What is Dyspnea???
Definition: uncomfortable awareness of breathing
Suffocation
Not enough air
Smothering feeling

Dyspnea is not
A pulse ox #

Mechanics of breathing
• Brain
• Chemoreceptors
• Mechanoreceptors
• Nerves
• Muscles
How common is dyspnea in our patients?

- 20%
- 45%
- 76.8%
- 90%

What Causes Dyspnea

- Obstructive Lung Disease
- Restrictive Lung Disease
- CHF
- Pleural Effusion or Pericardial effusion
- Anemia
- Pneumothorax
- Tumor
- Cardiac ischemia or arrhythmias

- Pneumonia
- Sleep apnea
- Radiation pneumonitis
- Ascites
- Paraneoplastic syndromes
- Atelectasis
- Superior Vena Cava syndrome

- Anxiety
- Psychosocial/Spiritual distress
- Hypoxemia
- Pulmonary Embolism
- Thick Secretions
- Respiratory muscle weakness
- Dying
SOAPBOX MOMENT

↑ respiratory rate ≠ (always) dyspnea

Mrs. Smith

86 yo s/p massive CVA at KBR for 6 days
nothing po/IV for 1 week
RR 42  HR 114

2300: Resp rate 42  HR 114
2315: MS 2 mg IV given for ↑ RR
2345: Intervention successful, RR 6

Treatments

• Environmental adjustments
• Medications
• Treatments
• Machines

Treatments: Environment

• Temperature
Treatments: Environment

- Fans
- Elevate head

Treatments: Environment

- Behavioral

Treatments: Medications

- Opioids
- Antibiotics
- Bronchodilators and other respiratory meds
- Steroids
- Diuretics
- Anticoagulation
- Oxygen
- Blood transfusions/Epogen* – like meds

*Medications that Brent REALLY doesn’t like

Opioids for Dyspnea

Mechanism of action:
- Likely involves endogenous opioids and mu receptors
- PET imaging has identified cortical areas involved in dyspnea. Co-localized with pain perception.

Pearls of wisdom:
- Dosed appropriately, opioids relieve dyspnea WITHOUT respiratory depression
- Opioids ↓ exercise induced dyspnea and ↑ exercise tolerance in COPD patients
Treatments: Oxygen

- Oxygen does not provide mechanical assistance to weak respiratory muscles.
- Oxygen may be needed for:
  - Pneumonia from infection or aspiration.
  - Must provide both oxygenation and assisted ventilation if muscle weakness and hypoventilation are present.
  - During air travel.
  - Palliative care.

SpO2 < 94% in absence of pulmonary disease indicates lung volume loss.

Oxygen – usually NOT the best treatment for shortness of breath.

Treatments: Therapies

Always ask: ???

1. Prognosis (functional status)
2. Patient goals

Radiation
Surgery/stenting
Chemotherapy
Thoracentesis/Pleurodesis/tunneled catheter

Connie: Wondertherapist

Evolution of Respiratory Failure in NMD

Respiratory Management of Neuromuscular Disease

Neuromuscular Respiratory Failure – is NOT a Pulmonary Disease

Upper Airway Muscle Failure
- Decreased upper airway respiratory muscle tone
- Poor glottic function – aspiration
- Cough insufficiency
- Sleep disordered breathing

Expiratory Muscle Failure
- Cough insufficiency

Expiratory Muscle Failure
- Cough insufficiency

NIV Machines
What are they and how do they work?

Any device that provides mechanical ventilation to the lungs using techniques that do not require an endotracheal airway (ET tube, Tracheostomy tube)

NIV Machines

When To Initiate Assisted Ventilation

- Evidence of progressive muscle weakness
- Symptomatic (early morning headaches, daytime sleepiness, confusion and memory impairment, increasing shortness of breath, increasing fatigue)
- Begin before there is danger of life-threatening acute respiratory failure
- Begin NIV initially for nighttime symptoms to provide respiratory muscle rest and increase as needed (shorter periods may be used if patient has difficulty tolerating)

NPPV Ventilation

- Goals
  - should be comfortable for patient
  - should achieve SaO2 of 95% or higher on room air
  - prevent hypercapnia
  - assist patient to cough and clear secretions
  - provide improved oral communication
- Interface
  - nasal mask
  - full face mask
  - mouthpiece (even if using volume ventilator) unless significant bulbar impairment is present

