Pathophysiology of Respiratory Failure

Clinical Documentation

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P, CPC I

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CORE VALUES

Elevate Medical Solutions has five core values: Integrity, Humility, Knowledgeable, Solutions Focused, and Team Player. Our focus from day one has been on our people. While everyone's walk of life is unique, we see a common theme in the professional journey of our people. Everyone on our team has a passion for what they do. They care about it, they get excited about it, and they love to watch their skills tackle the challenges their team is setting out to resolve.

ELEVATE TEAM SUPPORTING ENTER CLIENT NAME HERE

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Learning Goals

- Gain a working knowledge of the anatomy, physiology and pathophysiology associated with the respiratory system and respiratory failure
- The attendee will be able to distinguish between acute and chronic respiratory failure
- Be able to identify the clinical signs and documentation required from the provider to support the diagnosis of respiratory failure

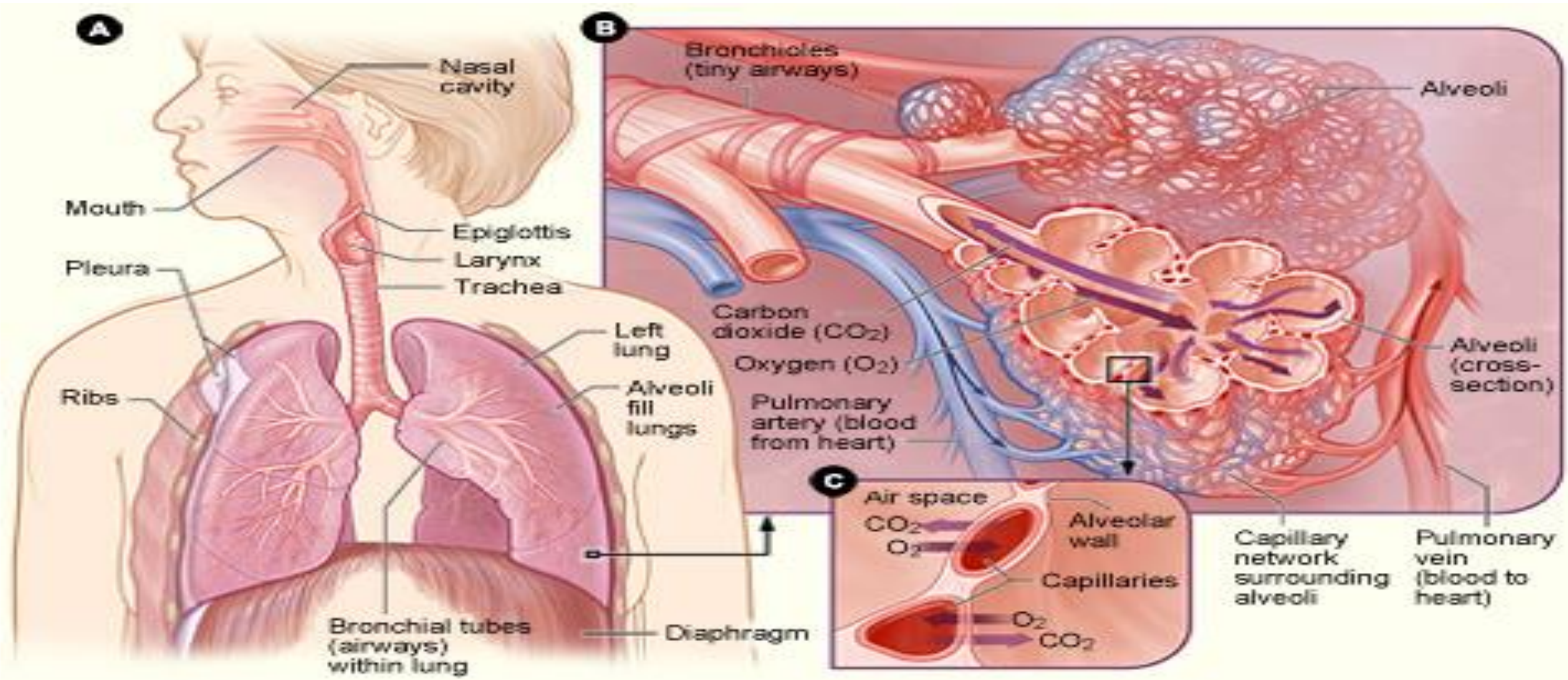
Reasons for Audit / Denial

- Short hospital stay 1-2 nights
- No supporting etiology
- No supporting comorbid conditions
- No need for extra oxygen
- History normal
- Exam Normal
- Inadequate / inconsistent documentation

The Respiratory System

- The respiratory system is made up of organs and tissues that allow you to you breathe.
    - Upper Airways,
    - Lungs
    - Blood vessels, and
    - Muscles that enable breathing

Respiratory System



https://www.ncbi.nlm.nih.gov/pubmedhealth/PMHT0022310/

The Lungs

- Spongy air-filled organs
- 2 Lungs – One on each side of the thoracic cavity
- Covered by pleura (visceral pleura)
- There is also a layer of pleura on the inner chest wall (Parietal Pleura)

The Pleural Cavity

- The area between the 2 layers of Pleura is the pleural cavity
  - A hollow space which allows the lungs to expand during inspiration.
- The pleural membranes secrete a serous fluid that acts as a lubricant between the 2 layers of Pleura.
- The 2 layers can move against one another without pain or friction.

The Lungs

- There are 5 lobes of the lungs
  - The Left Upper Lobe (LUL)
  - The Left Lower Lobe (LLL)
  - The Right Lower Lobe (RLL)
  - The Right Middle Lobe (RML)
  - The Right Upper Lobe (RUL)
- The inner surface of the lung would equal approx. ½ the size of a tennis court if stretched out.

