

# Disparities in Respiratory Care: Medical Center Vs Community



Michael Bocci, BS, RRT, RCP  
Manager of Respiratory Care Services  
Houston Methodist Hospital

# Disclosures

No disclosures to report



# Learning Objectives

- 1. Describe indications and applications of Advanced Ventilator Techniques Used in Trauma and Medical Center Hospitals that are not commonly used in community hospitals.
- 2. Describe Respiratory Diagnostic Techniques and Treatment Modalities used in Trauma and Medical Center hospitals not commonly used in community hospitals.

# Definitions

## What is a community hospital?

- A hospital is put into one of the community hospital groupings if it is not classified as a teaching hospital — meaning it does not have an intern- and resident-per-bed ratio of at least 0.03 or involvement in at least three GME programs overall.
- Broader definition of what a community hospital is goes beyond bed size and teaching status and into various factors, including location, governance structure, the role it plays in a town's economy and the role it plays in increasing care access, among others.

# Definitions Continued

## What is a medical center?

- Managed care -a health care organization defined by Structure—a physical plant—e.g., a hospital and buildings in which health care, research, staff support, and ancillary services are provided.
- Function—medical services that may be more complex than that provided by a traditional community hospital.

Total Number of All U.S. <b>Registered</b> * Hospitals	5,627
Number of U.S. <b>Community</b> ** Hospitals	4,926
Number of Nongovernment Not-for-Profit Community Hospitals	2,870
Number of Investor-Owned (For-Profit) Community Hospitals	1,053
Number of State and Local Government Community Hospitals	1,003
Number of Federal Government Hospitals	213
Number of Nonfederal Psychiatric Hospitals	403
Number of Nonfederal Long Term Care Hospitals	75
Number of Hospital Units of Institutions (Prison Hospitals, College Infirmarys, Etc.)	10
Number of Rural Community** Hospitals	1,855
Number of Urban Community** Hospitals	3,071



# Texas Medical Center (TMC)



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# TMC Facts

- The Texas Medical Center is the **largest medical center in the world** with one of the highest densities of clinical facilities for patient care, basic science, and translational research.
- The center contains 50 medicine-related institutions, including 21 hospitals and two specialty institutions, two medical schools, six nursing schools, and schools of dentistry, public health, pharmacy and other health-related practices.
- **All 50 institutions are not for profit.**



# So what does this all mean?

Resources that are available to the patient!!!!!!

- The center is where one of the first and largest air ambulance services was created and where a successful **inter-institutional** transplant program was developed. More heart surgeries are performed at the Texas Medical Center than anywhere else in the world.

# Our Perceptions as Clinicians

- Community hospital workers as applicants for employment at TMC-differences noted in experiences and skill levels.
- Number of hospital beds are less in community hospitals.
- Acuity of patients is evaluated for possible transfer to TMC.
- Resources available for specialized care-abundant TMC.
- Physicians and other professionals coming to TMC as it is a progressive learning environment.

# Hospital Systems

- Memorial Hermann, CHI-St. Luke's and Houston Methodist Systems ALL have outlying hospitals that may be considered community hospitals.
- Patients can shop around for a hospital that may serve their purposes and not have to travel to the Medical Center.



# Community Hospitals

- Typically, a community hospital is located in a smaller town, away from a large metropolitan area. A big city can have community hospitals in it, but they have to serve a market segment distinct from a major tertiary care center.
- The AHA breaks down its definition of community hospital into two groups: rural community hospitals, with a count of 1,971, and urban community hospitals, which clock in at 3,003.
- A community hospital is a place where care can come to a patient, instead of forcing a patient to drive far away for care.



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# Clinicians

- Applicants from other hospitals
  - Skill levels
  - Experiences
- Desire to learn and develop





# Human Resources

## Community Hospital



## Medical Center



# Teaching Hospitals Train Tomorrow's Doctors

The work of teaching hospitals is more important than ever, as our nation faces a growing shortage of physicians:

- By 2025, the U.S. will face a shortage of between 61,700 and 94,700 physicians in all specialties.
- The U.S. population will grow by 27 million people by 2025.
- By 2025, the number of Americans over age 65 will increase by 41 percent.

