Developmental Assessment of a Premature Infant

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Pediatric health care entails more than simply treating diseases. Instead, it also encompasses assessment of physical growth and attainment of developmental tasks, as well as cognitive and psychosocial development (Berry, Garzon, & Deloian, 2013). Premature infants often have more complications than infants born at full-term. Even near-term infants have been demonstrated to lag behind full-term peers in developmental tasks. Extremely low birth-weight infants, weighing less than 1 kg at birth, were shown to have higher rates of chronic illness, poorer academic achievement, and behavioral problems (Hack, 2007). A 2007 Belgian study showed that while 37% of extremely premature infants (born at 26 weeks gestation or less) continued to demonstrate neuromotor deficits at a corrected age of three years, an alarming 70% demonstrated psychomotor deficits (De Groote et al., 2007). Another study that examined extremely low birth-weight infants (< 750 grams) echoed these findings, in that 26% of infants had neurodevelopmental deficits at two years of age. In this same group of infants, a subset was classified as small for gestational age (SGA), defined by weighing <10th percentile of expected for gestational age. SGA infants were more likely to demonstrate developmental delays, in that 36% continued to have developmental deficits at age two (Claas et al., 2011). Knowing that these infants and children are at greater risk, care should be taken to monitor their development closely and intervene as needed.

**Summary of Child and Family**

Laney R\(^1\) is a four-month-old Caucasian infant who was born prematurely at 26 weeks of gestation to Mr. and Mrs. R, and is now 16 weeks old. Mrs. R’s pregnancy was complicated by severe pregnancy-induced hypertension and intrauterine growth restriction. Mrs. R was hospitalized during her 22nd week of pregnancy, in an effort to control her blood pressure and

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\(^1\) Names have been changed to protect confidentiality.
delay Laney’s birth as long as possible. Due to continued elevated blood pressure and inadequate fetal growth, Laney was delivered by Caesarian section at 26 weeks and two days, weighing 540g (1 lb., 3 oz.). She was classified as SGA, with a weight in the 3rd percentile for her gestational age. Her APGAR scores were 4 and 9 at 1 and 5 minutes, respectively. Initially, Laney made no respiratory effort, and was intubated and placed on mechanical ventilation and admitted to the neonatal intensive care unit (NICU). During her NICU course, she required high-frequency oscillatory ventilation and nitric oxide (NO) support to maintain adequate oxygenation and ventilation. After 32 days, she was extubated and transitioned to continuous positive airway pressure (CPAP) then to nasal cannula. Her NICU stay was also complicated by a patent ductus arteriosis, apnea of prematurity, hyperbilirubinemia, and respiratory distress syndrome; all of these resolved prior to discharge. Both mother and infant had type O+ blood, with no significant incompatibility. Laney had three head ultrasounds as well as magnetic resonance imaging (MRI) of her brain, which all demonstrated no abnormalities. Her third newborn metabolic screening test was normal, and she passed her newborn hearing screen. She was discharged home at 10 weeks of chronological age (36 weeks gestation adjusted age), requiring oxygen via nasal cannula at night. Her active discharge diagnoses included bronchopulmonary dysplasia (BPD), anemia of prematurity, and stage 2/zone III retinopathy of prematurity (ROP). Her discharge medications included hydrochlorothiazide and spironoloactone, used to promote diuresis in light her chronic lung disease. Ranitidine (Axid) was added to her medication regimen after discharge by her primary pediatrician for the diagnosis of gastroesophageal reflux.

Since her discharge from the NICU, Laney has been weaned off of oxygen successfully and has continued to grow and gain weight. At her four-month well child visit (two weeks adjusted age), she weighed 9 lb., 0 oz., and was 20.5 inches long; head circumference was 12
inches. Her review of systems revealed some tiredness with extended feedings and crying spells lasting more than three hours per day. She received scheduled vaccinations at two months of age, including palimizumab (Synagis) for prevention of respiratory syncytial virus infection. She was initially fed expressed breast milk, fortified to 24 kcal/oz, but is now fed Neosure formula 24 kcal/oz. She takes four to six ounces of formula every two to three hours, using a Dr. Brown bottle with a medium-flow nipple.

