

## NICU Tidbits

### To calculate calories for:

- ❑ PIA \_\_\_ cc x \_\_\_ % dextrose x 3.4 kcal/cc = \_\_\_ kcal
- ❑ 20% IL \_\_\_ cc x 2 kcal/cc = \_\_\_ kcal (# IL cc = # gm/kg x kg 1cc/0.2gm)
- ❑ PEF 20 \_\_\_ cc x 1 oz/30 cc x 20 kcal/oz = \_\_\_ kcal

**IVF** (goal is to minimize insensible H<sub>2</sub>O loss. Remember to cut down on IVF when electrolytes stabilize and UOP ↑)

- ❑ DOL #1 – give D10W for BW > 1000gm @ 80 cc/kg/day (give D5W if baby's BW < 1000 gm @ 100 cc/kg/day), aim for GIR 4-6 mg/kg/min
- ❑ DOL #2 – give 90-100 cc/kg/day + 3 mEq NaCl/100cc + 2 mEq KCl/100cc + 200mg Ca Gluconate / 100cc
- ❑ DOL #3 – start TPN w/ D10 @ 120 cc/kg/day + 1.5 gm/kg/day protein (0.5 gm/kg/day protein for term infants)
- ❑ DOL #4 – start TPN w/ D10 @ 120-150 cc/kg/day + IL
- ❑ DOL #5 – start TPN w/ D12.5 @ 120-150 cc/kg/day + IL
  - Increase protein and IL by 0.5 gm/kg/day to a max of 3

### Caloric and Protein Goals for preterm infant

- ❑ Parenteral goals: 100-110 kcals/kg
- ❑ Enteral goals: 120 kcal/kg
- ❑ DOL#4-5 provide anabolic calories: 50-60 kcal/kg of TPN, 60 kcals/kg of enterals
- ❑ DOL#7-8 provide maintenance calories: 70-80 kcal/kg of TPN, 90-100 kcal/kg enterals
- ❑ DOL#10-14 for sustained growth calories: 100 kcal/kg & 2.5 – 3 gm/kg protein of TPN, 120 kcal/kg & 3.2 – 3.5 gm/kg protein of enterals
- ❑ Feeds should be continuous for infants < 1200 gm, bolus feeds for infants > 1200gm

### Oral Supplement

- ❑ Polycose = 2 kcal/cc, 1 teaspoon = 8 kcal
- ❑ MCT = 7.7 kcal/cc
- ❑ ML = 4.5 kcal/cc
- ❑ BM supplement (1pkt/50cc adds 2kcal/oz; 1pkt/25cc adds 4 kcal/oz)

### Vitals

- ❑ HR = 100-160, RR = 30-60
- ❑ Temp = 36.5-37.5
- ❑ BP = 40-70/20-40
- ❑ MAP for < 1 kg ≥ 30, for > 1 kg = 35-45

### Feeding Intolerance

#### Signs

1. Stomach residuals retained before each feeding > 3cc or 30% of feed volume (if bolus) or 1 hour's worth of continuous feeds
2. Vomiting or regurgitation of formula
3. Abdominal distension
4. Heme or sugar present in stool

Treatment: may require temporary cessation of feeding and assessment of patient

- ❑ When called with residuals, ask what residuals look like. If green, think obstruction. If called again with same amount of residual 3 hours later, check the baby. If can't get to baby with increased residual, check CBG. If CBG shows metabolic acidosis, then possible NEC.
- ❑ Feeding intolerance may also be a sign of anemia

## Lab Values

Na 135-145	Cl 90-120	BUN <8	} Gluc 40-150	WBC 10-30k	} Hct 40-55	} Plt 100-500k
K 3.5 - 4.5	CO2 18-22	Cr <0.8				

## For abnormal values

- ❑ K riders five over 1-2 hours, not >10 mEq/hr. Repeat K level in 4-6 hours.
  - For K 3.0-3.5 give 0.25 mEq/kg
  - 2.5-3.0 give 0.5 mEq/kg
  - 2.0-2.5 give 0.7 mEq/kg
- ❑ For mEq  $\text{NaHCO}_3 = (\text{BE}) (\text{wt}) (0.3)$  give  $\frac{1}{2}$  then recheck, or give 1-2 mEq/kg over 1 hour to correct acidosis
- ❑ Give Bicitra for metabolic acidosis, none if  $\text{pCO}_2 > 50$
- ❑ CaGluconate IV 200-500 mg/kg/day divided q 6h

**Dopamine:** (wt) (60) = mg of drug added to 100 cc solution, then 0.1 cc/hr = 1 mcg/kg/min

**Surfactant Deficiency:** see ground glass, air bronchograms on CXR. After 28 days on vent develop BPD. Can extubate w/ IMV Rt 10-12 &  $\text{CO}_2$  40-50

**HFOV:** key = recruitment of alveoli; -for oxygenation:  $\uparrow$  MAP and  $\text{FiO}_2$ ; - for ventilation,  $\uparrow$  Amp ( $\Delta P$ ) and  $\downarrow$  Freq (Hz)