# Teaching Hospitals Provide Cutting Edge Care

- AAMC teaching hospital members provide around-the-clock, onsite, and fully staffed standby services for critically ill or injured patients.
- A significant number of patients are transferred to these hospitals because their illnesses or injuries require a sophisticated level of technology and expertise not available elsewhere in the community.

# Specialized Care

## ECMO



## Organ Transplant

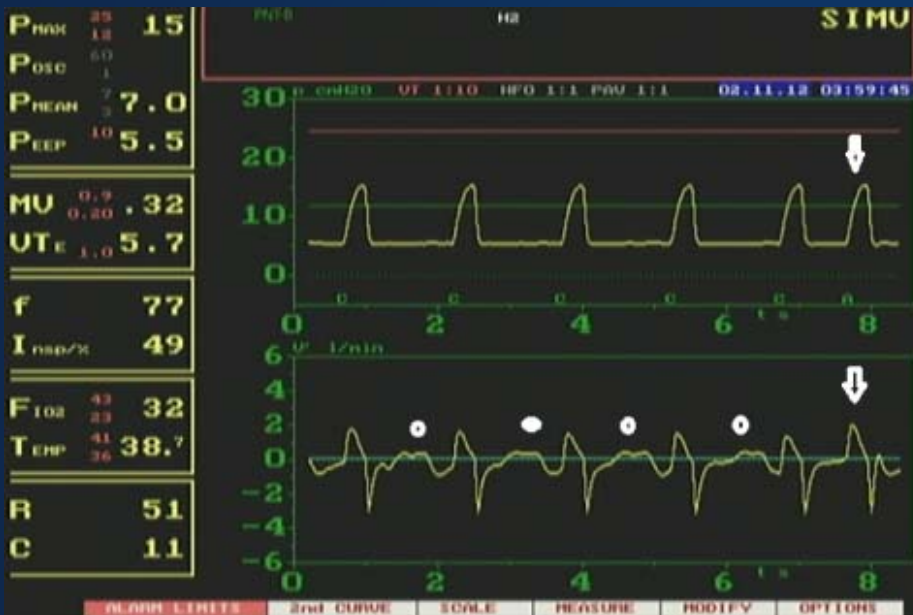


# Respiratory Care

- The conventional modes of mechanical ventilation are primarily used in community hospitals.
- Modes such as Assist-Control, SIMV and Pressure Support are dominant.
- In The Medical Center, modes such as BiLevel, DuoPAP, BiPhasic, APRV and Adaptive Support Ventilation (ASV) are most frequently seen in addition to the conventional modes.
- These modes require advanced skill levels of Physicians and RTs though they are misused as “last resort” modes of ventilation.