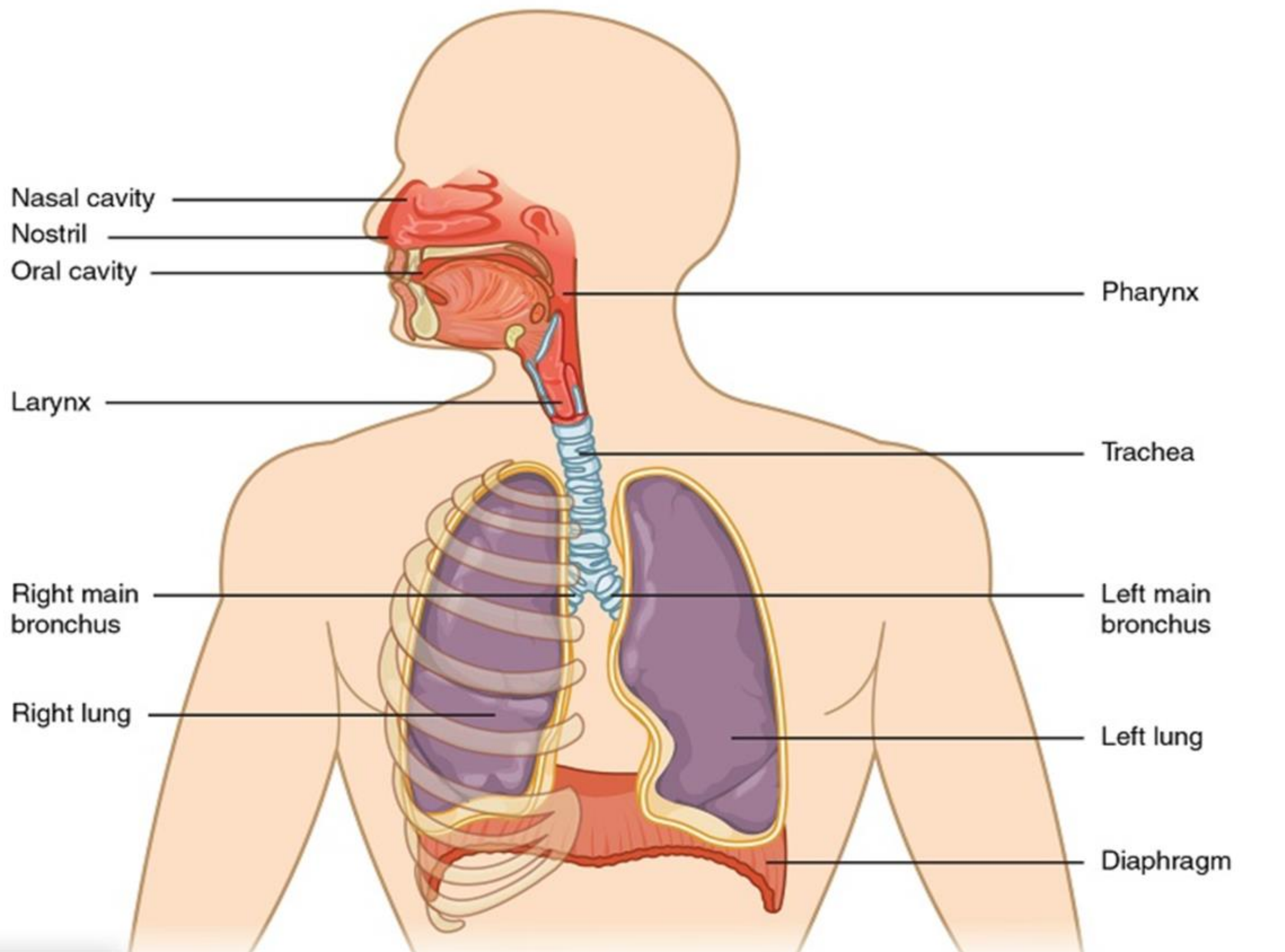
http://www.innerbody.com/anatomy/respiratory/lungs

The Lungs

- A bellows
- **Air Exchange** between our blood stream and the outside air.
  - Oxygen in
  - Carbon Dioxide Out

Airways

- Carry air between the lungs and the exterior of the body
  - Carry oxygen-rich air to your lungs.
  - Carry carbon dioxide rich air out of your lungs.
- Heat and humidify the air
- Help with swallowing and speech
- Allow you to cough
- Secrete Mucous


Nasal cavity
Nostril
Oral cavity
Pharynx
Larynx
Trachea
Right main bronchus
Left main bronchus
Right lung
Left lung
Diaphragm

What is Mucus ?

- A Lubricant
- A Protective coating
- Works like fly paper to trap bacteria and other unwanted particulates in the airways
- Comprised of water, epithelial cells, dead leukocytes, mucin and inorganic salts.

The Role of Mucus

- The pseudostratified epithelium that lines the bronchi contains many cilia and goblet cells.
- Cilia are small hair-like cellular projections that extend from the surface of the cells.
- Goblet cells are specialized epithelial cells that secrete mucus to coat the lining of the bronchi.
- Cilia move together to push mucus secreted by the goblet cells away from the lungs.

http://www.smosh.com/smosh-pit/articles/6-cartoon-spokes-characters-would-be-horrifying-real-life

The Role of Mucous

- Particles of dust carry pathogens like viruses, bacteria and fungi in the air entering the lungs that stick to the mucus and are carried out of the respiratory tract.
- Mucus helps to keep the lungs clean and free of disease.
- Nicotine paralyzes the Cilia causing the lower airways to become plugged and unable to exchange gases.

Lungs and Vasculature

- In the lungs, the bronchi branch into thousands of smaller, thinner tubes called bronchioles.
- The bronchioles end in bunches (think grapes) of tiny round air sacs called alveoli.

