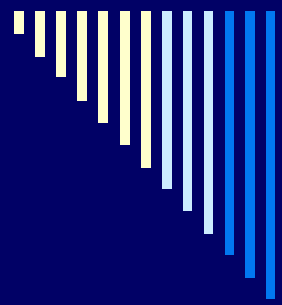


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# RC-170

□ Aerosol, Bronchial  
Hygiene & SMI  
Breathing Therapies,  
PAV & Infection  
Control

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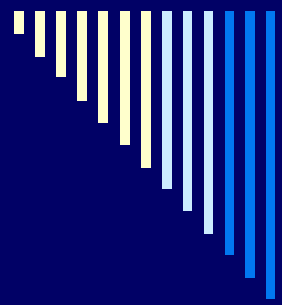
# Humidity Therapy

## □ Terms to know:

- Humidity: Water in a vapor state of matter.
- Absolute Humidity (mg/liter) actual amount of water in a vapor form.
- Relative Humidity (% up to 100) absolute compared to capacity expressed as percent of capacity:

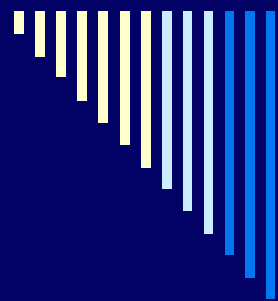
$$\text{RH} = \text{Absolute/capacity}$$

$$50\% = 22(\text{mg/liter}) / 44(\text{mg/liter})$$



# Humidity Therapy

- Can you see Humidity?
- What determines how much water vapor a liter of gas can hold(its capacity)?
- What is the difference between humidity and aerosol?
- Which can deliver the most water ?



# Humidity Therapy Exercise

- What will happen to RH if temp drops all else stays the same?
  - What will happen to AH under same circumstances?
  - How might this occur during patient care?
- 100f 100% RH
  - $45/45 = 100\%$
  - 98.6F  $44/44 = 100\%$



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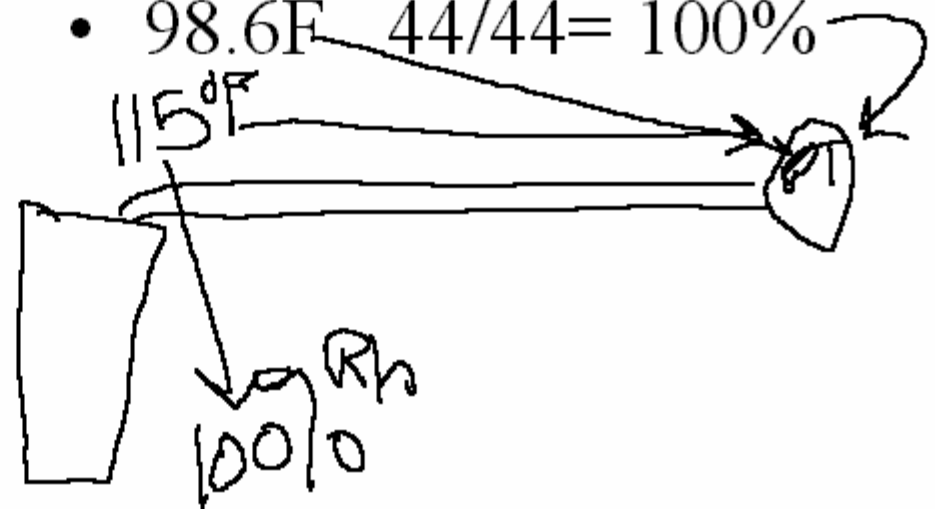
# AEROSOL THERAPY

- USED TO DELIVER MEDICATION TOPICALLY.
  - FAST, ECONOMICAL.
  - DECREASED SYSTEMIC SIDE EFFECTS.
  - PATIENT MUST BE ABLE TO DO
    - VOLUME
    - COOPERATION
-

# Humidity Therapy Exercise

- What will happen to RH if temp drops all else stays the same?
- What will happen to AH-under same circumstances?
- How might this occur during patient care?

- 100f 100% RH
- $45/45 = 100\%$
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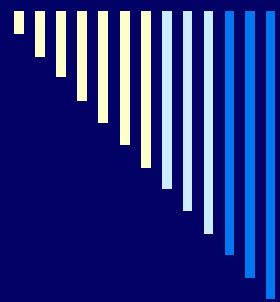




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# AEROSOL THERAPY

- ❑ MDI vs SVN ARE TYPICAL METHODS OF ADMINISTRATION.
- ❑ PROPER TECHNIQUE AND OR ADAPTERS TO INCREASE EFFECTIVENESS.
- ❑ IF PATIENT CAN'T DEEP BREATH THEN ASSISTED DEEP BREATHING IS INDICATED TO DELIVER AEROSOL.



