COMMON PROBLEMS IN NEONATAL CARE

รศ.พญ.ผกาพรรณ เกียรติชูสกุล
หน่วยการกั้นเกิด ภาควิชาการแพทย์ศาสตร์
คณะแพทยศาสตร์ มหาวิทยาลัยขอนแก่น
HIGH - RISK NEWBORNS

1. Risk factors
2. Classification
   A. Prematurity
   B. SGA / IUGR
   C. LGA
   D. Post term
<table>
<thead>
<tr>
<th>ลำดับ</th>
<th>รายการ</th>
<th>ค่า</th>
<th>หมายเหตุ</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Name</td>
<td>ศรีสุภัทร์ ไม้ไทย</td>
<td></td>
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<tr>
<td>2</td>
<td>Address</td>
<td>ขั้วเทือก .isNotEmpty</td>
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<tr>
<td>3</td>
<td>Phone</td>
<td>081-123-4567</td>
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<td>4</td>
<td>Email</td>
<td><a href="mailto:email@domain.com">email@domain.com</a></td>
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<td>5</td>
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<tr>
<td>6</td>
<td>DOB</td>
<td>01-01-1990</td>
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</tr>
<tr>
<td>7</td>
<td>Blood Type</td>
<td>AB+</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Allergies</td>
<td>Penicillin</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Medications</td>
<td>Aspirin, Ibuprofen</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Medical History</td>
<td>Hypertension, Diabetes</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Observation</td>
<td>P: 110/70, R: 12</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Temperature</td>
<td>37.2°C</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Heart Rate</td>
<td>70 BPM</td>
<td></td>
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<tr>
<td>14</td>
<td>Respiratory Rate</td>
<td>16 RMP</td>
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<tr>
<td>15</td>
<td>Laboratory Results</td>
<td>WBC: 8,000, Hb: 13.0</td>
<td></td>
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<tr>
<td>16</td>
<td>Imaging Results</td>
<td>Chest X-Ray: Normal</td>
<td></td>
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<tr>
<td>17</td>
<td>Other Notes</td>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>
NEWBORN MATURITY RATING and CLASSIFICATION

ESTIMATION OF GESTATIONAL AGE BY MATURITY RATING

Symbols: X - 1st Exam 0 - 2nd Exam

NEUROMUSCULAR MATURITY

Gestation by Dates ______ wks
Birth Date ______ Hour ______ pm
APGAR ______ min ______ min

MATUREITY RATING

Scored Weeks

5 26
10 28
15 30
20 32
25 34
30 36
35 38
40 40
45 42
50 44

PHYSICAL MATURITY

SCORING SECTION

1st Exam = X 2nd Exam = 0

Estimating Gest Age by Maturity Rating ______ Weeks ______ Weeks

Time of Exam
Date ______ am
Date ______ am

Age at Exam ______ Hours ______ Hours

Signature of Examiner M.D. M.D

NEONATAL UNIT
SRINAGARIND HOSPITAL, KKU.

Adapted from Taksaphan S., Pengsaa K., et al: Intrauterine growth of Northeastern Thai Infant.
Case
HYPOGLYCEMIA

- Glucose level rapidly fall to low point in the first 1-2 hrs
- Depends on the infant’s gestational age and risk factors
- Absence of overt symptoms at low glucose level does not rule out CNS injury
- No single value which brain injury definitely occurs
HYPOGLYCEMIA

Etiology

1. Increased utilization of glucose: hyperinsulinism

- IDM
- Erythroblastosis
- Islet-cell hyperplasia
- Beckwith–Weidemann syndrome
- Insulin-producing tumor
- Maternal tocolytic therapy
- Maternal chlorpropamide therapy
- Malpositioned UAC
- Abrupt cessation of high-glucose infusion
- After exchange transfusion
Etiology (cont.)

2. Decreased production/stores

- Prematurity
- IUGR
- Inadequate caloric intake
Etiology (cont.)