Laney’s mother, Mrs. R, age 28, stopped working during her pregnancy. She previously worked as a massage therapist. Her husband, Mr. R, age 35, works in the finance department at a local oil and gas company. The couple has been married for three years, and lost a previous pregnancy to miscarriage after seven weeks in 2011. Mr. and Mrs. R have no other children. Laney’s extended family will be discussed further in the Significant Findings from Genogram and Ecomap section.

**Macroscopic View of Family**

Healthy families interact with the world, not just with its own members. Much can be learned about a family and its health by examining the family’s interactions with the community and world around them. The Calgary Family Assessment Model explores the external structure of families, and includes an examination of both the extended family and larger systems (Wright & Leahey, 2009).

The R family is relatively isolated. Mrs. R is somewhat estranged from her parents, although she has spoken to them “three or four times” since Laney’s birth. Prior to that, Mrs. R had not spoken to her parents regularly for more than one year, and has not visited them, as they live out of state and are divorced. She cannot recall a reason for the lack of contact, but believes that they drifted apart. She feels stressed when talking with them, as each parent talks negatively
about the other parent. Mrs. R does keep in contact with her older sister via Facebook and email. Mrs. R is part of a NICU support group and keeps in contact with other NICU mothers. Prior to Laney’s NICU discharge, Mrs. R spent every day in the hospital with her daughter. She feels like she was closer with the NICU nurses and other NICU moms before her daughter was discharged. She states that her neighbors have offered assistance, but that she prefers not to ask for help. She also mentions that she feels lonely at times and that she spends all of her time alone with Laney.

She dislikes that her husband works long days away from home, but knows that he is working to support the family.

Mr. R speaks with his parents via Skype once or twice per month. He is an only child, and feels responsible for maintaining contact with his parents. He would like to visit them more often, but cannot due to his work schedule. He has only been employed at his company for two years, and fears any extensive leave of absence could lead to being laid off. Mr. R worries about the prospect of being laid off, since he is the sole provider for the family and carries medical insurance for Laney. He fears that without his job, they would not be able to care for her medical needs.

The family attends a local non-denominational Christian church on a “semi-regular” basis, according to Mrs. R. She reports that they would like to become more involved and meet more people at their church, but that she worries about exposing Laney to infections by being in public. They moved to the Spring area approximately two years ago from Louisiana and have recently purchased their first house. They have met a few friends since moving here, but have had difficulty in developing close relationships. The family seems to have little outside support and resources, although they are financially stable and live in a safe environment.
In examining the R family genogram and ecomap, several concerns are notable. First, the family has limited outside support or interaction. Mrs. R receives a great deal of support from her NICU support group. However, most of her energy and activities revolve around her daughter, without having any outside interests. She does not appear to have adequate outside support from her community or extended family. Likewise, Mr. R spends a great deal of energy on his career, and has limited outside interests.

Mrs. R’s older sister was diagnosed with breast cancer at a young age, but is now healthy according to Mrs. R. Both Mrs. R and Laney will be at higher risk of breast cancer in the future. Type 2 Diabetes Mellitus is also a highly heritable disease. Mrs. R and Laney will be at higher risk, and will need to monitor their diets and exercise to minimize their risks of developing
diabetes and its complications. Since allergies, eczema, and asthma are all interrelated, Laney may be at higher risk of atopic disease.

Laney’s paternal grandparents have hypertension and osteoarthritis, which are both fairly common conditions which may be related to overweight or obesity. If Laney or her parents become overweight, predisposing factors for hypertension and diabetes may result in more severe consequences.

The genogram also shows that Mr. and Mrs. R may have an increased risk of pregnancy-related loss, should they become pregnant again. Mrs. R had a first-trimester miscarriage and severe pregnancy-induced hypertension during her pregnancy with Laney. Any future pregnancies will be at very high risk.

