Dr. Rubin's Mini Medical School
Student Handout
Mini Medical Experiences

Introduction

The mission of Dr. Rubin's Mini Medical School is to provide educational programs hands on experiences and counseling to students and parents about the field s of medicine and surgery. After completing our programs, we believe you will have enough experience and information to decide if you want to pursue a career in healthcare.

Purpose

Please read this handout prior to attending the program. The purpose of this handout is to enable you to better understand, learn and retain the experiences.

The Experiences

This handout explains 20 experiences or stations for you to learn. The experiences can be divided into 2 types. "Clinical Skills" which are the skills needed to properly examine a patient and typically learned in the first or second year of medical school, and "Procedure Skills" which are the skills performed on patients that are taught in or after the third year or even during residency. This handout was written by Dr. Rubin to provide you with basic background information and instructions on how to perform each skill. Reading this handout before attending the program will allow you to appreciate and experience the medical profession. I hope you will learn what healthcare professionals do and how they formulate their assessment and treatment plans.

Please keep in mind that the field of medicine is complicated and diverse. The information and procedures provided are reflective of Dr. Rubin's preferred methods. Many skills and procedures have several valid ways to attain the same results. The skills presented are used every day in healthcare and were chosen by Dr. Rubin because of their ease of performance, ease of learning and their relevance to young students.

Dr. Ira Rubin pursued an M.D. - Ph. D. at The University of Chicago, Graduate Division of Biological Sciences and the Pritzker School of Medicine from 1978 to 1984. During his 6 years in graduate school, he completed a Ph.D. in Pathology and his M.D. Dr. Rubin did his residency in Pediatrics at The University of Chicago Hospitals and Clinics. He has been in private practice at Naperville Pediatric Associates since 1988. He is an active member of the medical staff of Edward Hospital including past Chairman of the Department of Pediatrics.

Dr. Rubin created the Mini Medical School for High School Student Program and Summer Experience Program as a community service project in 2005 and eventually incorporated the program into a 501C3 Not For Profit Private Foundation.

If you are interested in medicine, dentistry, podiatry or optometry, you may want to investigate combined programs. Such program are often called direct programs, meaning that you are able to get accepted into a professional school after graduating from high school. Most of these programs are conditional. Many are limited to the state the school is located. A list of such programs is posted online in our website: www.minimedicalschool.com . Scroll to the bottom of the home page and lo ok for series of buttons.

It is my belief that nothing is impossible, as long as you put in the work, time and effort, you can accomplish anything. Thus, if you want to work in healthcare, you can accomplish this goal. Consider that there are over 200 jobs in the healthcare industry. Some require years of training, some only a few months. Consider how much time you are willing to commit, our academic standing, and how much education you want to commit to and afford.

You have a future in healthcare provided you want to pursue it.

Ira S. Rubin, M.D., Ph.D.

President

Dr. Rubin's Mini Medical School, NFP

www.minimedicalschool.com

Dr. Rubin's Mini Medical School Experiences

Experience 1: Vital Signs

Vital signs are indicators of one's overall health. They offer clues to diseases and help us evaluate a patient's progress toward recovery. Vital signs should be taken at rest. Any abnormal findings should be repeated in order to verify the findings. The most common vital signs measured are body temperature, heart rate, respiration rate, and blood pressure.

Temperature

There are many places to measure a patient's temperature: mouth, rectal, ear and skin. Most healthcare facilities today use ear or skin temperatures because they are less invasive. We will practice by measuring the patient's skin, press the button to activate the thermometer, look at the display and if you see the hourglass, it's activated. Put the round metal pad on the forehead; wait until you hear a beep. Look at the display. Normal body temperatures range from 97 to 100.3 degrees F, the average being 98.6 Fahrenheit. The most accurate way to measure a body temperature is rectally. Since that is not patient friendly, most healthcare facilities measure ear, skin or mouth temperatures. For a temperature to be accurate, the patient would need to rest in room temperature for at least 30 minutes. Patients who have a temperature high or low after coming indoors would need to be retested in 15-30 minutes to ensure accuracy.

Heart Rate

You can measure a pulse anywhere there is an artery (wrist, arm, neck, knee, foot or head). Most people use the radial artery in the wrist. To feel the pulse in the wrist, place your index and middle finger over the underside of your opposite wrist, below the base of the thumb. Press firmly with flat fingers until you feel pounding – the pulse. Once you find your pulse, count the beats for 1 full minute. You can get an approximate pulse by counting for 30 seconds and multiplying by 2, or by counting for 15 seconds and multiplying by 4. The easiest approximation comes from counting for 6 seconds then adding a zero. The bad thing about approximations is that they become less and less accurate as you count for shorter and shorter times. The normal pulse varies with age and the amount of time you are resting. A normal adult pulse is 60 to 100 beats per minute.

Respiratory Rate

Observe the patient's stomach or chest and watch until you see it rise and fall. Count the number of times the stomach or chests rises for 15 seconds and multiply by 4, or for 30 seconds and multiply by 2. This tells you the respiratory rate per minute. A normal respiratory rate at rest is 20 to 40 breaths per minute depending on your age.

Blood Pressure

Blood pressure measures the force of the circulating blood on the walls of the arteries. The average blood pressure is 120 millimeters of mercury (systolic-the upper number), over 80 millimeters of mercury (diastolic-the lower number). A resting blood pressure of over 90 diastolic is considered mildly elevated; over 100 may require treatment. Blood

pressure is the hardest vital sign to measure. It takes a lot of practice to master. The following steps describe how to measure a patient's blood pressure.

1. Place the patient's left arm on a table so that it rests at the same level as your heart. The left arm is preferred as it is closer to the heart.
2. Turn the cuff so that the stethoscope diaphragm is on the inside of the arm.
3. Find the pulse with your index and middle fingers on the inside of the arm near the elbow. Now place the stethoscope diaphragm on top of it.
4. Wrap the cuff and secure it.
5. Close the air-flow valve on the inflating bulb by turning the knob clockwise.
6. Inflate the cuff by repeatedly squeezing the bulb with your right hand.
7. Listen to the pulse beat while inflating the cuff.
8. When you can no longer hear the pulse beats raise the pressure an additional 30 mmHg.
9. Slowly open the air-flow valve by turning it counterclockwise so that the pressure drops about 2-4 mmHg with each beat of your heart.
10. After opening the air-flow valve, listen carefully for a pulse beat.
11. The moment you hear the faint rhythmic thumping sounds of the pulse beat, note the reading on the gauge. This is your systolic blood pressure.
12. Allow the pressure to continue dropping at the same rate as before.
13. Listen carefully with the stethoscope for swishing sounds.
14. When you can no longer hear the sounds, read the gauge and record it. This is your diastolic pressure.

Measuring vital signs may seem easy but in reality it takes time a practice to measure them accurately. For today, take the vital signs of 2 or 3 of your group members.

Name:

Temp: Heart Rate: Respiratory Rate: Blood Pressure:

Name:

Temp: Heart Rate: Respiratory Rate: Blood Pressure:

Name:

Temp: Heart Rate: Respiratory Rate: Blood Pressure:

Dr. Rubin's Mini Medical School Experiences

Experience 2: Examination of Eyes

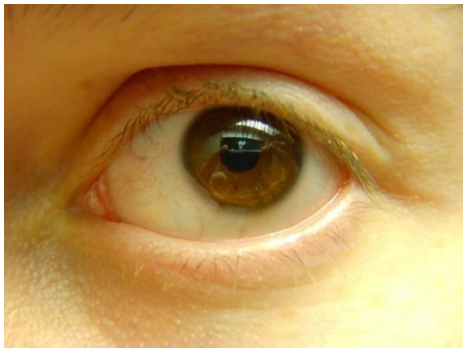
The thoroughness an eye exam will vary depending on the need and patient cooperation. A comprehensive exam would have six components. I will describe all six parts, but for our program, you should concentrate on the 6th part: examination of the fundus (retina). The eye exam is very hard and takes a lot of practice. Ideally the rooms should be dark.

1. Visual Acuity

Allow the patient to use their glasses or contact lenses if available. You are interested in the patient's best corrected vision. Hold a Rosenbaum pocket card at a 14 inch "reading" distance or position the patient 20 feet in front of the Snellen eye chart. Have the patient cover one eye at a time with their hand. Ask the patient to read progressively smaller letters until they can go no further. Record the smallest line the patient read successfully (20/20, 20/30, etc.). Repeat with the other eye. Unexpected/unexplained loss of acuity is a sign of serious ocular pathology.

In cases of eye pain, injury, or visual loss, always check visual acuity before proceeding with the rest of the exam or putting medications in your patient's eyes.

2. Inspection



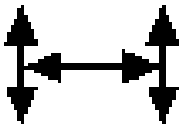
Grossly observe the eyelids. Does the patient have any abnormalities: ptosis (eyelid droop), exophthalmos (bulging eyes), lesions, deformities, or asymmetry. Ask the patient to look up and pull down both lower eyelids to inspect the conjunctiva and sclera. Next spread each eye open with your thumb and index finger. Ask the patient to look to each side and downward to expose the entire bulbar surface. Note any discoloration, redness, discharge, or lesions. Note any deformity of the iris, sclera or cornea.

If you suspect the patient has conjunctivitis, be sure to wash your hands immediately. Viral conjunctivitis is highly contagious - protect yourself!

3. Visual Fields

Visual fields are screen by confrontation (face to face) with the patient. Stand two feet in front of the patient and have them look into your eyes. Hold your hands to the side half way between you and the patient. Wiggle the fingers on one hand. Ask the patient to indicate which side they see your fingers move. Repeat two or three times to test both temporal fields. If an abnormality is suspected, test the four quadrants of each eye while asking the patient to cover the opposite eye with their hand or a card.

4. Extraocular Muscles



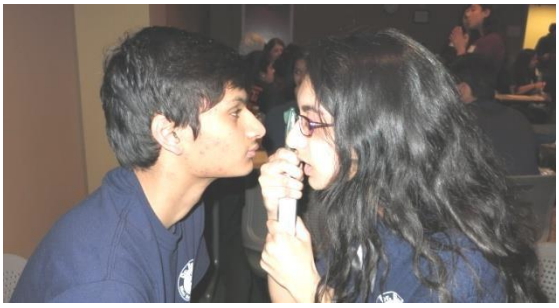
Corneal reflections are a simple way to see if the eyes are aligned. Stand about 3 feet directly in front of your patient and shine a light at your Patient's eye. The corneal reflections should be centered over the pupils. Asymmetry suggests extraocular muscle pathology. Extraocular movement is a simple way to detect muscle or nerve defects. Stand or sit 3 to 6 feet in front of the patient. Ask the patient to follow your finger with their eyes without moving their head. Check gaze in the six cardinal directions using a cross or "H" pattern. Check convergence by moving your finger toward the bridge of the patient's nose.