3. Increased utilization and /or decreased production or other causes

- Perinatal stress
- Exchange transfusion
- Defects in carbohydrate amino acid metabolism
- Endocrine deficiency
- Polycythemia
- Maternal therapy with propranolol
HYPOGLYCEMIA

Diagnosis

Symptoms, nonspecific

- Lethargy, apathy, limpness
- Apnea
- Cyanosis
- Weak or high-pitched cry
- Poor feeding, vomiting
- Tremors, jitteriness, irritability
- Seizure, coma
Diagnosis (cont.)

- Confirmatory laboratory glucose

- Serial blood glucose level should be routinely measured in infants who have risk factors

- Rare causes of hypoglycemia should be considered if persistent hypoglycemia or need large glucose infusions over 1 week
Screening and Management of Postnatal Glucose Homeostasis in Late Preterm and Term SGA, IDM/LGA Infants

([LPT] Infants 34 – 36\textsubscript{0/7} weeks and SGA (screen 0-24 hrs); IDM and LGA ≥34 weeks (screen 0-12 hrs))

### Symptomatic and <40 mg/dL → IV glucose

### ASYMPTOMATIC

<table>
<thead>
<tr>
<th>Birth to 4 hours of age</th>
<th>4 to 24 hours of age</th>
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</thead>
<tbody>
<tr>
<td><strong>INITIAL FEED WITHIN 1 hour</strong></td>
<td><strong>Continue feeds q 2-3 hours</strong></td>
</tr>
<tr>
<td>Screen glucose 30 minutes after 1\textsuperscript{st} feed</td>
<td>Screen glucose prior to each feed</td>
</tr>
<tr>
<td>Initial screen &lt;25 mg/dL</td>
<td>Screen &lt;35 mg/dL</td>
</tr>
<tr>
<td>Feed and check in 1 hour</td>
<td>Feed and check in 1 hour</td>
</tr>
<tr>
<td>&lt;25 mg/dL</td>
<td>25–40 mg/dL</td>
</tr>
<tr>
<td>IV glucose*</td>
<td>Refeed/IV glucose* as needed</td>
</tr>
<tr>
<td>25–40 mg/dL</td>
<td>&lt;35 mg/dL</td>
</tr>
<tr>
<td>IV glucose*</td>
<td>Refeed/IV glucose* as needed</td>
</tr>
<tr>
<td>&lt;35 mg/dL</td>
<td>35 – 45 mg/dL</td>
</tr>
</tbody>
</table>

#### Target glucose screen ≥45 mg/dL prior to routine feeds

*Glucose dose = 200 mg/kg (dextrose 10\% at 2 mL/kg) and/or IV infusion at 5–8 mg/kg per min (80–100 mL/kg per d). Achieve plasma glucose level of 40-50 mg/dL.

Symptoms of hypoglycemia include: Irritability, tremors, jitteriness, exaggerated Moro reflex, high-pitched cry, seizures, lethargy, floppiness, cyanosis, apnea, poor feeding.

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Management

1. Well infants at risk
   • Feeding in first hr, if <25 mg/kg re-feeding >if <25 : IV

2. Symptomatic infants who cannot tolerate oral feeding, failed oral feedings
   • Glucose 200 mg/kg IV over 1 min
     maintain with GIR 5-8 mg/kg/min
   • If GIR >12 mg/kg/min: persistent hypoglycemia
   • Before administering hydrocortisone, obtain blood sample for insulin and cortisol levels
POLYCYTHEMIA

DEFINITIONS

- Venous haematocrit >65%
- Capillary haematocrit 5-20% higher than venous haematocrit
- Increase viscosity
- Decrease blood flow
- Decrease oxygen transport
POLYCYTHEMIA

CAUSES

A. PLACENTAL RED CELL TRANSFUSION

Delayed cord clamping
Holding the baby below the mother
Twin - to - twin transfusion
B. PLACENTAL INSUFFICIENCY

SGA infants

Maternal hypertension, chronic hypoxia

Post-mature infants

Pregnancy at high altitude

Maternal smoking
CAUSES OF POLYCYTHEMIA (CONT.)

