Neonatal Nuggets:
What Every Non-Neo Needs to Know

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Objectives

• Understand trends leading to increase in NICU days
• Understand common NICU diagnosis
• Understand long-term outcomes of NICU graduates
What?

• Trends
• Diagnosis
• Outcomes

Why are you here today?

Why Should I Care?
NICU admissions/1000 normal birth weight (births >500 grams to US residents)

Harrison W et al. JAMA Pediatr. 2015: 169(9):855-862

Neonatal Mortality Rate
Very Low Birth Weight Survival

Trends

- Increased births
- Increased preterm births
- Increased survival
- Increased expectations
So why are these babies admitted?

Common NICU Diagnosis

Level 2
• RDS
• Hypoglycemia
• Apnea
• Fever
• Emesis or feeding problems

Level 3
• Prematurity/RDS
• Chorioamnionitis
• Surgical Conditions
• Congenital Heart Disease
• Genetic Anomalies

35 yr G3P2002
Normal prenatal labs, GBS unknown
Normal US at 20 weeks
PROM at 34 weeks, 0100 hours
Presents to community hospital 2 hours later in labor

What do you do?
A. Go back to sleep and pretend this isn’t happening
B. Get mom out
C. Prepare for a potential high risk delivery
Well.....
A. Sleep - nope
B. Transfer mom - that depends
C. Get ready for the delivery - YUP!

Risk Factors for High Risk Neonatal Delivery
- Antepartum
- Intrapartum

NSVD
APGARS 5,8
Weight 2120 g
Cries, then starts grunting at 7 minutes
Needs blow by oxygen at 10 minutes
Retractions, RR 85
- Respiratory Distress of the Newborn
- Does RDS = HMD? Always?

Respiratory Distress
- TTN
- RDS
- Pneumonia/sepsis
- Meconium
- PPHN
- Pneumothorax
- CDH
- Other?
CXR- Hazy
Oxygen- increases to 50% by 3 hours of age
Time for transport

A few words about oxygen....
• Hood
• Cannula
• RAM cannula
• Heated humidified high flow cannula
• NIPPV
• CPAP
• Neo-puff (T-piece)
• Conventional Ventilation
• High frequency ventilation
• NAVA (neurally adjusted ventilator assist)
• WHEW!

Principles of Oxygen Therapy
More is NOT better
• Maintain targeted SpO2 levels
• Relieve hypoxemia
• Does NOT improve ventilation or treat the underlying cause
• Mask signs of hypercapnea
Hypoglycemia

- Clinical Dfn: a plasma glucose concentration low enough to cause symptoms and/or signs of impaired brain function.
- Cannot be defined as a specific plasma glucose concentration because
  1. brain threshold variation
  2. brain injury influenced by other factors
  3. technical factors

Require Screening:
1. Symptoms
2. LGA
3. Perinatal Stress- fetal distress, PHHIYN, IUOR, MAS, NIH, polycythemia, hypothermia
4. Premature or post dates
5. IDM
6. Family history
7. Congenital syndromes

Exclude disorder before discharge:
1. Severe hypoglycemia (symptomatic or need for IV dextrose)
2. Inability to maintain preprandial glucose > 50 up to 48 hours of age and >60 after 48 hours of age
3. Family history of genetic form of hypoglycemia
4. Congenital syndromes

Increased Risk for Persistent Hypoglycemia

What to do?

Suspect a Disorder
- Keep plasma glucose >70 mg/dL
- Transfer to an NICU

Don’t Suspect a Disorder
- High-risk neonate, normal feeds- keep plasma glucose >50 mg/dL
- After 48 hours, keep plasma glucose >60 mg/dL
Apnea

Dfn: Cessation of airflow

Apnea and Apnea of Prematurity are NOT the same thing!

Apnea: Differential Diagnosis

- Choking
- GER disease (GERD)
- Sepsis (including RSV, pertussis, other viral illnesses)
- Seizures
- Metabolic disorders
- Intracranial pathology
- Airways obstruction
- Drugs- maternal or infant

Apnea: work up

- Complete and thorough history and physical
- CBC/d/t
- Blood culture
- Consider electrolytes
- Consider viral panel
- Consider LP
- Consider blood gas
- Consider cranial imaging
Chorioamnionitis and Fever

- Chorio-Obstetric Diagnosis with significant neonatal ramifications

Potential Adverse Effects
- Perinatal Death
- Asphyxia
- Sepsis
- Pneumonia
- Meningitis
- IVH
- White matter injury
- Neurodevelopmental delay
- Cerebral Palsy

CDC Guidelines 2010
Fever

- Rectal >38.4 = 100.4
- Higher risk if infant born at <37 weeks
- Risk to infant
  - Meningitis 1-3%
  - Bacteremia or sepsis 1-2%
  - UTI 16-28%

Fever Evaluation and Treatment

- Complete history and physical
- CBC dip
- Blood culture
- Glucose
- CRP/PCT
- UA/Ucx
- LP; consider HSV, enterovirus
- Therapy: ampicillin and gentamicin

Long Term Outcomes in ELBW Infants
Traditional Outcomes up to 5 years of Age

- Normal
- Mild-Moderate Disability
- Severe Disability

Preschool Outcomes by Gestational Age

Hoekstra et al. Survival and Long Term Neurodevelopmental Outcome of Extremely Premature Infants Born at 23–26 Weeks Gestational Age at a Tertiary Center. Pediatrics 2004 (113) 1.
School Age Outcomes

- Normal
- Mild-Moderate
- Severe

Is there more to the story?

- 50-70% have challenges in school including
  - Language comprehension and expression (verbal and nonverbal communication)
  - Learning (spatial relationships)
  - Impulse control, busy behavior
  - Organizational abilities
  - Social immaturity with emotional lability
  - Anxiety, separation anxiety
  - Motor coordination

Why?

Can we predict who will be affected?

- MRI at term in ex-preterm infants
- Cost: Canada $900; US average $2500
- Negative predictive value good for CP
- Positive predictive value less precise
- Impact on attachment and parenting
  - Disrupt attachment, perception of broken
  - Increase parental anxiety
Do Parents Want to Know?

“Brain damage. Two of the most horrific words a parent can hear.”

Doctor “compassionate but vague”

“Earth shattering, crushing information”

Should there be informed choice regarding MRI?

Rebecca Pearce, Jason Baardsnes. Life Sciences, NRC Human Health Therapeutics Portfolio, National Research Council Canada

Early Adult Outcomes

Early Adult Outcomes

- 136 kids; 1986-1990
- Survival 64%
- Follow up rate 82%
- Telephone questionnaire-27 item
- 88% High School Graduates
- 52% Assistance (Special Ed, Tutor, IEP)
- 56% enrolled post-secondary education
- 49% currently or formerly employed
- 17% signs depression

Our Child is Not just a gestational age. A first hand account of what parents want and need to know before a premature birth

When we were about to deliver, we did not want a long list of diagnoses and their medical explanations. We needed to know what other parents, those who were once in our position, thought about their life, their children and their family. When we read the medical literature, we generally find an exhaustive list of what preterm infants may or may not be able to do. We have NEVER found a list describing what they can do and how they enrich the lives of their families and other people who love them.
Temper discussions about the risks with words about something good happening, such as resilience, love, and the chances of healing.

It is not enough to do your best; you must know what to do, and THEN do your best.

W. Edwards Deming

Questions?