# Spectrum of Aerosol/Humidity Rx

**Water**

**Mucomyst**

**Terbutaline**



*Large amounts*  
*Continuous*

*Small Amounts*  
*Intermittent*

**Physical  
Action**

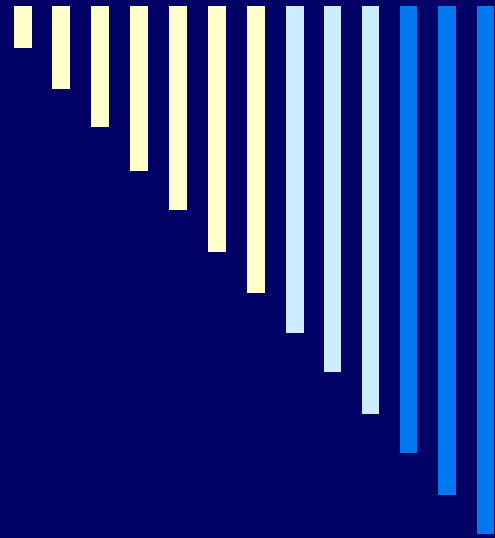
**Chemical  
Action**

**Biochemical  
Action**



# Aerosol Therapy Exercise

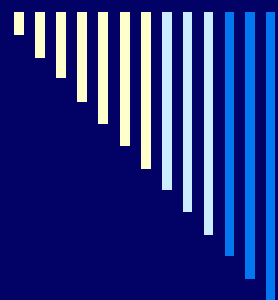
- If we want to add water to the respiratory tract to liquify secretions, what should we use
  - Humidifier or Nebulizer?
- In Both, explain why?
- Dr. Orders Bronchosol for a patient which device to administer?
  - A. Humidifier Cool
  - B. Nebulizer, large
  - C. SVN
  - D. MDI
  - E. Heated Humidifier



# SMI BREATHING Rx

IPPB, INCENTIVE SPIROMETRY  
DEEP BREATHING, ETC.

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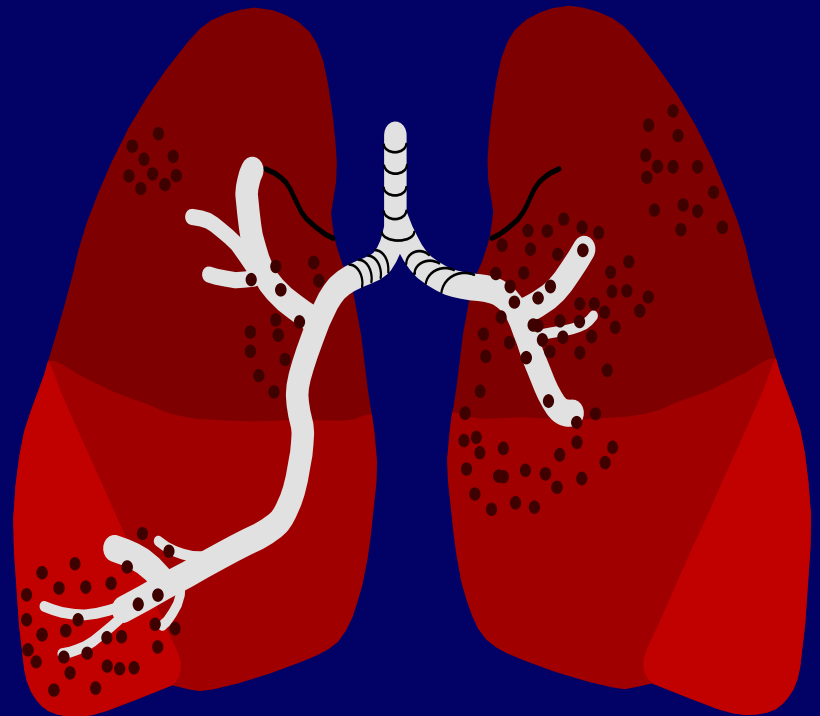
# SMI Therapy Exercise

- Why do we ask certain patients to deep breath periodically?
- Name three ways we can get patients to deep breath periodically.
- What Patients?



