275-01A01 [PI: L.N.-R.]). The authors declare no conflicts of interest.

Portions of the study were presented as an abstract at the annual meetings of the Pediatric Academic Societies in Denver, CO, April 30-May 3, 2011 and Academy of Breastfeeding Medicine in Miami, FL, November 3.6, 2011.

http://dx.doi.org/10.1016/j.jpeds.2013.12.035

studies to relate positively to breastfeeding duration.[11,14-16] In addition to potentially serving as a marker for weaker breastfeeding intentions, early formula provision has been hypothesized to create or exacerbate problems with infant breastfeeding behavior and/or maternal milk supply.[17]

Our objectives were to prospectively evaluate, among first-time mothers intending to exclusively breastfeed during the birth hospitalization, the predictors of, reasons for, and characteristics of in-hospital formula supplementation, and whether in-hospital formula supplementation is associated with increased risk of not fully breastfeeding between days 30-60 or breastfeeding cessation by day 60, after adjusting for strength of breastfeeding intentions measured prenatally.

Methods

Our analysis is based on participants in a longitudinal cohort study examining barriers to early lactation success in a multiethnic population of first-time mothers. We have previously described the screening and enrollment.[18,19] Briefly, we screened all women receiving care between January 2006 and December 2007 at the University of California Davis Medical Center (UCDMC) for eligibility based on prenatal inclusion (participants between 32 and 40 weeks gestation at time of interview, expecting their first live-born infant, carrying a single fetus, speaking either English or Spanish, and living within the catchment area [8-mile radius of UCDMC in Sacramento, California]), and exclusion (mothers who were referred to UCDMC because of a medical condition, those with known absolute contraindication to breastfeeding, or who were <19 years of age and not able to obtain parental consent) criteria. Consenting, enrolled participants were further screened for postpartum follow-up eligibility within 24 hours of giving birth. Postnatally, we excluded participants from follow-up for the following reasons: mother delivered elsewhere, infant born <37 weeks, mother and baby separated in the immediate postpartum >24 hours, or mother did not initiate breastfeeding. In addition, for this analysis, we excluded mothers who indicated in the prenatal interview intention to exclusively breastfeed <1 week. Institutional review board approval from the University of California Davis and written informed consent from each participant were obtained. A protocol to conduct secondary chart review and data analysis was also approved by the Cincinnati Children's Hospital Medical Center institutional review board.

UCDMC has a breastfeeding policy consistent with the Ten Steps for Successful Breastfeeding.[20] Mothers experiencing lactation difficulties are referred to a nurse lactation consultant. Women may also be referred to an early breastfeeding follow-up clinic after discharge for on-going lactation assistance.

Subjects were interviewed prenatally regarding demographic characteristics (ethnicity, years of education, health insurance status [public vs private, used as a proxy for income] and age), psychosocial measures related to infant feeding,[21] and Infant Feeding Intentions (IFI). For the latter, we used the previously validated IFI scale,[22,23] which provides a quantitative measure of intention to provide breastmilk as the sole source of milk over the first 6 months. Possible score ranges from 0 (no intention to breastfeed at all) to 16 (very much agree with 'When my baby is 6 months old, I will be breastfeeding without using any formula or other milk'). Based on the IFI scale score, we ranked strength of breastfeeding intention as weak (0-7.5); moderate (8.0-11.5); strong (12-15.5); or very strong (16.0). We also asked the open-ended questions 'How long do you plan to breastfeed before you start giving your baby formula/cow's (or regular) milk?' Within 24 hours of birth (day 0), research assistants obtained information from the medical record and a face-to-face interview with the mother on labor, delivery, and birth interventions and outcomes; infant feeding patterns and breastfeeding behaviors; breastfeeding problems; formula use and reasons for supplementation (multiple reasons were accepted); and nipple type and pain.[24] Assistants observed and rated breastfeeding according to the Infant Breastfeeding Assessment Tool[25] if possible. Feeding surveys and observations were repeated on days 3 and 7 at the home, hospital, or clinic. In-hospital formula supplementation was recorded if reported by the mother or documented in the medical record prior to hospital discharge up to 72 hours of age. Daily reasons for in-hospital formula supplementation, as described by the mother in response to open-ended queries, were coded according to salient concepts; multiple codes could be assigned to each response. Related codes were then grouped into main categories. Mothers were queried at 14, 30, and 60 days by telephone regarding: (1) breastfeeding practices, both since the previous interview and within the past 24 hours, including breastfeeding frequency and use of formula or other milks/liquids (and reasons); (2) breastfeeding problems since the last interview; and (3) reasons for breastfeeding cessation, if applicable.

Analytic Sample

In addition to the postnatal exclusion criteria established for the original follow-up cohort, for the analysis reported here we also excluded participants who did not intend to ever exclusively breastfeed. We operationally defined this exclusion criterion as participants who indicated in response to the prenatal interview question, "How long do you plan to breastfeed before you start giving your baby formula?" an answer of less than 1 week. Thus, this analysis is based on first-time mothers who delivered at term, were separated from their infant for fewer than 24 hours after birth, and intended to exclusively breastfeed at least through the maternity stay.

Assignment of In-Hospital Formula Supplementation Exposure Status

Dyads were categorized into the in-hospital formula supplementation group if the infant received any formula supplementation as reported by the mother or documented in the medical record during the maternity stay. Otherwise, the dyad was defined as exclusively breastfeeding during the birth hospitalization.