C. OTHER CONDITIONS

IDM

Some LGA infants

Infants with CAH, Trisomy 21, 13, 18

Dehydration of infant
POLYCYTHEMIA

CLINICAL FINDINGS

- Most infants asymptomatic
- CNS
- Cardiorespiratory
- Renal
- Other: thrombocytopenia, jaundice, hypoglycemia, NEC, DIC
POLYCYTHEMIA

Management

A. Symptomatic infants

Venous Hct > 65%: partial exchange transfusion

B. Asymptomatic infants

Venous Hct > 65-70%: increase fluid intake

Repeat Hct 4-6 hr

Venous Hct > 75%: partial exchange transfusion
POLYCYTHEMIA

PARTIAL EXCHANGE TRANSFUSION

Volume of exchange = (Observed Hct - Desired Hct) \times BW \times 80

\begin{align*}
\text{ Observed Hct } & \quad \text{BW} \quad \text{80} \\
\text{Desired Hct 50 - 55\%} & \\
\text{Normal saline}
\end{align*}
ANEMIA

PHYSIOLOGIC ANEMIA OF INFANCY

- Erythropoietin levels
- Short half life of red blood cell
- Hb levels reach nadir at 8-12 weeks, active erythropoiesis
ANEMIA

ANEMIA OF PREMATURITY

a. RBC mass decreased after birth
b. Hb nadir earlier than in term infant
   RBC survival decreased
   Relatively more rapid rate of growth
   Vitamin E deficiency
c. Nadir Hb in premature is lower than in term infants
ANEMIA

ETIOLOGY OF ANEMIA IN THE NEONATE

A. blood loss: ↓or ± Hct, ↑or ± retic, ± bilirubin

Obstetric causes of blood loss
Occult blood loss
Bleeding in the neonatal period
Iatrogenic causes
ANEMIA

DIAGNOSIS

A. History: obstetric

B. Physical examination
   Acute blood loss
   Chronic blood loss
   Chronic hemolysis

C. Laboratory: CBC, reticulocyte count
ETIOLOGY OF ANEMIA IN NEONATE (CONT.)

B. Hemolysis: ↓Hct, ↑retic, ↑bilirubin

Immune hemolysis
Hereditary RBC disorders
Acquired hemolysis
ETIOLOGY OF ANEMIA IN NEONATE (CONT.)

C. Diminished production: ↓Hct, ↓retic, ± bilirubin

- Diamond - Blackfan syndrome
- Congenital leukemia
- Infections
- Drug - induced RBC suppression
- Physiologic or anemia of prematurity
ANEMIA

THERAPY

A. TRANSFUSION

B. PROPHYLAXIS: PREMATURE INFANTS

Iron supplement

Vitamin E until the baby is PCA 38-40 week’s

Recombinant human erythropoietin
RESPIRATORY DISORDERS

- RDS
- Congenital pneumonia
- TTNB
- MAS
- Pneumothorax
- Apnea
RESPIRATORY DISTRESS

Definition
RR > 60/min, cyanosis, retraction, expiratory grunts, flaring of alae nasi

Etiology
• Pulmonary disorders
• Extrapulmonary disorders
# RESPIRATORY DISTRESS

## Pulmonary Disorders

<table>
<thead>
<tr>
<th>Common</th>
<th>Less Common</th>
<th>Uncommon</th>
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<tbody>
<tr>
<td>RDS</td>
<td>pulmonary hemorrhage</td>
<td>congenital lung cysts, tumors</td>
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<tr>
<td>TTNB</td>
<td>diaphragmatic hernia</td>
<td>congenital lobar emphysema</td>
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<tr>
<td>MAS</td>
<td>pulmonary hypoplasia/agenesis</td>
<td>tracheoesophageal fistula</td>
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<tr>
<td>congenital pneumonia</td>
<td>upper airway obstruction</td>
<td>pulmonary lymphangioleciatasis</td>
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<tr>
<td>pneumothorax/air leak</td>
<td>abdominal distention</td>
<td>tracheal lesions</td>
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<td></td>
<td>tracheomalacia</td>
<td>rib cage anomalies</td>
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<tr>
<td></td>
<td>pleural effusion/chyloothorax</td>
<td>extrinsic masses</td>
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</table>
## RESPIRATORY DISTRESS