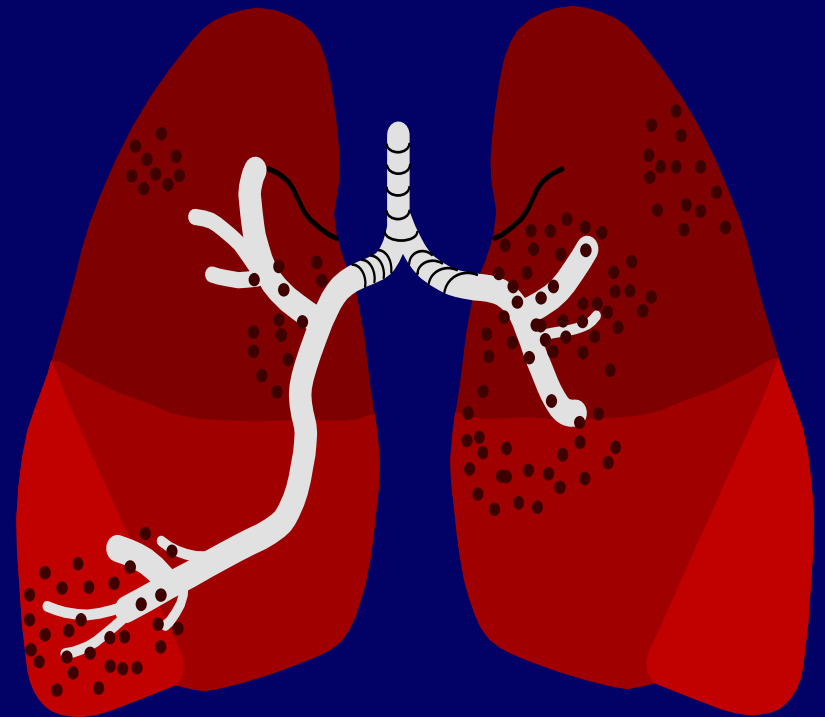
# NORMAL BREATHING

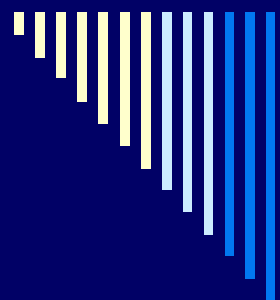
- INTRAPULMONARY PRESSURES.
- INTRAPLURAL PRESSURES.
- RELATIONSHIP TO AMBIENT PRESSURES.



# DEEP BREATHING

- VOLUMES DURING INSPIRATION 2 TO 3 TIMES NORMAL TIDAL VOLUME, BASED ON IBW.
- IS THE PATIENT ABLE, COMFORTABLE, DOING THE DEEP BREATHING.
- PAIN, SPLINTING.





# IPPB

- INTRAPULMONARY
  - PRESSURES
- INTRAPLURAL
  - PRESSURES
- COMPARED TO NORMAL DURING INSPIRATION.

## NORMAL vs IPPB

↓ -	↑ +
↓ -	↑ +

## PRESSURES



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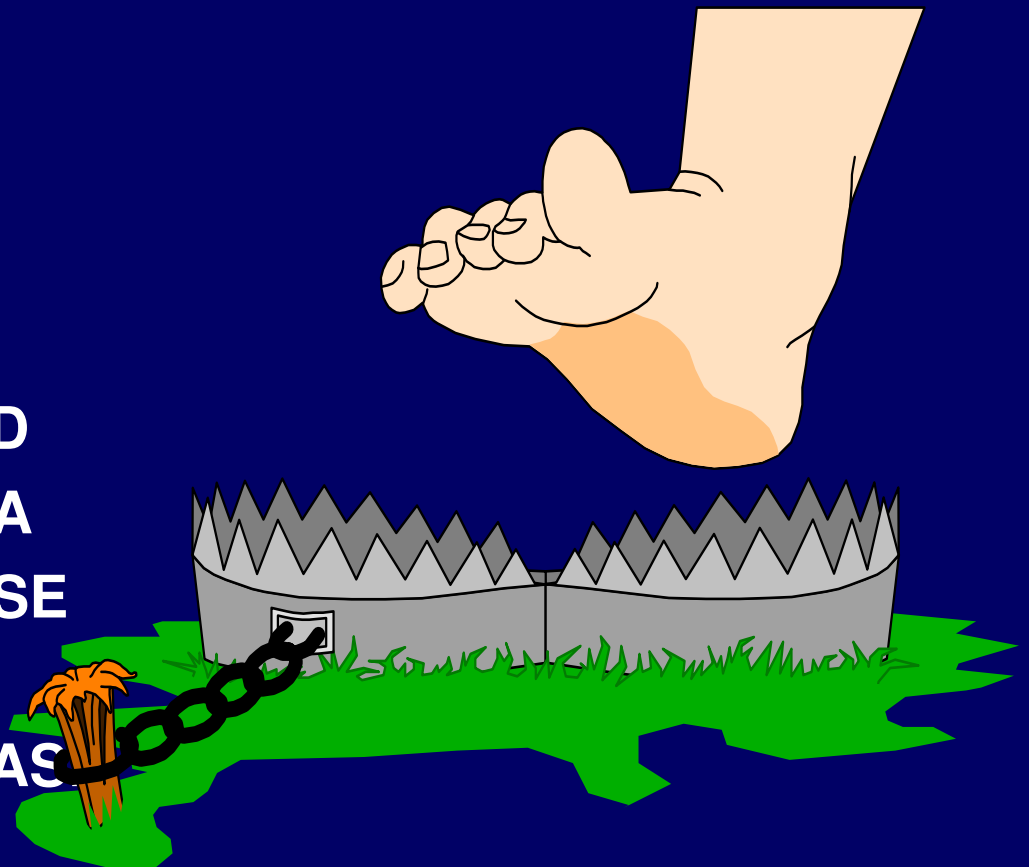
# SMI INDICATIONS