## Sepsis

- ❑ Think sepsis when feeding intolerance, temp instability, respiratory distress, tachycardia, I:T ratio >0.2 (bands / bands + neutrophils)
- ❑ Antibiotics- Ampicillin and Gentamycin, Cefotaxime, or Vancomycin

**Jaundice** – phototherapy to start at bili level that is 5% of birth weight; exchange transfuse at levels that are 10% of birth weight

**Lines-** for UAC, hi = above diaphragm @ T6 – T10, Lo = L3 – L4; for UVC, above diaphragm

## Weights for:

Open crib ~ 1700-1750 gm. Nipple ~ 1500 gm. D/C home from level II = 1850 gm. Admit to level I = 2100gm.

To go from level III to II = 1000gm.

In well baby, vag d/c at 36 hrs, c/s d/c at 72 hrs

All level II and III get BAER & CPR.

ROP Ophthalmology Consult for <1500gm at 6-7 wk old (especially important around 35 WGA).

HUS for <32WGA on DOL# 7-10

Routine NICU Issues:

**1. Weight Criteria**

<u>Event</u>	<u>Weight</u>
Transition IIR → Step down	1000gm if doing well/nippling (1250gm expected)
Isolette → open crib	1750 gm/nippling all feeds/holding temperature
Admit to Level I (Well Baby)	2000 gm (2100gm at University)
Discharge from Level II	1850 gm

**2. Studies/Interventions**

Feeding and Formula Transition

Nipple coordination develops at 1500gm/35WGA, order OT for nipple assistance, non-nutritive sucking. Watch for residuals of >30% of feeds or 10-15cc. If tolerating increase, you may increase by 20% every day. Plot weekly Sunday growth parameters on the growth chart graphic.

Consider transitioning from premature formula to Neosure 22 around 1800-2000gm when patient starts taking BIG volumes (ie 200 cc/kg/day) and doesn't need the extra Ca + P. End point for premature formula is 3-3.5 kg

BAER (Brainstem Auditory Evoked Response)

Order if <35WGA/IIR/Sick?Aminoglycoside or Lasix to assess sensorineural hearing baseline. If abnormal, must repeat in three months.

ROP (Retinopathy of Prematurity) Evaluation

65% of infants less than 1250gm develop some stage of ROP which is an interruption of the normally developing retinal vasculature. Retinal vessels begin formation at 16 WGA and complete around 40-44 WGA. Routine screening if <1800gm (AAP guidelines are <1500gm or if unstable.oxygen therapy).

Stage I	line formation between retina and avascular zone
Stage II	line becomes a ridge
Stage III	fibrovascular proliferation with ridge
Stage IV	Fibrosis/Scarring ("cicatrices") and neovascularization into vitreous. Traction on retina causes detachment.
+ disease	Vessels posterior to ridge become dilated and tortuous (neovascularization)

First exam done at 5 weeks or 31-33 weeks PCA with follow-up exams every 2-4 weeks until retinal maturity. If ROP: exam every 1-2 weeks. Treat with cryopexy (Stage III+) or laser surgery and follow every 1-2 years if regressed.

HUS (Head Ultrasound)

Order DOL#1 if cardiac defect/prenatal asphyxia/traumatic delivery

Order DOL#7-10 if <34WGA or <1500gm

If HUS demonstrates Grade I or II, repeat in 1 week. If IVH has resolved, get one more in one month or at discharge

If HUS demonstrates Grade III or IV IVH, then repeat every week.

Periventricular Leukomalacia should be screened for at 1 month by HUS even if patient had only a Grade I or II

Labs:

Week #1: BMP on DOL #3-4 if on TPN      Week #2 CMP mon/thurs      Week #3 CMP qowweek

If on TPN, need CMP/liver enzymes q week; get a TG when changes to lipids are made daily. Keep TG <150 in liver disease, <200 otherwise. If at risk, start at only 0.5gm/kg.

(Don't forget Alk Phos→ if high, may be leaching Ca/P from bone and gut and the labs to check for biliary sludging if on TPN). Don't forget to check the GIR (Glucose Infusion Rate) when stepping up the glucose infusion—should be around 8-11 for preemies.

Radiology:

CXR daily for cardiac kids in IIR; all others use clinical judgement. Daily ETT "placement check" alone not enough. If on HFOV, then q6hour CXR for 48-72hrs, then q 12-q day.

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Apnea: (Sleep Study lab 988-5345)

Apnea is defined as 20 seconds in preemies, 15 seconds in term infants. 65% of preemies have a degree of apnea due to an abnormal response to hypoxia and hypercarbia. Apnea of prematurity seen usually at 28-34 WGA with benefits from methylxanthenes (Theophylline) or caffeine.

*On theophylline:* check a level 2 hours after the 5<sup>th</sup> dose; therapeutic is 10-12 mcg

Central apnea = no gas flow or respiratory effort. Mixed apnea is a combination of both.

