Approach to Dyspnea

Dr Shaker

Epidemiology

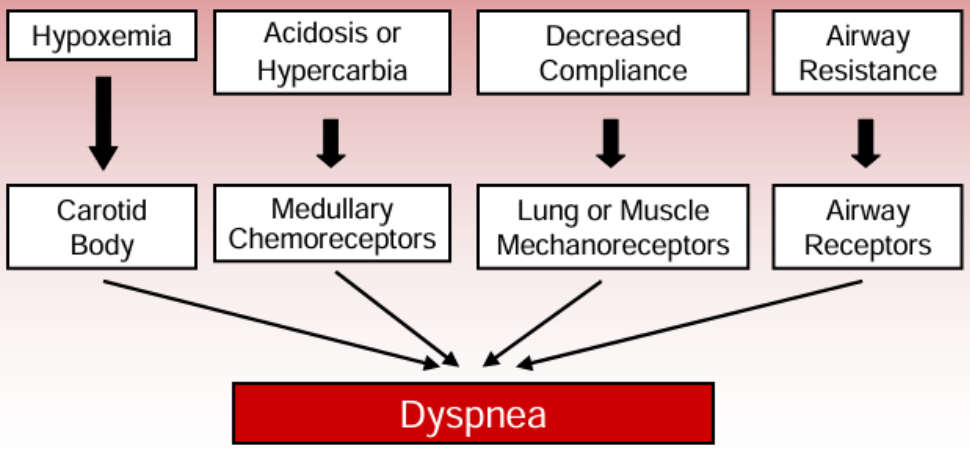
- 3-6% of ED visits
- 15-20% of hospital admissions
- 85% of cases:
  - COPD
  - Pneumonia
  - Cardiac Ischemia
  - Interstitial Lung Disease/CHF
  - Psychogenic
- 30% Multi-factorial

Definition

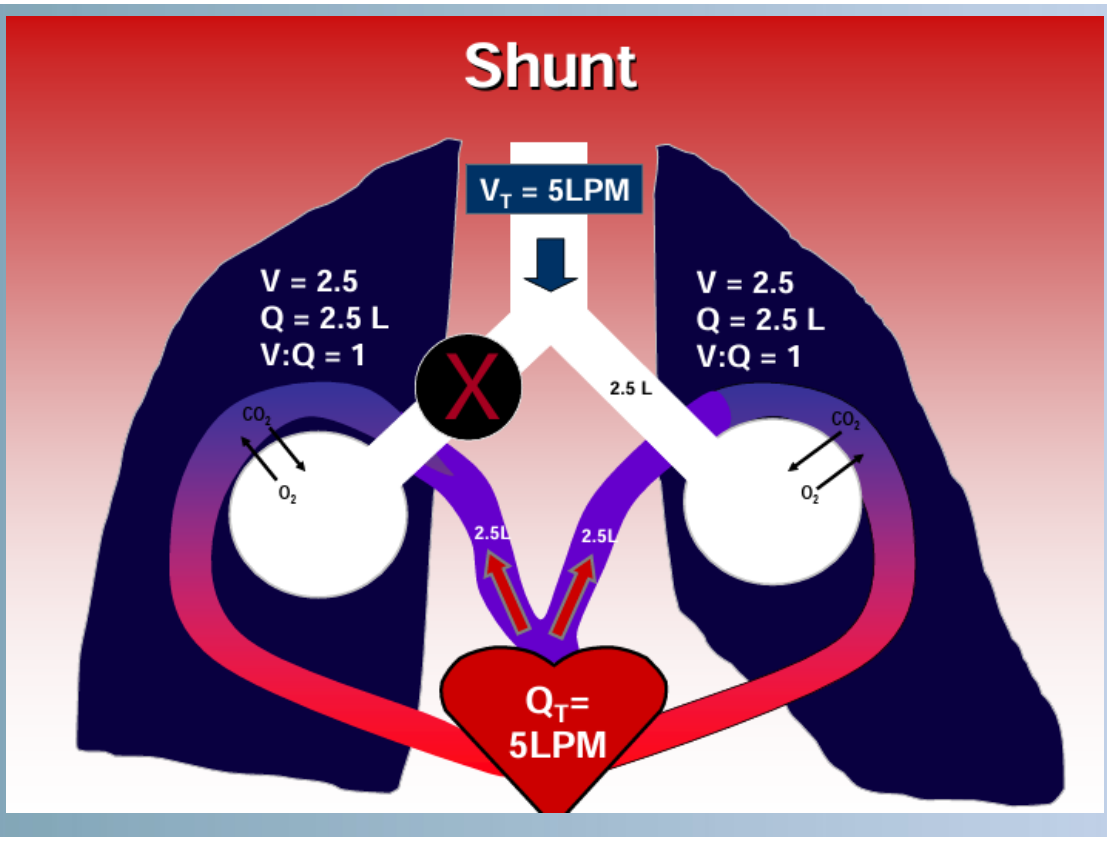
"Dyspnea is a term used to characterize a subjective experience of breathing discomfort that is comprised of qualitatively distinct sensations that vary in intensity. The experience derives from interactions among multiple physiological, psychological, social and environmental factors, and may induce secondary physiological and behavioral responses."