# Conventional Modes of Mechanical Ventilation

## SIMV



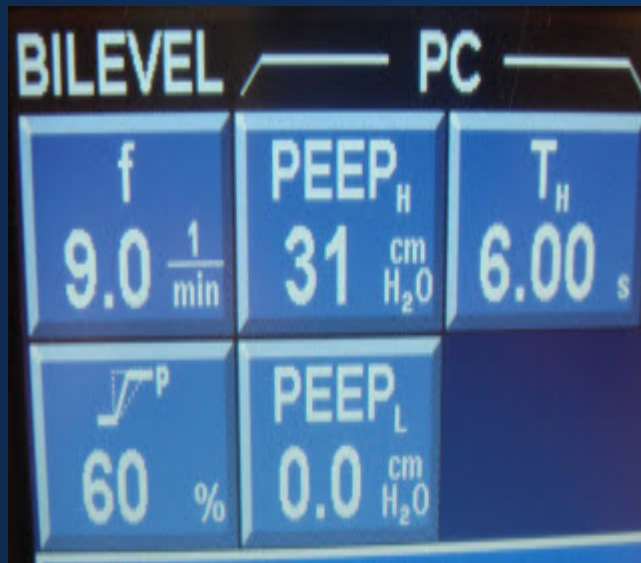
## Pressure Support



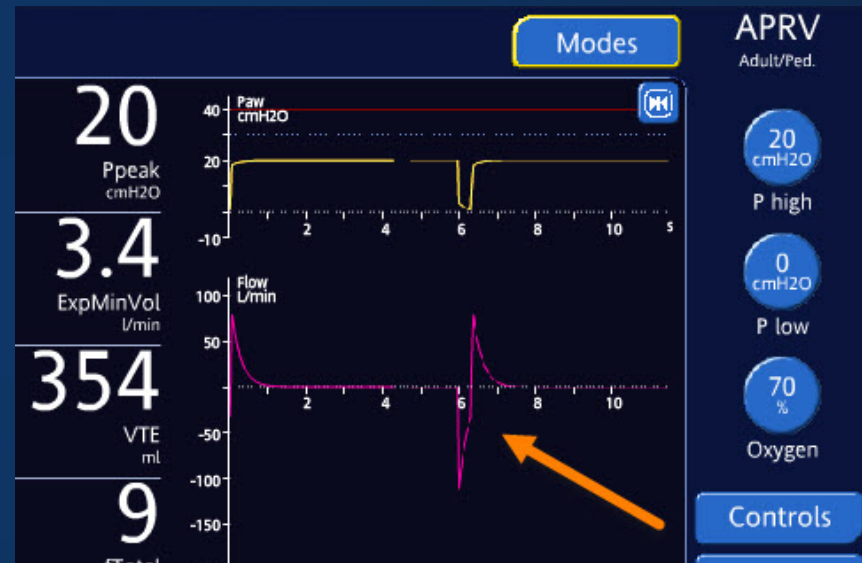


# Nonconventional Modes of Mechanical Ventilation

## BiLevel



## APRV

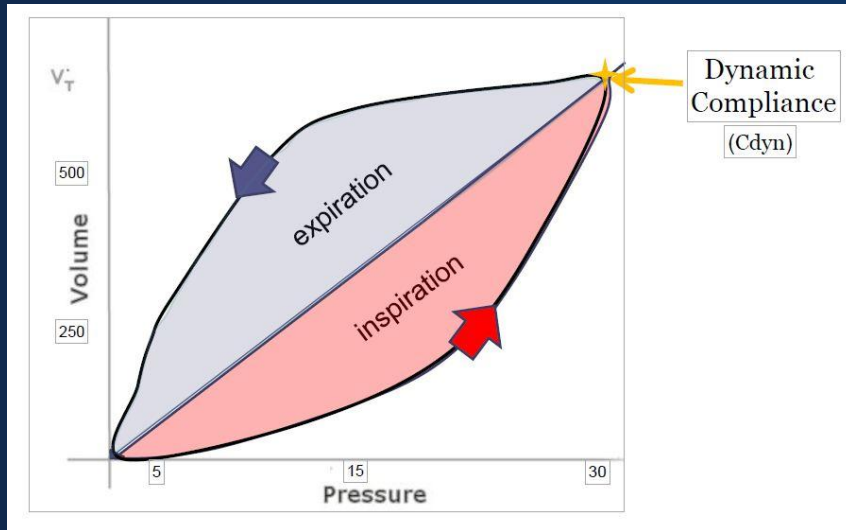


# Setting of PEEP

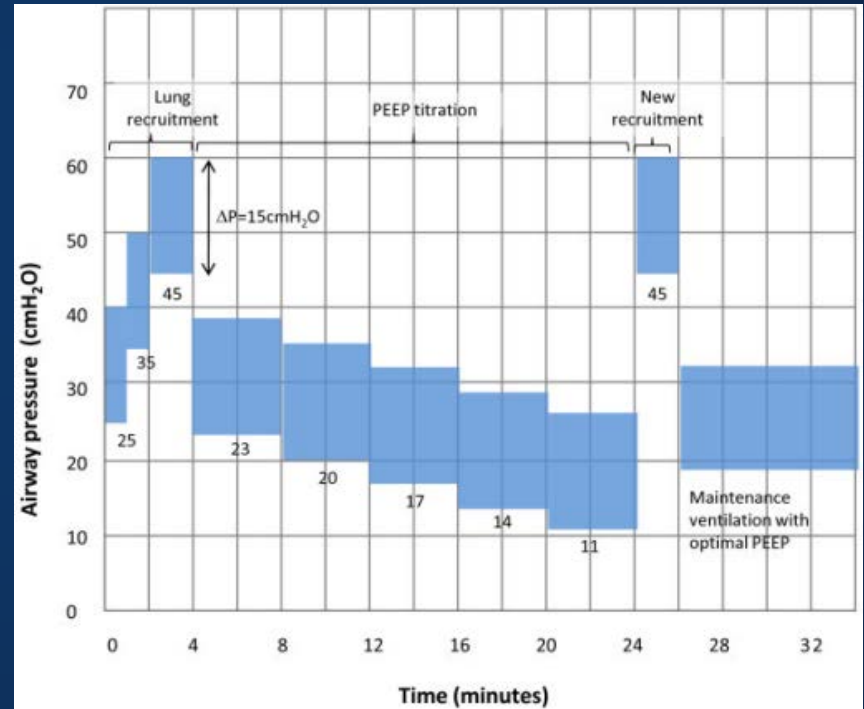
- Therapists in community hospitals tend to utilize simpler less complex methods of setting PEEP.
- The use of PEEP/Compliance grids and tables is common.
- Slow volume pressure volume loops are also commonly seen in community hospitals.
- In the Medical Center, the added utilities and features on the ventilators are used such as the PV Tool Pro on the Hamilton vents.