Starting NPPV

- Masks: While full face masks are commonly used in the in-patient setting, some patients find them claustrophobic. Nasal masks tend to be better tolerated, but they do not work as well in patients who are mouth breathers. Patient preference and clinician familiarity should guide this decision.
- Settings: Two parameters need to be set: the inspiratory positive airway pressure (IPAP) and end-expiratory positive pressure (EPAP). These pressures are usually triggered by the patient. On many devices, it is possible to set a back-up rate if the patient does not trigger a breath spontaneously. This is inappropriate in dying patients needing NPPV for symptom relief.
- Strategies: There are two general approaches to initiating NPPV settings: a 'high to low' approach and a 'low to high' approach, referring to the initial IPAP settings. The EPAP is usually set at 3-5 cmH2O. In order to maximize the tolerability of NPPV for symptom relief in dying patients, a 'low to high' approach is recommended, with a lower IPAP (5-10 cmH2O) and gradually increasing inspiratory pressures to achieve alleviation of dyspnea, decreased respiratory rate, increased tidal volume, and patient-machine synchrony.
- Monitoring: Monitoring of pulse oximetry and arterial blood gases are not needed for patients using NPPV only for symptom control. Rather, the effect of NPPV should be assessed through subjective improvement with respect to symptoms and patient comfort. It is important to reassess patients frequently (looking specifically for respiratory rate, use of accessory muscles, and signs of anxiety), and to ask them if they are comfortable with the NPPV and deriving any benefit from it. Breaks from NPPV to eat, drink, and more freely communicate should be encouraged as much as patients desire.

Choosing the Correct Machine/Settings

- BiPAP — not CPAP
  - "Wide-span" pressure support (usually used at least a 10 cm H2O I/E span to move air)
  - Titrate IPAP
    - Usually range of 12 – 20 cm H2O
  - EPAP 3-4 cm H2O
  - Spontaneous/Timed Mode
    - Necessity of backup rate (REM sleep)
    - Rise time, TI max and trigger sensitivity
  - Increasing rise time may improve tolerance in bulbar patients
  - Volume ventilator – best for breath stacking
    - Can be used with face mask or nasopharyngeal or upper airway is obstructed
    - VT usually 800-1500 ml at rates of 10-12/minute
Those pesky masks

Who will benefit????

Consider Assisted Ventilation if —
- Patient is highly motivated and engaged in living
- Medical problems are stable or progressing slowly
- Can perform some ADL
- Able to communicate
- Patient and family understand pros and cons
- Caregiver support is available
- Resources are available for equipment
- Can use non-invasive ventilation on trial basis

May Want to Avoid Assisted Ventilation if —
- Disability is advanced
- Severe bulbar patients may not tolerate BiPAP
- Communication is very limited
- Interest/motivation for living is low
- Not mentally alert or self-directed
- Lack of caregiver/financial resources
- Unable to use non-invasive ventilation on trial basis

Challenges to NPPV

- Patient interface
- Mask leaks
- Nose/cheek/bridle discomfort
- Nasal caliber
- Dry mouth
- Reduced humidification
- Nasal impact
- Asynchrony
- Support head
- BiPAP often set too high/NPPV often set too low
- Some patients may not tolerate NPPV. Allow use of NPPV on a trial basis with patient’s input
- Severe weight loss
- Mask intolerance
- Therapy is usually reliable
- Need to strictly synchronize when non-invasive ventilation is used
- Monitoring: patient’s vital signs are often unreliable;
  mandatory to monitor PaO2 when BiPAP is below 95% or higher

Volume –Cycled Ventilators

- Can be used either invasively or non-invasively
- Capable of delivering larger tidal volumes of air than NPPV units

http://www.bestcppprice.com/ Sleep-Comfort-Care-Nose-Bridge- Pad-by-Sequal-Technologies_p_0-672.html

PORTABILITY

Issues with Invasive Ventilation

- Airway management
- Communication
- Financial
- May require as much as 19 or more hours per day caregiver time
Other Options for Respiratory Support

- Diaphragmatic Pacing
- Pneumobelt
- Shell
- Assisted Coughing
  - Provide manual cough assist if VC is less than 1000 - 1500 ml
  - Assisted cough flow must be at least 60 L/min to clear airway secretions
  - Once assisted peak cough flows are below 270 L/min teach manual and mechanically assisted coughing
  - Caregiver applies quick inward, upward pressure to diaphragm as patient coughs or provide mechanical cough with in-exsufflator

Assisted Coughing

1. Take two slow, deep breaths to expand lungs
2. Breathe in again
3. Caregiver places hands on abdomen or lower rib cage, then quickly pushes inward and upward against the abdominal muscles to assist cough (Figure 2)
4. Exhale (it may help to attempt to cough), as the caregiver pushes the hands into the abdomen to help the diaphragm move up and expel air and secretions.
5. Repeat procedure until the secretions are cleared.

Secretions

- Overall volume of saliva varies from 1/2 - 2 quarts per day
- Thick saliva deep in throat
  - Hydration
  - Beta-Blockers
- Sialorrhea
  - Amitriptyline
  - Glycopyrrolate
  - Neostigmine
  - Hyoscine
  - Botulinum toxin injection
  - Irradiation

Neuromuscular Disease Quality of Life/Survival

- Respiratory muscle function is a key determinant of QOL and survival
- Non-invasive ventilation can increase survival by several months
- Invasive ventilation may increase survival more effectively but with a greater financial, emotional and caregiver burden
- Patients on long term ventilation can lead meaningful lives and few regret being on a ventilator
- When a patient can no longer tolerate non-invasive ventilation, or it becomes ineffective, he or she has to choose between tracheostomy and invasive ventilation or palliative care