Assessment of the Newborn

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Learning objectives:
- Describe scales used in neonatal assessment
- Identify the purposes for neonatal assessment scales
- Explain the significance of scores from neonatal scales.
- Describe normal physical features of neonates.
- Describe abnormal physical features of neonates.
- Explain the significance of abnormal physical findings
- Describe normal neurologic responses of neonates.
- Identify normal physiologic features of neonates
- Describe characteristics of normal neonatal blood
- Describe normal gestational age to weight relationships

Apgar score
- Used to assess general condition
- Rated at one minute and five minutes post-partum
- Components
  - Color
  - Heart rate
  - Reflex activity
  - Activity
  - Respirations

Apgar score

<table>
<thead>
<tr>
<th>Component</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>cyanosis</td>
<td>peripheral cyanosis</td>
<td>pink</td>
</tr>
<tr>
<td>Heart rate</td>
<td>none detectable</td>
<td>&lt;100</td>
<td>&gt;100</td>
</tr>
<tr>
<td>Respiratory effort</td>
<td>apnea</td>
<td>irregular, shallow</td>
<td>crying</td>
</tr>
<tr>
<td>Reflex</td>
<td>none</td>
<td>grimace (withdraw)</td>
<td>crying</td>
</tr>
<tr>
<td>Muscle tone</td>
<td>flaccid</td>
<td>some flexion</td>
<td>well-flexed</td>
</tr>
</tbody>
</table>

Dubowitz- Ballard scale- estimation of gestational age
- Physical signs
  - Skin
  - Breast
  - Lanugo
  - Eye/ear
  - Plantar surface
  - Genitalia

Dubowitz- Ballard Scale

<table>
<thead>
<tr>
<th>Gestational age/ score</th>
<th>24-26 wk score = 0</th>
<th>35-40 wk score = 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin</td>
<td>gelatinous, red, translucent</td>
<td>parchment, deep cracks, no visible vessels</td>
</tr>
<tr>
<td>Lanugo</td>
<td>sparse</td>
<td>mostly bald</td>
</tr>
<tr>
<td>Plantar surface</td>
<td>no crease</td>
<td>creases over entire sole</td>
</tr>
<tr>
<td>Breast</td>
<td>barely perceptible</td>
<td>full areola; 5-10 mm bud</td>
</tr>
<tr>
<td>Eye and ear</td>
<td>lids open, pinna flat &amp; stays folded</td>
<td>thick cartilage, ear stiff</td>
</tr>
<tr>
<td>Genitalia-male</td>
<td>scrotum empty, faint rugae</td>
<td>testes pendulous deep rugae</td>
</tr>
<tr>
<td>Genitalia-female</td>
<td>prominent clitoris small labia minora</td>
<td>majora cover clitoris and minora</td>
</tr>
</tbody>
</table>
**Dubowitz-Ballard scale- neuromuscular signs**

- **Posture**
  - ✓ degree of extremity flexion
  - ✓ greater flexion ==> maturity

- **Popliteal angle**
  - ✓ angle of knee, with thigh on chest
  - ✓ lesser angle (90 degrees) ==> maturity

- **Square window**
  - ✓ flexion of hand to forearm
  - ✓ greater flexion (0 degrees) ==> maturity

- **Scarf sign**
  - ✓ put hand on opposite shoulder
  - ✓ lesser travel of elbow across midline ==> maturity

- **Arm recoil**
  - ✓ recoil of arm after full extension
  - ✓ full recoil ==> maturity

- **Heel-to-ear**
  - ✓ non-forceful movement of heel toward ear
  - ✓ greater distance between heel and ear ==> increased maturity

**Dubowitz-Ballard scoring**

- Physical signs scored on 0- 4 scale
- Neuromuscular signs scored on minus 1- 5

- **Maturity ratings**
  - ✓ 0 24 weeks
  - ✓ 10 28 weeks
  - ✓ 20 32 weeks
  - ✓ 30 36 weeks
  - ✓ 40 40 weeks
  - ✓ 50 44 weeks