5. Papillary Reaction to Light

Dim the room lights as necessary. Ask the patient to look into the distance. Shine a bright light obliquely into each pupil in turn. Look for both the direct (same eye) and consensual (other eye) reactions. Record pupil size in mm and any asymmetry or irregularity.

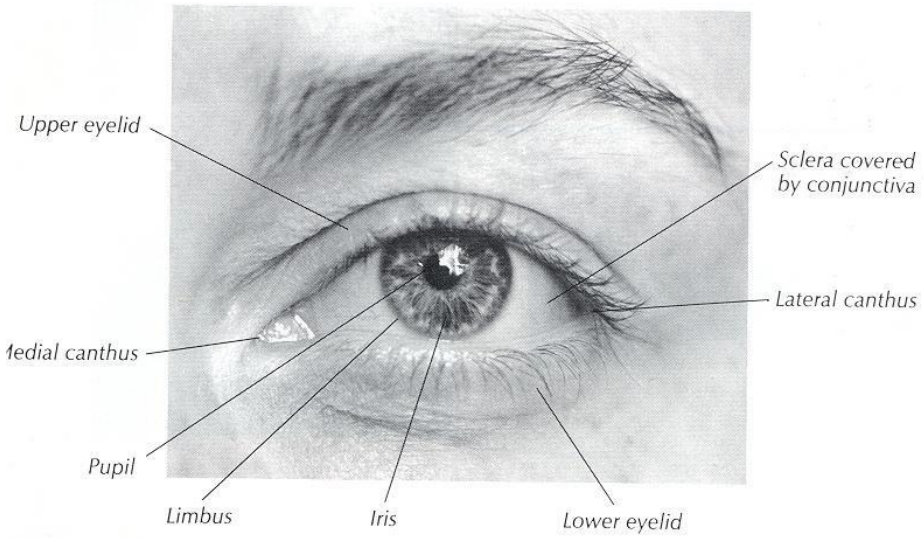
6. Fundus Exam

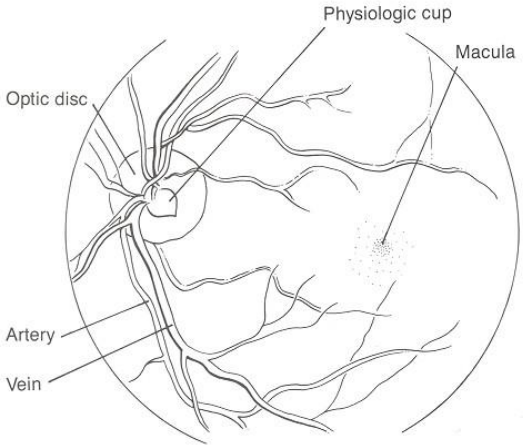
The ophthalmoscopes used in our program vary with size and features. All have a dial for controlling brightness, an aperture setting for the size and type of beam and a dial for the lens strength measured in diopters (the number at the base of the scope head). If you wear glasses take them off, if you use contact lenses, it is best to leave them in.



Darken the room as much as possible. Adjust the ophthalmoscope so that the light is no brighter than necessary. Adjust the aperture to a plain white circle. Set the diopter dial to zero s. Use your left hand and left eye to examine the patient's left eye. Use your right hand and right eye to examine the patient's right eye. Place your free hand on the patient's shoulder for better control. Ask the patient to stare at a point on the wall or corner of the room. Look through the ophthalmoscope and shine the light into the patient's eye from about two feet away. You should see the retina as a "red reflex." You will see any opacities in the lens (Cataracts) as defects in the red reflection. Follow the red color to move within a few inches of the patient's eye. Adjust the diopter dial to bring the retina into focus. Find a blood vessel and follow it to the optic disk. Use this as a point of reference. Inspect outward from the optic disk in at least four quadrants and note any abnormalities. Move nasally from the disk to observe the macula. Look around at the general state of the surrounding retina for hemorrhages, exudates or raised masses. Finally end by reducing the brightness on the ophthalmoscope and asking the patient to look directly at the light. You will then be able to see the macula and fovea. Don't linger for too long! Repeat for the other eye.

Look for the following structures when examining your fellow student or manikin.





Make sure that you see the following structures when looking into the back of the eye with your ophthalmoscope.

1. Physiologic cup
2. Optic disc
3. Artery
4. Vein
5. Macula (Fovea)

In the diagram above, is the eye shown a right eye or left eye? How do you know?

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Experience 3: Examination of Ears

First inspect the external ear and then use the otoscope to inspect the inner ear. Make sure there is good light. Look at both ears of 2 students in your group.

1. The External Ear

Examine the external ear and the area around it. Make a visual inspection of the ear and palpate any abnormality detected.
Any red or inflamed areas? Any blue or bruised areas? Any area swollen? Any area looks abnormal – cut, malformed, deformed? Any pain when you pull on the helix or the tragus?

2. EXAMINATION OF THE INNER EAR

To examine the ear canal you need to use an instrument called an otoscope. There are many companies that make otoscopes. We are using mainly 2 types for the class. One is a standard 3.5 volt halogen Welch-Allyn scope. The top part is removable and in some cases can be converted into a throat illuminator (flashlight) by screwing off the top. The other type we are using is a pocket scope designed to be carried in your shirt pocket. This is a 2.5 volt halogen light using disposable AA batteries. Both types of scopes have a side port to attach a rubber bulb used to spray air into the ear canal. Each otoscope connects to a speculum. There are different speculum sizes to enable the scope to fit different ear canal sizes. The speculums we are using are disposable so that there is no potential of cross contamination. Alternatively, one can clean the speculum after each patient. Each otoscope head can be removed, and the handle can be converted to power another head like an ophthalmoscope. Remember the scope is an expensive piece of equipment. Some of our scopes are old and may not appear to work well. If you have trouble, get help from an assistant. Handle the scopes with care. The scopes are designed to be on for brief periods of time, otherwise if left on, they will get quite warm and the battery will go dead very quickly.

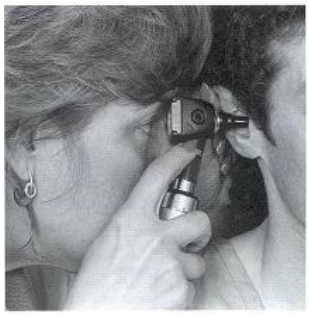
Rheostat

Red or Green switch used to turn on the light and control brightness – press and slide.

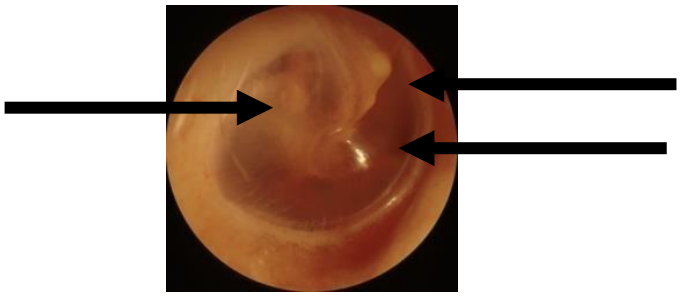
Speculum

Black tip made of round pointed plastic of various sizes – the size depends on the patient's age. This piece is typically made of disposable plastic.

Step 1: Switch on the otoscope by pressing down the red or green button and then turning the ring (for a pocket scope, just turn the ring at the base of the head), which is a rheostat, the more you turn, the brighter the light – does the bulb shine brightly? If no light, the bulb or battery may need to be changed. Get help if it does not light.
Step 2: There are different ways to hold the otoscope – see the 3 pictures below. Rest the base of your hand against the patient's head to avoid hurting the patient. It is important to make sure the patient does not move his/her head. You don't want to hurt your patient.


Step 3: With your other hand gently pull the external ear away from the head to straighten the ear canal: for adults pull it back and up, for children pull it back and down.
Step 4: First shine the light into the opening to inspect the entrance to the ear canal. Look at the ear canal.
Step 5: Then look through the otoscope and gently put the speculum into the ear canal DO NOT go into the deep part of the ear canal. If you do, you may cause discomfort for your patient.
Step 6: Inspect the contents of the ear canal and the tympanic membrane. The tip of the speculum should only go into the ear canal far enough to see the tympanic membrane.
Now examine your patient's ears. What structures are the arrows pointing to?



Normal ear canal

After your exam answer the following questions:

Is the ear canal (the tissue leading to the eardrum) normal?
Can you see the eardrum? Can you identify all of the parts of the ear drum?
The umbo, malleus, incus, pars tensa, pars flaccida?
Is it normal? Red? Bulging? Is there a hole in the ear drum? What does the hole mean?

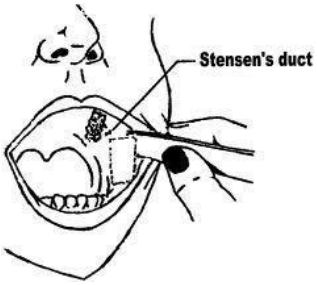
Dr. Rubin's Mini Medical School Experiences

Experience 4: Examination of Mouth

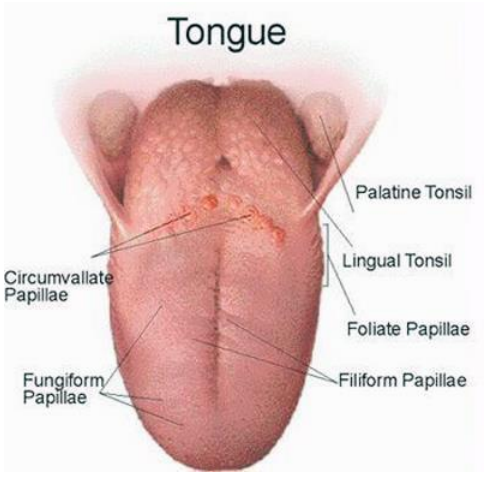
Many diseases have signs that appear in the mouth. Making a complete examination of the mouth can help you find abnormalities and make appropriate treatment recommendations.

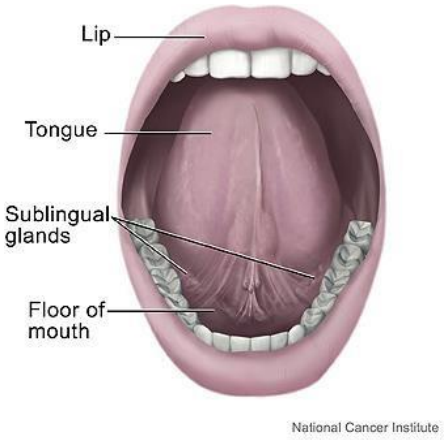
For this part of your patient's exam, you will need a tongue depressor, mirror and clean gauze to grab the tongue with.

Lips – start your examine by looking at the patient's lips for color, fissures and symmetry. Then fold open the lower and upper lips looking at the frenulum and gums.

