Oxygenation and Perfusion

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Hi students, this is Mrs. Egler, and this is chapter 39 on oxygenation and perfusion. We are going to go through this powerpoint today.

In the beginning, we have a lot of anatomy. The book starts off with a lot of anatomy and explaining the respiratory system and a little bit of our cardiac because of perfusion and how that affects oxygenation.

I know you've all had anatomy so the beginning of these powerpoints, I'm just going to briefly run through anatomy on the slides.

And then we'll get into more of the content as we go through the powerpoint.

So when we think about the anatomy of our respiratory system, we want to ask ourselves, well, why is this important, and basically it is the pathway for transport and exchange of oxygen and carbon dioxide. So if we understand the role of our respiratory and our cardiovascular...
Anatomy of Respiratory System

- Why is anatomy important?
- It is the pathway for transport and exchange of oxygen and carbon dioxide
- Understanding the role of the respiratory and cardiovascular systems provides foundation for assessing oxygenation in our patients
- This assessment assist us in planning and implementing interventions to promote optimal oxygenation.
systems we have a better foundation for understanding and assessing oxygenation
in our patients in this assessment when we are
assessing that oxygenation of our patients
can assist us in planning and determining what interventions we are
going to want to promote for that optimal oxygenation so
as we get started as i said we're going to go run through the anatomy of our
respiratory system so just a basic overview the respiratory
system consists of our airway which begins at
our nose and ends at the terminal bronchioles we have our
upper airway which consists of our nose our pharynx our
larynx and our epiglottis then our lower airway is our trachea we have a
left and right main stem bronchi segmental bronchi and terminal
bronchioles the mucus so we have mucus within our
narys and that lines our airway
Anatomy of Respiratory System

• **Airway** - begins at the nose ends at the terminal bronchioles
• **Upper airway**
  • Nose, pharynx, larynx, epiglottis
• **Lower airway**
  • Trachea, right/left main stem bronchi, segmental bronchi, terminal bronchioles
• **Mucous**
  • Lines airway
  • Helps trap debris
  • Protects underlying tissue
• **Cilia**
  • Helps propel trapped material up the airway
    • Thinner mucous helps this process
and that helps us trap debris and protects us from underlying
or protects our underlying tissues and then we have cilia which help
propel trapped material up the airway the thinner that our mucus is
helps with this process as well so that when we think of our
respiratory system we need to think of all these different parts
that make up our respiratory system as we continue on our respiratory system
is also composed of our lungs so our right lung has three lobes and
our left lung has two lobes they're composed of elastic tissue
and this is good to think about because as we
start to age we may see a decrease in the elastic tissue which is going to
cause some compliance problems with having that lung being
able to expand so we'll talk about that in a few
Anatomy of the Respiratory System

- Lungs
  - Right lung 3 lobes
  - Left lung 2 lobes
  - Composed of elastic tissue

- Alveoli
  - Small air sacs at the end of bronchioles
  - Made of single cell layer of squamous epithelium
  - Covered in capillaries
  - Site of gas exchange
  - Surfactant reduces surface tension in alveoli helping prevent collapse
slides down we also within our respiratory system

have alveoli which are small air sacs at the

down of the bronchioles they're made of single cell layer of

squamous epithelium they're covered in

capillaries and this is our site for gas exchange

so if we have a surfactant reduces surface tension in our alveoli

helping prevent their collapse as we continue to review our anatomy of

our respiratory system we have pleura and this is a serious our

serous membrane the visceral pleural covers our lungs

the parietal pleural lines our thoracic cavity

and these are continuous and form a sac this the sack is filled with pleural

fluid this fluid is lubricant and this is what

allows our lungs to even easily move along the chest wall
Anatomy of Respiratory System

Pleura

- Serous membrane
- Visceral pleura covers lung
- Parietal pleura lines thoracic cavity
- These are continuous and form a sac
  - Sac is filled with pleural fluid
    - Fluid is lubricant that allows lungs to easily move along the chest wall
  - Pressure in the pleural space is always sub-atmospheric
    - Holds the lungs in the expanded position
the physiology of our respiratory system so

pulmonary ventilation we have the movement of air

in and out of our lungs and this takes place with two steps

inhalation and exhalation with inhalation our diaphragm contracts and
descends into the thoracic cavity this is the active phase that brings air

into our lungs the next phase exhalation diaphragm
relaxes this is the passive phase where the air

moves out of our lungs air moves from a greater pressure in the
lungs to an area of lesser pressure outside of the body within this phase

some other factors that contribute to airflow in and out of our lungs is our

compliance of our lungs so as i mentioned earlier our

ability of our lung to be inflated depends on upon its elasticity
Compliance

- Ability of lungs to be inflated
- Depends upon elasticity
  - Decreased elasticity decreases compliance
    - Aging
    - Emphysema
so there are conditions such as emphysema

as well as aging that cause that decrease elasticity or that compliance

and so if you think about it if the ability to of the lung to inflate

depends upon elasticity if you think about trying to blow up

a balloon and it doesn't want to blow up

very easily that can be what you can think of when

you think about compliance and elasticity

is it requires a greater inspiration or a greater

push of air to inflate those lungs so compliance

will affect the amount of oxygenation a patient has and how much

effort it takes to actually inflate their lungs while they’re

breathing ri resistance is another
Airway Resistance

- Impedes air movement into lungs
  - Obstruction
    - Foreign body, tumors, thick mucous, liquids
  - Constriction
    - Asthma
factor when we're thinking about our respiratory system that can have an impact and so any process that changes the bronchial diameter or the width can cause a resistance which can impede that air movement into the lungs so any obstruction whether it's a form body tumors maybe the patient's really ill with pneumonia they may have this thick mucus that kind of blocks that airway or some conditions such as asthma which kind of constrict or narrow that airway are going to cause airway resistance and they're going to impede that air movement into the lung as i said earlier with our respirator respirations we have gas exchange so respiration involves the gas exchange between the atmospheric air and the alveoli and blood in the capillaries this gas exchange as i said earlier
Respiration

Gas exchange
- Occurs in the alveoli
- Diffusion
  - Movement of gas particles from area of higher pressure/concentration to area of lower pressure/concentration

Affected by:
- Changes in surface area (loss of tissue, tissue damage)
- Incomplete lung expansion (atelectasis)
  - Thickening of alveolar capillary membrane (PNA, Edema)
  - Partial pressure (altitude)
  - Obstruction
  - Immobility
occurs in the vli and it takes diffusion which
diffusion i don't know if you have that anatomy or
biology is that movement from an area of higher
concentration to lower so the greater the pressure of oxygen in
the vli causes it to move to the capillaries containing the unoxgenated
venous blood and then carbon dioxide in the venous blood exerts greater pressure
than the carbon dioxide and the voi and therefore carbon dioxide
diffuses across the capillary into the voi and then that
is exhale gas exchange and diffusion can be affected by as i said earlier
surface area so loss of tissue or any tissue
damage incomplete lung expansion or collapse of the alveoli can prevent
those pressure changes again obstruction just immobility and
that's not expanding our lungs as fully so make sure you are
you know again that's why i said it was important to understand the anatomy so
that we can realize if our patients have some of these
problems we will realize that that's i'm going to affect their
gas exchange and their oxygenation we're still in some of the slides with
anatomy so i kind of talked about
what our airway system consists of and having adequate
being able to inhale exhale and what's involved with those systems
so we also have to have adequate perfusion
so our blood carries our oxygen to our tissues
and this is dependent upon that adequate blood supply
and our cardiovascular function regulation of our respiratory system is
done with within the medulla so we have
or it is stimulated by increased concentrations of carbon dioxide and
Regulation of the Respiratory System