Pathophysiology

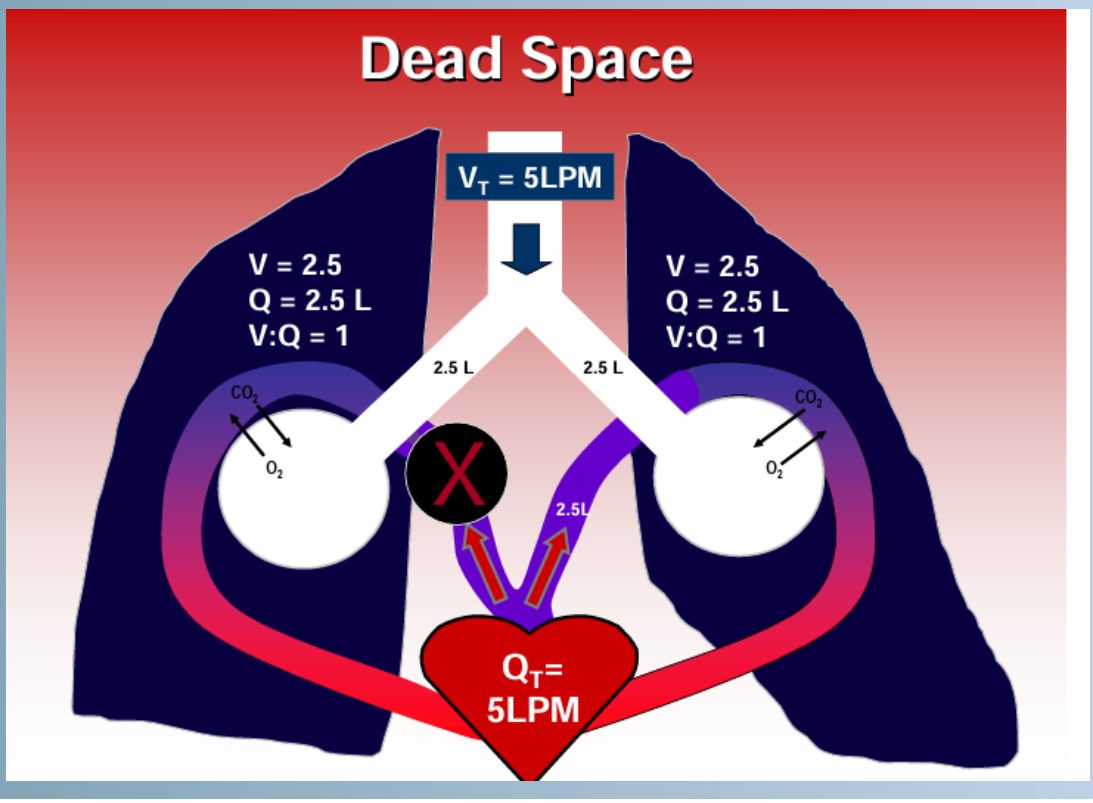
Dyspnea results when a stimulus activates a respiratory center beyond a certain threshold



Shunt

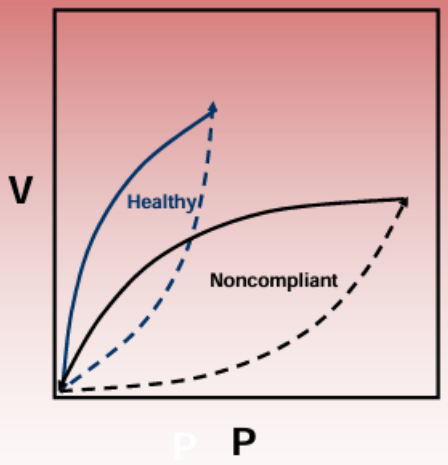


Dead Space



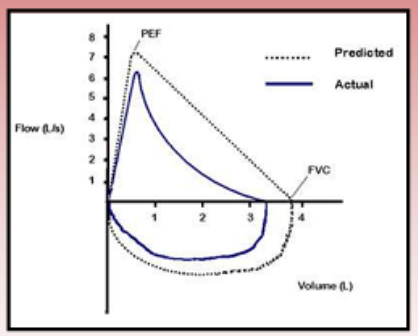
Decreased Compliance

- Compliance = dV/dP
- Mechanoreceptors in diaphragm, chest wall and airways
- Examples:
  - CHF
  - Obesity
  - Airway restriction
  - Surfactant loss
  - Chest wall tightness