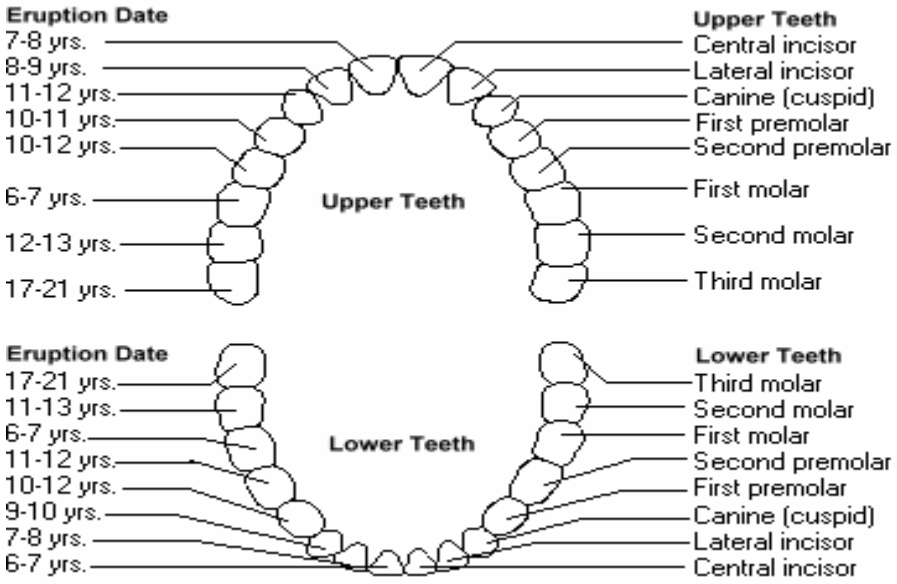


Mucosa - Have your patient open the mouth and look at the inside surface of the checks. This is called the buccal mucosa. Assess the color. Look for vesicles. Is the surface moist or dry? You may notice a posterior dot just above the teeth which releases amylase from the parotid gland called the Stensen;s duct or parotid duct.

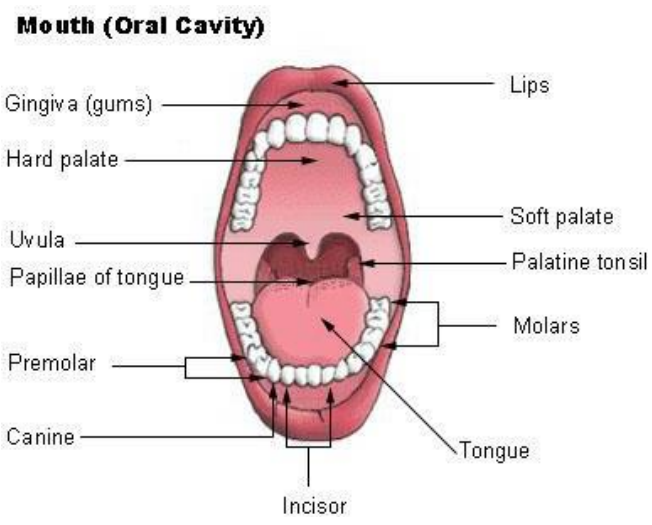




Tongue – The tongue is the large muscle at the center of the mouth. Look at its color, symmetry, papillae (taste buds) and position, as your patient to lift the tongue and look at the floor of the mouth. Find the frenulum and the sublingual glands. Use your mirror to visualize the top and back part of the tongue. Note the large taste buds in the back of the tongue. Note any abnormalities in the surface of the tongue. You may need to grab the tongue with gauze to see all of the tongue.



Teeth - Inspect the teeth . If needed, use your mirror. How many teeth do you have? In general, children have as many teeth as digits, but we get more as we develop into adults. How many teeth do adults have? Look at the diagram above. Continue with your moth exam and look at the teeth. What condition are they in? If there is a complaint of toothache, tap the tooth with your tongue depressor looking for pain. Dentist will inspect the teeth and gums with probes. Most physicians do not do as in-depth of an exam. X-rays are often taken to further evaluate the health of teeth.



Palate - The palate is composed of hard and soft (front and back) areas and the uvula. Check it to make sure it is intact and not sitting high or low. Ask the patient to say "ah" and observe the movement of the uvula. If necessary press a tongue blade firmly upon the tongue for visualization of the pharynx.

Tonsils – There is a tonsil on each side of the mouth which is composed of lymphoid tissue used to catch viruses and bacteria. Look at the size, shape and if they have any pus or exudates coating the surface.

Posterior pharyngeal wall- This is the back of the mouth. Look at the color and evaluate if the tissue is smooth or cobblestoned in appearance.

Rapid Antigen Strep Testing

Probably the most common procedure done in a patient's mouth is strep testing for sore throats. There are 3 types of tests done for strep throat infections which I will list in the order of most accurate (>99%) to least accurate (~95%): a throat culture, a nucleic acid detection test or a rapid antigen test. Cultures take 12 to 48 hours to obtain a result. Nucleic Acid test take about 15 minutes but a rapid antigen test takes 5 minutes. Most medical offices will perform a rapid antigen test with a reflex test to culture for any negative result. This way no patient will get a false negative result.

If there is any time left, your TA will perform a rapid antigen test with your group. Please keep in mind that we typically use ICON Fx but based on availability and the cost, we may substitute a different brand and use a slightly different procedure in class.

Test Procedure:

1. The affected area of throat is swabbed with a Dacron sterile cotton-tipped applicator and a wooden cotton applicator. Normally the second wooden q-tip would be obtained used on a culture plate if the rapid antigen test is negative. If no area is inflamed then the pharynx and tonsils are swabbed.
2. Place the Dacron applicator in the triangular chamber.
3. Add four (4) drops of solution #1 and then add four (4) drops of solution #2.
4. Twist applicator 360 degrees 3 times to mix the solution
6. Wait 1 minute and then seal the card by removing the tape on the opposite side and closing the card.
8. Wait for 4 to 5 minutes – the red line on top (control) will appear.
9. Read the card: 2 red lines means a positive test – strep is detected. If only one line is red and it is in the control box, the test is negative and strep is not detected. In this case a throat culture is done to detect any false negative results.

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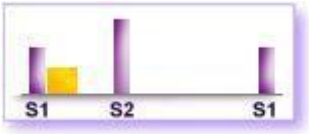
Experience 5: Heart and Lung Sounds

The complete examination of the heart and lungs is beyond our scope today. However, I wanted you to get a sense of the complexity by hearing the normal and many abnormal sounds that are hear routinely by physicians. Your teaching assistant will play a number of normal and abnormal heart and lung sounds to give you some experience with your listening skills. In addition, you will have 2 baby models with clinical scenarios to examine.

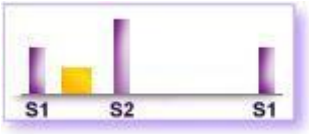
The Heart:

The normal heart sounds are described commonly as "lub-dub". Lub is the first heart sound referred to as S1 (sound 1) and S2 (sound 2) is the second heart sound heard. There is a greater pause between the S2 to S1 than S1 to S2. S1 is what is heard when the mitral and tricuspid valves close and the heart pumps blood (systole). S2 is what is heard when the aortic and pulmonary valves close and the ventricles are filling up with blood (diastole). Any additional sound is called a heart murmur. The pattern of the murmur often reflects a disease or defect in the heart; however, some murmurs are normal variants. Listen today to the patterns of heart sounds and determine which pattern you are hearing.

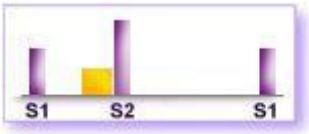
Heart Murmurs



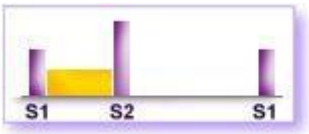
Early Systolic Murmur - begins with S1 and ends before or about the middle of systole.



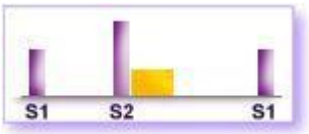
Mid Systolic Murmur - begins after S1 and ends before S2.



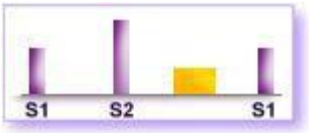
Late Systolic Murmur - begins at about the middle of systole and ends at the time of S2.



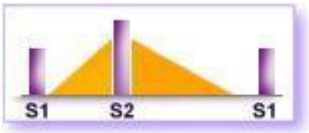
Holosystolic Murmur - begins with S1 and ends with, or continues somewhat beyond, S2.



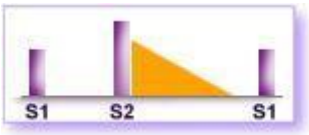
Early Diastolic Murmur - begins with S2.



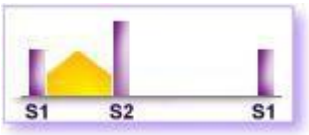
Mid Diastolic Murmur - begins after S2.



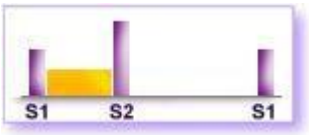
Continuous Murmur - has both systolic and diastolic components.



Decrescendo - the loudness of the murmur decreases progressively. The murmurs of aortic and pulmonic regurgitation are examples of this type.



Crescendo-Decrescendo - the loudness of the murmur increases and then decreases. This configuration is typical of systolic ejection murmurs.



Plateau - the loudness of the murmur remains relatively constant. Holosystolic murmurs are representative of this type.

The Lungs

Normal breath sounds are often described as ***Vesicular or Bronchial.*** Vesicular sounds are what you would be heard over all areas of normally ventilated lungs. They have been described as "leaves rustling" or "like a gentle breeze". The inspiratory sound is louder than the expiratory sound and there is no pause between inspiration and expiration. Bronchial sounds are also called tubular. These normal breath sounds would be heard over the trachea and main bronchi. It is a very loud and high pitched.

When listening to the lungs you may hear diminished sounds or no sound reflecting a decrease air flow in the patient's lungs or you may hear one of the following abnormal breath sounds:

Wheezes: These are high pitched whistles associated with narrowing of the small airways like in asthma or pneumonia.

Crackles **(Often called Rales):** These are crackles like the sound you hear when you rub bubble wrap are caused by the sudden opening of collapsed airways. They are heard in patients with obstructive lung disease or pneumonia

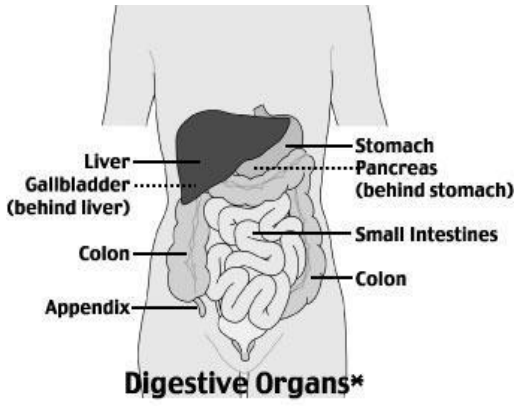
Rhonchi: These are louder and harsher then the fine crackles. They are associated with excessive secretion in the upper airways. They are heard in patients with bronchitis type diseases.