**Normal physical features**

- **Lanugo-- fine hair**
- **Peripheral cyanosis- due to reduced peripheral perfusion**
- **Vernix caseosa-- white coating**
- **Fontanelles-- anterior, posterior**
- **Physiologic jaundice- > 24 hrs post-partum**
- **Telangiectatic nevi-- “stork bites”**
- **Minimal ecchymoses & petechiae**

**Respirations**

- ✓ normal RR = 30-60/min
- ✓ auscultation ==> sounds transmitted easily across small chest
- ✓ periodic breathing (apnea < 10 sec) common in preterm newborns- non-pathologic

**Silverman Respiratory Status Index**

- ✓ Synchrony of upper & lower chest - see-sawing = 2
- ✓ Nasal flaring - marked = 2
- ✓ Lower chest retractions = marked intercostal retractions = 2
- ✓ Xiphoid retractions - marked retraction of skin over xiphoid = 2
- ✓ Expiratory grunt - audible to ear = 2

**Cardiovascular assessment**

- ✓ HR = 120 - 160 /min
- ✓ auscultate for murmurs- abnormal blood flow
- ✓ brachial pulses compared to femoral for equal intensity
- ✓ BP (term infant) = 50-70/25-50
- ✓ umbilical stump- 2 arteries, 1 vein

**Neurologic response- reflexes**

- ✓ Grasp- grasps with hand
- ✓ Suck
- ✓ Rooting- turns head to suck
- ✓ Moro- response to falling
Abnormal features
► Meconium stains
► Flaring, grunting, retractions
► Central cyanosis
► Icterus (jaundice) < 24 hours PP
► Fontanelles
  ✔ bulging ==> increased ICP
  ✔ sunken ==> dehydration
► Upper extremity immobility
  ✔ Broken clavicles
  ✔ Brachial plexus injury
► Facies
  ► micrognathia (small mandible)
  ✔ microstomia (small mouth)- trisomy 18
  ✔ cleft lip, palate

Abnormal features
► Simian crease- single palmar crease
  ✔ present in some normal infants
  ✔ common in trisomy 21
► Gastroschisis- externalized, uncovered bowel
► Omphalocele
  ✔ bowel covered with peritoneum
  ✔ associated with other anomalies
► Spina bifida- exposed spinal cord
► Hydrocephaly- cerebral edema

Normal physiologic features
► Ventilatory mechanics
  ✔ Lung compliance = .004 L/cmH2O
  ✔ High chest wall compliance ==> decreased support of lung expansion by chest wall
  ► thoracic retractions- early sign of distress
  ✔ Airway resistance = 29 cm H2O/L/sec
  ✔ Inspiratory flow = 3-6 L/min

Umbilical arterial gases

<table>
<thead>
<tr>
<th></th>
<th>20 min</th>
<th>1 hour</th>
<th>4 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>7.35</td>
<td>7.40</td>
<td>7.40</td>
</tr>
<tr>
<td>PaCO2</td>
<td>35</td>
<td>30</td>
<td>35</td>
</tr>
<tr>
<td>PaO2</td>
<td>50-65</td>
<td>50-65</td>
<td>65-70</td>
</tr>
</tbody>
</table>

Neonatal Blood
► Fetal Hb
  ✔ Higher affinity for O2 than adult Hb
  ✔ Present, with adult Hb up to 1 yr.
► initial CBC (term)
  ✔ Hb = 16.5
  ✔ Hct = 50
  ✔ WBC = 18,000
► Immunoglobulins
  ✔ IgG from mom while in utero
  ✔ IgA from breast milk
  ✔ newborn starts developing IgG post-natally
  ✔ increased IgM ==> intrauterine infection

Weight/gestational age relationships
◆ Appropriate for gestational age (AGA)
◆ Small for gestational age (SGA)
◆ Large for gestational age (LGA)

Weight
Moderately low (MLBW) 1501-2500g
Very low (VLBW) 1001-1500g
Extremely low (ELBW) <1000g

References