Neurodevelopmental Follow Up of the NICU Graduate
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Disclosures

- Nothing to disclose
**Prematurity**

- Birth at less than 37 completed weeks gestation
- Rates in U.S.- 9.8% overall
  - Varies by state from 7.8% to 13.6%, Nebraska is at 9.6%
- Survival roughly 85% for VLBW (<1500gm), 70% for ELBW (<1000gm) according to NICHD study of 2000’s.
- Recent statistics from 272 Mednax facilities in 34 states in 2016-17
  - Survival at 24 weeks 65% increasing to 99% at 31 weeks

**Risk Factors for Developmental Delay**

- Prematurity
- Low birthweight
- Hypoxic ischemic encephalopathy (HIE)
- Severe Intraventricular Hemorrhage (IVH)
- Surgery
- Infection
- Length of stay
How do we decrease risk?

- Prevent premature birth
- Therapeutic hypothermia
- Neuroprotective positioning
- Neuroprotective medications
- Avoid surgery if possible
- Prevent infection

Motor Development

- Positioning in the NICU during muscle growth and development
- Torticollis
- Plagiocephaly
- Cerebral palsy
- Term equivalent cranial U/S < 32-34 weeks or risk factors
How do we decrease risk?

Sensory development risks

- Overstimulation and interruptions
- Noise
- Lighting
- Pain

Brain at 23 weeks

Brain at full term
**Sensory Issues**

- Difficulty calming
- Transitioning between activities
- Sleeping
- Maintaining alert periods

**Vision**

- Retinopathy of Prematurity (ROP)
- At risk for other visual problems: strabismus, errors of refraction, visual acuity
Hearing Loss

- Risk factors
  - ECMO, assisted ventilation, ototoxic meds (Gentamicin, Vancomycin, Lasix), severe hyperbili, HIE, sepsis/meningitis, NICU stay > 5 days
  - Craniofacial anomalies including ear and temporal bone
  - Family history of permanent childhood hearing loss
  - In utero infections CMV, herpes, rubella, syphilis, toxoplasmosis
  - Post natal infections including bacterial and viral meningitis
  - Recurrent or persistent otitis media ≥ 3 months

Hearing Screening

- Automated auditory brainstem response (AABR) prior to discharge
- Repeat screen recommended for infants with risk factors
Sensory Loss
How do we decrease risk?

- Appropriate exposure to light
- Quiet environment
- Developmental care/protected sleep
- Assess and treat pain
Oh Boy! You’re wearing me out!

Late Preterm Infants

- 34 0/7 to 36 6/7 weeks gestation
- Account for 70% of all preterm infants born
Late preterm infants have risks too!

A baby’s brain at 35 weeks weighs only two-thirds of what it will weigh at 39 to 40 weeks.

Late Preterm Infants

- Have worse neurodevelopmental outcomes than term infants
- Are less ready for school at age 5-6
- More likely to have socioeconomic risk factors
- Lower reading and math scores at entry level grades
- Increased risk for borderline IQ scores (<85)
Neurodevelopmental Follow Up Clinic

- Adjust for prematurity until 2 years of age!!
- Tracking Infant Progress Statewide (TIPS) program

- Screening clinic refer to Early Development Network (EDN)
  - http://edn.ne.gov/cms/

TIPS

- Support infants and families that have experienced the NICU by monitoring development and providing education and resources.
- Gather information about how NICU babies develop to better meet their needs in the future
Developmental Screening Tests

- Ages and Stages questionnaire sent to parents
- Bayley III screener used in clinic

ASQ3

- Highly reliable, easy to use
- Available in 5 languages
- Teaches parents about development while screening
- Tests communication, fine motor, gross motor, problem solving and personal-social areas
- Agesandstages.com
Bayley III Screening Test

- Select items from the Bayley Development assessment
- Administered in 10-20 minutes
- Areas assessed: cognitive, expressive communication, receptive communication, fine motor and gross motor

Who qualifies for EDN referral at discharge?

- Genetic syndromes with known developmental or cognitive delays
- NG/GT feedings at discharge
- Meningomyelele
- CPS referral for drug exposure
- Confirmed hearing impairment
Provides services for children birth to 3 years of age with developmental delays or health conditions that affect development

Evaluations can be requested by parents or referrals made by healthcare professionals

Parent Support and Involvement

Outcomes improve with engaged, involved parents

Studies support increased risk with less maternal education and socioeconomic risk factors

Studies support worse outcomes with increased maternal anxiety
Case Study

Additional Resources

- Early Head Start
  - 6 weeks to 3 years in home resource for children and parents for low income families
General Recommendations for NICU Graduates

Growth and Nutrition

- Use corrected gestational age to monitor growth until 2 years of age
  - All growth parameters
  - Feeding clinics available
  - Supplement/fortify feeds with transitional formula 6-12 months CGA
    - Not just for growth!!
    - Protein, calcium, phosphorus, zinc, vitamins
Vitamin D

- 400 IU vitamin D recommended until infant taking 1000 ml formula per day or 1 year of age
- Human milk fed infants should receive supplementation until 1 year of age

Iron Supplementation

- At risk for anemia
  - Nadir at 1 month instead of typical 4 months
  - If hgb ≤9.5 at discharge, obtain CBC 2 weeks after discharge and repeat 1-2 months
  - Supplemental dose 2-6 mg/kg/day until 1 year of age
  - Iron deficiency anemia can lead to loss of IQ points
  - Multivitamin with iron 1 ml daily provides Vit D and iron needed
Case Studies

Clinical Practice Guidelines for Girls and Women with Turner Syndrome
  - http://pediatrics.aappublications.org/content/140/5/e20172626

Health Supervision for Children with Down Syndrome
  - http://pediatrics.aappublications.org/content/128/2/393

Health Supervision of Children with Achondroplasia
  - http://pediatrics.aappublications.org/content/116/3/771
References