# Community Hospital Methods

## Pressure Volume Loop



## PEEP Grid



# Medical Center Method

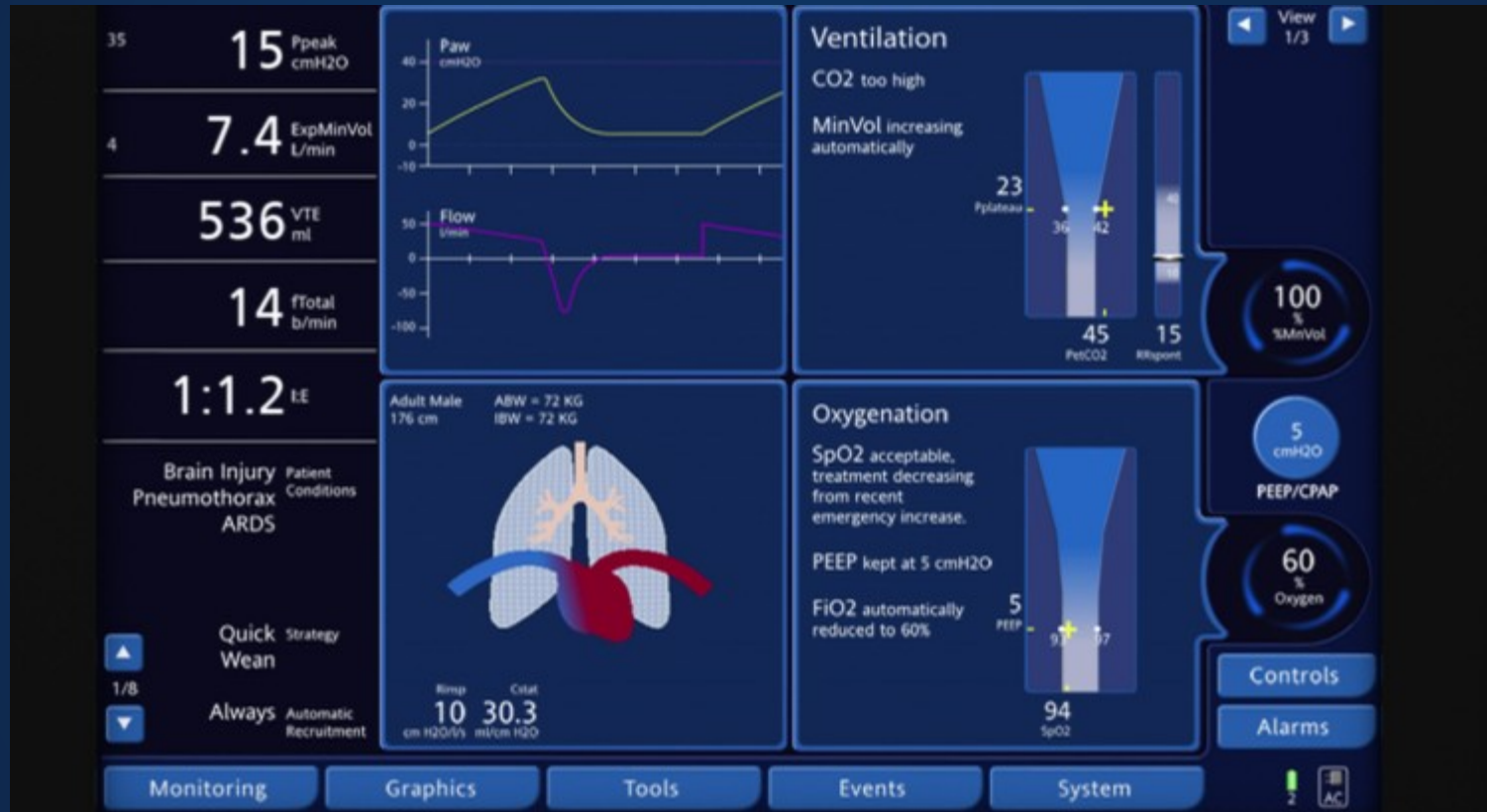
## PV Tool Pro



# Weaning Patients from the Ventilator

- Many times in the community hospitals, a gradual reduction in ventilatory support is seen over the course of several days or even weeks.
- For example, in SIMV a decrease in the rate of 2 per day and then going to pressure support ventilation is almost routine or standard.
- In The Medical Center, the use of Adaptive Support Ventilation or similar advanced modes is now commonly utilized.

# Adaptive Support Ventilation





# Spontaneous Awakening and Spontaneous Breathing Trials

## Awakening and Breathing (AB) Safety Screens

### *Awakening Trial*

- No active seizures
- No active alcohol withdrawal
- No active agitation
- No active paralytic use
- No myocardial ischemia (24h)
- Normal intracranial pressure

### *Breathing Trial*

- No active agitation
- Oxygen saturation  $\geq 88\%$
- $FiO_2 \leq 50\%$
- $PEEP \leq 8$  cm H<sub>2</sub>O
- No myocardial ischemia (24h)
- Normal intracranial pressure
- No significant vasopressor or inotrope use

Girard TD, et al. *Lancet*. 2008;371(9607):126-134.