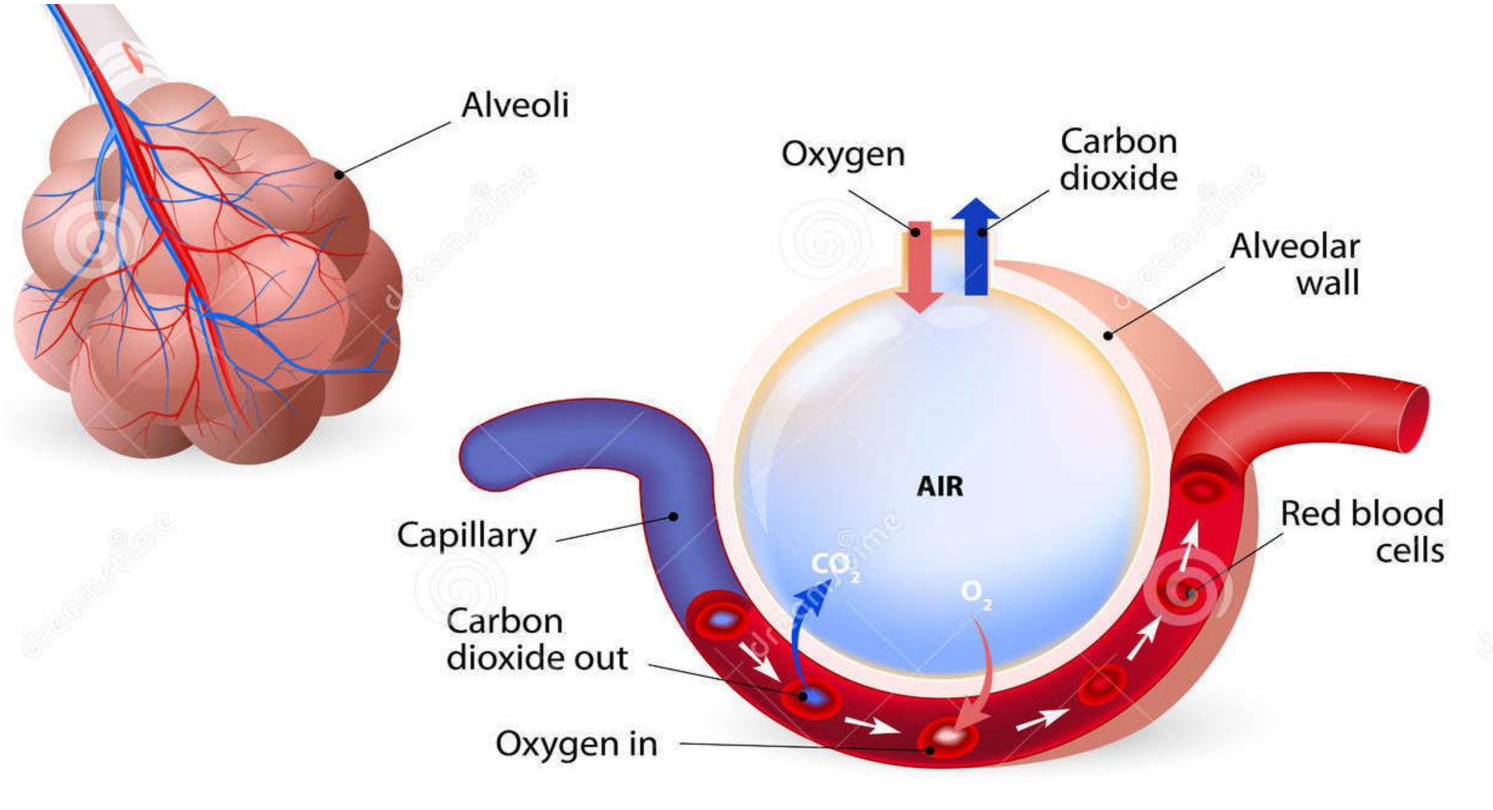
Lungs and Vasculature

- Each of these air sacs is covered in a mesh of tiny blood vessels called capillaries.
- The capillaries connect to a network of arteries and veins that move blood through your body.

The Alveoli

- Alveoli are the functional units of the lungs that permit gas exchange between the air in the lungs and the blood in the capillaries of the lungs.
- Alveoli are found in small clusters called alveolar sacs at the end of the terminal bronchiole.
- Each alveolus is a hollow, cup-shaped cavity surrounded by many tiny capillaries.

Alveolar Gas Exchange



https://www.dreamstime.com/stock-illustration-alveolus-gas-exchange-pulmonary-alveoli-capillaries-lungs-image48200122

The Alveoli

- The walls of the alveolus are lined with simple squamous epithelial cells known as alveolar cells.
- A thin layer of connective tissue underlies and supports the alveolar cells.
- Capillaries surround the connective tissue on the outer border of the alveolus.

The Alveoli

- Where the walls of a capillary touch the walls of an alveolus is referred to as the respiratory membrane.
- Gas exchange occurs freely between the air and blood at the respiratory membrane,
- The respiratory membrane and capillary membranes are a single cell layer thick.

Alveolar Septal Cells

- Produce alveolar fluid
- Coat the inside of the alveoli
- Acts as a surfactant that keeps the alveoli moist
- Helps to maintain the elasticity of the lungs and keeps thin walls from collapsing

Muscles of Respiration

- Diaphragm
- Intercostal muscles
- Abdominal muscles
- Muscles in the neck and collarbone area

Blood Flow Through the Lungs

- The pulmonary artery and its branches deliver venous blood rich in carbon dioxide to the capillaries that surround the air sacs.
- Inside the air sacs, carbon dioxide moves from the blood into the air.
- Once the hemoglobin is free of CO_2 the oxygen moves from the air into the blood in the capillaries.

Blood Flow Through the Heart

- The oxygen-rich blood travels to the heart through the pulmonary vein and its branches.
- The heart pumps the oxygen-rich blood out to the body via the arterial system.

