1. General Presentation

Respiratory distress is a clinical condition characterized by the presence of one or more signs of increased work of breathing including: tachypnea, nasal flaring, grunting, and chest wall retractions. It is vital to recognize these signs early and alleviate respiratory distress in the newborn because the patient can rapidly deteriorate to respiratory failure. Some of the underlying causes of respiratory distress include upper and lower airway diseases, lung diseases, and poor respiratory effort secondary to central nervous system dysfunction. Risk factors for developing respiratory distress vary depending on the underlying cause.

2. Questions to ask

Initial assessment of newborns in respiratory distress should begin by evaluating the ABC’s (airway, breathing, circulation). Only then should you move onto the history and physical exam. Even though respiratory distress is a clinical sign, details from the patient’s history are critical in formulating the differential diagnosis. When faced with a newborn, asking about the pregnancy, labor and delivery are especially important since these questions can elicit risk factors for the various causes of respiratory distress in the newborn.

a) History of Presenting Illness
   - Onset (acute vs. insidious)
   - Timing
   - Severity (improving, deteriorating)
   - Associated symptoms (cough, relation to feeds, emesis etc.)

b) Past Medical History
   - Maternal/Obstetric History: prenatal fetal assessments (ultrasound, amniocentesis, triple screen), Group B Streptococcus (GBS) status, maternal diabetes, infections, toxic exposures, medications
- **Labour and Delivery**: fetal monitoring (HR, beat to beat variability, decelerations), prolonged rupture of membranes, maternal fever, vaginal delivery vs. Caesarian section, gestational age, use of forceps/vacuum, complications (trauma, meconium, asphyxia)
- **Neonatal period**: APGAR scores, need for resuscitation

3. **Differential Diagnosis**

   - Pulmonary
     - Respiratory distress syndrome/hyaline membrane disease; transient tachypnea of the newborn/wet lung; meconium aspiration syndrome; pleural effusion; pneumothorax: congenital lung malformations
   - Infectious
     - Sepsis; pneumonia (GBS, other infectious organisms)
   - Cardiac
     - Congenital heart disease; persistent pulmonary hypertension of the newborn
   - Hematologic
     - Blood loss/anemia
     - Polycythemia
   - Anatomic
     - Tracheoesophageal fistula
     - Congenital diaphragmatic hernia
     - Upper airway obstruction
   - Metabolic
     - Hypoglycemia
     - Inborn errors of metabolism
     - Acidosis
     - Neurologic
   - CNS
     - Trauma or intracranial bleed
     - Drug withdrawal syndromes
     - Seizures
   - MSK
     - Chest wall deformities

4. **Physical Examination**

   In the assessment of a newborn in respiratory distress, you should perform a focused respiratory exam, as well as exams of the other systems that are part of the differential diagnosis:
Vital signs:
Tachypnea (RR >60/minute), tachycardia (HR >160/minute), decreased oxygen saturation, temperature instability

Inspection (the most important aspect of the physical exam):
Increased work of breathing, cyanosis, pallor, scaphoid abdomen, meconium staining, (clubbing may be difficult to detect in newborns), asymmetric chest wall movement (suggestive of tension pneumothorax)

Palpation:
Tracheal deviation, displaced apical beat, thrill may be palpable in the precordium

Percussion:
Usually not very informative in the newborn (may have dullness to percussion with consolidation, or hyper-resonance with a pneumothorax)

Auscultation:
Make sure you auscultate over all the lung zones (don’t forget about the right middle lobe). Listen for air entry (symmetry and adequacy of air exchange), bronchial/vesicular air sounds, adventitious sounds (crackles, wheeze), as well as possible bowel sounds. It is important to also take the time to listen to the heart sounds for the presence of any pathological murmurs.

Special Tests:
Transillumination of the chest wall is used to quickly detect a pneumothorax

5. Investigations

a) Blood work:
Arterial blood gas (ABG) or capillary blood gas
CBC with differential, blood cultures
Blood glucose
Other blood work will depend on the differential diagnosis

b) Imaging:
Chest x-ray (CXR)
Echocardiogram/ECG (if indicated)