- ❑ NEEDS TO FOR PREVENTION OR REVERSAL OF ATELECTASIS
- ❑ ALSO HYPOSTATIC PNEUMONIA POST-OP SYNDROME
- ❑ Patient needs biofeedback or incentive to motivate and provide meaningful therapy.



# HAZARDS

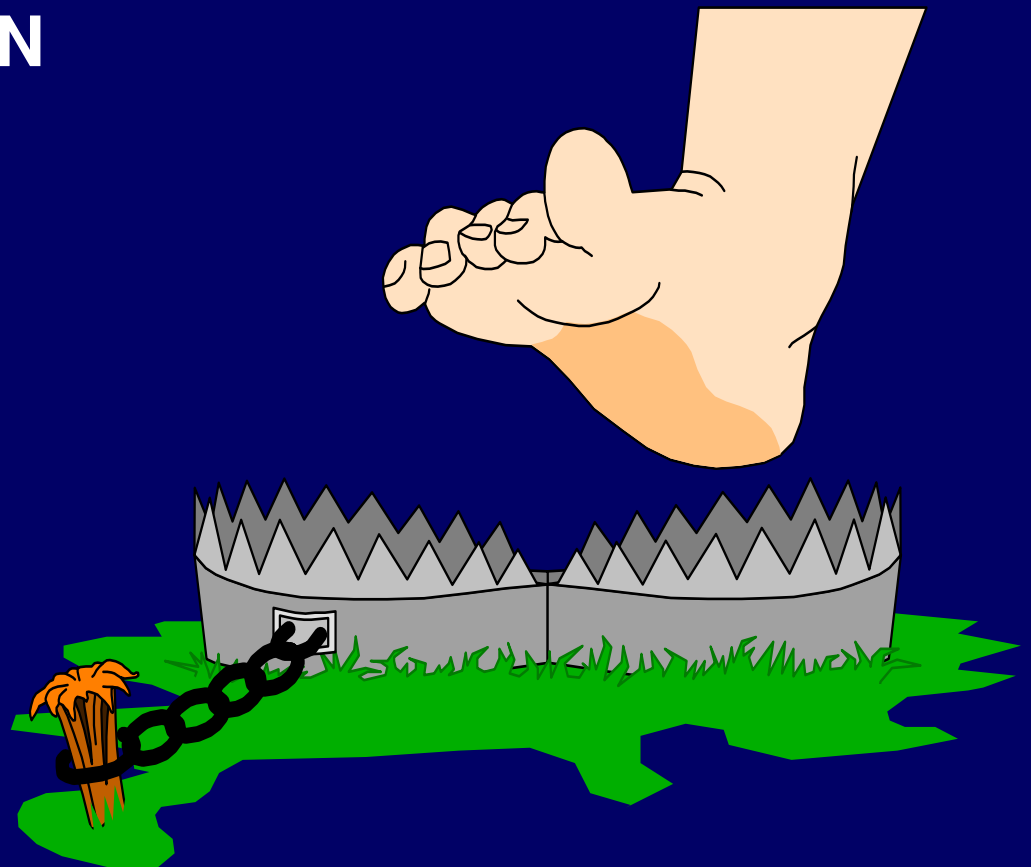
- ❑ HYPER-VENTILATION
- ❑ ALKALOSIS
- ❑ PVCs
- ❑ DIZZINESS, LIGHTHEADED
- ❑ BAROTRAUMA
- ❑ WOB INCREASE
- ❑ INEFFECTIVE
- ❑ BRONCHOSPAS