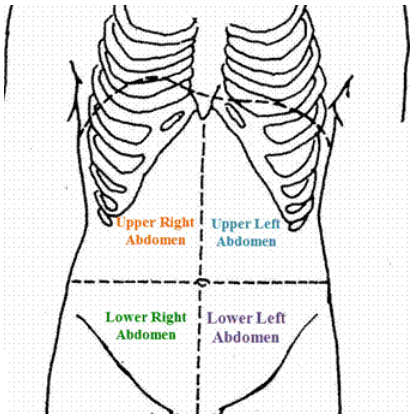
Strider: This is a harsh, high pitched inspiratory sound over the larynx. It can often be heard without the stethoscope and are caused by croup or epiglottitis.

Dr. Rubin's Mini Medical School Experiences

Experience 6: Abdominal Exam

The exam of the abdomen is divided into 4 parts: inspection, auscultation, percussion and palpation. It is best to examine from the right of the patient. The abdomen is then evaluated by referring to it in four quadrants: RUQ, LUQ, RLQ and LLQ. Some physicians prefer to divide the abdomen into thirds: epigastric, umbilical and hypogastric.





Inspection: First undrape the patient to expose the skin. Look for imperfections like scars, moles, or rashes. Then look at the shape of the abdomen. Is it flat, rounded, scaphoid or distended. Then look at the symmetry of the abdomen for an obvious mass or organ enlargement.

Auscultation: Use your stethoscope to listen to all four quadrants for bowel sounds. The stethoscope has a bell and diaphragm. It is best to use the bell since most sounds are low frequency tones but you may not be able to seal the bell. Otherwise use the diaphragm. A normal abdomen will sound like water moving, When the bowel is inactive there is no sound or the sounds are reduced.

Percussion: First practice percussion. Place your left middle finger over the table and tap it with your right middle finger. Move your left finger over different surfaces and palpate. A solid material will not resonate. You should be able to tell if there is a fullness or mass vs. air. Now percuss over the 4 abdominal quadrants looking for pain and or masses. You can assess the size of the patient's liver by percussing over the mid clavicular line of the right chest.

Palpation: Use one hand to gently press into the abdomen in each quadrant. Look for pain, fullness or masses. Then repeat the process with two hands pushing deeper and again look for pain, fullness or masses. If there is pain, see if it is decreases or increases as you remove your hand (rebounds). What illness should you consider if you find tenderness and rebound in the right lower quadrant? The spleen is not palpable in the normal patient. If you are concerned about the spleen you would need to palpate deeply with two hands on the left upper quadrant to assess its size.

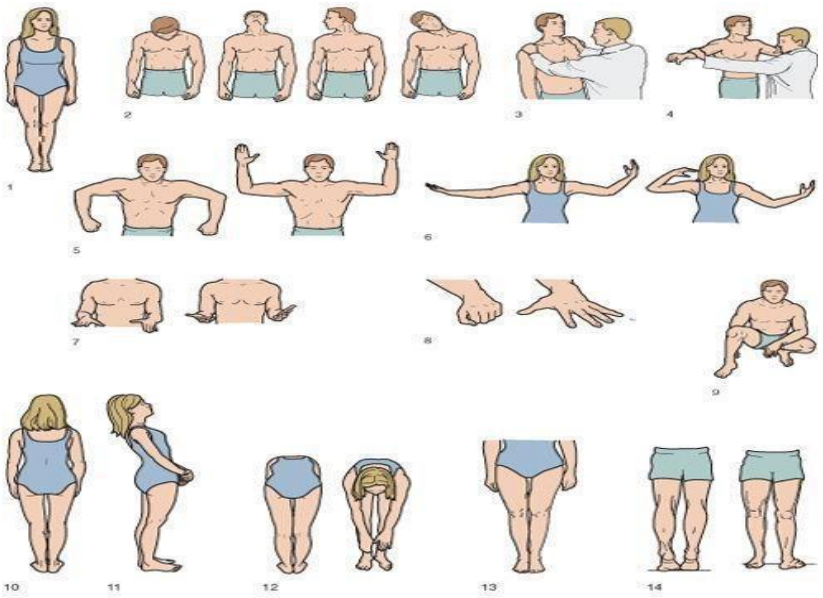
Dr. Rubin's Mini Medical School Experiences

Experience 7: Muscular-Skeletal Exam

The muscular-skeletal systems consist of the bones that support the weight of the body and the muscles used to provide motion or movement. The 14 steps shown are used in a sport's pre-participation exam. If an abnormaility is found, then specific testing is done for that area. These specific examinations are unique to each part of our body. For our purpose, we will perform the general exam of the muscles and skeleton of the human body.

I typically play "Simeon says". By demonstrating for the patient, you will get better cooperation and this process would take about 4 minutes to complete. Check all 14 areas.

1- Stand straight facing forward – look for symmetry of upper, middle, and lower body.
2- Move your neck in all directions – checks for cervical spine problems.
3- Shoulder strength testing – hands on shoulder and have patient resist the push.
4- Shoulder strength testing – resist moving arms down to waist
5- Shoulder range of motion – extend arms, flex elbows then rotate shoulder 6- Elbow range of motion – extend and flex each elbow.
7- Wrist range of motion – point thumb up and then down.
8- Hand range of motion – clench each fist and then open and close each finger 9- Duck Walk – bend knees and lower your pelvis then take 3 steps to walk like a duck This checks knees and pelvis. If not possible, stand on 1 leg, balance and jump 3 times.
10- Stand facing backward and side view – look for symmetry of the body.
11- Stand facing backward and tilt – looks for lower back pains from spine defects. 12- Stand facing backward – touch toes by bending at waist, not knees- look for back symmetry – if not, possible scoliosis.
13- Stand facing backward – look at lower extremities at muscles to detect defects.
14- Inspect feet – stand on toes and heels – hop 3 times each foot separately - look at foot arches.



Dr. Rubin's Mini Medical School Experiences

Experience 8: Neurologic Exam
Cranial Nerves/Peripheral Nerves/ Reflexes/ Hearing and Vibrations

There are millions of nerves in our body. However, we will only discuss 43 of them. The nerves that emulate from the brain are called Cranial Nerves. They are numbered 1 to 12. Then there are the nerves that emulate from the spinal cord. They are called the peripheral nerves, and they are also numbered 1- 31.

Cranial Nerve Exam
Most physicians follow an abbreviated systematic exam to assess the health of the cranial nerves. Here is one simple method.

If smelling is of concern the **Olfactory (1) nerve** can be easily tested. However if the patient is not complaining, most physicians do not formally test this nerve. Before starting check the nasal passage and make sure it is patent. If it is you can simply use a bar of soap and test each nostril. Ask the patient to close his or her eyes and place the soap by the open nostril and ask if the patient can smell the soap scent. In class I will provide you with a small bottle of coffee grounds to smell. Then check the **Optic (2) nerve** which is tested by doing the eye exam presented in project 2. The **Oculomotor** (3) **Trochlear** (4) and **Abducent** (6) nerves are also tested in project 2 when you check eye movements. Next ask your patient to smile and look at the facial muscles. This test the **Trigeminal** (7) and **Facial** (5) nerves. Now test the **Vestibulocochlear** (8) nerve by doing the Weber and Rhine test as follows: Take the high pitched (1024 Hz) and low-pitched fork. Gently tape each fork and ask your student if a sound is heard. Then place each fork on the top of the head and ask if the sounds are heard equally in each ear. Then place each fork on the bone just behind each ear (right and left mastoid) and then in front of the respective ear. The sounds should be the same in each test except louder when heard over the ear. Do you know why? Now test the **Glossopharyngeal** (9) nerve by placing a tongue depressor at the back of the tongue and seeing if you elicit a gag reflex. Next test the **Vagus** (10) nerve by asking your patient to say "ah" confirming that that the pharynx is innervated. Now have your patient shrug the shoulders to test the **Accessory** (11) nerve. Now you are at the end of your exam. Ask your patient to stick out his or her tongue and move it from side to side to check the **hypoglossal** (12) nerve. You have now completed the cranial nerve exam.

Peripheral Nerve Exam
Deep Tendon Reflexes are used to assess the spinal cord and peripheral nerves.
The patient must be relaxed and in the proper position before starting. Use no more force than you need to provoke a response. Reflexes are graded on a 0 to 4 "plus" scale where 0 means absent, 1 means hypoactive, 2 is normal, 3 is hyperactive without clonus (continuous contractions) and 4 is hyperactive with clonus.

Try obtaining the following reflexes from your fellow students using the small hammer supplied.

Biceps Reflex – tests C5 and C6
The patient's arm should be partially flexed at the elbow with the palm down. Place your thumb or finger firmly on the biceps tendon. Strike your finger with the reflex hammer. You should feel the response even if you can't see it.

Triceps Reflex – test C6 and C7
Support the upper arm and let the patient's forearm hang free. Strike the triceps tendon above the elbow with the broad side of the hammer. If the patient is sitting or lying down, flex the patient's arm at the elbow and hold it close to the chest.

Brachioradialis Reflex- test C5 and C6
Have the patient rest the forearm on the abdomen or lap. Strike the radius about 1-2 inches above the wrist. Watch for flexion and supination of the forearm.

Knee Reflex – test L2, L3 and L4
Have the patient sit or lie down with the knee flexed. Strike the patellar tendon just below the patella. Note contraction of the quadriceps and extension of the knee. If you cannot get this reflex, have your patient criss-cross the index fingers and pull. Then try again.

Ankle Reflex- S1 and S2
Dorsiflex the foot at the ankle. Strike the Achilles tendon. Watch and feel for plantar flexion at the ankle.

Foot (Babinski) Reflex- test for an intact spinal cord.
Stroke the lateral aspect of the sole of each foot with the end of a reflex hammer. Note movement of the toes, normally flexion (withdrawal).
Extension of the big toe with fanning of the other toes is abnormal. This is referred to as a positive Babinski.

Sensory Response
Part of assessing the peripheral nerves is to see if they can perceive sensations. One ease sensation is vibration, but you could also check pain and heat. Test a fellow student for sensory reception. Use a low pitched tuning fork (128Hz). Tap your tuning fork and touch the stem of the fork to both the right and left distal interphalangeal joint of the index fingers and big toes. Ask if vibrations are felt. If the patient senses the vibration continue with your evaluation by testing the wrists, elbows, medial malleoli of the ankles and patellae (kneecaps). Remember to check both the right and left sides for each area you check.