The Act of Ventilation

- Negative Pressure Ventilation
  - Need a pressure differential between outside air and inside the alveoli
  - Respiratory muscles expand and create a negative pressure inside the alveoli
  - Causes air to come into the lungs in the act of **Inhalation**
  - When Respiratory muscles contract and decrease the size of the thoracic cavity the pressure in the alveoli increases and the air is expelled or **exhaled.**

Breathing

- Conscious Control
  - Cerebral Cortex of the brain
- Unconscious control
  - Controlled by the respiratory center in the brainstem
  - Monitors the concentration of gasses in the blood stream and adjusts the respiratory rate accordingly

The Art of Breathing

- Process is dependent on the difference in pressure between the atmosphere and the lungs.
  - Boyle's Law $P_1V_1 = P_2V_2$ - For a gas at a constant temperature there is an inverse relationship between volume and pressure.
  - Boyle discovered that the pressure of a gas is inversely proportional to its volume: If volume increases, pressure decreases. Likewise, if volume decreases, pressure increases.

Gas Flow

- Gas moves from higher pressure to lower pressure
- **Atmospheric pressure** is the amount of force that is exerted by gases in the air surrounding any given surface, such as the body.
  - Atmospheric pressure can be expressed in terms of the unit atmosphere, abbreviated atm, or in millimeters of mercury (mm Hg). One atm is equal to 760 mm Hg, which is the atmospheric pressure at sea level.

Gas Flow

- **Intra-alveolar pressure** is the pressure of the air within the alveoli, which changes during the different phases of breathing
  - The alveoli are connected to the atmosphere via the tubing of the airways and as such the interpulmonary pressure of the alveoli **always equalizes** with the atmospheric pressure.

Pleural Cavity

- **Intrapleural pressure** refers to pressure in the pleural cavity due to the fluid bond between the visceral and parietal pleura and the parietal pleura's adhesion to the body wall and diaphragm.
- Intrapleural pressure changes during the different phases of breathing.
- The intrapleural pressure is always lower than, or negative to, the intra-alveolar pressure (and therefore also to atmospheric pressure).

Lung Volumes

- Total air volume of the lungs is about 4 to 6 liters and varies with a person's size, age, gender, and respiratory health.
- Lung volumes are measured clinically by a device known as a spirometer
- Normal shallow breathing only moves a small fraction of the lungs' total volume into and out of the body with each breath. This volume of air, known as *tidal volume*, usually measures only around 0.5 liters

http://www.innerbody.com/anatomy/respiratory/lungs

Lung Volumes

- The volume of air exchanged during deep breathing is known as *vital capacity*
  - Ranges between 3 to 5 liters, depending on the lung capacity of the individual.
- A residual volume of around 1 liter of air remains in the lungs at all times, even during a deep exhalation.

Respiratory Failure Lay Definition

- Respiratory failure is a condition in which not enough oxygen (O_2) passes from your lungs into your blood.
  - Your body's organs, such as your heart and brain, need oxygen-rich blood to work well.

AND/OR

- Carbon Dioxide (CO_2) is not adequately removed from the lungs
  - This can cause problems with body pH such as respiratory acidosis

Etiologies

- A wide range of of etiologies can be responsible for Respiratory Failure
  - Primary pulmonary pathologies or
  - Initiated by extra-pulmonary pathology
  - Causes are often multifactorial

Etiologies

- Can be caused by abnormalities in:
  - **Central Nervous System** impairment due to *e.g. drugs, metabolic encephalopathy, CNS infections, increased ICP, OSA, Central alveolar hypoventilation*
  - **Spinal cord *trauma or disease*** *e.g. transverse myelitis*
  - **Neuromuscular *diseases*** *e.g. polio, tetanus, M.S., M.Gravis, Guillain-Barre, critical care or steroid myopathy)*

Etiologies

- Can be caused by abnormalities in:
  - Chest wall dysfunction *or deformity e.g. Kyphoscoliosis, obesity)*
  - Upper airway trauma or disease *e.g. obstruction from tissue enlargement, infection, mass; vocal cord paralysis, tracheomalacia*
  - Lower airway disease e.g. *bronchospasm, CHF, infection*
  - Lung parenchyma disease or disruption due to e.g. *infection, interstitial lung disease*
  - Impact from Cardiovascular system

Acute Versus Chronic

- Important Distinction in ICD 10 CM Coding
  - Provider MUST make the statement
    - Acute Respiratory Failure
    - Chronic Respiratory Failure
    - Acute on Chronic Respiratory Failure
  - Important in that the diagnoses here drive different DRGs.

Respiratory Failure

- Respiratory Failure is not a disease
- It is the consequence of problems interfering with the ability to breathe.
- The body is no longer able to perform the functions of respiration
  - Delivering oxygen to the blood and
  - Removing Carbon Dioxide from the blood

Types of Respiratory Failure

Type		Typical Causes
Acute	Ventilatory	Drug Overdose
	Oxygenation	Pneumonia
Chronic	Ventilatory	Neuromuscular Disease
	Oxygenation	Pulmonary fibrosis

https://www.thoracic.org/patients/patient-resources/breathing-in-america/resources/chapter-20-respiratory-failure.pdf

Chronic Respiratory Failure

- Results from progressive disease process over time
- Main cause of death in COPD and Lou Gehrig's Disease
- Third leading cause of death in the US

Acute

- The sudden onset of a process resulting in loss of the ability to ventilate adequately or to provide sufficient oxygen to the blood and systemic organs.
- The pulmonary system is no longer able to meet the metabolic demands of the body with respect to oxygenation of the blood and/or CO_2 removal.