- **Medulla**
  - Stimulated by increased concentration of CO2 and H+
    - Decreased O2 to a lesser degree
    - Stimulation increases rate and depth of ventilation
- **Chemo Receptors in aortic arch**
  - Sensitive to changes in ABG’s
  - Can activate the medulla
hydrogen and decreased amounts of oxygen in the arterial blood the medulla sends an impulse down the spinal cord to the respiratory muscles to stimulate an inhalation

if we have a patient that has conditions that causes chronic changes in their oxygen and carbon dioxide levels then we may see that their chemoreceptors become desensitized and they are able to really regulate their ventilation adequately and that is based off of this drive or the stimulation within the medulla so alterations with our respiratory function we went through our anatomy if we have any problems within ventilation respiration or perfusion then that will develop into hypoxia and hypoxia is an inadequate amount of oxygen that's available to the cells it's often
Alterations in Respiratory Function

- **Hypoxia** – inadequate amount of oxygen is available to cells.
  - Often caused by hypoventilation (decreased rate or depth of air movement into the lungs).

- **Signs of Hypoxia include:**
  - **Dyspnea** - difficulty breathing
    - Elevated blood pressure w/small pulse pressure
    - Increased respiratory and pulse rate
    - Pallor
    - Cyanosis

- Anxiety
- Restlessness
- Confusion
- Drowsiness
caused by hypoventilation so a decreased rate or
death of air movement into the lungs and so some signs of
hypoxia include dyspnea which is just difficulty breathing and so with
somebody cannot or they're having difficulty breathing
you may also see correlate with that an elevated blood
pressure they're going to have an increased
respiratory rate and a pulse rate because they're
trying they're working harder to try to get
that air in they may seem pale you may see some cyanosis so
some bluish tinge to maybe their lips their
fingertips the big thing is when you can't breathe
and you can't catch your breath you may also become very anxious anxiety
may set in which then even increases more
of your respiratory rate that's going on you may see the patient
become restless if you suddenly have a very restless
confused patient or they become very drowsy all of a
sudden you're probably going to want to check a pulse ox to see
what it's registering and what is their oxygenation
because those kind of go hand in hand as well
if we have a patient that has chronic hypoxia
which some conditions can cause that some i'm thinking of
emphysema copd or chronic obstructive pulmonary disease
you will begin to see that hypoxia being detected in all the body systems
so they can be manifested as an altered thoughts
process maybe the patient has headaches or chest pains
we may start to see that they have enlarged heart
clubbing of the fingers and toes anorexia they and constipation
they may begin to have some decrease in
Chronic Hypoxia

- Can be detected in all body systems
- Manifest as:
  - Altered thought process
  - Headaches
  - Chest pain
  - Enlarged heart
  - Clubbing of fingers and toes
  - Anorexia
  - Constipation
  - Decreased urinary output
  - Decreased libido
  - Weakness of extremity muscles
  - Muscle pain
their urinary output weakness of their extremities and
muscles and also muscle pain so oxygen as we said in carbon dioxide
must move through the alveoli and be carried to and from
body cells by blood and this is why we have to have an adequately
functioning cardiovascular system in order to have
that exchange of gas so again this is just the anatomy of the
heart you probably had that in your anatomy class but the
heart has valves the atrias
are the two upper chambers they receive blood from the veins
and the ventricles the two lower chambers some blood through the
arteries and then when we think about the pumping of the heart we have a
stroke volume so that's the quantity of blood forced out of the left ventricle
with each contraction and our cardiac output the amount of
blood that's pumped each minute
Cardiovascular System

- Heart
  - Atria
    - Upper chambers
    - Receive blood from veins
  - Ventricles
    - Lower chambers
    - Send blood through the arteries
  - Stroke volume
    - Quantity of blood forced out of left ventricle with each contraction
  - Cardiac output
    - Amount of blood pumped/minute
    - Average 3.5-8L/min
    - Cardiac output = stroke volume X heart rate
cardiac output is equal to the stroke volume
by the heart rate we are not going to ask you a test question on that
but just realize that that having a heart that efficiently pumps is very
important to our oxygenation system the physiology of our cardiovascular
system oxygen is carried primarily by our red blood cells
and just a small amount via plasma to the tissues of our body
the hemoglobin in the rbcs has a strong attraction to oxygen
and therefore about 97 of oxygen is carried in the form of oxyhemoglobin
and once those red blood cells reach the tissue
we will see internal respiration must occur
and all that means is internal respiration is that exchange of oxygen
and carbon dioxide between the circulatory
circulating blood and the tissues and cells
so based on this this physiology of the
Physiology of the Cardiovascular System

- Oxygen is carried primarily by red blood cells (small amount via plasma) to the tissues of the body.
  - Hemoglobin in the RBC’s has a strong attraction to oxygen and therefore 97% of oxygen is carried in the form of oxyhemoglobin

- Once RBC’s reach tissue Internal Respiration must occur

- Internal Respiration: Exchange of O2 and CO2 between circulating blood and tissue cells
  - Affected by any abnormality in blood components/volume
    - Hemorrhage, anemia
  - Exercise increases heart’s effectiveness
cardiovascular system and how our oxygen is carried in our hemoglobin
that can be you know if our oxygenation can be affected by any
abnormality in blood components so if you have a patient that's having a
hemorrhage or they have anemia you're probably going to see maybe
that have an impact on their oxygenation another one i think
of is sickle cell disease
and so just being aware that if you have somebody coming
in with those conditions you're going to want to be
looking at their their rbcs their hemoglobin levels and
and keeping an eye out on their oxygenation
levels so cardiovascular blood flow the muscles
of the heart have their own blood vessels that provide
oxygen and nourishment and remove waste products
Cardiovascular Blood Flow

- Muscles of the heart have their own blood vessels that provide oxygen and nourishment and remove waste products.

- The main blood vessels are the Coronary arteries.
the main blood vessels are the coronary arteries
and as we get into the next slide any alteration
in that will also affect oxygenation of the patient
so alterations in our cardiovascular function
patients with dysrhythmia this is a disturbance in the rhythm of the heart
or some kind of abnormal conduction whether it's
regarding or whether it's from hypertension heart disease
heart damage but this can decrease the oxygenation because it's
the heart is not pumping effectively when a patient's
having a disturbed rhythm heart failure is another
alteration in cardiovascular function that will affect our
oxygenation the heart is i know unable to pump sufficient blood supply
there's multiple causes for that hypertension coronary artery artery
disease heart valve disease but some signs and
Alterations in Cardiovascular Function

- **Dysrhythmia**
  - Disturbance in rhythm of the heart
  - Abnormal impulse from SA node
  - Abnormal conduction: HTN, heart disease, heart damage (MI), trauma, drugs, decreased oxygenation

- **Heart Failure**
  - Heart unable to pump sufficient blood supply
  - Multiple causes
    - HTN, CAD, heart valve disease
    - Sx- SOB, edema, fatigue