Dr Rubin's Mini Medical School Experiences

Experience 9: Clinical Cases

Physicians are problem solvers. If you like solving problems, you would probably like the field of healthcare. The field is very imprecise, and your judgment plays a significant role. This is one of the biggest reasons why medical training takes so long. Each patient presented gives you a chance to learn about that patient's problem and its solution.

For our purpose, all Dr Rubin wants you to know that the format for solving a patient's problem is as follows:

1. Talk to the patient and write down the history of the problem or problems.
2. Include a level of history depending on the complexity and severity of the problem. For example, a routine office visit will have limited history, but an ER visit will require more information. A patient who has been sick and seen by many healthcare professionals will have a lot more to review and consider than a patient who just go sick yesterday.
3. Perform a physical exam starting with vital signs and concentrate on any part of the body that relates to history.
4. Perform any tests needed based on the patient's history and symptoms.
5. After thinking about steps 1-4, what is your impression? What do you think is the problem?
6. Perform any additional test to confirm or disprove your initial impression.
7. Make the diagnosis
8. Offer the patient a treatment plan.
9. Ask the patient to make a follow up visit to reassess the patient and ensure a cure.
10. At the follow up visit, either the patient is cured, or you need to rethink your diagnosis and treatment plan (repeat steps 5-9) until you cure the patient.

Your TA will present a review of this process and then walk you through several cases of patients to demonstrate how a patient is evaluated. Here is a simple graphic representation of the process:

History
↓
Physical Examination with focus on a particular body part if indicated.
↓
Tests Indicated by history and examination.
↓
Impressions: List what you think may be possibly wrong with the patients
↓
Diagnosis and Treatment Plan
↓
Follow up as needed – if the patient is not cured, repeat the process.

Dr. Rubin's Mini Medical School Experience

Experience 10: Radiology - X-Rays

1.2% of physicians specialize in radiology. Generally, radiologists are different from other physicians because he or she diagnoses diseases by obtaining and interpreting medical images. Some images are obtained by using x-rays or radioactive substances, others by means of sound waves or the body's natural magnetism. A radiologist correlates medical image findings with other examinations and tests, recommends further examinations or treatments, and confers with referring physicians (the doctors who send patients to the radiology department or clinic for testing). Radiologists also treat some diseases by means of radiation (radiation oncology) or minimally invasive, image-guided surgery (interventional radiology).

X-rays are high-energy photons, which are created by an electric current within a cathode ray tube. The x-ray tube is aimed at a patient's body part of interest, with a film plate positioned behind the body part. Body parts that are dense, like bone, do not allow the photons to pass through. Less dense tissue – such as muscle, fat, and air – allows the x-rays to pass through and hit the photographic plate. The x-rays then produce a chemical reaction in the film, causing it to be exposed. When the film is developed, the exposed areas turn black (fat) and the non-exposed areas turn white (bone). The entire image then becomes a reflection of tissue density: High-density tissues are white, intermediate tissue densities are gray, and low-density tissues show up as black. Most x-rays today are digital and can be viewed on a computer. When a test is ordered by a physician, the radiologist will interpret the results and notify the ordering physician. However, many physicians also review the findings themselves to ensure a clinical correlation with the patient's physical findings. When viewing an x-ray, make sure you have the correct patient, date, type of x-ray and that the film is technically adequate – not under or over exposed and adequately shows the area of interest. There are many variations of x-ray tests that can be ordered. Some examples are upper GI tract (also called a barium swallow), lower GI tract (also called a barium enema, chest x-ray (CXR), abdominal x-ray (KUB – kidney, ureter and bladder), and any specific body part like fingers, wrists, knee or elbow.

Other radiology tests that are commonly done are:

- **Ultrasound** – This is used to see internal structures that are hollow or soft tissue organs like the liver, gall bladder, uterus, fetus or kidneys.
- **Nuclear Medicine tests** – These tests use a drug that is radioactively tagged which is metabolized by a specific organ enabling the detection of disease. For example, a bone scan detects osteoclast activity which can correlate with a bone infection or new bone formation suggesting a small fracture like a stress fracture.
- **Computer Tomography (CT Scan)** - This is when the patient is scanned in multiple angels forming a slice over a particular part of the body. A computer 2-D and 3-D image is generated. CT is very helpful in emergency situations as it is very fast and detects bone deformities very well.
- **Magnetic Resonance Image (MRI)** – This is when the patient is scanned with magnetic waves over a particular part of the body. Just like the CT, a 2-D and 3-D image is formed. MRI is very good for looking at soft tissue structures like the brain or ligaments in a joint. MRI has a higher resolution than CT scans. MRI is also a lot more expensive.

Your TA will use a PowerPoint presentation to present several interesting patient cases and the images used to help diagnose and treat these patients. Imagine you are a Radiologist.

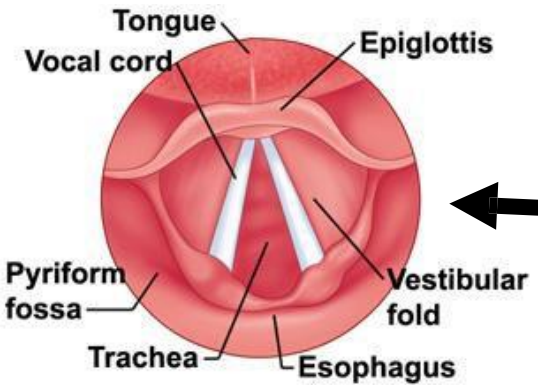
Dr. Rubin's Mini Medical School Experiences

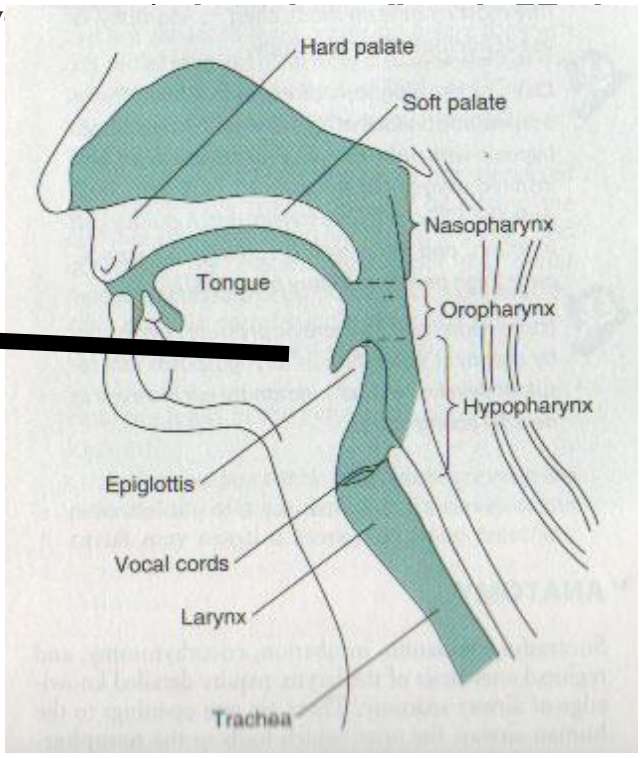
Experience 11: Emergency Medicine - Intubation

Patients are often in need of assisted breathing. This would occur when a patient has a cardiac arrest, during injury to the head or throat, or when general anesthesia is administered.

Intubation procedure:
1. Initially ventilate the patient with a face mask a few times to oxygenate the patient.
2. Open the laryngoscope to activate the light and hold it in your left hand.
3. Open patient's mouth with right hand.
4. Insert blade without touching patient's teeth - keep the blade on the right side of the mouth with the tongue pushed to the left.
5. Advance the blade to groove between base of tongue and epiglottis.
6. Lift scope up and forward. Do not use scope as a lever or press scope on teeth.
7. Visualize the vocal cords – see the diagram below.
8. Hold the ET tube in your right hand with bevel facing to the side and insert it between the vocal cords.
9. Remove the scope while stabilizing ET in position and remove the stylette.
10. Attach an Ambu bag to the ET tube and compress the bag. Observe for a symmetrical expansion of lungs. If air is moving only in the right lung - pull back ET tube about 1 cm and recheck Repeat moving ET back 1 cm until air is seen or heard in both lungs.

If you do not hear air in either lung y
and repeat the procedure. Your tube





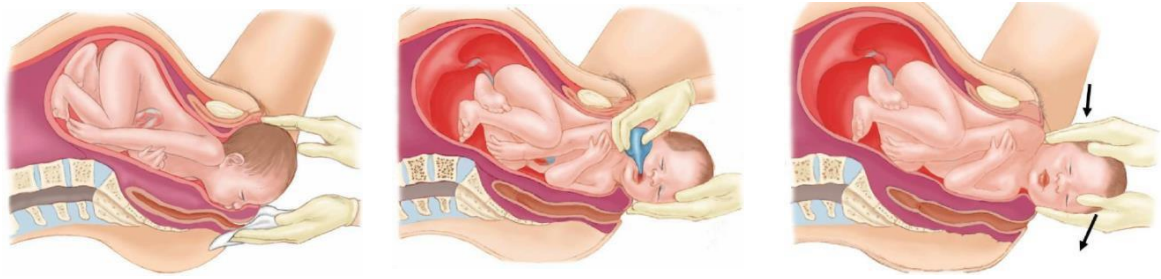
Dr. Rubin's Mini Medical School Experiences

Experience 12: OB/GYE - Deliver a baby

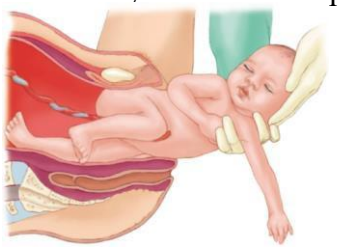
Although the birth of a baby is a normal healthy process, physicians deliver babies to ensure a healthy outcome for both mother and baby.

There are 3 stages of labor and delivery:
I. First Stage of Labor: From the onset of true contractions to full dilation and effacement of the cervix.
II. Second Stage of Labor or the fetal stage: This is the time from the full dilatation and effacement of the cervix to the time that the infant is delivered.
II. Third Stage of Labor or Placental stage: This is from the time fetus is born to the delivery of the placenta.

HOW TO DELIVER YOUR BABY



1. You are now in stage 2. The head has crowned. Be ready!
2. First grab the infant's head with both hands. Wait for a few more pushes. The head is now fully out.
3. Suction the nose for secretions.
4. Then check the neck in case the cord is wrapped around it. In that case, gently loosen the cord and unravel it. If that is not possible, the cord would be clamped and cut.
5. Now gently grab the head with both your hands and push down to free the infant's right shoulder.