Obstructive apnea = no gas flow but respiratory effort.

With history of apnea, patients need overnight sleep study prior to discharge. It will determine if they need home oxygen therapy and an apnea monitor. If meds discontinued, must be off for 21 weeks before sleep study.

Discharge Admin Stuff:

Ensure nipple all feeds ad lib and transitioned to discharge formula (ie Neosure 22 from PEF)

BAER (ideally 48 hours prior to d/c)—if abnormal, needs repeat BAER outpatient in 3 months.

ROP exam (if possible, get exam prior to d/c rather than as outpatient for ease of parents)

Sleep Study—fill out parameters before sleep study/need prescriptions for oxygen and apnea monitor on d/c

Rooming-in arrangement for parents: must write orders before the evening of rooming in

Child Net (get from Witt, social services)

CPR training for parents (taught by RNs)

Social Services as needed (home health forms, special formula prescription for Neosure 22, WIC 17 form)

Dictation completed

Verify Synagis and immunization status. (BATCH synagis doses for babies in NICU)

Neonatal Screening labs (PKU, Thyroid, Sickle Cell)

Reminders from Orientation

**Admin:** Write doses as 0.3 not .3 and in mg NOT cc's tell nurses face-to-face immediately after you write them

Ensure all notes have patient stamp.

In level II: don't write notes at the nurse station; use conference room or computer room.

Wear your ID tag and please introduce yourself to family (baby too if you feel like it)

Please eat only in the conference room or in the kitchen; clean up after yourself in the conference room.

On admit, consent for blood, PICC line, and general treatment. Nitric oxide needs consent.

HC/Wt/Length measured every Sunday by RN (must order this at UH); plot every week

Coordinate exams and attempt to do it around 7:30 ish if possible

Discharge planning at Tulane Wed 1:30; a representative from the med team must be there

**ID:** Scrub when entering the NICU; if wearing long sleeves, roll them up to elbows.

Wash hands before and after you touch the baby. No rings/watches.

Must send Synagis orders in a BATCH (dose is 15mg/kg)

**Betteisms:** Limit exams to one person if possible on fragile babies; no students on <750gm

All babies will be on TPN by DOL#2 if expected to be NPO>4d unless genetics kid.

No PRBCs unless the baby is symptomatic.

Use survanta as surfactant 1<sup>st</sup> line, Infasurf only for <750gm, PPHN, etc.

NNPs are limited to 8 patients.

Use double-lumen UVC, single-lumen UAC and remove by 21-28 days.

**Genetics Issues**  
NICU

**I. Scheduling Genetics Patients for Follow-up**

Call Kelly Jackson, Genetic Counselor/Clinic Coordinator (988-7680). She will quarterback the patients into the correct clinic. We also go to regional clinics in Lafayette, Hammond/Amite, Baton Rouge, wherever the family tree doesn't branch.

**II. Dietary Questions**

There is a genetics dietary nutrition specialist dedicated to *genetic patients only*. Her name is Amy Cunningham (988-2989). This is critical for IEM/PKU patients. Do not bother the poor pediatric nutritionists—they don't care about Benzoate and Phenylacetate any more than you do.

**III. Genetic In-House Consults**

If STAT (suspected IEM, etc), attending staff should call the on-call geneticist. If a "routine" consult, the resident should call the staff geneticist to briefly discuss the case; it's a good opportunity for teaching points/correct lab determinations to be made. *Please remember to have your growth parameters and family history prior to your call.*

**IV. Tests that you may be interested in ordering are: (\* = denotes tests that need to come to Hayward)**

TEST	Source/Amount	Tube	Transport	Purpose
Ammonia	<b>Free flowing blood</b> 1-2 ml	green	Ice Immediately!	Hyperammonemia; r/o IEM, urea cycle defect
Lactic Acid	<b>Free flowing blood</b> 1-2 ml	gray	Ice	Lactic acidosis; r/o IEM
Serum Organic Acids*	1-3 ml blood	green	Refrigerate	IEM
Urine Organic Acids*	15-20 cc urine	N/A	Refrigerate or freeze	IEM, especially if ammonia low
Urine Thin Layer Chromatography	15-20 cc urine	N/A	Refrigerate or freeze	Tests for: Mucopolysaccharides, Oligosaccharides, Mono/Di Sugars  (Urine Reducing Substances are the initial SCREENING test)
Prometaphase Chromosomes*	3 ml blood	green	Room temp	Numeric abnormality; must ask for cytogenetic/molecular for Fragile X
FISH Probes*	4-6ml blood	green	Room temp	Test for specific Dz by probe: (examples, but not limited to):  DiGeorge 22q11 Kallman Xp22 Prader Willi/Angelman 15q11-13 Williams 7q Wolf-Hirschhorn 4p16 Retinoblastoma 13q14
Enzyme Studies*	Blood (WBC/Plasma)	green	Immediately refrigerate	Disease-dependent such as: Tay-Sachs Krabbe Gaucher Biotinidase Galactosemia