- **Myocardial Ischemia**
  - Decreased O2 to the heart
  - Commonly caused by artherosclerosis

- **Angina**
  - Chest pain
  - Imbalance between amount of O2 available to the heart and amount needed by the heart

- **Myocardial infarction**
  - Death of heart tissue
  - Heart attack
    - Sx- pain, anxiety, nausea/vomiting, indigestion, SOB
heart valve disease but some signs and symptoms you'll see with heart failure
or shortness of breath the patient will have some edema
and fatigue and then the last one myocardial
ischemia so again when i said that the heart has its own blood supply to it
if we have any decreased oxygen to the heart
such as a blockage the patient can experience chest pain
they'll experience an imbalance between the amount of oxygen that's available to
the heart and the amount needed by the heart and this can cause
a myocardial infarction which is basically
death of heart tissue so they the patient ends up suffering a
heart attack but when the patient presents you may
see them having like i said the chest pain they'll have
the anxiety because they can't breathe as well they may be nausea
nauseated and have some vomiting they may feel like they have indigestion
but another big one is they will be very short of breath
so those are alterations in cardiac cardiovascular function that affect
oxygenation in our patients so factors that will affect a patient's
cardiopulmonary functioning and oxygenation
so your book goes in to discuss several things
the first is they're just in general our patients level of health and some of
these we've already had on renal conditions so if the kidneys
aren't functioning properly and they are not excreting
urine out because they're not functioning at full capacity
this can cause fluid overload in the patient
and it can impair you know with food or fluid overload the
heart can't pump as efficiently and that can impair
tissue perfusion and oxygenation
Diseases/Conditions Affecting Cardiopulmonary Functioning and Oxygenation

- Renal conditions cause fluid overload and impaired tissue perfusion
- Anemia
- Weakened muscles (sedentary)
- Damage to heart muscle
- Obesity
as i've already stated earlier we want to watch
our patients with anemia because we know oxygen is carried
via the hemoglobin so those patients oxygenation could be affected weakened
muscles just a sedentary lifestyle can really affect how well we
are able to inhale and exhale and breathe
as i just got done talking about any damage to our heart muscle
we don't perfuse as well and then there's been
a hey i'm sorry there's been a correlation
between obesity and patients having conditions
like chronic bronchitis and it's thought that those who are
obese are often short of breath during activity which
ultimately leads to less participation in exercise and as a
result the vli are rarely stimulated and they don't
expand fuelly so there is some correlation between again
that sedentary lifestyle and obesity and muscle weakness or poor
muscle tone and some of these again we've already
talked about but just being aware that the diseases
or conditions that affect our cardiac and our
cardiopulmonary and our oxygenation our lives are i'm sorry our level of
health and these are listed here

your book goes on to talk about developmental considerations

being a factor that affect our cardiopulmonary

and although we won't test you on any pediatric patients

it is good to be aware that infants have a short airway
Developmental Considerations

- Infants
  - Short airways
  - Increased respiratory rate (30-55)
  - Surfactant
    - Formed 34-36wks in-utero
  - Respirations primarily abdominal
- Toddlers/Preschoolers
  - Eustachian tubes, bronchi, bronchioles are elongated and less angular
    - Increased risk for colds/infections
- Older adults
  - Elasticity of lung and heart tissue decreases
  - Muscles of inspiration/expiration weaken
  - Airway collapse easier
their surfactant isn't formed until 34 to 36 weeks in utero so if they're born prematurely they may not have that development of that yet but it this is why infants have an increased respiratory rate and their normal rate runs at 30 to 55. and when we look at an infant and their breathing their respirations are primarily abdominal so you'll see more abdominal breathing with that patient toddlers and preschoolers sometimes have an increased risk for colds and infections and that has to relates to where their brachii or their bronchula are elongated but they're less angular and then again we kind of talked about already the older adult as we age that elasticity of the lung and heart tissue decreases the muscles of our our respiratory system of inspiration expiration can be more weak airway collapse easier so just that older patient in general we're going to want to consider them and keep an eye on them for cardiopulmonary alterations and or alterations in functioning medications are another consideration when we're thinking about
cardiopulmonary functioning and our oxygenation and that's just because many medications can or any medication that has an effect on our central nervous system we need to be monitoring carefully for respiratory complications an example of this would be pain medications or opioids that can depress the medullary respiratory center and that can cause a decreased rate or death of respirations so we definitely want to keep an eye on our patients as far as how much pain medication they're getting how often they're
Medication Considerations

- Opioids
  - Depress medullary respiratory center
    - Decreases rate/depth of respirations
getting it how is their oxygenation

after they take the med we want to go see how they’re reacting to it

check a set of vitals if we need to

based on this information the next one your book talks about is

lifestyle considerations we kind of mentioned this briefly when

we talked about obesity but just that sedentary

lifestyle can impact or decrease

pulmonary and circulatory functions it also can decrease the ability to

respond to stressors and illness for that sedentary

person it's thought that the activity patterns do not encourage

the expansion of vla and development of pulmonary exercise patterns or deep

breathing for those who have a sedentary lifestyle

your book goes on to talk about considering cultural implications
Lifestyle Considerations

- Sedentary lifestyle
  - Decrease pulmonary and circulatory function
    - Decreases ability to respond to stressors/illnesses
- Cultural implications
- Environmental Considerations
  - Air pollution
    - Causes coughing, choking, irritated nasal passages
  - Occupational exposure
    - Asbestos, coal dust, silica
an understanding a patient’s cultural background is necessary to promote
health and disease prevention and lastly you know a good example
might be cigarette smoking for example
is a major you know when we think about that and culture maybe
depending on how they were brought up or what is important to that person what
they value we want to try to promote strategies
that encourage that person to stop smoking
cigarettes because as we know cigarettes are a
major contributor to lung disease to respiratory distress
heart disease lung cancer they're one of the most important risk
factors for a patient developing copd so it's very important to try to work
with that patient to have them understand the implications
if they if their lifestyle is one that they are
a smoker other things to think about
environmental considerations you know just occupational exposure where do they
work at what are they exposed to in those areas
air pollution i know some patients who have severe asthma
depending on times of the year and you know if the air pollution is bad
that can cause them to have problems with their
oxygenation and breathing so just being aware of lifestyle
considerations when we're taking care of our patients
and how that can affect their oxygenation
so the beginning of this powerpoint we've reviewed anatomy of our
respiratory and cardiovascular systems we've kind of reviewed or we've went
over our factors affecting these systems and how they can affect
those systems and we are moving on to how we assess
our patient
Nursing History

- Interview with patient
- Helps identify current/potential health concerns and needs for focused assessment
- Factors to assess and appropriate questions: See Focused Assessment Guide 39-1 P. 149?
and so the first thing when a patient comes in is we want to get that nursing history we want to interview that patient we want to try to identify any current or potential health concerns and needs that they may have that we want to keep an eye on and then your book i was looking through and it's called the focused assessment guide 39-1 it's on page 1493 and it gives great kind of suggestions for factors to assess and what are the questions that are how should you approach that so when you're trying to assess their usual pattern of respirations you know questions you could ask your patient in a history would be how would you describe your breathing you know do you have any allergies what type of allergies do you have you may go on to say do you have any difficulty breathing when you're having allergy issues do we always want to know what kind of medications they are taking any health history do they have heart and lung and breathing conditions lifestyle and environments as we talked about we want to know if they smoke if they've had any recent cough
sputum what color is it are they ever short of breath
and are they having any fatigue and so it
gives this kind of overview of things you should assess for with the nursing
history and kind of the appropriate questions
you can ask your patient to try to get that information so i
highly recommend having a look of that and then our next slide we're going to
talk about what we assess for physically on our patient
the next part as we are assessing our patient is our physical assessment
so when we walk in the room we want to look at our patient
do they have any signs and symptoms that they are in distress
does their skin as we look at it does it have any paleness or cyanosis
to it what is the shape of their chest
Physical Assessment