6. Once the shoulder is out, gently pull upward and the baby will fall out. Be careful so that you don't drop the baby. Once the baby is out, you clamp the cord. In our case you will disconnect the baby's umbilical cord at the navel.
7. Now you enter stage 3 and deliver the placenta. In a real situation, the mother will give a few pushes and the placenta falls out. Make sure that the whole placenta is out! Why?
8. It is now time for a family picture.

Dr. Rubin's Mini Medical School Experiences

Experience 13: General Medicine - Injections and IV Cath insertion

Injections

There are many routes for injection: intramuscular (into the muscle), subcutaneous (into the skin), intravenous (into the vein), intraperitoneal (into the abdomen), intraosseous (into the bone), and even intrathecal (into the brain). Although most injections are administered by nurses or medical assistants, physicians must have a sound knowledge of the injection process to insure the safe and effective delivery every patient's medical needs. For our program we will limit our simulation to an intramuscular injection on foam objects.

Follow these steps to inject your ball.

1. Unwrap your syringe if not already done.
2. Uncap the water bottle if it was not already done.
3. Uncap the syringe and move the plunger to 0.5 cc.
4. Place the needle into the water bottle and inject the air.
5. Hold the bottle up toward the ceiling as illustrated, making sure that the needle tip is still immersed in water.
6. Pull back on the plunger to the 0.5 cc mark.
7. Place the bottle on the table and remove the needle.
8. Take your stress ball in your non-dominant hand and gently squeeze it so that the top bulges. This is how a subcutaneous injection is done. Don't squeeze if doing an intramuscular injection. Why?
9. Orient your needle with the bevel at 3 o'clock and insert it approximately ½ inch into the ball.
10. Slowly press the syringe to inject the water.
11. Wait about 10 seconds.
12. Now slowly remove your needle – since silicone does not absorb the water, you may see some leakage through the injection site.
13. It is now time to clean up. Do not recap your needle – place it in our sharps box.

The "IV" – Intravenous Line

Peripheral lines are used commonly and are placed by everyone on a health care team including nurses and physicians. Peripheral IV catheter is typically placed in most hospitalized patients as a means of administering medications urgently, and to ensure the fast action of the drug. There are a lot of other reasons for the placement of an IV line. Here are some of them:

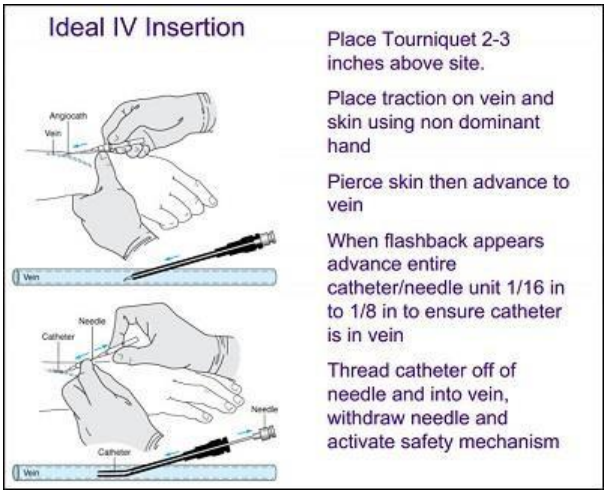
1. The patient cannot take a medicine by mouth
2. There is no other route is available for the drug needed
3. To restores & maintains fluid & electrolyte balances
4. To transfuse blood & blood products
5. To deliver nutrients & nutritional supplements

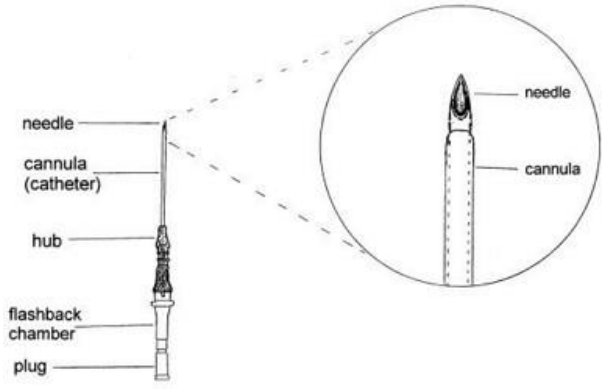
6. When the administration of continuous or intermittent medication is required
7. When administration of a bolus medication
8. When administration of anesthetics is required for the surgery
9. For the administration of diagnostic reagents: radiopaque dyes used for radiographic images
10. For monitoring & maintaining hemodynamic functions (homeostasis)

An IV line is typically placed in peripheral veins - usually the distal arms & hands but sometimes they are placed in the lower extremities. The device used to cannulate a vein is called a catheter. The size of a catheter is chosen depending on the size of the vein. The catheter is comprised of a needle covered by a plastic sheath which ends with a connector. Catheter sizes range from 18 gauge (large) to 24 gauge (small)-these numbers reflect the needle size- the lower the number the bigger the bore size.

Inserting your IV Cath and starting your I.V. requires the following steps:

1. Select the venipuncture site then apply an antiseptic in a circular motion 2-3 inch diameter, moving from the center towards the outside. Allow area to dry for 30 seconds then repeat with a povidone-iodine (betadine)swab.
2. Apply a tourniquet - do not tie a knot, the tourniquet must be easily removed.
3. Insert the appropriately sized catheter by first placing some tension over the selected vein with your non dominate hand, then placing the needle directly over vein with the bevel of the needle up. Enter at a 10–30-degree angle. You will Observer a "pop" and then flashback of blood. At this point advance the needle a little bit more and then separate the catheter from the needle. Carefully advance the Cath until it has about 1 cm exposed over the skin.
4. Release the tourniquet and apply pressure over the vein, above the venipuncture to prevent blood leaking before removing stylate. Remove the needle and attach the IV tubing.
5. Observes for swelling at I.V. site
6. Appropriately tape the Cath to the patient and label the site.





Dr. Rubin' s Mini Medical School Experiences

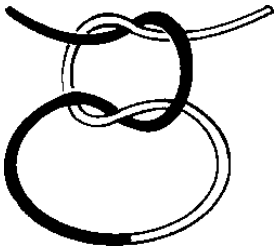
Experience 14: Surgery - Knots

There are 2 basic knots used for surgery: the square knot and the surgeon's knot. There are 2 basic ways to tie a knot: the free hand and the instrument tie.

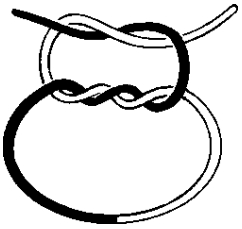
Try both methods using the knot tying board. It may seem simple but it actually is quite difficult. Practice makes it much easier. After mastering knot tying, you will be able to do experience 15 or suturing. Do not try suturing or laceration repair without mastering knot tying.

Your TA will provide you with a picture booklet to help you learn how to tie these knots. A video may also be available. You may wish to view this video on online prior to attending the program:

two handed square knot: https://youtu.be/o8OqxTGaS7o
instrument surgeon's knots: https://youtu.be/Av2gp-3mKwE

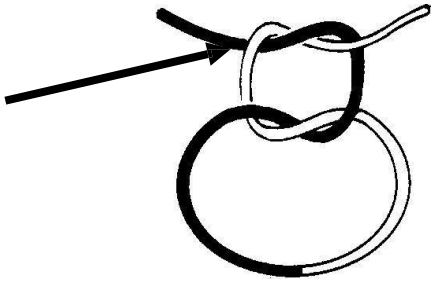


The Square Knot



The Surgeon's Knot

The suture is on top rather than under



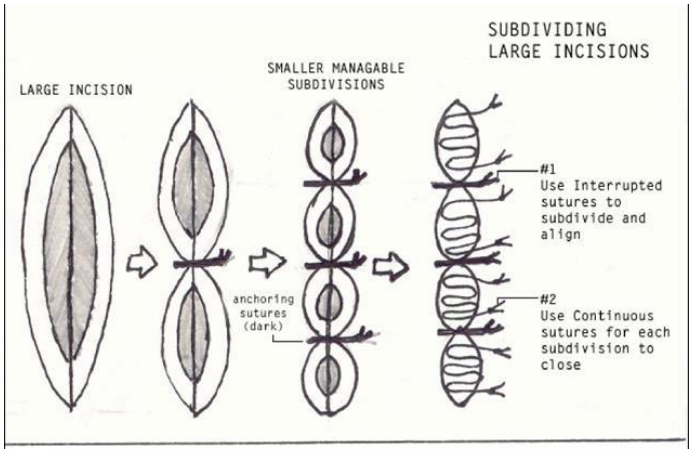
The Granny Knot (you do not want this knot)

Dr Rubin's Mini Medical School Experiences

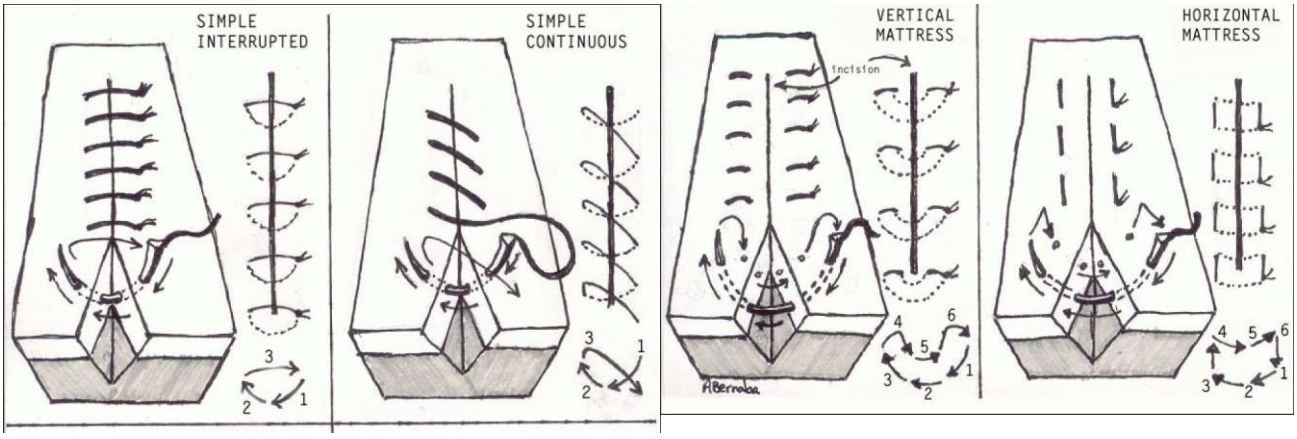
Experience 15: Laceration Repair

You have a suturing board, needle holder, forceps and suture. In the real world gloves are worn when you suture. Do you know why?

A laceration is repaired using the rule of halves; you tie a suture in the middle to reduce the opening in half and then again in half until the opening is closed as illustrated here.



