Impact of a Transition Home Program on Rehospitalization Rates of Preterm Infants

Betty Vohr, MD[1,2], Elisabeth McGowan, MD[1,2], Lenore Keszler, MD[1,2], Barbara Alksninis, PNP, NNP[1], Melissa O'Donnell, BA, MSW[1], Katheleen Hawes, PhD, RN[1,2,3], and Richard Tucker, BA[1]

Objectives To evaluate the effects of a transition home program on 90-day rehospitalization rates of preterm (PT) infants born at <37 weeks gestational age implemented over 3 years for infants with Medicaid and private insurance, and to identify the impact of social/environmental and medical risk factors on rehospitalization.

Study design In this prospective cohort study of 954 early, moderate, and late PT infants, all families received comprehensive transition home services provided by social workers and family resource specialists (trained peers) working with the medical team. Rehospitalization data were obtained from a statewide database and parent reports. Group comparisons were made by insurance type. Regression models were run to identify factors associated with rehospitalization and duration of rehospitalization.

Results In bivariable analyses, Medicaid was associated with more infants hospitalized, more than 1 hospitalization, and more days of hospitalization. Early PT infants had more rehospitalizations by 90 days than moderate ($P = .05$) or late PT infants ($P = .01$). In regression modeling, year 3 of the transition home program vs year 1 was associated with a lower risk for rehospitalization by 90 days (OR, 0.57; 95% CI, 0.36-0.93; $P = .03$). Medicaid ($P = .04$), non–English-speaking ($P = .02$), multiple pregnancies ($P = .05$), and bronchopulmonary dysplasia ($P = .001$) were associated with increased risk. Both bronchopulmonary dysplasia and Medicaid were associated with increased days of rehospitalization in adjusted analyses. The major cause of rehospitalization was respiratory illness (61%).

Conclusions Transition home prevention strategies must be directed at both social/environmental and medical risk factors to decrease the risk of rehospitalization. *(J Pediatr 2017;181:86-92).*

Prematurity is a serious public health problem that costs the US more than $26 billion annually. Early preterm (PT) infants have increased rates of neonatal and postdischarge morbidities, including increased rates of rehospitalization.[1-10] Recent data indicate that the increased risks associated with prematurity extend to moderate and late PT infants,[11-14] who often require care in a neonatal intensive care unit (NICU). Regardless of gestational age, PT infants covered by Medicaid insurance have been shown to be at greater risk of morbidity and resource utilization compared with those with private insurance.[4,9,15-17]

Rehospitalization of high-risk PT infants contributes to increased costs, placing a burden on both the health care system and families. A comprehensive transition home program was developed for very low birth weight infants cared for in a tertiary care center's 80-bed NICU covering the catchment area of Rhode Island, southeastern Massachusetts, and northern Connecticut. It was implemented in 2007 in collaboration with the infant's medical home to provide enhanced transition education and support to families, and also to serve as a resource for primary care providers (PCPs).[1] Infants with Medicaid insurance were twice as likely as infants with private insurance to be rehospitalized by age 3 months (28% vs 11%) during the first year of the program. Over 2 years, the odds of rehospitalization for very low birth weight infants receiving Medicaid were significantly reduced,[1] and in 2012 the program was expanded to include all PT infants <37 weeks receiving NICU care for >5 days.

The primary objective of this study was to evaluate effects of an enhanced transition home program with social workers and family resource specialists (FRSs) as team members to decrease the rate of rehospitalization in PT infants cared for in a NICU for > 5 days within the first 90 days postdischarge. A secondary objective was to identify key social/environmental and medical risk factors associated with rehospitalization. Our study hypotheses were that rates of rehospitalization would decrease between year 1 and year 3 as the programmatic components of the transition home program were implemented, and that social and environmental risk factors, including Medicaid insurance, would be important predictors of rehospitalization.

BPD	Bronchopulmonary dysplasia
FRS	Family resource specialist
NICU	Neonatal intensive care unit
NNP	Neonatal nurse practitioner
PICU	Pediatric intensive care unit
PCP	Primary care provider
PT	Preterm

From the [1]Division of Neonatology, Department of Pediatrics, Women & Infants Hospital of Rhode Island, Providence, RI; [2]Alpert School of Medicine, Brown University, Providence, RI; and [3]College of Nursing, University of Rhode Island, Kingston, RI

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Methods

This prospectively enrolled cohort included Rhode Island residents who were early, moderate, and late PT infants hospitalized for >5 days in an 80-bed single-room level 3-4 NICU. Infants were enrolled between October 15, 2012, and September 4, 2015. Institutional Review Board approval and informed consent were obtained. Of the families of 1294 eligible infants, 954 (74%) agreed to participate, and only those families received the enhanced services.