# Spontaneous Awakening and Spontaneous Breathing Trails

## Wake up and Breathe (ABC) Study

**A: Spontaneous Awakening Trials**



**B: Spontaneous Breathing Trials**

The ABC protocol reduced....

- Duration of mechanical ventilation by ~3 days
- ICU and hospital length of stay by ~4 days
- Duration of coma by ~1 day
- 32% lower likelihood of dying and a number needed to treat (NNT) of 7 to save a life at 1 year

Girard TD, et al. *Lancet*. 2008;371:126-134.

# Ventilator Status Bar



# Diagnostic Devices and Procedures

## Arterial Blood Gases



TABLE 1

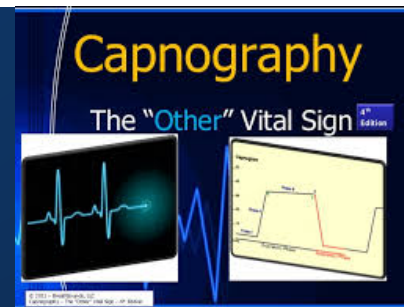
### Normal ABG Figures

PH	7.35-7.45
PO <sub>2</sub>	80-100
PCO <sub>2</sub>	35-45
HC0 <sub>3</sub>	22-28

## Capnography

Table 1: Factors Affecting EtCO<sub>2</sub>

CAUSES OF ELEVATED EtCO <sub>2</sub>	CAUSES OF DECREASED EtCO <sub>2</sub>
<b>METABOLISM</b> Pain Hyperthermia Shivering	<b>METABOLISM</b> Hypothermia Metabolic acidosis
<b>RESPIRATORY SYSTEM</b> Respiratory insufficiency Respiratory depression COPD Analgesia/sedation	<b>RESPIRATORY SYSTEM</b> Alveolar hyperventilation Bronchospasm Mucus plugging
<b>CIRCULATORY SYSTEM</b> Increased cardiac output	<b>CIRCULATORY SYSTEM</b> Hypotension Sudden hypovolemia Cardiac arrest Pulmonary emboli
<b>MEDICATIONS</b> Bicarbonate administration	