There are many suturing methods. Try closing a laceration on the board using the simple interrupted method. If you do well, try a vertical or horizontal mattress. Refer to the following diagram. After you finish, remove your sutures. Your TA will show you how. To prep for the program you should watch this video: https://youtu.be/5Sfz8EmCpio



Dr Rubin's Mini Medical School Experiences

Experience 16: Laparoscopic Surgery Basics

What is laparoscopic surgery?
Laparoscopic surgery refers to a special technique by which surgery is performed through several small holes in the abdomen with the aid of a camera. It is also known as "minimally invasive surgery". These incisions are much smaller than would have been required using traditional surgical techniques. The performance of laparoscopic procedures requires good hand eye coordination, good depth perception and familiarity of the tools. In general, the operations are the same in principle as used in open surgery (longer incisions of the abdominal wall allowing direct visualization of abdominal contents).

What advantages does laparoscopic surgery have over conventional surgery?
Laparoscopic surgery usually results in reduced hospital stays, fewer wound infections, less pain, and a faster recovery time. From a surgeon's perspective, laparoscopic surgery may allow for easier dissection of scar tissue, less surgical trauma, and improved outcomes in certain groups like the elderly and extremely overweight individuals.

What are the indications for laparoscopic surgery?
Many surgeries that were once performed "open" can be performed laparoscopically. The laparoscopic surgeon can operate upon many organs, including but not limited to the colon, small intestine, stomach, gallbladder, liver, and pancreas. Any previous surgery can create scar tissue in the abdomen making a laparoscopic procedure more technically difficult. The surgeon would decide if a laparoscopic approach is the best choice for each patient.

*** The example of an appendectomy****

Dr Rubin showed a video on how a laparoscopic appendectomy is done.

During an open appendectomy, a surgeon makes one incision in the lower right side of the abdomen. Your appendix is removed and the wound is closed with stitches. This procedure allows the surgeon to clean the abdominal cavity if the appendix has burst. So the open appendectomy is preferred if he appendix has ruptured and the infection has spread to other organs. It's also the preferred option for people who have had abdominal surgery in the past who have significant scar tissue.

During a laparoscopic appendectomy, a surgeon accesses the appendix through a few small incisions in your abdomen. A small, narrow tube called a cannula will then be inserted. The cannula is used to inflate your abdomen with carbon dioxide gas. This gas allows the surgeon to see your appendix more clearly. Once the abdomen is inflated, an instrument called a laparoscope will be inserted through the incision. The laparoscope is a long, thin tube with a high-intensity light and a high-resolution camera at the front. The camera will display the images on a screen, allowing the surgeon to see inside your abdomen and guide the instruments. When the appendix is found, it will be tied off with

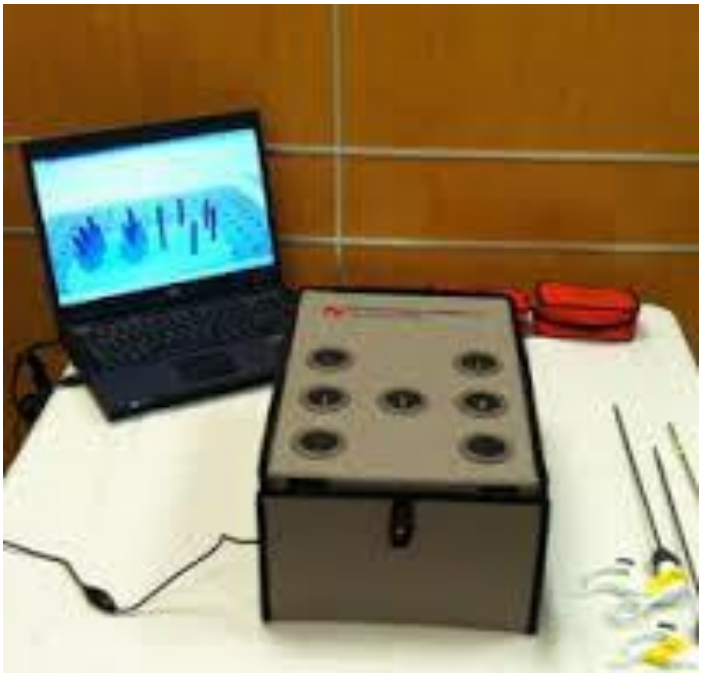
stiches and removed. The small incisions are then cleaned, closed, and dressed. Laparoscopic surgery is usually the best option for healthy adults and people who are overweight. It has fewer risks than an open appendectomy procedure, and generally has a shorter recovery time.

*** Laparoscopic Training ***

Surgical training is done during a physician's post graduate education as a resident or fellow. Before performing laparoscopy, training is done by simulation. We are using the Ethicon simulation portable training simulator designed for surgical residents. The box has multiple ports, a video camera connected to a computer and several laparoscopic tools – graspers, scissors and holders. The TA will explain each and demo the 3 procedures first, then you try.
We want you to perform 3 exercises.

1. Pick up a plastic bead with a grasper and place it in the container. Do this at least 3 tunes.
2. Pick up a plastic bead and put it on the small center pole. Repeat this twice so that you have 3 beads in a row.
3. Pick up a rubber band, stretch it and attach it to the two poles.

These are the first 3 training exercises of the Ethicon education training program in laparoscopy. If you did all three and have time left, the TA will give you a tootsie roll to unravel or a block of licorice to peel.



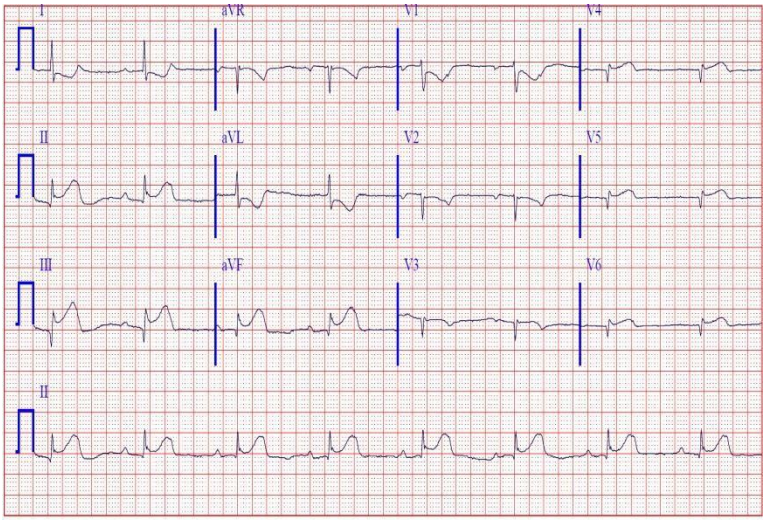
Dr. Rubin's Mini Medical School Experiences

Experience 17: Cardiology - The EKG

Your TA will give you a rapid review of EKG interpretation using a PowerPoint presentation including several EKG rhythm strips for you to interpret and time permitting, several cases for your review.

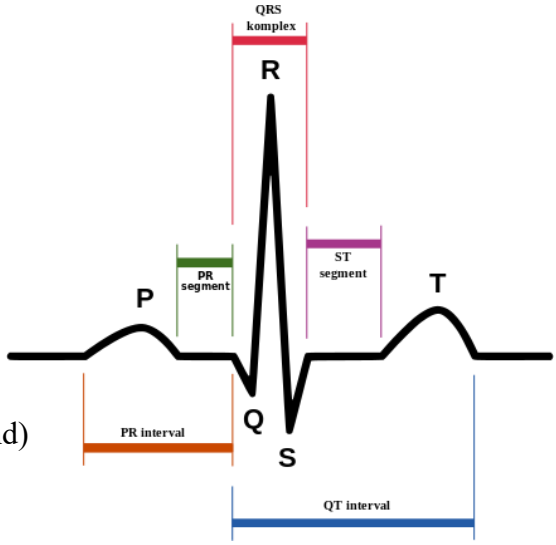
Currently, a lot of high schools are using EKGs to screen for heart disease. This is a complicated tool. In its simplest form, you can read 2 leads to check a heart, but the standard today is to use 9 leads to make 12 measurements. There is one lead for each arm (right arm and left arm) then one lead for the left foot. These 3 leads give you 6 measurements by combining 2 to augment a reading, so for example the right foot measured against the right and left arm gives the aVF (augmented voltage to the foot). In addition, 6 leads are placed on the chest called the precordial leads. These are used to assess the location of heart problems more clearly. There are several methods for reading an EKG. Here is one method that I feel you will understand. Consider there are 10 measurements you need to systematically use to evaluate an EKG:

1. Rhythm
2. Rate
3. P wave
4. P-R interval
5. QRS interval
6. QRS complex
7. ST segment
8. T wave
9. U wave
10. Q-T duration



Rhythm:
Is it regular or irregular? Then look for the P wave (*P Stands for Pulse, the first wave*)
If regular: is it sinus rhythm? A-V junctional or idioventricular?
If irregular: is there a pattern? Or is erratic as in atrial fibrillation.

Rate
The quickest method of estimating rate is counting the number of cardiac cycles in a six sec strip and multiplying by 10. The normal rate is 60-100. Below 60 is bradycardia. Above 100 is tachycardia.



P wave
Represents atrial depolarization.
Normally upright in leads I, II, V4-6 and aVF
Normally inverted in aVR
Variable in lead III, aVL and other chest leads

P-R interval
Measured from the *beginning* of the P wave to the *beginning* of QRS complex (normally 0.12 to 0.20 second)
It is prolonged in first degree A-V block which is due to coronary artery disease, or rheumatic heart disease
It is shortened in pre-excitation syndromes such as WPW syndrome, A-V junctional and low atrial rhythms

QRS complex
It represents spread of impulse through the ventricular muscle
If the first deflection is downward (negative) it is a **Q wave**
The first upright deflection is an **R wave**, whether or not it is preceded by a Q wave
A negative deflection following an R wave is an **S wave**
Subsequent excursions above the line are labeled successively as R', R'' etc and similarly later negative excursions are labeled S', S" and so on.
When the complex consists exclusively of a Q wave it is described as a QS complex.
The term 'QRS complex' may used as a sort of collective noun to describe the ventricular complex no matter what waves actually compose it.

In interpreting the QRS complexes at least *6 features* should be routinely inspected

a) Duration
b) Amplitude (or voltage)
c) Presence of Q waves
d) Electrical axis in the limb leads
e) The relative prominence of QRS complex in the precordial leads V 1 to V6 to note the transitional zone
f) The general configuration of the QRS complex, including the presence and location of any slurring or notching

ST segment
This is the segment that immediately follows the QRS complex and the point it 'takes off' from the QRS is called the J (junction) point.
Two features of ST segment should be observed:
a) its *level* relative to the baseline
b) its *shape*
Frank displacement of ST segment is the hallmark of myocardial ischemia or injury. ST depression in precordial leads is said to indicate subendocardial ischemia whereas ST levation is transmural or subepicardial injury.

T wave

T wave represents the recovery period of the ventricles or repolarization.