- Inspection
  - Observe for s/s of distress
  - Inspect skin for pallor/cyanosis
  - Note shape of chest
  - Note rate/rhythm/depth of respiration
- Palpation
  - Note skin temp/moisture
  - Note chest expansion (symmetrical)
- Percussion
  - Used to assess position and density of lungs
  - Not used often by nursing
- Auscultation
  - Assesses airflow through the airways
    - Vesicular- low pitch soft sounds in peripheral lung fields
    - Bronchialvesicular- medium pitched blowing sounds over upper anterior chest and intercostal area
    - Bronchial- loud high pitched sounds heard over trachea/larynx
we’re also noting their respiratory rate
but what is their depth are their respiration shallow
are they able to take deep breaths what is their rhythm
is it irregular and we want to note that as we look at
our patient do they appear like they’re short of
breath then we want to palpate so we want to notice the skin and
temperature and do they have moisture are they sweating
is it possible they have a fever and that’s why they have this increased
respiratory rate do they feel cool to touch
percussion is usually not often used by nursing it’s used by
more of an advanced practitioner but we can do percussion
over the lungs but i’m not going to go into great detail because as i said
most of the time when you guys do your head to toe assessment
you will not be using percussion we’re going to also take our lung sounds we’re
going to assess for airflow through the airways
what sounds are they having and then the next slide we’re going to talk about
what are advantageous breath sounds that we’re noting that can
draw us to conclude that there do not have good air flow
so when we're auscultating our patients and we're listening for breath sounds
we want to know if they have crackles crackles can be an indicator of fluid in
the alveoli that sometimes patients have especially if they've got
a history of congestive heart failure archonic obstructive pulmonary disease
and it sounds like a high-pitched intermittent poppy
i almost i always tell students crackles for me sound like if you have a bowl of
rice krispies cereal and then you pour milk over the top and
you hear the little popping that is what crackles will sound like if
you have a patient and you hear crackles you should automatically think fluid
that they possibly have fluid
Adventitious Breath Sounds

- Crackles
  - High pitched intermittent popping
  - Secondary to fluid in alveoli
    - CHF, PNA, COPD
- Wheezes
  - Musical high pitched sounds
  - Secondary to:
    - Obstruction
      - Foreign body, mucous buildup
    - Constriction
      - asthma
in the voi or in their lungs wheezing is this more musical high-pitched sound
as we talked about with restriction in the lungs
a lot of times we'll see wheezing if they have that obstruction so if they
have some type of mucus buildup possibly a foreign body
or if they have any kind of constriction like we see with asthma patients
we will hear that wheezing sound we've assessed our patient and your book
goes on to talk about common diagnostic tests that we can do for our patients
depending on whether we think they have some type
of issue with their lungs or with their
heart the first one your book talks about is
an electrocardiogram you can hear this referred to as an
ecg sometimes you might hear it referred to as ekg
Electrocardiogram

- ECG
- Measures heart electrical activity
- Can identify MI, rhythm disturbances, chamber enlargement, electrolyte imbalance

Illustration of a patient getting an ECG.
and what we’re measuring is heart electrical activity
and this can help us identify that myocardial infarction or you know
if we think we’re patients having a heart attack
rhythm disturbances chamber enlargement and even possibly electrolyte imbalances
because electrolyte imbalances can cause a dysrhythmia within our heart
and so that is a common if we are thinking the patient has
cardio or cardiac issues and that is affecting their oxygenation
we can you know provide that recommendation
for the physician and possibly get an ecg
for our patients the next test we’re going to talk about is a pulmonary
function study these are normally conducted by a
respiratory therapist but it’s a group of tests that assess
respiratory function to assist in evaluating a respiratory
disorder and so my son who is an asthmatic
Pulmonary Function Studies

- Normally conducted by respiratory therapist
- A group of tests that assess respiratory function to assist in evaluating respiratory disorders
- Provides evaluation of lung dysfunction, diagnose disease, assess disease severity, assist in management of disease and assist in evaluating respiratory interventions
every time he visits the allergist we do a pulmonary function study
and they have him take a deep breath in he puts this device that you can see in
the picture here in his mouth and they have him blow out as hard and
long as he can you can see the mantra in the
background it's taking the readings when my son does this because he's a
pediatric patient they'll usually have him look at the
screen and they have a picture of a brick house and some little pigs
and they'll tell him to blow as hard as he can to try to
knock over the brick house and what they're doing when they're
doing that test is they're trying to evaluate his
lung function because they already have diagnosed him with asthma or
the disease they're assessing how severe is his asthma currently
they're looking at what medications do they have him on
as an intervention for his asthma and are those
working for him what is his lung function with
those interventions and they kind of his test he goes every six months they
kind of assist in the management of his disease
so based on his lung function test they can determine whether maybe we
can stop using a certain medication maybe we
need to up the dosage of a different inhaler or medication
so they do provide valuable resources and so you may see if you have a
patient possibly asthma emphysema
copd they may want to do a pulmonary function test just to see
or evaluate what is their lung function currently
and and how severe is their disease so our next device is a spirometer
we use this to measure or can be used to
Spirometry

- Measures volume of air in liters exhaled or inhaled by a patient over time
- Client deeply inhales and exhales into spirometer
- Review Guidelines for Nursing Care 39-1 p. 1504 on how to teach your patient to use an incentive spirometer.
measure volumes of iron leaders exhaled or inhaled by a patient over
time your book talks a little bit about
this on page 1496 but basically if we’re trying to
evaluate lung function and airway obstruction
through respiratory mechanics we can use this to measure the degree of airway
obstruction and so the patient inhales deeply
and then exhales forcefully into the spirometer
now if we’re wanting to use the spirometer to promote deep breathing
possibly because our patient has just had surgery
maybe they have pneumonia and we’re trying to get them to take a big
deep breath in to inflate those lungs we’re going
to use it just a little bit differently and with that we are going to always
promote that they they suck they don’t blow
so your nursing book and i hope you’ll take time to
look at this but has some guidelines for nursing care on page
1504 and this is how to teach your patient to use this incentive spirometer
if we’re trying to get them to engage in more deep breath
exercises such as with a post-op patient and basically and we have our patient
in exhale we have them put the spirometer in their
mouth and we want to take have them take a
long inhale and hold that for as long as they can
usually we always try to come up with some type of test question on spirometry
so i highly suggest that you review that that guidelines for nursing care and
you are very aware of how to teach your patient
to use the spirometer for deep breathing
the next device we're going to talk about is a peak flow
Peak Expiratory Flow Rate

