Respiratory Distress in Children
It's an early October evening, and the tones sound. Dispatch resonates, "Respond to a child in respiratory distress."
Pediatric Respiratory Emergencies are the #1 cause of

- Pediatric hospital admissions

- Death during the 1\textsuperscript{st} year of life – excluding congenital anomalies

- Most pediatric cardiac arrests begin as respiratory arrest.
Review of the developing respiratory anatomy and physiology
Pediatric Assessment

Has not changed, start with general assessment

Appearance

Work of breathing

Circulation
APPEARANCE

Muscle tone

Interactivity/mental status
  • Level of responsiveness
  • Interaction with care giver
  • Response to you or health care providers

Consolability

Look or gaze

Speech or cry
WORK OF BREATHING

Body Position
• Sniffing
• Tripod
Visible movement
• Retractions
• See-saw movement
Respiratory Rate
Respiratory effort
• Head bobbing
• Nasal flaring
WORK OF BREATHING

Audible airway sounds

- Stridor
- Grunting
- Gasping
- Gurgling
- Wheezing
Circulation

Skin color
- Pink or normal for child’s ethnic group
- Pallor
- Mottled
- Cyanosis
Primary Assessment

A = Airway: open / patent; suction; is this a trauma? Do we need C-spine precautions?

Do not thrust hard enough to lift the child off his feet.
Primary Assessment

B = Breathing: respiratory rate, effort, tidal volume, airway and lung sounds, pulse ox
Primary Assessment

C = Circulation: cardiovascular function and end-organ perfusion, control bleeding. Consider possible major internal bleeding

- Cardiovascular function: skin color and temp, HR, rhythm, BP, Pulses (peripheral and central) capillary refill

- End-organ function: Brain perfusion (mental status), skin perfusion, renal perfusion (urine output)
Primary Assessment

D = Disability

Evaluation of the cerebral cortex and brain stem
- Cerebral Cortex: AVPU and Pediatric GCS
- Brainstem: Pupillary response to light

Table II: Glasgow Coma Score or PGC

<table>
<thead>
<tr>
<th>Table II: Example of AVPU Assessment Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>A=Alert</td>
</tr>
<tr>
<td>Patient is alert and conscious</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table II: Glasgow Coma Score or PGC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infant &lt;1 yr</td>
</tr>
<tr>
<td>------------------</td>
</tr>
<tr>
<td><strong>EYES</strong></td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>VERBAL</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Coos, babbles</td>
<td>Oriented, speaks, interacts, social</td>
</tr>
<tr>
<td>4</td>
<td>Irritable cry, consolable</td>
<td>Confused speech, disoriented, consolable</td>
</tr>
<tr>
<td>3</td>
<td>Cries persistently to pain</td>
<td>Inappropriate words, incoherent</td>
</tr>
<tr>
<td>2</td>
<td>Moans to pain</td>
<td>Incomprehensible, agitated</td>
</tr>
<tr>
<td>1</td>
<td>No response</td>
<td>No response</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>MOTOR</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Normal spontaneous movement</td>
<td>Normal spontaneous movement</td>
</tr>
<tr>
<td>5</td>
<td>Withdraws to touch</td>
<td>Localizes pain</td>
</tr>
<tr>
<td>4</td>
<td>Withdraws to pain</td>
<td>Withdraws to pain</td>
</tr>
<tr>
<td>3</td>
<td>Decorticate flexion</td>
<td>Decorticate flexion</td>
</tr>
<tr>
<td>2</td>
<td>Decerebrate extension</td>
<td>Decerebrate extension</td>
</tr>
<tr>
<td>1</td>
<td>No response</td>
<td>No response</td>
</tr>
</tbody>
</table>
Primary Assessment

E = Exposure

• Remove clothing as appropriate
• Assess for signs of trauma or abuse
  • Institute warming measures
Primary Assessment

Estimate Size - Broselow tape

Use good judgment though
Respiratory Distress vs Failure
Respiratory Distress vs Failure
4 Types of Respiratory Illness

- Upper airway obstruction
- Lower airway obstruction
- Lung tissue (parenchymal) disease
- Disordered control of breathing
Upper Airway Obstruction

Three most common causes:

1. Croup

2. Anaphylaxis

3. Foreign-body obstruction
CROUP

- Respiratory infection that most commonly affects the area below the glottis
- Hoarseness and bark-like cough
- Viral
- Primarily affects children ages 6 months to 3 years
<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>Normal color, normal mental status, air entry with stridor audible only with stethoscope</td>
<td>O2 15L/peds NRB NS 6ml in nebulizer If wheezing albuterol Avoid agitation</td>
</tr>
<tr>
<td>Moderate</td>
<td>Normal color, audible stridor, mild to moderate retractions, slightly diminished air entry in an anxious child</td>
<td>O2 15L/peds NRB NPO Epinephrine (1:1000) 3ml via nebulizer</td>
</tr>
<tr>
<td>Severe</td>
<td>Cyanosis, loud stridor, significant decrease in air entry, marked retractions in a highly anxious child</td>
<td>O2 15L/peds NRB NPO Epinephrine (1:1000) 3ml via nebulizer</td>
</tr>
<tr>
<td>Impending Respiratory Failure</td>
<td>Poor air movement, lethargy or decreased LOC, dusky skin and mucus membrane in the absence of O2, barking cough, stridor and retractions may not be prominent secondary to hypoxemia and decreasing resp effort</td>
<td>Assist ventilations Epinephrine (1:1000) 3ml via nebulizer</td>
</tr>
</tbody>
</table>
EPIGLOTTITIS

- Bacterial infection of the upper airway
- Can progress to complete obstruction and death within hours
- Can occur at any age but typically affects children 3 to 7 years
- Difficulty swallowing, sore throat, drooling
- Muffled voice, shallow breathing
- Tripod position
- Looks sick
Management Epiglottitis

• Initial assessment, SAMPLE history
• Assist child into a position to comfort
• Avoid agitating the child
• High-concentration of O2 in a way that does not agitate the child
• Nothing by mouth
• Mod to sever cardiorespiratory compromise: Epi 1:1000 3ml (3mg) via nebulizer mask or aim mist at the child’s face
• If continued inadequate ventilation: position supine in sniffing position, ventilate with 15L O2/Peds BVM using slow compressions of bag
Anaphylaxis
Anaphylaxis

• IV NS fluid challenge 20ml/kg IVP/IO x3 if indicated
• Epinephrine 1:10,000 0.01mg/kg up to 1mg IVP/IO; if no vascular access Epi (1:1000) 0.01mgKG up to 1mg IM
• Benadryl 1mg/kg (max 50mg) slow IVP/IO over 2 – 3minutes. If not IV/IO give IM
• If wheezing albuterol neb
• If BP remains <70, dopamine 10mcg/kg/min up to 20mcg/kg/min.
Foreign Body Airway Obstruction

- 90% of deaths from FBAO occur in children < 5 years old
- 65% of the victims are infants
- Liquids are the most common cause of choking in infants
- Balloons, small objects, and food are the most common cause of obstruction in children
Lower Airway Obstruction

Bronchiolitis

Asthma
Lower Airway Obstruction

- Normal Bronchiole
- Inflamed Swollen Bronchiole
- Mucus
- Bronchiolitis
- Normal bronchiole
- Asthmatic bronchiole
Bronchiolitis
Management

- Peds initial medical care
- Suction if needed
- Supplemental Oxygen
- R/o foreign body aspiration
- Monitor for bradycardia
Asthma

- Peds IMC
- Supplemental O2 if hypoxic
- Monitor for bradycardia
- IV – Mild distress none, mod to severe IV
- Albuterol 2.5mg/3ml neb via HHN, mask, BVM, continue and repeat enroute
- Severe distress Epi (1:1000) 0.01mg/kg (max 0.3mg) IM, may repeat in 10 minutes
- Severe distress persists: Magnesium 25mg/kg (max 2 Gm) mixed with NS (to total of 20ml) slow IV/IO over 10 – 20 min
Lung Tissue Disease
## Lung Tissue Disease

<table>
<thead>
<tr>
<th>Signs and Symptoms</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Decreased breath sounds</td>
<td>• Peds IMC</td>
</tr>
<tr>
<td>• Rales</td>
<td>• Supplemental O2</td>
</tr>
<tr>
<td>• Rhonchi</td>
<td>• Suction prn</td>
</tr>
<tr>
<td>• Wheezing</td>
<td>• Monitor rhythm, vitals and pulse ox</td>
</tr>
<tr>
<td>• Tachypnea</td>
<td>• Assist ventilations if needed</td>
</tr>
<tr>
<td>• Chest pain</td>
<td>• KING tube if indicated</td>
</tr>
<tr>
<td>• Fever</td>
<td>• Establish vascular access</td>
</tr>
</tbody>
</table>
Disordered Control of Breathing

Abnormal respiratory pattern produces an inadequate minute ventilation.

