Mechanisms of Support

Nasal Cannula

Hi Flow Nasal Cannula

CPAP
- Continuous positive airway pressure
- Works like PEEP, but patient must be breathing spontaneously

BIPAP
- Like CPAP, but also uses PIP

Mechanical Ventilation:

Volume vs. Pressure:	**Volume Control**	**Pressure Control**
Cycle	Volume	Time or Flow
Trigger	Child and machine	Child and machine
Limit	Flow	Pressure
Tidal Volume	Constant	Variable
Peak Pressure	Variable	Constant
Advantages	Constant Tidal Volume	Avoids excessive PIP
Disadvantages	Risk of barotrauma	Variable tidal volume risks atelectasis

HFOV (high frequency oscillatory ventilation)
- Uses constant mean airway pressure
- MAP affects oxygenation
- Amplitude (Delta P) affects ventilation (CO2 removal)
- Hertz (1 Hz=60 bpm)
- Best for patients with very poor lung compliance and high airway resistance

PEEP (positive end expiratory pressure)
- Recruits alveolar space at the end of expiration

RATE
- Breaths per minute, effects CO2 removal, higher rate=more CO2 removal

PIP (peak inspiratory pressure)
- Amount of pressure required to force air into the lungs

Tidal Volume
- Volume of air inhaled and exhaled with each breath.
- Usually 5-10ml/kg

Inhaled Nitric Oxide (iNO)
- Pulmonary vasodilator
- Check Methemoglobin for toxicity
- Usually 5-20 +ppm

ABG Interpretations

Respiratory Acidosis: ▲pCO2 ▼pH

*impaired ventilation (example – pneumothorax, mucus plug, pneumonia)

Treatment: assisted ventilation, position, suction

Respiratory Alkalosis: ▼pCO2 ▲pH
*exaggerated ventilation (example – crying, fever)
Treatment: reduce ventilation with dead space, decrease rate

Metabolic acidosis: ▼HCO3 ▼pH (ex. – hypoxia, hypotension, diarrhea, TPN, diamox)
Treatment: improve oxygenation, correct hypotension, bicarb therapy, check Cl in TPN

Metabolic alkalosis: ▲HCO3 ▲pH (ex. – overzealous bicarb therapy, excessive vomiting, diuretics)
Treatment: electrolyte management, adjust diuretics

These are typical reference ranges, although various analysers and laboratories may employ different ranges.

Analyte	Range	Interpretation
pH	7.35 - 7.45	The pH or H^+ indicates if a patient is acidemic (pH < 7.35; H^+ >45) or alkalemic (pH > 7.45; H^+ < 35).
PO_2	80-100 mmHg	A low O_2 indicates that the patient is not respiring properly, and is hypoxemic.
PCO_2	35-45 mmHg	The carbon dioxide and partial pressure (PCO_2) indicates a respiratory problem: for a constant metabolic rate, the PCO_2 is determined entirely by ventilation.[5] A high PCO_2 (respiratory acidosis) indicates underventilation, a low PCO_2 (respiratory alkalosis) hyper- or overventilation. PCO_2 levels can also become abnormal when the respiratory system is working to compensate for a metabolic issue so as to normalize the blood pH.
HCO_3^-	22–26 mmol/l	The HCO_3^- ion indicates whether a metabolic problem is present (such as ketoacidosis). A low HCO_3^- indicates metabolic acidosis, a high HCO_3^- indicates metabolic alkalosis. HCO_3^- levels can also become abnormal when the kidneys are working to compensate for a respiratory issue so as to normalize the blood pH.
Base excess	-3 to +3 mmol/l	The base excess is used for the assessment of the metabolic component of acid-base disorders, and indicates whether the patient has metabolic acidosis or metabolic alkalosis. A negative base excess indicates that the patient has metabolic acidosis (primary or secondary to respiratory alkalosis). A positive base excess indicates that the patient has metabolic alkalosis (primary or secondary to respiratory acidosis).[7]

Respiratory Support
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3/09 last update