# CONTRAINDICATIONS

- ❑ HYPER-VENTILATION
- ❑ DIZZINESS,  
LIGHTHEADED
- ❑ TENSION  
PNEUMOTHORAX
- ❑ TUBERCULOSIS
- ❑ INCREASED ICP



# WHICH THERAPY?

- ❑ SPONTANEOUS DEEP BREATHING
- ❑ INCENTIVE SPIROMETRY
- ❑ IPPB
- ❑ OTHER SMI THERAPIES ?





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# Deep Breathing Therapy

- What is the major difference between deep breathing spontaneously and deep breathing with an IPPB device?
- What are the hazards associated with deep breathing with and without IPPB?
- What is the major reason to use IPPB instead of spontaneous deep breathing?



# Life Support or Prolonged Artificial Ventilation(PAV)

- Most patients are put on PAV for acute Respiratory Failure.
  - Life threatening change in ABGs
- May stay on it for hours, days, week, months, years...
- We may do all, some, little or no adjustments for breathing rate, volume, humidity, FIO<sub>2</sub>, etc.



# Life Support or Prolonged Artificial Ventilation(PAV)

- ABGs are needed to tell if ventilator adjustments are having the desired effect on blood gases like O<sub>2</sub>, CO<sub>2</sub>, and acid-base status, i.e. pH
- RF = pH of 7.25 Acid
  - If PaCO<sub>2</sub> increase is cause = Respiratory Acidosis.
  - If CO<sub>2</sub> increases(acid) then pH drops = acidosis, caused by the respiratory system.



## PAV & ABGs

- When on ventilator we control their  $O_2$  and  $CO_2$  .
- Both are related to survival of patient.
- Arterial blood is needed to check to see what the actual effects of the ventilator had on the patient.
- Goal maybe to increase  $O_2$  and/or change  $CO_2$  level of patient to change pH.



# Acid-Base Balance

- pH is how we judge how acid or base the blood is, 7.40 is normal.
- PaCO<sub>2</sub> is inversely related to pH, for example:

$$\text{pH} = \text{base}/\text{CO}_2$$



# Acid-Base Balance

- Most common disorder:

- Respiratory Acidosis

- The PaCO<sub>2</sub> increases(>40) the pH falls(<7.40)

- Why would the PaCO<sub>2</sub> increase?

- Change in minute ventilation, how much air you move in and out of your lungs in one minute.

- We use the ventilator to increase the ventilation, this makes the PaCO<sub>2</sub> go down and the pH back up to normal.

- Must have an ABG to confirm that this has occurred.

- Same goes for PaO<sub>2</sub> and tissue hypoxia.



# Practice:

- Respiratory Alkalosis with no metabolic compensation.
- Decrease  $\text{HCO}_3$  to compensate.
- Decrease minute alveolar ventilation to correct pH.
- $\text{pH} = 7.55$
- $\text{PaCO}_2 = 25$
- $\text{HCO}_3 = 24$
- Base = - 1
- $\text{PaO}_2 = 100$
- $\text{Sat}\% = 98$



# Nosocomial Infections

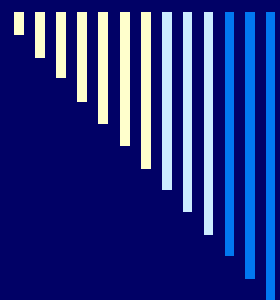
- ❑ Best way to reduce is to wash hands in between patients, eating and restroom visits.
- ❑ Many hospitals have instituted very strict rules with regards to handwashing.
- ❑ Bacteria and viruses don't have wings, they don't fly on there own, need to be carried.
- ❑ Breaks in procedure and protocol also cause many nosocomial infections.
- ❑ Practice Universal Precautions

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# AIDS & Health Care Workers

- Do we have it?
- Should we all be tested?
- Are we at risk for catching it from our patients?
- Should all our patients be tested?
- Should we wear protective equipment in all patient contacts?
- What is the best way to protect ourselves?
- 20 second lecture on AIDS prevention:



# Nosocomial Exercise

- What is the best way to protect yourself from infection when giving patient care?