The study transition home program team comprised the study physicians and nurse practitioners partnered with a team of 4 clinical social workers and 7 trained FRSs (each of whom had her own infant previously cared for in a NICU). The FRSs were paid employees who received training in parent and infant needs and hospital and community resources by the Rhode Island Parent Information Network (www.ripin.org) and our clinical research team. The FRSs were matched with mother–infant dyads sharing common backgrounds to the extent possible. Matching included primary language (fluent in, eg, English, Spanish, Portuguese) and infant history (eg, PT, home on oxygen, monitor). The FRS provided education and supportive intervention services under the supervision and guidance of licensed independent clinical social workers. It was expected that the FRS providers would become increasingly adept at facilitating the transition home intervention over the 3-year duration of the program.

Procedures Predischarge

The team made daily NICU rounds, identified eligible subjects, and obtained informed consent. The transition home team communicated closely with the NICU team, the follow-up clinic, and the PCP. A letter was sent to the PCP informing of enrollment and program purpose, and a summary of each visit was provided. Study providers met regularly with parents during the infant's hospitalization, reviewed a comprehensive education binder, and completed study questionnaires. The social worker or FRS informed all parents of indicated community resources, including early intervention, and reviewed all education binder components, including safety, nutrition, breast milk benefits, infection control, and respiratory syncytial virus prophylaxis. Attendance at an educational discharge class and a cardiopulmonary resuscitation discharge class were encouraged. Staff supported families in obtaining transportation, mental health services, housing, and infant supplies; accessing health care; and finding a primary provider. Families considered at high social, environmental, or medical risk (owing to, eg, housing, mental health issues, multiple PT infants) received a predischarge home visit to further assess and address home environment and family needs.

Procedures Postdischarge

The postdischarge intervention for early and moderate PT infants included a postdischarge call within 24 hours, a neonatal nurse practitioner (NNP) home visit within the first week, transmittal of summaries to the PCP, referral to early intervention, and round-the-clock on call by study physicians up to 90 days postdischarge. These services were provided in addition to standard visiting nurse and PCP visits. Each postdischarge home visit was conducted by 4 NNPs knowledgeable in the care and management of high-risk infants, who assessed the infant's growth, feeding, and respiratory status and the mother's comfort, concerns, and understanding of the care plan. The NNPs collaborated with the medical team, social workers, FRSs, support staff, PCPs, and follow-up clinic. Early and moderate PT infants were seen by the study providers in the follow-up clinic at 1 and 3 months, and their visit summaries were shared with the PCP and study staff. Directions for all medication doses and formula mixes were reviewed. Additional questionnaires administered will be reported in later work. Families of late PT infants were provided with the same support in the NICU, the education binder, early intervention coordination if eligible, a postdischarge call within 24 hours, and standard visiting nurse visits.

The late PT infants were considered at lower risk for rehospitalization and were not seen in the follow-up clinic. Instead, they received phone communications from the FRS or social worker to obtain an interim history at 1 and 3 months, at which time any needed referrals were made. All families were invited to enroll in Current Care, the Rhode Island statewide secure health information exchange, which provided real-time computer notification of rehospitalizations. A separate Current Care informed consent was obtained, facilitating rapid response support and intervention, along with accurate data on rehospitalization.

In terms of predictor and outcome variables, the 2 study groups were PT infants with Medicaid and PT infants with private insurance. Predictor variables included the year of the transition home program, maternal and infant characteristics and morbidities, insurance type, and social and environmental risk factors. The primary outcome variables were number of infants rehospitalized, number of rehospitalizations, and number of days of hospitalization by 90 days postdischarge. Study data were collected prospectively.

Statistical Analyses

Maternal characteristics and outcomes in the Medicaid and private insurance groups were compared using the *t* test and Wilcoxon rank-sum test for continuous variables and the χ^2 test for categorical variables. Infant variables and outcomes were analyzed using random effects models (continuous) or generalized estimating equations (categorical) to adjust for multiple births within mothers. Comparisons of maternal and infant characteristics were also made between those infants hospitalized and never hospitalized at 90 days postdischarge.

Logistic regression models were run to predict rehospitalizations by 90 days postdischarge. Independent variables in addition to the year of program implementation were those identified as significantly associated with rehospitalization in bivariable analyses and included early, moderate, and late PT; Medicaid; non–English-speaking; gravida >1; and breast milk at discharge. Birth weight, gestational age, grade 3-4 intraventricular hemorrhage, and oxygen at discharge were not