### Extrapulmonary Disorders

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<tr>
<th>cardiovascular</th>
<th>metabolic</th>
<th>neurologic/muscular</th>
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<tbody>
<tr>
<td>hypovolemia</td>
<td>acidosis</td>
<td>cerebral edema</td>
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<tr>
<td>anemia</td>
<td>hypoglycemia</td>
<td>cerebral hemorrhage</td>
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<tr>
<td>polycythemia</td>
<td>hypothermia</td>
<td>drugs</td>
</tr>
<tr>
<td>PPHN</td>
<td>hyperthermia</td>
<td>muscle disorders</td>
</tr>
<tr>
<td>cyanotic heart disease</td>
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<td>spinal cord diseases</td>
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<tr>
<td>congestive heart failure</td>
<td></td>
<td>phrenic nerve damage</td>
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</table>
Respiratory Distress Syndrome (RDS)

Perinatal Risk Factors

A. Factors that affect lung development at birth

- Prematurity
- Maternal diabetes
- Genetic factors
Perinatal Risk Factors (cont.)

B. Factors that may impair surfactant production, release, or function

- Perinatal asphyxia
- Antepartum hemorrhage
- Second-born twins
- C/S without labor
Respiratory Distress Syndrome (RDS)

Prenatal Prediction

A. Prenatal prediction of lung maturity by tests

B. Maternal glucocorticoid treatment

- GA < 34 weeks or lung immaturity
- Betamethasone or dexamethasone
- Lower incidence of RDS, PDA, IVH
Respiratory Distress Syndrome (RDS)

Postnatal Diagnosis

• Clinical signs shortly after birth
• Tachypnea, retractions, grunting, cyanosis
• CXR - low volume lungs with diffuse reticulogranular pattern and air bronchograms
Respiratory Distress Syndrome Management

A. Oxygen
- Maintain $\text{PaO}_2$ 50-80 mmHg

B. CPAP
- Prevent atelectasis
- Decrease lung edema
- Preserve functional properties of surfactant

C. Mechanical ventilation

D. Surfactant replacement therapy
Management (cont.)

E. Supportive therapy

• Temperature
• Fluid and nutrition - monitoring of serum electrolytes and body weight
• Circulation
• Possible infection - broad spectrum antibiotics for 48 hours > off if negative culture
Respiratory Distress Syndrome

Complications

A. Acute complications
  - Air leak
  - Infection
  - Intracranial hemorrhage
  - PDA

B. Long-term complications
  - CLD
  - ROP
  - Neurologic impairment
dangerous to infant retina
NEONATAL PNEUMONIA

- Intra-amniotic infection
- PROM
- Hematogenous or transplacental spread
- Common pathogens
  - GBS, E.coli, Klebsiella
NEONATAL PNEUMONIA

Risk Factors

- Rupture of membranes > 18 hours
- Maternal intrapartum fever > 38°C
- Chorioamnionitis, triple I
- Preterm
- Maternal GBS carrier
NEONATAL PNEUMONIA

Management

• Empirical therapy: ampicillin and gentamicin
• Blood culture-negative pneumonia: 10 days
Case

The patient, a male infant of 37 weeks' gestation, weighed 3,200 grams at birth. The birth was by C/S due to previous C/S, with Apgar scores of 8 and 9 at 1 and 5 minutes, respectively. The infant had tachypnea 1 hour after birth with body temperature (BT) of 36.7°C, heart rate (HR) of 165/min, and respiratory rate (RR) of 80/min.
Transient Tachypnea of the Newborn

• Delayed clearance of lung fluid
• Common, mild, self-limited disorder
• Usually affecting near-term or term infants
• Characterized by tachypnea with mild retractions and mild cyanosis
Transient Tachypnea of the Newborn

