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Effects of Home Visiting and Maternal Mental Health on Use of the Emergency Department among Late Preterm Infants

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ABSTRACT

Objective: To describe use of the emergency department (ED) among late preterm versus term infants enrolled in a home visiting program and to determine whether home visiting frequency was associated with outcome differences.

Design: Retrospective, cohort study.

Setting: Regional home visiting program in southwest Ohio from 2007–2010.

Participants: Late preterm and term infants born to mothers enrolled in home visiting. Program eligibility requires ≥ one of four characteristics: unmarried, low income, < 18 years, or suboptimal prenatal care.

Methods: Data were derived from vital statistics, hospital discharges, and home visiting records. Negative binomial regression was used to determine association of ED visits in the first year with late preterm birth and home visit frequency, adjusting for maternal and infant characteristics.

Results: Of 1,804 infants, 9.2% were born during the late preterm period. Thirty-eight percent of all infants had at least one ED visit, 15.6% had three or more. No significant difference was found between the number of ED visits for late preterm and term infants (39.4% vs. 37.8% with at least one ED visit, $p = .69$). In multivariable analysis, late preterm birth combined with a maternal mental health diagnosis was associated with an ED incident rate ratio (IRR) of 1.26, $p = .03$; high frequency of home visits was not significant (IRR = .92, $p = .42$).

Conclusions: Frequency of home visiting service over the first year of life is not significantly associated with reduced ED visits for infants with at-risk attributes and born during the late preterm period. Research on how home visiting can address ED use, particularly for those with prematurity and maternal mental health conditions, may strengthen program impact and cost benefits.

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The elevated risk of mortality and morbidity for late preterm infants (LPIs) born at 34 weeks 0 days to 36 weeks 6 days gestation, who represent more than 70% of all preterm infants, has been increasingly well described (Bird et al., 2010; Engle, Tomashek, & Wallman, 2007; Martin, Kirmeyer, Osterman, & Shepherd, 2009; Raju, Higgins, Stark, & Leveno, 2006). Compared with infants born full term (≥ 37 weeks), LPIs have higher rates of hospitalization and emergency department (ED) use in the neonatal period and through the first year of life (Escobar et al., 2005; Jain & Cheng, 2006; McLaurin, Hall, Jackson, Owens, & Mahadevia, 2009). Importantly, for certain conditions like neonatal jaundice, risk of hospitalization for LPIs is higher compared with full-term infants as well as infants born at earlier gestational ages (Ray & Lorch, 2013), suggesting an interplay of immature physiology and current systems of care for this population. In contrast to very preterm infants, LPIs are often discharged home from the hospital without a prolonged period of observation (Goyal, Fager, & Lorch, 2011), and many are not seen by any health care professional during the first week home (Hwang et al., 2013). Moreover, the majority of these infants are not enrolled in systematic, high-risk infant follow-up programs, which generally focus on very early preterm infants (Walker, Holland, Halliday, & Badawi, 2012). For LPIs, therefore, further research is needed to develop models of follow up care that can improve outcomes (National Perinatal Association, 2012; Premji, Young, Rogers, & Reilly, 2012).

One potential strategy to address these concerns is home visiting, a voluntary service delivered

Given the late preterm birth rate among at-risk infants, practices and policies related to their care have the potential for a large public health impact.

in a family's home to provide care coordination, parenting education, and social support for at-risk child-bearing women and their children (American Academy of Pediatrics Council on Child and Adolescent Health, 1998; Kitzman et al., 1997; Sweet & Appelbaum, 2004). Several national models of home visiting, including Nurse Family Partnership and Healthy Families America, have developed specific program curricula and protocols; qualifications of home visitors range from nurses to social workers to paraprofessionals (U.S. Department of Health and Human Services, 2013). Currently, an estimated 400 publicly and privately funded home visiting programs serve at least 500,000 families in the United States, and an additional $1.5 billion was allocated through the Patient Protection and Affordable Care Act to expand these services (Astuto & Allen, 2009; Health Resources and Services Administration, 2010). Despite significant public investment in this intervention, to date, a paucity of literature on outcomes such as ED use for preterm infants enrolled in such programs (Goyal, Teeters, & Ammerman, 2013).

The study objectives were to characterize ED use over the first year of life among late preterm and full-term infants enrolled in home visiting and to determine whether increased frequency of home visiting participation is associated with improvement in this outcome. Our logic model for this study was based on the social-ecological model of child health that underpins the role of home visiting for at-risk families. A strong body of literature has linked social and environmental risk factors with adverse child health outcomes, including avoidable hospitalizations and ED visits, that may be mitigated through early detection, parental education, and care coordination (McLaren & Hawe, 2005; Paul, Phillips, Widome, & Hollenbeak, 2004; Shanley, Mittal, & Flores, 2013; Shonkoff & Garner, 2012). Given the known contribution of LPIs to pediatric morbidity and health care costs and the fact that preterm birth is likely to disproportionately affect at-risk mothers eligible for home visiting, a more detailed understanding of program effectiveness for LPIs may be critical to addressing gaps in care for this important population.

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Methods

Setting and Participants

In this retrospective, cohort study we examined ED use among late preterm and term infants born to at-risk, first-time mothers enrolled in a well-established, regional home visiting program serving southwest Ohio. This community-based home visiting program, which has to date served more than 19,000 families, comprises 11 local home visiting agencies which adhere to program, training, and evaluation standards established by a central office at Cincinnati Children's Hospital Medical Center (CCHMC). To track and document process and outcome measures within and across agencies, the program uses rigorous continuous quality improvement procedures under the supervision of CCHMC quality improvement staff and is facilitated by a web-based data entry system (Ammerman et al., 2007).

In addition to being first- time mothers, women eligible for this program must have at least one of four risk characteristics: unmarried, low income (up to 300% of poverty level, receipt of Medicaid, or reported concerns about finances), < 18 years of age, or suboptimal prenatal care. Participants may be enrolled during pregnancy or postdelivery, before their child reaches age 3 months. Referrals to the program may be self-initiated or come from clinics, hospitals, and other community sources. Home visits are provided by social workers, child development specialists, or other professionals who employ a core program curriculum that is based on the Healthy Families America model of home visiting. The overall goals of the program are to (a) provide nutrition education and substance use reduction during pregnancy; (b) support parents in providing children with a safe, nurturing, and stimulating home environment; (c) optimize child health and development; (d) link families to health care and other services; and (e) promote economic self-sufficiency. To achieve these goals as outlined within the curriculum, the home provider offers printed materials for families but primarily focuses on interactive sessions with parents that may address curriculum content as well other issues or concerns specific to the family. Screening inventories for home safety, parenting stress, substance use, and other items are also performed at scheduled intervals to identify and address risks and to generate appropriate service referrals. Expected visit frequency consistent with the curriculum is weekly through the first 3 months of infancy, tapering to biweekly through the remainder of the first year.