- Point of highest flow during forced expiration
- Measuring size of pulmonary airways
- Patient takes as deep breath a breath as possible then forcibly exhales into peak flow meter
- Test repeated three times and highest number is recorded
meter that we like to call it and we're measuring
the size of the pulmonary airways so that
point of highest flow during forced expiration
we will see this a lot with especially patients with asthma
we will have them use a peak flow meter to measure that
and basically the patient takes a deep breath
and then they breathe or they exhale as forcibly as they can
into the peak flow meter and they we instruct patients to do this
three times and we record their highest number
and if you can see on the picture on this peak flow
we've got a red yellow and a green area on this so depending on what the
patient blows out what their highest number is
we want our patients in the green that means that their airways are open
and they're they have good function if we're in the yellow that
could be a warning sign maybe it's time to use
their inhaler maybe you know the air pollution or
their allergies are really bad they may need to
take some allergy medication but the yellow is more of a warning sign

and then if we have a patient who has asthma and they're using this at home

and they're in that red zone that means we need to contact the physician that

their airways are not open as they should

be and they they do not have ultima

optimal oxygenation going on in regards to probably constriction

from their disease process so again this is a valuable tool

and again if you have a severe asthmatic patient

you're probably going to see that they need to use this

during the day i'm sure from doing vital signs in the
Pulse Oximetry

- Measures oxygen saturation of Hgb in arterial blood
- Clients with low Hgb may have normal pulse ox readings, however may not have enough oxygen to meet the body’s demands

Pulse Oximeter
skills lab that you already know what a pulse ox is

but this is measuring a patient's saturation of hemoglobin in their arterial blood it is good to note that clients with low hemoglobin they may have a normal pulse ox reading even though they may not have enough oxygen to meet the body's demands it is possible it's something to keep an eye on but this is what the pulse ox is measuring i always tell students to highlight this because i could see this being a test question that we ask you what is the pulse ox measuring and a lot of students miss it but we are checking this most of the time we want our patient to be 92 percent or above there are cases when we're dealing with a copd patient where their normal is 89 and we're okay with that just because we already know with their condition that they're going to have that poor cardiopulmonary oxygenation it's a factor because of their disease process and they tend to run a little bit lower but this is another way that we can another type of diagnostic test we can do
with our patients we do not have to have an order for this
and we can go in and obtain this with a set of vital signs
capnography is the other one that i want to talk about here
capnography we are measuring the rate and depth of respirations and the amount
of co2 that patient is having come off when
they exhale we often use this with clients
when they come out of surgery or if they’re on a a pca which is a
pain medication pump and we want to measure their opioid induced
Capnography

- Measures rate/depth of respiration and CO2
- Often used for client’s with PCA to measure opioid induced respiratory depression
- Used to confirm ET placement
respiratory depression so if you have a patient you can see it in the picture here where they're on this type of pump for pain control we are worried that they will go into respiratory depression and we talk more about a pca pump in our pain chapter but we do want to monitor these patients and so we will put in this tubing and you can see it in the picture here on the left and it almost looks like oxygen tubing if we were going to get patient oxygen but it actually has a little bubble on the other end of the prongs and that's how we know this is for capnography so we know that this tubing if we hook it up to the device here the pump that we can measure if that patient has the correct amount of co2 coming off if a patient starts to go into respiratory depression it will monitor this and it will alarm us so that we can go in on that patient and check and make sure they are all right you can give oxygen through this tubing as well but i know a lot of students when
they go into the clinical setting and maybe their patient
has this on because of the pain medications they're on
and students will see this tubing and they automatically
think that their patient is on oxygen and that's not always the case
this tubing does like i said look very similar to oxygen tubing
but it does have the little bubble on it which means it's for capnography
it's a special tubing for that next diagnostic test we're going to talk
about is thorium centesis this is basically where we puncture
the chest wall and we aspirate pleural fluid
we may be doing this procedure to remove
Thoracentesis

- Air/fluid removed from pleural space via catheter
- Performed at bedside
- May be performed to obtain specimen
- Surgical asepsis required
- Patient sits at edge of bed and bends over table
- Fluid/air collected in vacuumed container
- Nursing responsibilities
  - Obtain baseline VS/info
  - Support patient during procedure
  - Remind client not to deep breath, cough, sudden movements
  - Post procedure assessment/monitoring
    - Monitor for blood in sputum, respiratory distress, severe coughing
fluid or air via syringe or we may
the physician may want to connect that patient to a chest tube
so this is performed at the bedside it is performed by a physician or a
advanced practiced individual such as a pa or a nurse practitioner
surgical asepsis is required however the nurse can assist at the bedside
basically the patient sits at the edge of the bed and kind of bends over a
table and the needle’s inserted and fluid or
air is collected into a vacuum cleaner for the nurse the reason we even go over
this test is you as the nurse will have
responsibilities you need to obtain a baseline vital sign
vital signs before you begin the procedure you’re going to be there to
support the patient during the procedure you’re going to want to try to
have them remain calm and stay as still as they can
you’re going to remind that client not to take a big deep breath or cough or
have any sudden movements and then post procedure you’re going to
want to be assessing that patient and monitoring
for blood in the sputum any respiratory distress any severe coughing
you'll want to get a set of vital signs after that procedure is done

so you know we've went over factors that can cause problems for our

patients as far as cardiopulmonary functioning and

oxygenation we've talked about assessing our patient

we've talked about diagnostic tests we can do depending on the condition for

our patient and now as nurses we want to promote

optimal function so your book goes through some different

things for promoting optimal function one is health and lifestyle encourage

our client to eat healthy we want to encourage them to exercise

you know avoid things such as smoking excessive

alcohol use
Promoting Optimal Function

- **Health Lifestyle**
  - Encourage client to eat healthy, exercise, avoid smoking and excess alcohol use
- **Vaccines**
  - Yearly flu
  - PNA vaccine for adults over 65
- **Pollution free environment**
  - Vacuum/dust often
  - Avoid cigarette smoke
- **Reduce anxiety**
- **Good Nutrition**
  - Low fat/cholesterol/salt diet
  - COPD patients need high protein/calorie diet d/t increased energy demand
- **Positioning**
  - High fowlers
  - Intermittent prone position has been shown to promote oxygenation in acutely ill clients
- **Maintain adequate hydration**
  - 2-3 quarts (1.9-2.9L) of clear liquid (water) a day helps promote thin secretions
    - Always check for fluid restrictions before encouraging fluids
- **Provide humidified air**
another one is to obtain their vaccines a yearly flu vaccine
a pneumonia vaccine for adults over 65
pollution-free environment you know talking to them
about environment i again my child has allergies and asthma and years
ago i worked for an allergist and you know they were always disgusting for
or discussing for the children who had severe allergies to
things you know dust
you know if if your child is severely allergic to dust
it’s a good idea to maybe get rid of carpet in the house and have wood floors
not having a parent smoke in the house would be good education
and so those type of issues or type of interventions can promote optimal
functioning we want to talk about good nutrition again with a
patient if we have a patient with certain disorders such as
chronic obstructive pulmonary disease or emphysema
that patient needs a higher protein calorie diet because they have increased
energy demands from trying to breathe positioning can be another thing
if we’re having a patient that is not breathing
optimally we may want to place them in high fallers
so that they can have a good exchange of oxygenation
we're going to maintain adequate hydration for our patients we're going
to encourage water this helps promote and thin
secretions and then sometimes even we can recommend
providing some humidified air so those are a few of some
ways nurses can promote optimal functioning
if we want to promote proper breathing with our patients
these are some different types of
Breathing Exercises

