Post-discharge Nutritional Care of Preterm Infants
By Jacqueline Wessel, MEd, RD, CNSD, CSP, CLE

The concept of a specialized formula for the discharged preterm infant was researched by Alan Lucas and others in the 1980s.¹ It seemed reasonable that, having used augmented nutrition for these infants in the hospital, enhanced nutrition should be continued after discharge. New formulas and methods of fortifying human milk were pioneered in the NICU. The next generation of nutritional innovation addressed the challenges of providing these same infants with appropriate nutrition after discharge.

Prior to the introduction of the new formulas, premature infants were often sent home on either term infant formulas or unsupplemented human milk. Occasionally, premature infant formulas were used post discharge. Usually this was for a limited time, typically until achievement of a term infant weight. After that the infant was switched to a term formula.

Infants post discharge take more volume on an ad lib schedule. As a result of this schedule (ad lib feeding) the high vitamin and mineral content of premature formulas (appropriate for premature infants on a more rigid schedule while in the hospital) becomes very high. The post-discharge formulas with a nutrient profile that is in-between premature infant formulas and term formulas, appear to be more appropriate for this stage of a premature infant’s life.

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Post-discharge formulas have been available in the United States since the mid 1990s. Originally, many called the post-discharge formulas “22 kcalories” for their calorie content. However, these formulas offer much more than just 2 more kcalories per ounce. If only calories were desired (as for a fluid-restricted term infant), term infant formula could simply be concentrated. However, the post-discharge formulas also contain more protein, and additional calcium, phosphorus, zinc, trace elements and vitamins than does a term formula. They more fully meet the needs of growing premature infants at this stage of life.

The original post-discharge study by Lucas et al compared an early post-discharge formula to a term formula in premature infants weighing under 1,850 gm. The analysis of growth over time showed that the infants fed the post-discharge formula had significant increases in weight and linear growth as compared to the infants fed a term infant formula. The premature infants fed the special post-discharge formula also had significantly better bone mineral content at 3 and 9 months corrected age than the infants fed term formula. Also, after adjusting for body size, the preterm infants fed the post-discharge formula had bone mineral contents that were not significantly different from infants born at term.

A larger study by the same researchers compared three groups of premature infants with a mean birth weight of 1,389 gm: infants who were fed post-discharge formula from hospital discharge to 9 months corrected age; infants fed term formula for the same period; and infants breast-fed for at least 6 weeks after term-corrected age. Growth parameters for weight and length at 9 months were greater for the infants fed the post-discharge formula than for the infants fed term formula. The difference in length continued to be present at 18 months. There was no difference in either head circumference or developmental scores. The breast-fed infants at 9 months weighed less and were shorter than either of the formula-fed groups.

A question of great interest is whether or not the use of enhanced nutrition, including the use of post-discharge premature formulas, contributes to excessive weight gain in premature infants. There has been concern that continuing rapid growth after discharge would lead to an increase in fat mass, predominately in the central intra-abdominal region, perhaps putting an infant at higher risk for metabolic syndrome X later in life. The question was addressed in a recent paper by Cooke and colleagues. In the study, more complete (weight and length) catch-up growth was seen in infants fed the post-discharge formula. This growth was associated with an increase in fat-free and peripheral fat mass but not with central adiposity.

There are currently three formulas available for the post-discharge nutritional care of preterm infants: SimilacExpertCare®NeoSure®,
made by Abbott Nutrition, EnfaCare®, made by Mead Johnson, and Nourish, made by Gerber. There are several studies in the literature of research on Similac Expert Care®NeoSure®.

Studies using NeoSure® have been done by Carver et al.6 and Worrell et al.7 The study by Carver was a prospective clinical trial in infants with birth weights less than 1,800 gm. Infants were fed term formula (Similac®) or NeoSure®.6 Overall, the infants fed NeoSure® had better growth from discharge to 12 months.6 The most significant differences were seen in infants with birth weight <1,250 grams, particularly for the head circumference measurement.3 Male infants also showed particular benefit.9

A retrospective study by Worrell on premature infants ≤1,250 gms using NeoSure® started the formula a week before hospital discharge.7 At each time point, the infants fed NeoSure® had better growth, z scores were closer to the NCHS medians for length and weight, and there was a significant advantage for length at 18 months (even though the formula was not fed up through that time).7

In the research using EnfaCare® by Clandenin et al, the use of a post-discharge formula was not the focus of the study. In that paper, EnfaCare® was used as one of 3 formulas: premature infant formula, post-discharge formula, and term formula that could have been used in the first year. The study investigated 2 different sources of docosahexaenoic acid (DHA), fish versus algal oil, as well as fungal source arachidonic acid (ARA).8 The protocol recommended feeding post-discharge formula from around discharge to 53 weeks post menstrual age or 3 months after term.8 However, the investigators were allowed discretion in selecting formula type and it is not clear exactly how long infants were on the post-discharge formula.8 The study compared the infants, premature, post-discharge, and term, on the entire group of formulas, to infants in a control group without DHA and ARA, as well as infants on a group of formulas that contained fish versus algal oil DHA and ARA from fungal oil.9

Using the Bayley mental and psychomotor development scores at 118 weeks post menstrual age as the evaluation tool, the study concluded that infants on the group of formulas from algal DHA had enhanced growth as compared to the fish DHA or control groups.8 Both infant groups on formulas with DHA and ARA had better developmental outcomes as compared to the unsupplemented control group. While this is a very interesting study, it does not evaluate the use of this post-discharge formula, only as part of a continuum of the use of the enhanced formulas.

In conclusion, post-discharge formulas are an essential tool in the continuum of enhanced nutrition support for the premature infant. Using a post-discharge product such as NeoSure® is important to support proportional growth for premature infants after discharge to the home setting. EnfaCare® may also provide these advantages, but it has not been as thoroughly studied.

About the Author
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…for body size, the preterm infants fed the post-discharge formula had bone mineral contents that were not significantly different from infants born at term.
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