



Health Care Use Outcomes of an Integrated Hospital-to-Home Mother–Preterm Infant Intervention

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ABSTRACT

Objective: To compare health care use from initial hospital discharge through 6 weeks corrected age in two groups of mother–preterm infant dyads: those who received an intervention, Hospital to Home: Optimizing Premature Infant's Environment (H-HOPE), and an attention control group.

Design: Prospective randomized controlled trial.

Setting: Two community hospital NICUs.

Participants: Mothers ($n = 147$) with social–environmental risk factors and their stable preterm infants.

Methods: Mother–infant dyads were randomly assigned to the H-HOPE or control group. When infants reached 6 weeks corrected age, information about health care visits since their hospital discharges was collected through an interview.

Results: Only half of all infants received all recommended well-child visits. Infants in H-HOPE were half as likely to have acute care episodes (illness visit to the clinic or emergency department or hospital readmission) as control infants (odds ratio [OR] = 0.46, 95% confidence interval [CI] [0.22, 0.95]). Infants of mothers with high trait anxiety were nearly 3 times more likely to have an acute care episode ($OR = 2.78$, 95% $CI [1.05, 7.26]$), and mothers who had low education levels ($OR = .22$, 95% $CI [0.08, 0.60]$) were less likely to have acute care episodes. There was a trend toward fewer acute care visits for infants whose mothers preferred an English interview ($OR = .47$, 95% $CI [0.21, 1.06]$).

Conclusion: Findings emphasize the importance of reinforcing well-child visits for vulnerable preterm infants. H-HOPE, an integrated mother–infant intervention, reduces acute care episodes (visits to the clinic or emergency department or hospital readmissions) for preterm infants.

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Nearly 500,000 infants are born preterm each year in the United States (Martin, Hamilton, Osterman, Curtin, & Matthews, 2015). Preterm infants (<37 weeks gestation) are at greater risk for suboptimal growth and development, poor behavioral organization, and health problems. Consequently, preterm infants have substantially greater health care use and expenditures during the initial (birth) hospitalization and beyond (Cuevas, Silver, Brooten, Youngblut, & Bobo, 2005; Engle, 2011; Gouyan, Iacobelli, Ferdynus, & Bonsante, 2012; Lo et al., 2011; McCormick, Litt, Smith, & Zupancic, 2011; McLaurin, Hall, Jackson, Owens, & Mahadevia, 2009; Petrou & Khan, 2012; Phibbs & Schmitt, 2006). Although most researchers examined health care throughout the first year of life, evidence suggests that health problems and health care use

are greatest during the first few months after the initial hospitalization discharge (Schiltz et al., 2014; Spicer et al., 2008; Wade et al., 2008). However, little is known about use of health care among preterm infants during this critical time or whether early interventions can reduce health care use.

Preterm Infants Have Greater Rates of Health Care Use

Preterm infants have more acute care visits and hospital readmissions and greater related costs in the first year of life than full-term infants (Engle, 2011; Gouyan et al., 2012; McCormick et al., 2011). Infants born at 23 to 32 weeks gestation had an average of 20 ambulatory care visits

Preterm infants are at greater risk for health problems that contribute to greater health care use and expenditures at birth and beyond.

during the first year (Wade et al., 2008). In another study, researchers found that late preterm infants (34–36 weeks gestation) had twice the risk of hospital readmission (15.2% vs. 7.9%) during the first year as full-term infants (McLaurin et al., 2009). The main reasons for urgent care visits and readmissions during the first year included hyperbilirubinemia/jaundice, acute respiratory disorders, feeding problems, apnea, fever, and suspected infection (Engle, 2011; Jain & Cheng, 2006; McLaurin et al., 2009; Schiltz et al., 2014; Underwood, Danielsen, & Gilbert, 2007).

Few investigators examined preterm infants' health care use in the first few months of life, when the parent–infant dyad is transitioning from hospital to home (Enlow et al., 2014; Escobar, Clark, & Greene, 2006; Escobar et al., 2005; Escobar, McCormick, et al., 2006; Schiltz et al., 2014; Spicer et al., 2008; Wade et al., 2008). Within the first 3 months of initial hospitalization discharge, the readmission rate across 10 hospitals was 11.3% among infants of 30 to 34 weeks gestation, compared with 4.3% for full-term infants (Escobar, McCormick, et al., 2006). In one study of 152 infants, 54% of whom were between 28 and 36 weeks gestation and 12% of whom were younger than 28 weeks gestation, 11% were readmitted within 3 months (Spicer et al., 2008). In a more recent population-based study, the number of readmissions during the first year was greatest during the first 30 days after the initial hospitalization (Schiltz et al., 2014). Readmission rates were greater among low-birth-weight infants (3.04%) and very-low-birth-weight infants (5.44%) than among normal-birth-weight infants (1.57%). Wade et al. (2008) found that the greatest use of care among preterm infants (23–32 weeks gestation) was during the first month after discharge. Most visits were for health problems: 69% for primary providers or specialists and 21% for emergency and urgent care. Only 22% were for well-child care visits (Wade et al., 2008). In a recent study of health care use within 2 weeks of NICU discharge among infants of all gestational ages (GAs; mean = 32.9 weeks gestation, standard deviation [*SD*] = 3.7), Enlow et al. (2014) reported that 35% of families sought care for an urgent visit and that 4% were rehospitalized.

The biologic risk of prematurity, earlier discharge practices, and the challenges of parenting preterm infants contribute to greater health care resource use (Boykova & Kenner, 2012). A mother may have difficulty recognizing and responding to her preterm infant's subtle behavioral cues (Feldman & Eidelman, 2006; White-Traut et al., 2013; White-Traut et al., 2015), which leads to greater stress, anxiety, and depression (Fabiya, Rankin, Norr, Shapiro, & White-Traut, 2012; Feldman & Eidelman, 2006; Holditch-Davis, Bartlett, Blickman, & Miles, 2003; Mew, Holditch-Davis, Belyea, Miles, & Fishel, 2003). Together, these infant and mother factors may result in the need for additional professional support and high levels of health care use.

Interventions for Parents and Their Preterm Infants

Programs aimed at parents of preterm infants have reduced parental stress and anxiety, but results were mixed for infant development (Als et al., 2004; Holditch-Davis et al., 2014; Lekskulchai & Cole, 2001; McCormick et al., 2006; Melnyk et al., 2006; White-Traut, Nelson, Silvestri, Cunningham, & Patel, 1997; White-Traut et al., 2002). Programs with an in-hospital component have reduced the hospital length of stay and cost of initial hospitalization for infants (Melnyk & Feinstein, 2009; Melnyk et al., 2006; White-Traut et al., 2002). A recent intervention with an in-hospital and postdischarge visit for infants who weighed less than 1,500 g showed promise for reducing rehospitalization rates during the first 3 months, especially among infants with public insurance (Vohr et al., 2012). This was the only intervention study in which investigators evaluated use of health care after the initial hospitalization.

To fill these gaps, we examined the impact of the Hospital to Home: Optimizing Premature Infant's Environment (H-HOPE) intervention on health care use after discharge from the initial hospitalization. H-HOPE combines a multisensory infant intervention and participatory guidance for the mother in the hospital and at home (White-Traut & Norr, 2009). Although length of hospital stay did not differ, infants who participated in H-HOPE exhibited more alert behavioral states and orally directed behaviors, improved sucking ability, and more rapid growth (Medoff-Cooper, Rankin, Li, Liu, & White-Traut, 2015; White-Traut, Rankin, Pham, Li, & Liu, 2014; White-Traut et al., 2015). At 6 weeks corrected age (CA), mother–infant

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