- Deep breathing
  - Encourage deep inhalation nasally
    - Exhale orally
- Incentive spirometry
  - Deep breathing with visual reinforcement
  - Assists patient to deep breath slowly
  - Decreases atelectasis
  - Pg 1503.
  - Review how to teach a patient to use an incentive spirometer (Guidelines for Nursing Care
    - 39-1, p. 1504)
- Pursed lip breathing
  - Can help reduce dyspnea/anxiety
  - Inhale through nose to count of 3
  - Exhale through pursed lips to count of 7
- Diaphragmatic breathing
  - Decreases respiratory rate, increases alveolar ventilation, may help expel as much air as possible during expiration
  - Place 1 hand on stomach and other in middle of the chest
  - Breath in slowly through nose letting abdomen protrude as far as possible
  - Exhale through pursed lips contracting the abdominal muscles with 1 hand pressing in and up on the abdomen
  - Repeat steps for 1 minute, rest for 2 minutes
breathing exercises we can do there's deep breathing where we encourage deep inhalation through the nose and we have the patient exhale out the mouth i've seen this done a lot with patients who maybe they're having an anxiety attack or just having some trouble catching their breath getting them to do this sometimes helps we've talked about incentive spirometry for wanting that patient to have deep breathing and and this also decreases atelectasis in our patients and again i have that guideline for how to teach that there purse lip breathing this can reduce dyspnea and anxiety the patient exhales through the nose to a count of three and then i'm sorry they inhale through the nose to a count of three and then they exhale through pursed lips to a count of seven we've seen this done especially with the copd patient or the emphysema patient personal breathing can sometimes improve their dyspnea diaphragmatic breathing this has been known to decrease respiratory rate increase alveolar ventilation and may
help expel as much air as possible during expiration the person places one hand on the stomach the other in the middle of the chest they breathe in slowly through their nose letting the abdomen protrude as far as possible then they exhale through pursed lips contracting the abdominal muscles with one hand pressing in and up on the abdomen again i highly recommend looking over these different breathing exercises in your textbook as you know as a student going in you may need to use one of these with your patients so it's important you understand when you would use this breathing exercise what it's for and how would you tell your patient to use it this next slide is about promoting or controlling a cough if a patient has a cough and it's important to be aware that coughing is a mechanism for clearing our respiratory tract of irritants and congestion and so basically it causes an explosive movement of air from the lower to the upper respiratory tract coughing can be good we we sometimes want our patients to cough it's
A cough is most effective when a client is sitting with their feet flat on the floor; it's important to be aware that sometimes a cough can be voluntary or involuntary. So when I think about voluntary, a voluntary cough is an important aspect of pre and post surgical care. You know if we're wanting our patient to deep breathe and use the spirometer after surgery, a lot of times when they do that, it will cause them to cough or loosen any secretions in there and so that is important; we want that voluntary cough.
Promoting/Controlling Cough

- Cough
  - Mechanism for clearing respiratory tract of irritants/congestion
    - Initial irritant, deep inspiration, quick/tight closure of glottis, forceful contraction of intercostal muscles, upward push of diaphragm
  - Causes explosive movement of air from lower to upper respiratory tract
  - Most effective when client sitting with feet flat on the floor
  - May be voluntary or involuntary
    - Voluntary cough important aspect of pre and post surgical care
  - For those unable to cough voluntarily manual stimulation over trachea and prolonged exhalation may be helpful
  - Assisted cough- for those with neuromuscular disorder that prevents cough
    - Firm pressure on abdomen below diaphragm in rhythm with expiration
for those that are unable to cough there
are manual stimulation that you can do for that
but at times sometimes a cough is involuntary
patients that are sick maybe have a cold or you know some type
of respiratory infections and sometimes that involuntary cough can
be disruptive so the next slide we're going to talk
about possible cough medications that
can assist with that involuntary cough so the one thing i want you to arouse
with cough medicines they act in different ways so
there are different types of cough medicine out there sometimes they are
expectorants and these are good because if you have a
patient that's coughing a lot this will help thin
secretions and it will make it easier for them to
cough out or remove what's in there that irritant that's causing the problem
Cough Medications

• Expectorants
  • Help thin secretions making them easier to cough out and remove

• Suppressants
  • Depress cough reflex

• Lozenges
  • Local anesthetic helps decrease cough mechanism

• Avoid prolonged use of cough meds
  • For coughs lasting over 7 days encourage client to visit PCP
suppressants tend to depress the cough reflex

I know sometimes if patients haven't been sleeping well

because of a cough they've been up coughing all night

occasionally you know they may take an over-the-counter suppressant

but really we don't want to suppress the cough constantly because it does serve

as a purpose lozenges can help decrease the cough

mechanism but the important thing we want to teach

our patients about this is to avoid prolonged use of cough

medication if coughing lasts over seven days we

want to encourage that patient to visit their physician to figure out

what's going on the next intervention for nurses

suctioning of the airway this can assist with removing saliva

pulmonary secretions blood vomit foreign material from the pharynx

so it is used at times
Suctioning

- Removes saliva, blood, emesis, phlegm from oro/nasopharynx
- Irritates mucosa and removes oxygen from respiratory tract
  - May cause hypoxemia
- Can be painful/distressing
  - Use pain meds prior to suctioning if needed
- Assess heart rate, color, amount/type of secretions
  - Cyanosis, change in HR indicate hypoxemia

Refer to Skill 39-2 P. 1528-1532
a physician order is needed we need to be aware as nurses it irritates the
mucosa and it does remove oxygen from the
respiratory tract possibly causing hypoxia
it can be painful and distressful at times
we always want to assess for that pain and and if we can provide
pain medication prior to suctioning that's not always possible but if we can
that's good to do it's important to remember we're going
to wear our ppe our gloves our goggles masks whatever is needed for
proper protection when we're suctioning a patient
and then when we're suctioning we want to
monitor the patient's color what's their heart rate
what is the amount and consistencies of the secretions we are getting now
does their heart rate and their respiratory rate indicate their
they have hypoxemias because we want to watch for that
and you guys will be suctioning a patient
and it's important that you refer to your skills
there the skill for suction is 39-2 and it's on pages 15-28-15-32
the next thing i want to go through is inhale medications

inhale medications are administered to open narrowed airways so you'll

see this a lot with asthma patients particularly there's several different

types of inhale medications that you could be given

we won't test you really on for instance a brand name of a

medication but as you go into the clinical setting

it's important to understand if they say your patients on a nebulizer

treatment well what is that and basically they take liquid

medication they put it in this machine
Inhaled Medications

- Nebulizers
  - Disperse fine particles of liquid meds

MDI
- Delivers controlled dose of med with each compression of the canister
- Common mistakes: failing to shake before dose, holding MDI upside down, inhaling too rapidly, stopping inhalation when propellant felt in back of throat, not hold breath after inhalation

- Dry Powder Inhaler
  - Breath activated
  - Quick deep breath by client
  - May clump if exposed to humidity