Arterial Blood Gas

- Measures the following
  - pH
  - Level of Oxygen
  - Level of Carbon Dioxide
- Drawn from an Artery
- Let's the provider know how well the patient can move oxygen from the air into the blood stream and how well they remove Carbon Dioxide.

http://www.webmd.com/lung/arterial-blood-gases

Venous Blood Gas

- Do not use this to show oxygenation!
- Use it for pH in Diabetes with Ketoacidosis
- Use it for pH in other metabolic conditions.

pH

- Measures the acidic or basic (alkaline) nature of a solution.
- The pH scale ranges from 0 (most acidic) to 14 (most basic).
- A neutral solution such as water has a pH of 7.
- Acidic Solutions have a pH less than 7, with 0 being the most acidic.
- Alkaline solutions have a pH greater than 7, with 14 being the most basic.

http://www.webmd.com/hw-popup/ph

PaO2

- Refers to the partial pressure of oxygen in the blood
- Refers to the pressure of oxygen dissolved in the blood
- Tells how well oxygen is able to move from the alveoli in the lungs into the blood.

PaCO2

- Refers to the partial pressure of Carbon Dioxide dissolved in the blood

- Tells how well the Carbon Dioxide is removed from the blood stream

Physiologic pH

- Measures the number of Hydrogen ions (H^+) in the blood stream
- Physiologic pH is between 7.35 and 7.45
- A pH of less than 7.35 is referred to as acidosis
- A pH of greater than 7.45 is referred to as Alkalosis
- The body is slightly alkaline

HCO3

- HCO3 is the chemical representation of Bicarbonate
- Bicarbonate in the blood stream acts as a buffer to keep the blood pH from becoming too acidic or basic (alkaline).

Oxygen Content Versus Oxygen Saturation

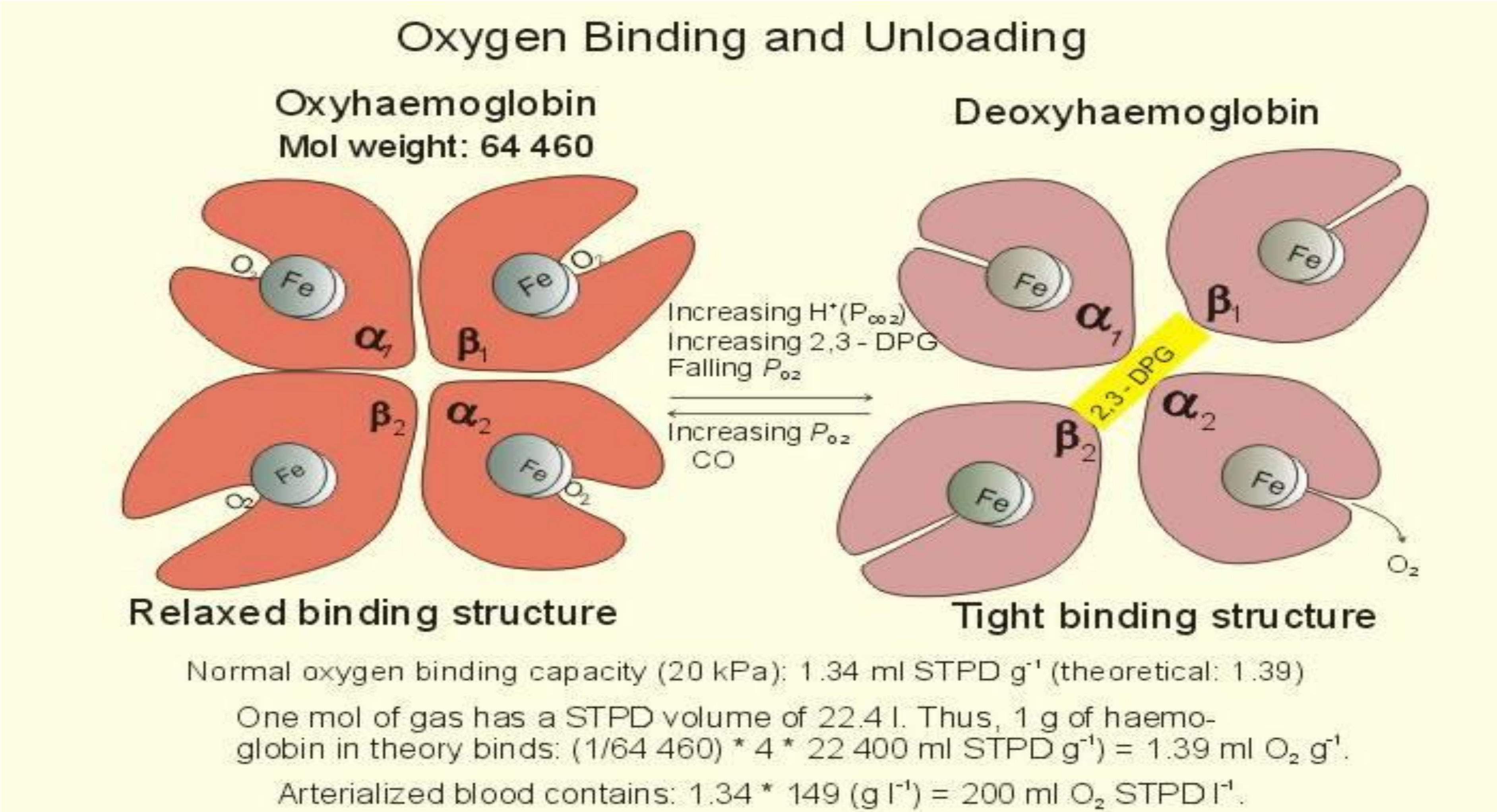
- Oxygen Content - O_2CT – Measures how much oxygen is in the blood
- Oxygen Saturation – Sao_2 - Measures how much of the Hemoglobin in the red blood cells is carrying oxygen.