**Family Life Cycle**

The R family describes themselves as being a middle-class family. Carter and McGoldrick’s North American middle class family life cycle model has been described by Wright and Leahy (2013). Stage three is defined by families with young children. The relevant tasks in this stage of young family are to: 1) Reframe the marital dyad to accommodate a child, 2) Allocate responsibilities for childbearing, finances, and the household, and 3) redefine roles with parents who are now grandparents. An analysis of the family demonstrates their progress in meeting these tasks.

In the R family, Mr. and Mrs. R are still struggling to complete the first task. Mrs. R states that she and her husband are no longer as close as they once were, before Laney’s birth. They have not yet found a balance to be able to meet each other’s needs, while still meeting those of their daughter. They do, however, deeply care about and love their daughter. Their emotional attachment to Laney is vitally important for Laney to master trust.
The R family is also struggling to redefine household and childbearing roles. Mrs. R relates that during some occasions, she wants help with Laney’s care, but that Mr. R is tired from work. Likewise, she does not believe he understands the amount of work involved caring for their daughter and household during the day. These conflicts may take time to resolve, and the nurse practitioner can help the family through counseling or referral to a counselor. They have agreed that it is best for their family for Mr. R to work outside the home to support the family, while Mrs. R cares for their daughter. Both parents agree on this financial arrangement.

Realigning parent and grandparent roles may be problematic for this family. Mr. R’s parents have visited Laney, and dote on her as their granddaughter. Mrs. R, however, is not close with her parents. Thus, Mrs. R’s transition to viewing her parents as grandparents may be problematic.

**Strengths and Difficulties faced by Family**

One strength of the R family is that of Laney’s “goodness of fit,” as described by Chess and Thomas in 1985 and delineated by Berry et al. (2013). Laney is active, yet content to be held, which fits well with her mother’s need to have physical contact with her after a long NICU hospitalization. Laney also has a predictable sleep/wake and feeding schedule, and is easily calmed during the day. These characteristics help define an “easy baby.” A good fit between the mother’s expectations and the easy temperament can decrease the mother’s stress of parenting and promote bonding.

Early in the pregnancy, Mrs. R was forced to prepare for the possibility of having a premature infant. She is well-educated on issues faced by premature infants, and cared for her daughter daily in the NICU. Her experience and knowledge in caring for her daughter will help her feel confident and competent, and should diminish the normal feelings of uncertainty faced
by first-time parents. The family’s financial stability and access to healthcare will also positively impact Laney’s life and development.

A further strength of this family is absence of any “Parenting Red Flags,” as described by Berry et al. (2013). These red flags include increased or decreased separation from the child, signs of depression or hostility, rejection of the infant, inappropriate criticism of the child, inconsistent discipline, and avoiding eye contact. As Laney is currently very young, it will be important to assess Mrs. R’s ability to detach from Laney and let her explore as she grows.

Laney is developing appropriately, as discussed in the Developmental Screening Finding section. Medically, she is doing well. She no longer requires oxygen therapy, and is able to maintain oxygenation and ventilation with small doses of diuretics. Multiple head ultrasounds and MRI failed to demonstrate any intraventricular hemorrhage during her NICU stay, increasing hope that Laney may have a positive neurodevelopment. She also passed her newborn hearing screen. These positive health markers may indicate that Laney will have a normal developmental course, as she is not medically fragile.

Outlook is also important in assessing one’s future. Henry Ford is credited with saying “Whether you believe you can, or believe you can’t, you’re probably right.” Mrs. R focuses on the progress that Laney has made. When asked, Mrs. R believes that Laney is now developing normally and that she will become a normal healthy child as she grows. This family is also financially stable and has stable medical insurance. This will allow Laney to receive appropriate care. Taken together, these positive attributes of Laney and her family are encouraging.

Aspects of this family are concerning, however. Mrs. R is the sole caregiver for this child, and she does not feel that she has adequate support in caring for her daughter. She has limited family and community support. The family is also struggling with expected
developmental tasks, such as ensuring adequate adult social needs are met and distribution of childbearing roles. Laney’s age and circumstances also place her at a higher risk for shaken baby syndrome (Troiano, 2011). Taken together, it is evident that this family should be followed closely in order to maximize its strengths and minimize its difficulties.