Teaching on these devices is on P. 865 (not in chapter 39)
that's at the top of this page

and it disperses fine particles of that liquid medication that the patient

breathes in the patient if they're older they can

just put this in their mouth and breathe in and out while the medication is going

if you have a younger patient you may see them put a mask to this and put the

mask over the nose and mouth to get this medication

mdis are meter dosed inhalers they delivered a control dose of

medication with each compression of the canister

common mistakes when patients give this medication is they fail to shake it

before the dose so it's important to teach that

they need to shake the canister they need to hold the

inhaler or they need to hold the inhaler upright

sometimes they hold it upside down which is not good

they inhale too rapidly when they're taking

this medication or they stop inhaling and

the medication just gets to the back of

the throat and it's important that they hold their breath after taking this
medication the reason i put this picture on here
is the mdi is most effective when it's used
in conjunction it can in conjunction with a
spacer which is what this tube is here so this
helps that problem of that medication getting stuck to the back of the throat
the other thing is to teach the patient they want to
exhale they'll want to shake their medicine
put it on the spacer put the spacer in their mouth and they want to take
a long slow deep breath then they will remove this and they want
to hold their breath for a count of 10 and then they can exhale and the last
medication we're going to go over here is the dry
powder inhaler again this is breath activated so
the patient clicks the lever down on the medication that
i'm showing this last picture at the bottom they're
going to take a quick deep breath in and that breath
activates that powder for them to inhale
and so that's if your patient's on one of these i just wanted you to be aware
of what they were and how those devices work and the
teaching involved around those
so this next slide is about supplemental oxygen so if our patient has a low pulse ox they are not breathing optimally we can
perform this intervention of supplying oxygen
however oxygen is considered a medication
and you have to have a physician's order for that
Supplemental Oxygen

- O2 is considered a med and must have order
  - In emergency patient be given O2 if needed, then call MD immediately for order
    - Often a part of emergency protocols with standing orders
- Canisters
  - Portable
  - Can be heavy and burdensome
- Concentrators
  - Concentrate oxygen from room air
  - Used in homes
  - Can deliver up to 5L O2/min
- Be careful with O2 in COPD clients
  - Hypoxia may be the stimulant that keeps them breathing
    - Too much O2 may cause client to lose the stimulus and stop breathing
- Humidification
  - Added to O2 delivery to help keep mucous membranes moist
  - Sterile water
in some cases such as you know a patient comes in the emergency room it's emergency the patient can be given oxygen if needed but the physician has to be called immediately for that order oxygen can be supplied in many different ways from wall units that you might see in the hospital to possibly a cylinder or tank that's portable but basically there is a flow meter that is attached to the wall unit or you know on the cylinder or tank and it has a valve and that regulates how much oxygen that patient is getting canisters are nice because they're portable but they can be heavy and birdsome to patients concentrators so your book has a small section that talks about this and these are used in homes they are a little cheaper because they are taking concentrate oxygen from room air and recycling it basically so that the patient gets that through the device it can deliver anywhere up to five liters of o2 per minute so it's a nice option for that patient that's at home that needs
to be on oxygen it’s a little bit cheaper than actually purchasing
an oxygen tank or canisters we always want to be careful with oxygen in the
copd client and basically hypoxia
may be the stimulant that keeps them breathing
they have too much or too much o2 may cause this client to lose the stimulus
and they stop their breathing so again when i was talking about pulse
oxes and normal ranges we this is the reason that sometimes
we’re okay with the copd patient running in the 88
89 percent because we know if we give them too much oxygen
we can stop their drive to breathe so we want to be very careful with how
much oxygen we’re giving a cobd patient
humidification can be added to an oxygen delivery
system and and sometimes that is needed because that helps keep the mucous
membranes moist and basically you’re just adding a
little sterile water to the the
flow meter or the valve as the oxygen comes out and it
humidifies it and it does assist with a patient's
complaining that their nose is feeling dry from that
oxygen it's always good to provide that you do not have to have an order to add sterile water or humidification to if a patient's on oxygen however you do need an order for the actual oxygen if you have a patient that's put on
Oxygen Precautions

- Combustible
  - No smoking/open flames
  - No electric razors
  - Avoid synthetic materials that build static
  - Avoid using combustible oils
oxygen in the hospital or maybe it's new they're going to go
home on oxygen or maybe they already are but it's it is good
to reinforce teaching about oxygen precautions
so oxygen is combustible we want to make sure that patient knows not to be
around an open flame it is advisable that they do not smoke when
they're on their oxygen because it is combustible
we want them to avoid using electric razors
they can you know we want to warn them about synthetic materials that
could build static and and cause a shock and avoid using
any combustible oils so it's good to give that education
to that patient like i said if oxygen is new to them
they need this information if they're already on oxygen it's good
to reinforce this information with them this slide is about the different types
of oxygen delivery depending on how much oxygen your
Oxygen Delivery

- Nasal cannula
  - Most common delivery device
  - Low flow
  - Can cause pressure ulceration behind the ears and on face
  - Delivers 1-6L/min 23-42%
- Face mask
  - Fit comfortably snug, but not too tight
  - Used to increase O2 delivery for short periods of time
  - Only use with 5-8L/min 40-60%
  - NEVER USE LESS THAN 5L
- Partial rebreather
  - Has reservoir bag
  - 8-11L/min 50-75%
- Nonrebreather
  - 12L/min = 80-100%
- Venturi Mask
  - High flow
  - Delivers precise concentrations
  - 4-10L/min
  - Careful monitoring of FiO2
- Oxygen tent
  - Commonly used with children

See Table 39-4 P. 1511
depending on how much oxygen your patient is needing

it will determine what type of device that you will put

on them so the nasal cannula is the most common delivery device

this is for a low flow oxygen and we can deliver anywhere from one to six liters a minute with this device again this is where you can add the humidification that may need to be given we want to be aware that the patient puts that you know puts the device in their nose and the tubing goes up along their face and over the back of their ears

so we want to be checking those areas to make sure that they're not getting any ulcerations or pressure areas or that tubings not causing any skin alterations on that patient

the next device we're going to talk about is the face mask and again i've tried to give you pictures here so the top the first picture is the nasal cannula the next one is the face mask and this we want to fit comfortably snug but we again want to make sure it's not too tight
and this is used to increase oxygen delivery for short periods of time
we can only use this with five to eight liters
of oxygen and we it will not be effective we never use it
with less than five liters so if you’re a patient only on
three liters of oxygen then you just need to put them on the nasal cannula we
don’t need to use this face mask this again is
for a short period of time and can be used anywhere from five to
eight liters the next one that we’re showing here is
the partial rebreather this has a reservoir bag that collects
the first part of the patient’s exhalation
it mixes it with a hundred percent of oxygen for
the next inhalation the rest of exhalation is released in the vents on
the side when we use this we can this is used
with 8 to 11 liters of oxygen if your patient’s
needing that the next one your book talks about is
the non-rebreather this is for when we need high
concentrations of oxygen like the partial rebreather
but this one has a two-way valve that prevents the patient from
inhaling their exhaled air we use this when a patient's on 12 liters of oxygen or they're needing 12 liters of oxygen and again you know with each of these you know the oxygen is a physician's order and with that order the doctor needs to be writing how many liters he wants the patient on what's the max you know if you've got your patient on five liters and that's what the doc that's the max the doctor wrote for and they you feel like they need more based on their signs and symptoms you're gonna have to call and get another order to increase that and and to figure out what device here that the physician wants them on the venturi mask has a large tube with an oxygen inlet as the tube narrows the pressure drops causing the air to be pulled in through the side ports ports are adjusted according to the prescribed oxygen concentration for the venturi this is used when we need some high flow oxygen because it delivers very precise concentrations this can be used for at four to ten liters a minute and again it requires careful
monitoring but be but it is for patients who really
need that precision of concentration and they need to be on high flow
oxygen tents commonly used with children your book does not talk about these
anymore so you don't need to worry about an
oxygen i did put a picture here to show what that might look like
if you had a patient on it there's also a table that talks about these
oxygen delivery systems here on page 15 11 it's table 39-4
the next advice we're going to talk about is positive airway
pressure this uses mild air pressure to keep airways
open it's referred to there's bipap and there's cpap bipap
changes air pressure while the client breathes in and out
cpap is continuous air pressure this usually will
fit over the client's nose and mouth if you have them on it
Positive Airway Pressure