Hemoglobin (Hb)

- Most of the O_2 that diffuses into the pulmonary capillary blood rapidly moves into the red blood cell (RBC) and chemically attaches to hemoglobin
- Each RBC contains 280 million Hb molecules
- Each hemoglobin molecule has the ability to combine with four oxygen molecules.
- The amount of O_2 bound to hemoglobin is directly related to the partial pressure of oxygen (P_{O2}).

Terms for Hemoglobin

- Oxyhemoglobin (HbO_2)
  - Hemoglobin bound with oxygen
  - Oxygen Saturation (SO_2)
    - Four O_2 molecules bound to a Hb molecule = 100% saturated
    - Three O_2 molecules bound to a Hb molecule =75% saturated
    - Two O_2 molecules bound to a Hb molecule = 50% saturated
    - One O2 molecule bound to a Hb molecule = 25% saturated



http://www.dynapulse.com/educator/WebCurriculum/Chapter%201/Final%20Chapter%201CV%20Physiology.htm#_Transcapillary_Fluid_Exchange

ABG Normal Values at Sea Level

- Partial pressure of oxygen (PaO_2): 75 - 100 mmHg
- Partial pressure of carbon dioxide ($PaCO_2$): 38 - 42 mmHg
- Arterial bloot pH: 7.38 - 7.42
- Oxygen saturation (SaO_2): 94 - 100%
- Bicarbonate - (HCO_3): 22 - 28 mEq/L

Note:
mEq/L = milliequivalents per liter;

mmHg = millimeters of mercury

At altitudes of 3,000 feet and above, the oxygen value is lower.

https://medlineplus.gov/ency/article/003855.htm

Acute Hypercapnic Respiratory Failure

- Acute Hypercapnic Respiratory Failure
  - A rise in arterial carbon dioxide levels is called **hypercapnia (with normal or near normal Oxygen levels)**.
  - Excess CO_2 causes the pH to drop, a symptom of this is a pH < 7.30

http://emedicine.medscape.com/article/167981-overview

Chronic Hypercapnic Respiratory Failure

- Chronic Hypercapnic Respiratory Failure
  - pH not decreased far from baseline
  - Usually higher HCO_3, due to compensation from kidneys

http://emedicine.medscape.com/article/167981-overview

Chronic Hypoxemic Respiratory Failure

- Chronic Hypoxemic Respiratory Failure
  - Patient will have low oxygen levels and normal or near normal Co2 levels
  - May see polycythemia or
  - Right Sided Heart Failure (Cor Pulmonale)

http://emedicine.medscape.com/article/167981-overview

Classifications

- ***Type 1 (Hypoxemic)*** - PaO_2 < 60 mmHg on room air or O2 saturation < 90%
- Usually seen in patients with acute pulmonary edema or acute lung injury.
- These disorders interfere with the lung's ability to oxygenate blood as it flows through the pulmonary vasculature.

Classifications

- ***Type 2 (Hypercapnic/ Ventilatory)*** - PCO_2 > 50 mmHg (if not a chronic CO_2 retainer).
- This is usually seen in patients with an increased work of breathing due to airflow obstruction or
  - Decreased respiratory system compliance, with decreased respiratory muscle power due to neuromuscular disease, or
  - With Central respiratory failure and decreased respiratory drive

Classifications

- ***Type 3 (Peri-operative)***. This is generally a subset of type 1 failure but is sometimes considered separately because it is so common.
- ***Type 4 (Shock)*** - secondary to cardiovascular instability.

Hypoxemic Respiratory Failure

- Physiologic Causes of Hypoxemia
  - Low FiO_2 (high altitude)
  - Hypoventilation
  - V/Q mismatch (low V/Q)
  - Shunt (Qs/Qt)
  - Diffusion abnormality
  - Venous admixture (low mixed venous oxygen)

Ventilatory / Hypercapnic Respiratory Failure

- Physiologic causes of Hypercapnia:
  - Increased CO_2 production (fever, sepsis, burns, overfeeding)
  - Decreased alveolar ventilation
  - Decreased RR
  - Decreased tidal volume (Vt)
  - Increased dead space (Vd)

Hypercapnia Independent of Hypoxemia

- Hypercapnia results from either increased CO_2 production secondary to increased metabolism resulting from issues such as:
  - sepsis,
  - fever,
  - burns,
  - Overfeeding

OR…….

Hypercapnia Independent of Hypoxemia

- Decreased CO_2 excretion.
  - CO_2excretion is inversely proportional to alveolar ventilation (VA).
  - VA is decreased if total minute ventilation is decreased - secondary to either a decreased respiratory rate (f) or
  - A decrease in tidal volume (Vt);
  - Or if the deadspace fraction of the tidal volume is increased (Vd/ Vt).

Causes of Decreased Alveolar Ventilation

- Decreased CNS drive (CNS lesion, overdose, anesthesia).
  - The patient is unable to sense the increased $PaCO_2$. The patient "won't breathe".
  - The Medulla senses Carbon Dioxide levels
  - When $PaCO_2$ is elevated it causes Co_2 to pass through the blood brain barrier and this causes H^+ ions to form creating an acidosis.

Causes of Decreased Alveolar Ventilation

- Neuromuscular disease
  - Myasthenia Gravis,
  - ALS,
  - Guillian-Barre ,
  - Botulism,
  - Spinal cord disease,
  - Myopathies

The patient is unable to neurologically signal the muscles of respiration or has significant intrinsic respiratory muscle weakness. The patient "can't breathe

Causes of Decreased Alveolar Ventilation

- –Asthma/ COPD
- –Pulmonary fibrosis
- –Kyphoscoliosis

Increased Work Of Breathing leading to respiratory muscle fatigue and inadequate ventilation.

Causes of Decreased Alveolar Ventilation

- Causes of increased dead space ventilation
- Pulmonary embolus,
- Hypovolemia,
- Poor cardiac output, and
- Alveolar over distension.