**CAUSES:**
- Increased ICP
- Poisoning or drug overdose
Increased ICP

- Irregular breathing patterns are caused by damage to neural pathways (anywhere from the cortex down to the medulla).
- Apnea can occur with loss of consciousness even with relatively minor head trauma.
- Acute respiratory arrest usually results from brain stem compression or infarct.
Increased ICP

**Management**

- Jaw thrust maneuver to open airway, manually stabilize the C-spine
- Supplement ventilations if needed
  - Keep head midline
- If poor perfusion, NS 20ml/kg
- Treat agitation and pain aggressively
  - Keep warm, avoid hypothermia
Poisoning

• Depression of Respiratory drive
• Weakness or paralysis of respiratory muscles
• Complications can be:
  ➢ Upper airway obstruction
  ➢ Hypoxemia
  ➢ Aspiration
  ➢ Pneumonitis
  ➢ Noncardiogenic pulmonary edema
Poisoning

Management

- Support airway and ventilations
- Be prepared to suction
- Poison Control
- Peds drug overdose/poisoning protocols

POISON
Help
1-800-222-1222
Theory is splendid but until put into practice, it is valueless.

JAMES CASH PENNEY
CO-FOUNDER, J.C. PENNEY
Case Study #1

- You are dispatched at 2024 for a 6 month old male with respiratory distress.

- Upon arrival you are met at the door by the infant’s father who leads you to the living room couch where the mother is sitting holding the child.
What are you immediately looking at?
Primary assessment

• Airway
• Breathing
• Circulation
• Exposure
  • VS

History
What is your plan of care?

While enroute baby’s condition deteriorates:

RR – decreasing to 40 – 20 – 12 and becoming more shallow
Pulse ox – 86%
LOC – decreased
HR down to 70

What now??
Case Study #2

At 2:15 pm you and your partner are sitting at the station eating a late lunch, when you hear the door bell ringing. As you approach the door you hear a women screaming, “Help me, he can’t breathe!! Please someone help me!”
You open the door a women, her car is directly behind her. You see a young boy in the back seat. You go to the child and this is what you see:

• He is conscious, but looks terrified
• He has a weakly audible cough, faint inspiratory stridor and minimal air movement at nose and mouth. Perioral cyanosis, radial pulse is strong and rapid.

• Mom tells you he was eating a piece of hard candy when her car hit a large pothole in the road. When she glanced back at him, he was grabbing his throat and was unable to talk
What is your initial treatment?

Despite your initial attempts to clear the airway the child becomes unconscious with increased cyanosis and apnea.

Now what?

After several cycles obstruction is not relieved. What intervention is indicated now?
You have successfully removed the piece of candy from the child’s airway and are now able to ventilate him.

He remains unconscious, cyanotic and apneic.

You palpate a carotid pulse of 65

Pulse ox 90% with bagging.

How will you continue to manage this child enroute?
Case Study #3

You are toned out for a 5 yr old child with difficulty breathing.
Upon arrival:

• Child is awake and aware of surroundings
• Appears ill and anxious
• Nasal flaring noted
• Chest movement present
• Increased work of breathing evident
• Face and lips are pale.
Primary Assessment

• Airway: Patent
• Breathing: Nasal flaring; suprasternal, intercostal and subcostal retractions; diminished lungs sounds on left lower lobe, rhonchi left upper lobe; coughs frequently; RR 48; O2 sat 87% room air
• Circulation: Central and peripheral pulses normal; skin pale, warm, dry; cap refill 3 sec; HR 164
• Disability: Awake and alert; normal muscle tone and movement
• Exposure: No trauma or rash seen
vital signs

HISTORY™
What is your Treatment Plan?

Reassessment while enroute:
Unresponsive
P 88, BP 80/56 RR 10, CR 5, O2 sat 80%

Where do we go from here?

After interventions child remains unresponsive, color improved, VS after 2nd bolus 98/60, P 128, RR bagged at 10 O2 sat 95% Cap refill 3 sec
Case Study #4
Toned out for a 14 month old diff. breathing

- Awake and agitated,
- Hives to face arms and chest
- Chest movement present
- Increased work of breathing evident
- Inspiratory stridor is audible
- Face and lips are pink
Airway
Breathing
Circulation
Disability
Exposure
Repeat Assessment after interventions

- BP 74/46, P 118, RR 28, CR 2 sec O2Sat 99%
- Decreased stridor and retractions
- Hives resolving
Case Study # 5

You are called out for a 2 year old with difficulty breathing.

- Child in tripod position
- Awake but unconcerned about your presence
- Nasal flaring
- Chest movement present
- Increased work of breathing
- Face and lip pale
Airway
Breathing
Circulation
Disability
Exposure