- Uses mild air pressure to keep airways open
- BIPAP changes air pressure while client breaths in and out
- CPAP continuous air pressure
- Usually fits over the client’s nose or mouth/nose
- Support/encourage use
  - High noncompliance rate
and it's often used to treat sleep apnea in patients
so you will see that on a patient that may
have sleep apnea this keeps their airway open at night
and that's i just wanted to do a quick
overview of what that is the next thing we're going to talk about is an overview
of managing chest tubes a chest tube
is indicated when there's negative pressure in the pleural space
or it's disrupted and this can happen from a thoracic
surgery or trauma patients with fluid like such as a pleural fusion
patients with blood such as the hemothorax
or air and pneumothorax in the pearl space require a chest tube
to drain these substances and that allows the compressed
lung to re-expand so all a chest tube is is a firm plastic tube
it's placed in the plural spaces by a
Managing Chest Tubes

• Chest tube
  • Firm plastic tube
  • Placed in the pleural space
  • Sutured in place
  • Covered with air tight dressing
  • Drains air or fluid
    • Air tube placed high
    • Fluid placed lower

• Nursing responsibilities
  • Continually assess respiratory status/pain
  • Observe dressing
  • Palpate around insertion site for crepitus (rice crispies)
  • Assess water seal for bubbling
    • Maintain water at the 2cm mark
  • Avoid milking tubing
  • If tubing becomes disconnected from system, immediately submerge end of tubing into sterile water
  • Keep rubber tipped clamps and Vaseline gauze dressing at bedside.
  • Review Guidelines for Nursing Care 39-3 p. 1514
physician it’s sutured into place we cover it with an airtight dressing
and it drains that error fluid from that area
nursing responsibility so we’re going to continue to assess the respiratory
status and pain status of our patients we’re going to observe that dressing
around that site we’re going to palpate around the insertion site
for crepitus we’re going to assess water seal for bubbling and they go into
more of chest tubes and med surg once so again this is just a little overview of
chest tubes you will get more in depth of how to
care for chest tubes as you advance through the program
but when we’re caring for these again we want to assess the water sill it
should be bubbling we want to avoid
milking the tube so if we get some type of clot you don’t want to
milk that tube to try to get that clot out of that tubing
this is a and very important to remember if the tubing becomes disconnected from
the system so meaning not from the patient the
tube’s still in the patient but it’s not connected to the system
we want to immediately submerge the end of that two weed into sterile water
so that's why it's important to keep sterile water at the bedside

we also want to keep rubber tipped clamps and vaseline gauze dressing at

the bedside and your book does give some really good
guidelines as far as monitoring a patient with a

chest tube and the guidelines for nursing care and

you can see that on page 15 14 it's guidelines for nursing
care 39-3

as we come to the end are near the end of this
chapter the last few slides are about artificial airways

and so your oropharyngeal airway this is a tube or
Oropharyngeal Airway

- Tube of plastic or rubber inserted into the back of the pharynx through the mouth or nose
- Often used post-operatively
a plastic or rubber and we see this inserted in the back of the
pharynx through the nose or the mouth this is often used postoperatively and
it keeps the tongue from blocking the
airway so it's really important that the correct size
is used as to not to hinder that airway so again this is just an overview so
that if you see this you understand what it is and what it's used for
so the next artificial airway we're going to talk about is the endotracheal
tube this is inserted into the trachea a
laryngoscope is used to insert this is usually done again by advanced
practitioner or physician we can use this to
administer oxygen by mechanical ventilation most
commonly we use a cuffed endotracheal tube to prevent air leakage and
bronchial aspirations once this is put into a patient the
Endotracheal Tube

- Inserted into trachea
- Laryngoscope used to insert tube
- Used to administer O2 by mechanical ventilation
patient cannot speak and once we put this in often it
requires suctioning to remove secretions

last couple of slides here are about a tracheostomy

this is inserted for mechanical ventilation it bypasses the upper airway

if a patient has an upper airway obstruction

and or to remove endocrine endotracheal secretions and this is an

artificial opening into the trachea normally about the second or third
cartilage ring it can be permanent or temporary the
tube consists of an inner an outer cannula and an inner cannula

there's an obturator that guides the direction of the outer cannula during

insertion again this can be cuffed or

non-cuffed but it's held in place with a velcro

strap or tape and
Tracheostomy

- Inserted for mechanical ventilation, bypass upper airway obstruction, or remove endotrachial secretions
- Artificial opening into trachea normally at 2\textsuperscript{nd}/3\textsuperscript{rd} cartilage ring
- Can be permanent or temporary
- Tube consists of outer cannula and inner cannula
  - Obturator guides direction of outer cannula during insertion, removed once trach in place
- May be cuffed or non-cuffed
- Held in place with twill tape or velcro straps
- Nursing implications
  - Administer heated/humidified oxygen
  - Keep trach free from foreign objects
  - Clean/replace inner cannula
  - Regularly change dressings/ties
  - Clean skin surrounding tube
so there's nursing implications with this
administering heat or humidified oxygen we want to keep the
trach free from foreign objects we want to keep that
clean and replace the inner cannula as needed
we want to do regular changing of the dressing and ties and and
assess and clean that skin area around the tube
standard bedside equipment that should be kept at the bedside should your
patient have a tracheostomy is the obturator the suction equipment
oxygen a manual ventilation bag and a spare tracheostomy
tube should that come out of the patient tranquil suction is one of the skills
that is usually performed or taught in the skills lab
you should review that providing tracheostomy
care that skill can be found 39-5 on
Tracheal Suctioning

- Performed by passing sterile catheter through ET or trach
- Performed using sterile technique in hospital
  - Clean technique in the home
- Uncomfortable, can be painful
  - May need to admin pain med prior if necessary
- Risks- hypoxia, mucosal damage, dysrhythmia, infection, atelectasis
- Hyperoxygenate the client before and after each suction attempt
- Limit suctioning to 10-15 seconds
- Do not insert suction tube more than 1cm beyond the length of the tube
page 1540 and you should be reviewing tracheal suction which is a skill on of 39-6 in the back of your book but we do when we do tracheal suctioning we want to pre-perform this using a sterile catheter and we want to use sterile technique if we're in the hospital if a patient has to do this at home our loved one has to do it for a patient at home we usually recommend clean technique in the home we want them this can be very uncomfortable and it can be painful so we want to make sure we administer any pain medicines prior if necessary and if it's not an emergency situation the patient when we are doing tracheal suctioning is at risk for hypoxia mucosal damage dysrhythmias infection and atelectasis so before we start the procedure we always want to