Increased Physiologic Dead Space (Vd) - When blood flow to some alveoli is significantly diminished, CO_2 is not transferred from the pulmonary circulation to the alveoli and CO_2 rich blood is returned to the left atrium.

Documentation Requirements in the Outpatient Setting

- **Accurate documentation drives accurate reporting of ICD-10-CM diagnosis codes**

  For accurate reporting of ICD-10-CM diagnosis codes, the documentation should describe the patient's condition, using terminology which includes specific diagnoses as well as symptoms, problems, or reasons for the encounter. There are ICD-10-CM codes to describe all of these.

Criteria for Acute Respiratory Failure

- Room Air pO_2 less than 60
- Room Air O_2 Sat less than 90- 91* percent
- pCO_2 greater than 50 and pH less than 7.35
- pO_2/FiO_2 less than 300
- pO_2 decrease, or pCO_2 increase of 10mmHg from baseline

Acute on chronic respiratory failure

- A patient who was in compensated respiratory failure has an acute insult, manifested by:
  - pO_2 decreases by 10; or
  - pCO_2 increases by 10

*(10 is the magic number)

Acute vs Chronic Hypercapnic Respiratory Failure

- Acute hypercapnic respiratory failure - $PaCO_2$ is ≥ 45 mmHg and the **blood pH is acidemic,** defined by a pH < 7.35.
- Chronic hypercapnic respiratory failure is diagnosed when the $PaCO_2$ is ≥ 45 mmHg,
  - the increase in the $PaCO_2$ **is not** compensatory for a primary metabolic alkalosis, and the **blood pH is normal or near normal.**

The Golden Rule of Clinical Documentation

- If patient care is not documented by the physician or provider, it did not happen for the purposes of medico-legal challenges and coding and reimbursement.

Clinical Documentation

IN

OUT =

Lost

Linking Documentation for Causal Relationships

- Provider must tie cause and effects together
  - Infection due to a procedure
  - Sepsis due to a specific organism
  - Heart Disease due to Hypertension
  - Renal Failure due to Heart Disease
  - Neuropathy due to Diabetes
  - Complication related to a procedure

Study Results of Diagnostic Tests

- Coding rules
  - Require provider to document the findings in the progress notes from diagnostic tests, e.g.
    - Pathology reports
    - Cultures
    - Radiology Reports
    - Cardiology Reports
    - ABGs

DRG

- Diagnosis Related Grouper - Inpatient Prospective Payment System (IPPS)
- Driven by Principal diagnosis -
  - When a patient is admitted to the hospital, the condition established after study found to be chiefly responsible for occasioning the admission to the hospital should be sequenced as the principal diagnosis.
  - Not always the same as the admitting diagnosis; e.g. Headache turns out to be brain tumor.

MS DRG

- MS-DRGs introduced a three-tiered structure:
  - Major complication/comorbidity (MCC),
  - Complication/comorbidity (CC),
  - No complication/comorbidity (non-CC).

MS DRG

- MCCs reflect secondary diagnoses of the highest level of severity.
- CCs reflect secondary diagnoses of the next lower level of severity.

MS DRG

- Secondary diagnoses which are not MCCs or CCs (the non-CCs) are diagnoses that do not significantly affect severity of illness or resource use.
- The MS-DRGs provides better recognition of severity of illness than the traditional CMS DRG system.

DRG

- 189 - Pulmonary Edema and Respiratory Failure

- https://www.cms.gov/ICD10manual/Fullcode_cms/P0109.html

Principal Diagnoses that Drive DRG 189

- J18.2 Hypostatic pneumonia, unspecified organism
- J68.1 Pulmonary Edema due to chemicals, gases, fumes and vapors
- J80 Acute respiratory distress syndrome
- J81.0 Acute pulmonary edema
- J81.1 Chronic Pulmonary Edema

Principal Diagnoses that Drive DRG 189

- **J951** Acute pulmonary insufficiency following thoracic surgery
- **J952** Acute pulmonary insufficiency following nonthoracic surgery
- **J953** Chronic pulmonary insufficiency following surgery
- **J9582** Postprocedural respiratory failure

Principal Diagnoses that Drive DRG 189

- **J95.821** Postprocedural respiratory failure

- **J95.822** Acute and chronic post procedural respiratory failure

Principal Diagnoses that Drive DRG 189

- **J96.00** Acute respiratory failure, unspecified whether with hypoxia or hypercapnia
- **J96.01** Acute respiratory failure with hypoxia
- **J96.02** Acute respiratory failure with hypercapnia

Principal Diagnoses that Drive DRG 189

- **J96.10** Chronic respiratory failure, unspecified whether with hypoxia or hypercapnia
- **J96.11** Chronic respiratory failure with hypoxia
- **J96.12** Chronic respiratory failure with hypercapnia

Principal Diagnoses that Drive DRG 189

- **J96.20** Acute and chronic respiratory failure, unspecified whether with hypoxia or hypercapnia
- **J96.21** Acute and chronic respiratory failure with hypoxia
- **J96.22** Acute and chronic respiratory failure with hypercapnia

Principal Diagnoses that Drive DRG 189

- **J9690** Respiratory failure, unspecified, unspecified whether with hypoxia or hypercapnia
- **J9691** Respiratory failure, unspecified with hypoxia
- **J9692** Respiratory failure, unspecified with hypercapnia

Clinical Presentation

- Short of Breath
- Respiratory rate > 22
- Unable to complete a sentence
- Using accessory muscles of respiration
- In moderate to severe respiratory distress
- Tripoding
- Cyanotic
- Wheezes, Rhonchi and/or rales
- SpO_2 :< 89%
- $PaO_2 < 60$, $PaCO_2 > 50$

Signs and Symptoms

- Hypotension usually with signs of poor perfusion suggest severe sepsis or pulmonary embolus
- Hypertension usually with signs of poor perfusion suggests cardiogenic pulmonary oedema
- Wheeze & stridor suggest airway obstruction
- Tachycardia and arrhythmias may be the cause of cardiogenic pulmonary edema