Three features should be observed: a) Direction b) Shape and c) Height

T wave is

a) Normally upright in leads I, II and V3 to V6
b) Normally inverted in aVR
c) Variable in lead III, aVF, aVL, V1 to V2

The *shape* of the T wave is normally slightly rounded. Sharply pointed symmetrical T waves (upright or inverted) is suspicious of myocardial infarction. The *height* of the T waves is normally not above 5 mm in any standard lead and not above 10 mm in any precordial lead. Unusually tall T waves suggests myocardial infarction or hyperkalemia.

Q-T duration

This is the interval from the *beginning* of the QRS to the *end* of the T wave and gives the total duration of systole. It varies with age, sex and its normal values is determined by standard tables. A rule of thumb is that QT interval should be less than half the preceding R-R interval at *normal sinus rates* (60-100 b.p.m). A prolonged QT indicates delayed repolarization of the ventricular myocardium and is associated with development of life-threatening arrhythmias.

U wave

It is the small low voltage wave sometimes seen following the T wave.
It is the same polarity as the T wave and is best discerned in lead V3
It is rendered more prominent in hypokalemia.

Suggested routine for reading EKGs

Rhythm_____ **Rate**_____

P-R Interval_____ **QRS interval**_____ **QT duration**_____

P wave: _____

QRS complex: _____**Axis**_____ **Q waves**_____

T waves: _____ **Axis** _____

U wave: _____

Impressions/ Comments

1)
2)
3)
4)

Dr. Rubin's Mini Medical School Experiences

Experience 18: Orthopedics -Casting

Introduction

Casting is a common procedure used in Orthopedics. Casting is used mainly to immobilize a part of the body: hand, wrist, elbow, knee, ankle or foot. There are several reasons to immobilize a body part. Bone fractures and tendon repairs are among the most common reasons. You can also immobilize a part of the body with a splint or tape. These methods are not reliable and can only be used in minor problems. A cast can be made of plaster or fiberglass. The advantage of fiberglass is that it is water resistant and light. However, plaster is much less expensive and much easier to work with. We will use plaster mainly because it takes more time to dry and thus is safer to work with. To demonstrate the process of casting, we will make the plaster cast of an ankle or wrist.

Procedure

First take a stocking net and cut it about 6 inches. In a real patient this will depend on the size of your patient. You would measure the needed socknet by running the stocking net about 3 inches above and below the center of the ankle. Then take cotton or cling gauze to insulate the joint. Start rolling the cotton roll at the base of the foot, approximately 1 inch from the toes around the foot twice and then run it up the ankle and lower leg to about 1 inch from the top of your stock net. The cotton roll should overlap around 50 percent. If any area is lacking cotton, you can always add additional cotton by simply tearing a piece and tacking it on. Now take a roll of gauze plaster, find the end of the roll and separate it from the rest. Dip the roll holding the leading edge into water in a pail of water and then ring out the excess water. Apply the plaster to the starting at the toes around the foot once and then work up the leg as you did with the cotton roll. Make sure you overlap the plaster by 50 percent. Usually, one roll is enough to cover the entire ankle. In a real patient, up to 3 layers would be applied to strengthen the cast. For our purpose we will only apply one layer. The cast will vary on how fast it hardens, the time to harden depends on the type of plaster used, fast setting takes 10-15 minutes, ultrafast takes 2 to 10 minutes. The plaster hardens based on a chemical reaction which generates heat to dry the plaster. During this time, your patient should keep still and in a neutral position.

Removing a cast:

There are several ways to remove a cast. Traditionally, physicians used a cast cutter which took too much time. Today most physicians use a cast saw to cut the cast and then split it open with a cast splitter. A bandage scissor is then used to cut open the stocking net and the cast is removed. If not properly done, the cast cutter can burn the patient or even lacerate the skin.

The same procedure is used for an arm or a leg. Your TA will choose which model you will cast.

Dr. Rubin's Mini Medical School Experience

Experience 19: Gastroenterology – Colonoscopy

The number one cause of death in the US is heart disease. The second most common cause of death is cancer. The most common cancer in women is breast cancer and in men the most common is prostate cancer. After these, the second most common cancer is colon cancer. The best way to deal with cancer is early detection and early treatment. For colon cancer the standard is to use the procedure call colonscopy to detect colon cancer in its early stages.

Colonoscopies are a key part of colorectal cancer screening, helping to detect polyps that can develop into cancer and removing them before they spread and cause trouble.

The procedure:

1. Bowel Preparation:
Before the colonoscopy, you'll need to follow specific bowel preparation instructions to clear the colon of stool, often involving a special diet and medication.

2. Sedation:
During the procedure, you'll typically receive sedation to help you relax and be comfortable.

3. Insertion of the Colonoscope:
The colonoscope is inserted through the rectum and gently advanced through the colon.

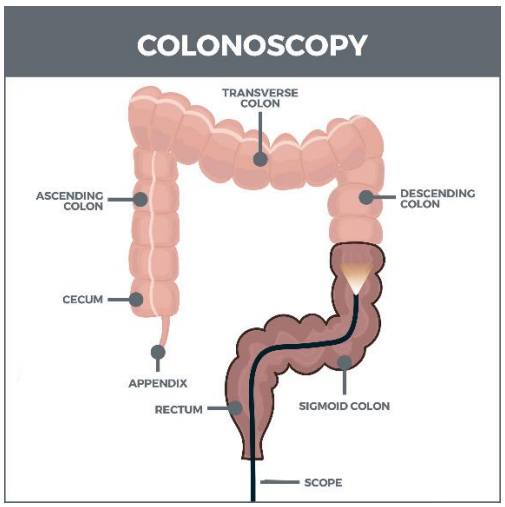
4. Examination:
The doctor uses the camera to visualize the lining of the colon and look for any abnormalities.

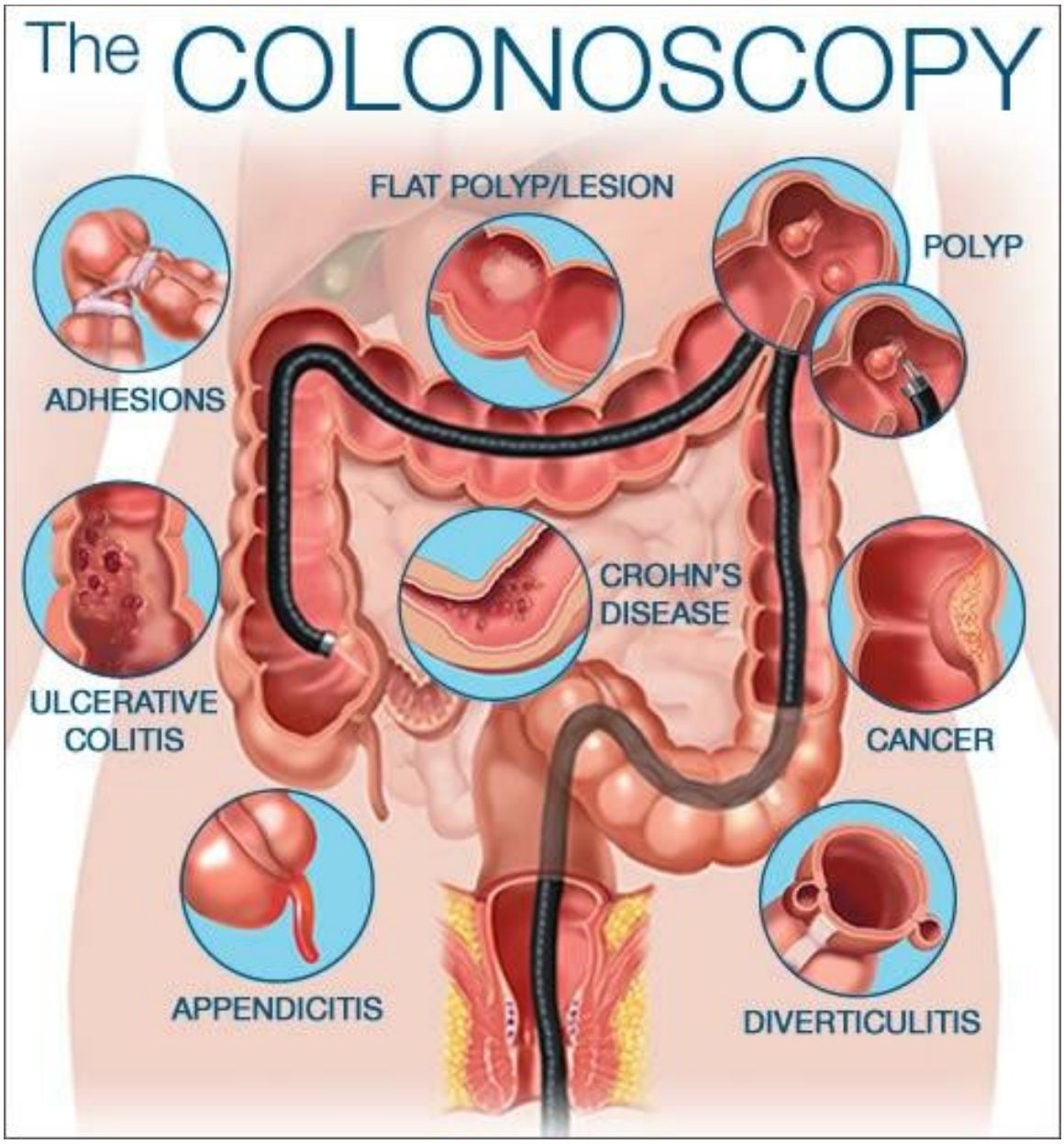
5. Follow-up:
After the procedure, you may be instructed to return for further examination or treatment.

A colonoscopy is typically recommended every 10 years starting at age 45.until age 75.

Your TAs will go over the anatomy of your large bowel with you and explain the procedure Then

using a silicone replica of a large bowel, you will explore the bowel looking for polyps, a cancer, etc.




The COLONOSCOPY
FLAT POLYP/LESION
POLYP
ADHESIONS
CROHN'S DISEASE
ULCERATIVE COLITIS
CANCER
APPENDICITIS
DIVERTICULITIS

Dr. Rubin's Mini Medical School Experience

Experience 20: Mini Dental School

There are over 200 distinct jobs in the healthcare industry. This program focuses on medical school, which leads to many occupations ranging from mental health professionals to pediatricians. To provide you an opportunity to experience another common profession, I have created a Mini Dental School Expereince; In this station, the TAs will explain how to examine the mouth using dental instruments : mirror, probe, explorer and forceps. Then how do you find a cavity. When you find the one in the manakin, they will explain how to use the dental drill and restore the tooth using composite.

I hope this experience opens your mind to the field of Dentistry. If it does, email Dr Rubin at

Dr Rubin@MiniMedicalScool.com

Time and budget permitting, we may be making alginate mouth molds with you as well.