6. Supplementary information

<table>
<thead>
<tr>
<th>Pathophysiology</th>
<th>Risk Factors</th>
<th>Presentation</th>
<th>Investigations</th>
<th>Prognosis/Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTN (Transient Tachypnea of the Newborn)</td>
<td>Delayed absorption/clearance of fetal lung fluid</td>
<td>-Term or preterm -Short labor -C-section -Infant of diabetic</td>
<td>-Tachypnea, -Occasionally grunting and nasal flaring -Onset immediately</td>
<td>ABG: mild to moderate hypoxemia, respiratory acidosis CXR: ↑</td>
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<td>&quot;Wet Lung&quot;</td>
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<tr>
<td>Pathophysiology</td>
<td>Risk Factors</td>
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<tr>
<td><strong>RDS</strong> (Respiratory Distress Syndrome) / HMD (Hyaline Membrane Disease)</td>
<td>Lack of pulmonary surfactant</td>
<td>- Preterm</td>
<td>- Resp distress begins at or within few hrs of birth</td>
<td>May require continuous positive pressure ventilation</td>
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<td></td>
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<td>- IDM</td>
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<td>Need surfactant replacement</td>
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<td></td>
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<td>- Short labour</td>
<td>- Worsen over next 24-72hrs</td>
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<td></td>
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<td>- C-section</td>
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<td>- Asphyxia</td>
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<td>- Acidosis</td>
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<td>- Sepsis, MAS</td>
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<tr>
<td><strong>MAS</strong> (Meconium Aspiration Syndrome)</td>
<td>-10-15% of infants are meconium stained, of these, 5% develop MAS</td>
<td>- Term or post term</td>
<td>- Meconium present</td>
<td>In utero: monitor for fetal distress</td>
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<td>- Fetal distress in utero</td>
<td>- Varying degrees of respiratory distress within hrs of birth</td>
<td>During labour: intrauterine amnioinfusion</td>
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<td>(passage of meconium in amniotic fluid may represent fetal hypoxemia)</td>
<td>- Barrel shaped chest</td>
<td>Delivery of head: suction oropharynx</td>
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<td>- Audible rales or rhonchi</td>
<td>At birth: intubation, suctioning below the vocal cords</td>
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<td>10-20% have pneumothorax</td>
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<td><strong>Pneumonia/Sepsis</strong></td>
<td>Inflammation of pulmonary tissues</td>
<td>- Prolonged rupture of membranes</td>
<td>- Respiratory distress</td>
<td>Treat with broad spectrum antibiotics</td>
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<td></td>
<td>Associated with consolidation of alveolar spaces</td>
<td>- Maternal fever</td>
<td>- Temp instability</td>
<td>until cause of pneumonia is identified and sepsis is ruled out</td>
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<td>In neonates: must consider sepsis</td>
<td>- Mother is a GBS carrier</td>
<td>- Lethargy</td>
<td>Blood Culture: may be positive Elevated WBC’s or neutropenia</td>
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<td></td>
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<td>- Poor feeding</td>
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<td>- Jaundice</td>
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<td>- Apnea</td>
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<td><strong>Congenital Diaphragmatic hernia</strong></td>
<td>Loops of bowel in chest area via defect in diaphragm</td>
<td>- Respiratory distress</td>
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<td>Treatment and prognosis depends on the degree of lung hypoplasia as well as the presence of associated</td>
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<td>Hypoplastic lungs</td>
<td>- Cyanosis</td>
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<td>- Scaphoid abdomen</td>
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<td>- Barrel chest</td>
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<td>- Dullness to percussion</td>
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<td>- Absent breath</td>
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7. Appendix

**Increased work of breathing:**

- **Tachypnea:** respiratory rate >60/minute (increased respiratory rate to maintain ventilation in the face of decreased tidal volume)
- **Grunt:** partial closure of glottis during expiration (attempt to maintain lung volume and allow for adequate gas exchange)
- **Nasal flaring:** attempt to decrease airway resistance
- **Suprasternal retractions/ tracheal tug:** suggests upper airway obstruction
- **Subcostal retractions:** less specific sign, associated with either pulmonary or cardiac disease

**Respiratory failure:**
inadequate oxygenation or ventilation of tissues

**Oxygenation:** supply of adequate oxygen to tissues

**Ventilation:** removal of carbon dioxide from tissues

Signs of respiratory failure include cyanosis, gasping, choking, apnea and stridor

**Pulmonary Surfactant:**

Mixture of lipids and proteins produced by type II pneumocytes in the lung. Surfactant creates a thin layer within the alveoli that decreases surface tension, preventing collapse of alveoli. This increases the amount of available surface area for gas exchange.

8. References


Acknowledgements
Writer: Shir Minnes