Signs and Symptoms

- Tachycardia and arrhythmias may be the cause of cardiogenic pulmonary edema
- Elevated jugular venous pressure suggests right ventricular dysfunction
- Respiratory rate < 12b/m in spontaneously breathing patient with hypoxia or hypercarbia and acidemia suggest nervous system dysfunction
- Paradoxical respiratory motion suggest muscular dysfunction

Intensity of Management

- Medications –
- Bronchodilators
- Steroids
- Antibiotics

Additional Oxygen –

- Venti Mask
- Re-breathing mask
- biPAP, cPAP (unless on this at home)

Oxygen Delivery Devices

Oxygen delivery devices

Oxygen delivery device	Deliverable flow rates ($L \cdot min^{-1}$)	Estimated FiO2 (%)
Nasal cannula	1–2	24–28
	3–4	20–35
	5–6	38–44
Simple face mask	5–10	35–55
Venturi mask*	5–15	24–50
Non-rebreather mask*	10–15	80–95
High-flow nasal cannula*	Up to 60	30–100

Oxygen Delivery by Nasal Cannula

- The FIO2 cutoff for acute respiratory failure is 6 liters by nasal cannula or more (which equals an FiO2 of 50 percent or higher) to substantiate treatment and call it acute respiratory failure.

Diagnosis and Management of Acute Respiratory Failure - PMC

Intubation and Ventilation

- Not required for diagnosis of respiratory failure
- This is the Gold Standard for managing respiratory failure.

Questions Regarding Documentation

- Query the provider
- Provide your findings
- Ask open ended questions
  - e.g. Are these findings associated with any pertinent diagnoses
  - Never ask a yes or no question

Peri-Operative Respiratory Failure

- May or may not be seen as a HAC
- The Provider must document a cause and effect relationship between the surgery or a complication of surgery and the respiratory failure
- Make certain to code all applicable diagnoses

MLN Matters® Number: MM6954 Revised

- This clinical review judgment involves two steps:
  - The synthesis of all submitted medical record information (e.g. progress notes, diagnostic findings, medications, nursing notes, etc.) to create a longitudinal clinical picture of the patient; and
  - The application of this clinical picture to the review criteria to determine whether the clinical requirements in the relevant policy have been met.

Keep Expectations Reasonable

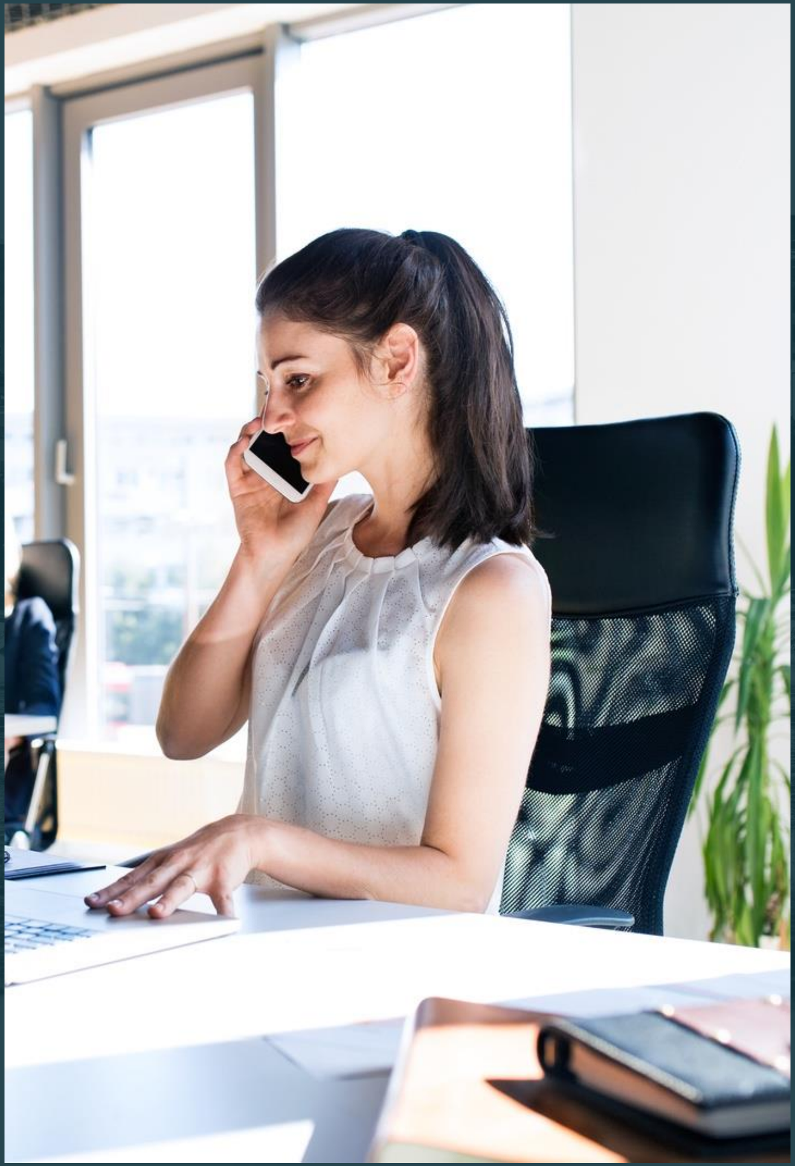
- Look at what is said and left unsaid
- We are not the providers
- Never force the issue
- Let the provider arrive at his or her own conclusion

Frank and Ernest

Questions

Resources

- The Physician Advisor’s Corner: Documenting Acute and Chronic Respiratory Failure | Premier Health
- https://pmc.ncbi.nlm.nih.gov/articles/PMC10910131/



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