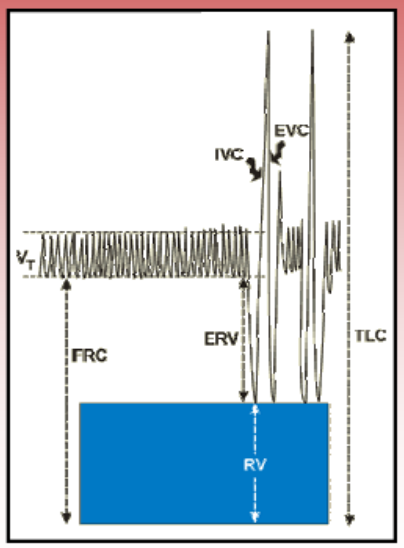
Airway Resistance

- Decreased flow through narrowed airways
- Airway Receptors
- Increased work of breathing
- Examples
  - Reversible
    - Asthma
    - Allergic Bronchospasm
    - Toxic
  - Some Non-Reversible
    - Emphysema
    - Chronic Bronchitis



Hyperinflation

- Functional Residual Capacity =
  - Volume left at bottom of tidal volume breath
  - Our natural O_2 reservoir
- Mechanoreceptors in diaphragm, chest wall and airways
- Symptom:
  - "Fullness"
  - "Inability to take a deep breath"
- Examples:
  - Emphysema
  - Blebs
  - Pregnancy
  - Abdominal Distention



Other

- Volume Loss / External Compression
  - Pleural Effusions
  - Pneumothorax
  - Malignancy
- Decreased Oxygen Delivery to Tissues
  - Anemia
  - Toxic Exposure
  - Sepsis
  - Metabolic Acidosis
- Decreased Diaphragm/Chest Wall Strength
  - Neuromuscular
    - CNS or Spinal Cord Disorder
    - Myopathy/Neuropathy
  - Chest Wall Injury
- Constitutional or Psychiatric Factors
  - Deconditioning
  - Psychogenic

Brief Differential Diagnosis

- Asthma
- Primary lung cancer
- Metastatic cancer
- Chronic bronchitis
- Bronchiolitis
- Laryngeal disease
- Tracheal stenosis
- Tracheaomalacia
- Alveolitis
- Drug toxicity
- Anaphylaxis
- Emphysema
- Chronic Bronchitis
- Pneumonitis
- Pulmonary edema
- Pulmonary fibrosis
- Abdominal distention
- Chest wall trauma
- Pulmonary effusion
- Pericardial effusion
- Pulmonary hypertension
- Pulmonary embolism
- Vasculitis
- Myocardial Infarction
- Arrhythmia
- Myocardial ischemia
- Congestive heart failure
- Intracardiac shunt
- Left ventricular hypertrophy
- Atrial myxoma
- Pericarditis
- Myocarditis
- Valvular disease
- Myopathy
- Neuropathy
- Phrenic nerve dysfunction
- Spinal cord injury
- Anemia
- Deconditioning
- Gastroesophageal reflux disease
- Hyperthyroidism
- Metabolic Acidosis
- ARDS
- Sepsis
- Psychogenic dyspnea
- Acute bronchitis
- High altitude pulmonary edema
- **PLUS HUNDREDS MORE>>>>>>>>>>**

H & P and CXR

- History:
  - 56% accurate for all causes
  - 67% accurate for cardiac causes
  - 47% accurate for pulmonary causes
- History, Physical Exam, Chest X-Ray
  - 66% accurate for all diagnoses
  - 81% accurate for most common diagnoses
  - 27% of CXR will demonstrate 'serious' findings

Physical Exam Findings

- Wheezing
  - Asthma
  - COPD
  - Cardiac Ischemia?
  - Heart Failure?
  - Anaphylaxis?
- Fever
  - Pneumonia
  - PE?
- Cough
  - Pneumonia
  - COPD/Asthma?
  - PE?
  - Heart Failure?
- Leg Edema
  - Heart Failure
  - PE
  - Myocardial Ischemia?
- Tachycardia
  - PE
  - Tachyarrhymia
  - Pneumonia?
  - CHF?
- Chest Pain
  - Myocardial Ischemia
  - PE
  - Pneumonia?
  - Trauma?