**Developmental Screening Findings**

Although Laney is now four months old, her corrected age is 2 weeks, as she was born at 26 weeks of gestation. Developmental screens should use her corrected age until she reaches two years of age. Using the Denver II Developmental Screen, Laney is performing as expected for a 2 week-old infant, and performing a few tasks for an infant up to 4 months of age.

Laney demonstrates equal movements bilaterally and is able to lift her head, as expected of a 2 week-old infant. She also demonstrates moderate head control when being held upright and is able to roll from front to back when placed on her abdomen, which are tasks expected of an older infant.

Laney vocalizes well and babbles, but does not laugh, squeal, or turn her head to a voice. She scores appropriately for a 2 week-old infant, however. Laney’s prolonged intubation while in the NICU may adversely affect her expressed language.

In the fine motor domain, Laney is able to visually follow a toy past the midline of sight, as expected at her corrected age. She is not able, however to grasp or shake a toy.

In the Personal-Social domain of the Denver II tool, Laney scores well, as she is able to regard her mother’s face, smiles spontaneously and reactively, and is able to regard her own hand. In this section of the screening tool, she scores as expected for a 4 month-old infant.

At this screening visit, no delays were found for Laney when adjusting for her premature birth. Additional tools for evaluating Laney’s development, such as the Bayley Scales of Infant
Development were not available. Additional screening, using this screening tool, could be completed to identify a low, moderate, or high risk of developmental delay (Council on Children With, Section on Developmental Behavioral, Bright Futures Steering, & Medical Home Initiatives for Children With Special Needs Project Advisory, 2006).

Laney can usually be calmed by her mother, and smiles responsively to her mother. Mrs. R states that she “always picks her up right away” when Laney fusses. Prompt response to infant needs promotes the formation of trust, attachment, and bonding.

**Summary of the Family and Screening Assessment**

On the surface, Laney is a small, vulnerable infant who was born 14 weeks early, and her mother is her sole caregiver. Further assessment of Laney and her family demonstrates strengths and reasons to expect a positive outcome for this child and family. Laney is reasonably medically healthy and meeting developmental tasks for an infant with her corrected age. She is growing well, and at 9 pounds, she weighs just above the 50th percentile for her gestational age on the Fetal-Infant Growth Chart for Preterm Infants (Fenton & Kim, 2013). Her length and head circumference show appropriate growth near the 50th percentile as well. She is meeting developmental tasks appropriate to her corrected age.

Her family, particularly her mother, remains isolated, however. The family has limited family support, and few interactions with the community at large, except for a NICU support group and Mr. R’s employment. Due to Laney’s prematurity, Mrs. R is hesitant to become more active with church or other community organizations, out of concern for infectious diseases. This isolation places Laney and her family at high risk for continued social isolation, marital problems, and poor child-child interaction.

**Suggested Interventions and Parental Guidance**
As Laney is at high risk for developmental difficulties, structured early childhood intervention is of great importance (Berry et al., 2013). Care must also be family-centered. Interventions should be aimed at not only improving Laney’s development, but development of the R family to empower Mrs. R to care and advocate for her child. Mrs. R should be recognized as the expert in her daughter’s care, and she should be an equal part of any decision-making process for Laney’s care. To help Mrs. R be in control of her daughter’s health, she can be encouraged to keep a health journal to manage Laney’s health needs, medications, and appointments. Mrs. R can also be encouraged to jot notes about Laney and her development, such as noticing a reactive smile, looking for a toy out of sight, or rolling over.

While Laney is chronologically four months old, her adjusted age is that of a two week-old newborn. Anticipatory guidance should include both her chronological and adjusted ages. Since Mrs. R is the primary caregiver for Laney, support and encouragement and education about shaken baby syndrome is vital. Mrs. R should be taught that evening crying spells may be expected, but typically last only a matter of weeks, and may be improved by a regular schedule. Mrs. R should also be taught tools for coping with Laney should she begin to experience more crying spells (Deloian & Berry, 2013). Mrs. R can be supported and encouraged by telling her in which specific ways she is meeting Laney’s needs.