Risk Factors

- Premature
- Precipitous birth
- Operative delivery without labor
- Male sex
- Excessive maternal sedation, maternal fluids
Transient Tachypnea of the Newborn

Radiographic Findings

- Mild to moderate cardiomegaly
- Prominent perihilar streaking
- Increased lung volume
- Fluid in minor fissure, pleural space
- Usually resolve within 48-72 hrs
Transient Tachypnea of the Newborn

Management
A. Oxygenation
B. Feeding
   RR < 60/min - oral feeding
   RR 60-80/min - orogastric tube feeding or IV
C. Diuretics
   not effective
การเพิ่มชาย อาฤุครรภ์ 41 สัปดาห์ น้ำหนักแรกเกิด 3,100 กรัม คลอดโดย C/S เนื่องจาก fetal distress with MSAF หลังคลอดทารก non vigorous ช่วยหายใจด้วยแรงดันมาก 30 วินาที Apgar scores 5, 7 ที่ 1 และ 5 นาที ทำมีอาการหายใจลำบากหลังคลอดได้รับการใส่อช่วยหายใจ
MECONIUM ASPIRATION SYNDROME

CAUSE

Acute or chronic hypoxia

Passage of meconium in utero

Rarely occur prior to 37 weeks’ gestation
MECONIUM ASPIRATION SYNDROME

DIAGNOSIS

History of meconium stained amniotic fluid
Meconium in trachea by direct suction
Respiratory distress
Abnormal chest X-ray
Meconium present?

- Yes
  - No longer advise routine intrapartum oropharyngeal and nasopharyngeal suctioning

- No
  - Baby vigorous?*
    - Yes
      - Endotracheal suction immediately
    - No
      - Continue with remainder of initial steps
        - Clear mouth and nose of secretion
        - Dry, stimulate, and reposition
        - Give O₂ (as necessary)

*strong respiratory effort, good muscle tone, and HR>100 bpm
Management

A. Broad-spectrum antibiotics
B. Thermal environment
C. Obstruction, chemical pneumonitis
D. Oxygen therapy, CPAP
E. Mechanical ventilation
MECONIUM ASPIRATION SYNDROME

COMPLICATIONS

Air leak
Pneumothorax
Pneumomediastinum
Pulmonary hypertension
PPHN
PNEUMOTHORAX

- Spontaneous pneumothorax
  0.07% of healthy neonates
- 1/10 symptomatic
- Associated urinary tract abnormalities, PPV
PNEUMOTHORAX

Diagnosis

A. physical examination

- Respiratory distress
- Cyanosis
- Asymmetrical expansion of chest
- Episodes of apnea and bradycardia
- Mediastinum shift
- Diminished or distance breath sounds
- Alterations in vital signs
Diagnosis (cont.)

B. Arterial blood gases
decrease PO$_2$ and increase PCO$_2$

C. Chest X-rays

D. Transillumination

E. Ultrasound
PNEUMOTHORAX

TREATMENT

Conservative therapy

Needle aspiration

Chest tube drainage
APNEA

- Cessation of respiration > 20 seconds
- Accompanied by bradycardia or cyanosis
- Increase incidence with decreasing GA
- Generally begin at 1 or 2 days of life
- Generally cease by term
APNEA

PATHOGENESIS

Developmental immaturity
Chemoreceptor response
Reflexes
Respiratory muscles
APNEA

ETIOLOGY

A. PRIMARY APNEA OF PREMATURITY

B. SECONDARY APNEA

- Infection
- Metabolic disturbance
- IVH
- Anemia, polycythemia
- RDS
- Hypo or hyperthermia
- Drugs
- Airway obstruction
- Seizure disorder
- GER
Types of Apnea

Central apnea
Obstructive apnea
Mixed apnea
APNEA

TREATMENT

Severity and frequency

Treat underlying cause

Avoid reflexes that may trigger apnea

Nasal CPAP

Drug therapy

  methylxanthines, caffeine citrate

Mechanical ventilation