Signs and Symptoms Overlap

	Pneumonia	CHF	PE
Dyspnea	37-93%	86%	78-85%
Fever	70%	--	44%
Cough	85%	12%	40%
Chest Pain	60%	--	65%
Tachycardia	62%	10%	26-69%
Rales or Rhonchi	26-85%	24-65%	--
Wheezing	36%	17%	15%
Leg Edema	--	--	33%

Organize your thoughts

Is the dyspnea…
- –A new problem?
- –An exacerbation of a chronic problem?
- –A combination?

Is the dyspnea…
- –Pulmonary?
- –Cardiac?
- –Neither?

Is the dyspnea one of the deadly but subtle diagnoses I should think of every time?

Is the Dyspnea…

A new problem?
- Myocardial ischemia
- Pneumonia
- Pulmonary embolism
- Anaphylaxis
- Arrhythmia
- Trauma

- Keys to Diagnosis:
  - No history of prior cardiopulmonary disease
  - Atypical of other disease presentations
  - New risk factors
    - e.g. recent surgery

Is the Dyspnea…

An exacerbation of a preexisting problem?

- Asthma
- Emphysema/Chronic Bronchitis
- Congestive Heart Failure
- Interstitial Lung Disease
- Cardiac Arrhythmia
  - e.g. atrial fibrillation with rapid ventricular response
- Pleural or pericardial effusion
- Neuromuscular Disorder
- Anemia

- Keys to diagnosis:
  - Past medical history
  - Typical or atypical of prior presentations
    - Is there a reason this presentation could be different than usual?
  - Precipitating or exacerbating factors
    - e.g. missed medications, dietary indiscretion, infection
  - Corroborating findings on physical examination and testing
    - Be careful to notice signs of compensated or decompensated disease

Is the Dyspnea…

A combination of a new and chronic problem?

- Recurrent Disease:
  - Myocardial ischemia
  - Pulmonary embolism
  - Arrhythmia
- Multiple diseases conspiring together:
  - Infection exacerbating Heart Failure
  - Arrhythmia exacerbating Heart Failure
  - Anemia exacerbating Cardiac Ischemia
  - COPD complicated by pneumonia

- Keys to Diagnosis:
  - Stable disease becoming unstable
  - Findings consistent with multiple processes
    - e.g. fever and diffuse wheezing

Is the Dyspnea…

Pulmonary?

- Airway:
  - Asthma
  - Emphysema
  - Anaphylaxis
  - Tracheal pathology
- Parenchymal (V/Q Mismatch):
  - Pneumonia
  - Pulmonary embolism
  - Mucous plugging
- Decreased Tidal Volume or Functional Residual Capacity:
  - Pneumothorax
- Keys to Diagnosis:
  - Abnormal breath sounds, I:E Ratio, Stridor
  - Chest X-Ray

Is the Dyspnea…

Cardiac?

- Myocardial Ischemia
- Left Sided Dysfunction
  - CHF
  - Atrial Fibrillation
  - Aortic stenosis or insufficiency
- Right Sided Dysfunction
  - Pulmonary hypertension
  - Sleep apnea
- Insufficient filling / preload
  - Pericardial effusion / tamponade
- Keys to Diagnosis
  - EKG
  - Murmurs
  - Bedside ultrasound

Is the Dyspnea…

Something else entirely?

- Neuromuscular disease
- Anemia
- Metabolic acidosis
- Toxic exposure
- Endocrine disorder
- Obesity/deconditioning
- Traumatic injury
- Abdominal distention
- Psychogenic

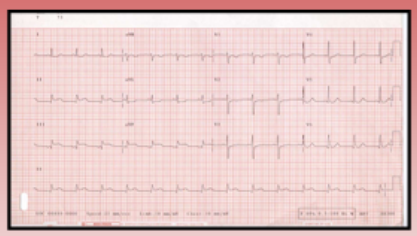
Diagnoses to Consider Every Time

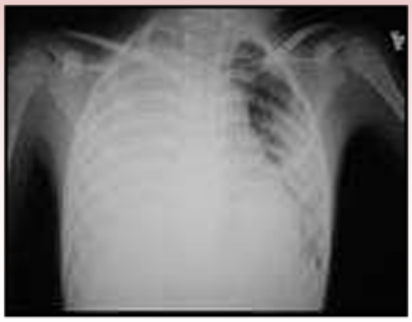
- Myocardial Ischemia
- Pulmonary Embolism
- Infection/Sepsis
- Pericardial Tamponade
- Arrhythmia