To advance physical development, Mrs. R should be encouraged to give Laney sufficient tummy time, which helps strengthen muscles needed for head control and rolling over. Toys, such as mobiles or mirrors can be used to promote visual development.

While full-term infants can begin taking solid foods around four months of age, depending on readiness, Laney should not begin solids until she has reached an adjusted age of four months. Because Laney is growing appropriately, Mrs. R can be encouraged to feed her
only on demand overnight. This will aid both Laney and her parents in consolidating sleep hours (Deloian & Berry, 2013). Her nutritional needs are currently being met with a premature-infant formula, Neosure, fortified to 24 kcal/oz. Because growth of the preterm infant is directly related with neurodevelopmental outcomes, Laney should be maintained on her current feeding regimen of Neosure (Tudehope, Page, & Gilroy, 2012).

Although Laney has multiple medical needs related to her bronchopulmonary dysplasia, she is quite healthy for a child born at 26 weeks of gestation and SGA. Her medical care can be handled effectively in a community-based setting, rather than in the Texas Medical Center, which is a 25-mile drive for her family. Utilizing community-based care instead of medical center based care decreases the burden on families related to multiple follow-up appointments, yet is still as effective in generating positive outcomes for these children (O'Shea et al., 2007). She will continue to need follow-up and surveillance for her vision related to her retinopathy of prematurity (Paysse, 2013).

**Effects and Outcomes of Interventions**

Laney has been receiving physical therapy services as part of Early Childhood Intervention initiatives (ECI), and is meeting corrected age-appropriate tasks. Her mother continues these therapy modalities at home. Mrs. R began keeping a journal with Laney’s activities, and states that she enjoys being able to look back at how Laney has grown and developed “like any other baby.” Mrs. R still reports feeling overwhelmed at times with caring for her daughter, but does regard her efforts in a positive light. She did state that it is easier to care for Laney now that she is growing and doing new things, compared to when she was first released from the NICU. She also related that she knows that she can ask for more help from her husband, or ask a neighbor to watch Laney during naptime if she needs a break. She also
understands the risks of becoming overwhelmed in regards to the risk of losing her temper and injuring Laney. She called her pediatrician’s office to make an appointment to discuss Laney’s crying spells; at that visit, gastroesophageal reflux was diagnosed and therapy initiated.

**Status of Presenting Problem**

Laney R continues to grow and develop well, despite being born at 26 weeks of gestation. She interacts with her environment, and her mother beams when talking about Laney’s new behaviors. Since beginning H2-blocker therapy for gastroesophageal reflux, her mother reports fewer crying spells, particularly after feeding. Less fussiness coupled with increased maternal sleep has been noted by Mrs. R, who states that she is “doing much better.” Mrs. R knows that her daughter may face future challenges, especially during this fall and winter with regard to respiratory illnesses, but states that she is no longer afraid of the frailty of her daughter. At a follow-up appointment, Mrs. R stated “We’re doing great!” and that she is less stressed about caring for Laney and her needs. Laney’s growth and development is being closely followed by an experienced pediatrician/neonatologist. Further developmental assessment will be done throughout Laney’s early childhood.

The importance of developmental screening and assessment cannot be understated in the care of premature infants. Early detection of difficulties and early intervention can help minimize struggles faced by these tiny infants. A family assessment can also aid in caring for the family, since a detached, isolated family has few resources when coping with highly stressful situations. With thoughtful, well-reasoned plans and interventions, the nurse practitioner can help maximize children’s potentials.
References


Appendix B

Fetal-Infant Growth Chart

Fetal-infant Growth Chart for Preterm Infants (WHO Growth Standards version)

Length
Head Circumference
Weight

Plot growth in terms of completed weeks of gestation.

Date: 2/15/13
Gestational age (weeks)