# EtCO<sub>2</sub> versus Arterial CO<sub>2</sub>



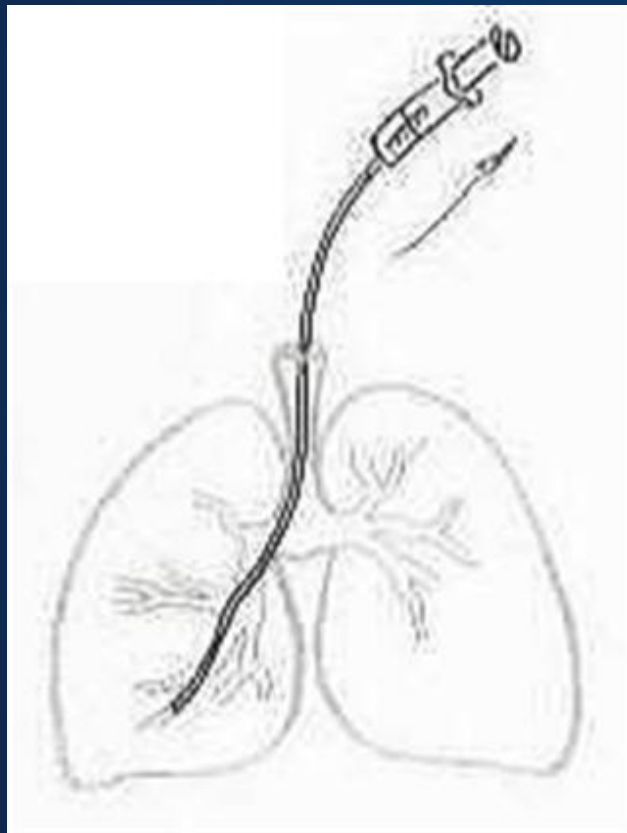
- In healthy lungs the normal a-ADCO<sub>2</sub> gradient is 2-5 mmHg



- In diseased lungs, the gradient will increase due to ventilation/perfusion mismatch

# Diagnostic Devices and Procedures

## Mini BAL



## Sputum Samples





# Respiratory Council

- For the Houston Methodist System, a Respiratory Council has been developed and its main purposes are communication and also to develop standards of treatments, devices, staff competencies and job descriptions which affords consistency throughout the hospital network.
- Hopefully, this may narrow the gap in the services provided from 1 entity community hospital to another.

# Conclusion

- There are disparities in the treatment and specialized care for the patient when you compare community hospitals and the medical center.
- Maybe we can decrease these differences as time goes on.



# Learning Assessment Question #1

- Question 1:

1. The advanced modes of mechanical ventilation such as DuoPAP or Bi-level should only be used when a patient's status is classified as highly critical and a rescue mode is deemed appropriate?

Question: True or False?

# Question #1 Answer:

- The answer is false.
- These modes of mechanical ventilation can be utilized throughout a patient's stay on the ventilator. These modes promote spontaneous breathing and less sedation. Can be used on patients ranging from routine needs for mechanical ventilation to patients with ARDS or on ECMO.

# Learning Assessment Question #2

- Question 2:

2. Currently, which method is the more preferred way to wean a patient?

A. Place them on SIMV, decrease the support rate by 2 each day until you can place them on CPAP and then complete respiratory weaning mechanics for possible extubation.

B. Use a T-piece weaning trial to see if a patient can be extubated.

C. Use the combination of Spontaneous Breathing Trials and Sedation Awakening Trials.

# Question #2 Answer:

- The answer is C.
- For the last 10 years, evidenced based medicine has proven the use of SBTs and SATs has decreased length of stay of the patient on the ventilator, decreased delirium and less patients have been reintubated after extubation.



# Learning Assessment Question #3

- Question 3:
- Which mode of mechanical ventilation is more comfortable for most patients and decreases asynchrony?
  - A. Assist Control
  - B. SIMV
  - C. Pressure Support Ventilation
  - D. ASV (Adaptive Support Ventilation)

# Question #3 Answer:

- The answer is D.
- ASV adjusts the mechanical rate and targeted pressures of the ventilator for the patient based on the “live” ever changing compliance and resistance of the patient. This enhances the patient’s ability to breathe spontaneously, utilize the least work of breathing and for the ventilator to meet the needs of the patient, insuring patient synchrony and comfort.

# Questions