Diagnostic Tests

Nearly All Patients:

- Pulse Oximetry
- Electrocardiogram
- Chest X-Ray
  - 35% abnormal
  - 60% of clinical decisions

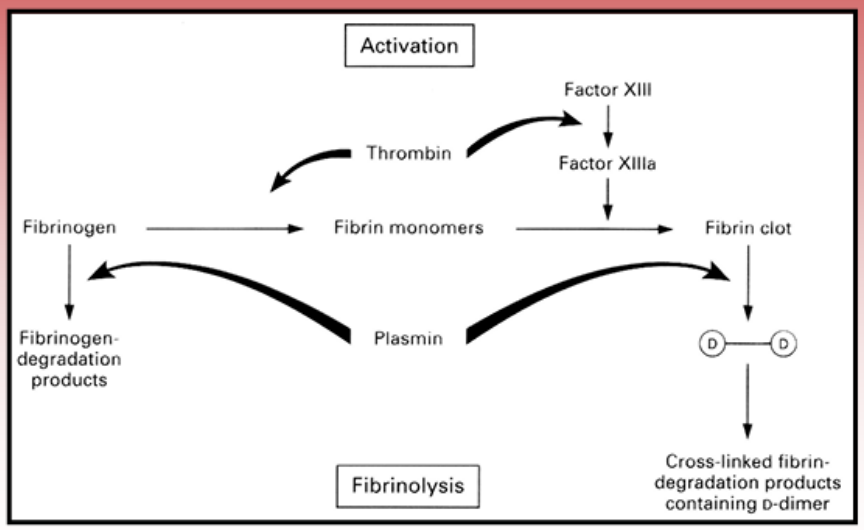


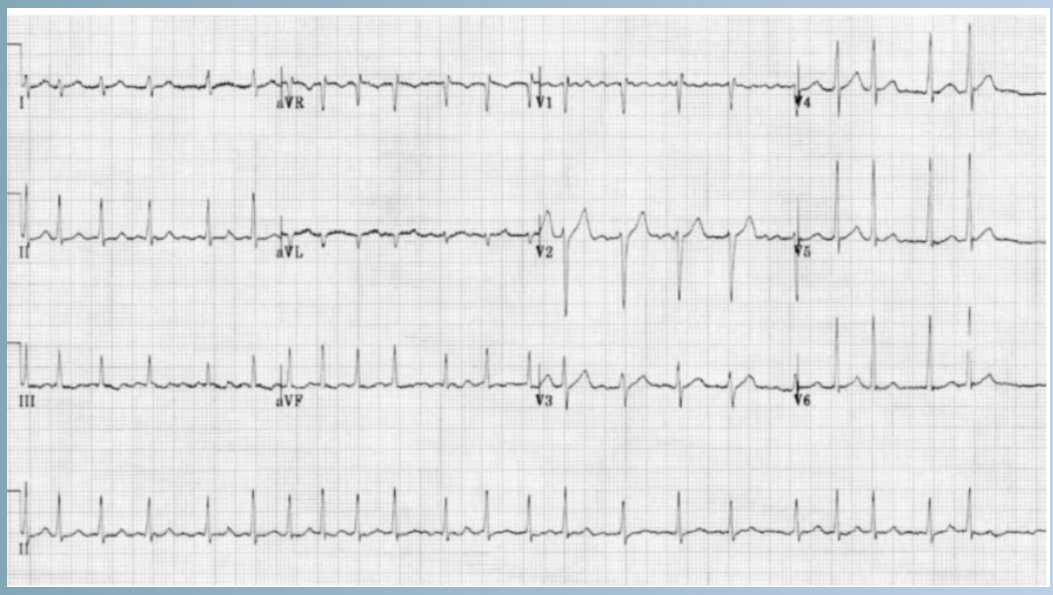


Diagnostic Tests

- Select Patients
  - Complete Blood Count
  - Basic Chemistry Panel
  - Arterial Blood Gas
  - Peak Flow / Spirometry
  - Cardiac Troponin
  - Bedside Ultrasound
  - **D-dimer**
  - **BNP**

Diagnostic Tests - D-dimer

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