Dr. Rubin's Mini Medical School for Middle School Students
Mini Medical Experiences

www.MiniMedicalSchool.com

Introduction

The mission of Dr. Rubin's Mini Medical School is to provide educational programs with hands-on experiences and counseling to students and parents about the fields 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. There are over 200 jobs in the healthcare industry, ranging from technical jobs that require a few months of training after graduating high school to medical doctors that require a minimal of 11 years. Dr. Rubin believes that everyone interested in healthcare can obtain a job in the field. It is a matter of how much time you want to spend on education and how much effort and expertise you have to offer.

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 13 experiences or stations you will have during the program. I have divided the experiences into 2 types. "Clinical Skills" which are taught in the first or second year of medical school, and "Procedure Skills" which are taught in the third or fourth year or even during residency. This handout provides you with basic background information and instructions to enable you to perform each skill. Read this handout before attending the program.

The medical profession is complicated and diverse. There are a lot of different opinions and many ways to accomplish the same things Many times more than one method is standard. The information and procedures provided are reflective of Dr. Rubin's preferred methods. The skills presented are used by healthcare providers every day. They were chosen by Dr. Rubin because he believes they are easier to perform, minimize patient discomfort, easier for you to learn and they are 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

an 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 Dr. Rubin's Mini Medical School in 2004. His first pilot program was run with students from Naperville Central High School. Over the years he has added programs for College Pre-Meds, Middle School Students and Elementary School students. He also created programs in Podiatry and Dentistry to support the diverse healthcare needs of our community.

For your future reference, I have created a list of combined programs for Medical, Osteopathic, Dental, Podiatry, Optometry, etc. for your reference. A list of programs for each field is posted on my website: www.minimedicalschool.com . Go to the bottom of my home page to find these lists.

It is my belief that nothing is impossible. If you put in the work, time and effort, you can accomplish anything. Thus, if you want work in healthcare, you can accomplish this goal. Consider that there are over two hundred jobs in the healthcare industry. Some require years of training, some only a few months. Consider how much time you are willing to commit, your academic ability and how much education you can afford. Then make a decision about what you want to do and go out and do it.

You have a future in the fields of Medicine provided you want it.

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

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. If using an ear scan, take your left hand and pull up the patient's ear to straighten the ear canal. Carefully insert the thermos scan tip into the ear canal. Press the button to take a temperature and wait until it beeps (about 3 seconds). Pull the scan out and read the display. When measuring the patient's skin, press the button to activate the thermometer, look at the display and if you see the hourglass, its 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 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.

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 chest rises for 15 seconds and multiply by 4, or for 30 seconds and multiply by 2. This tells you about 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 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 of 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).

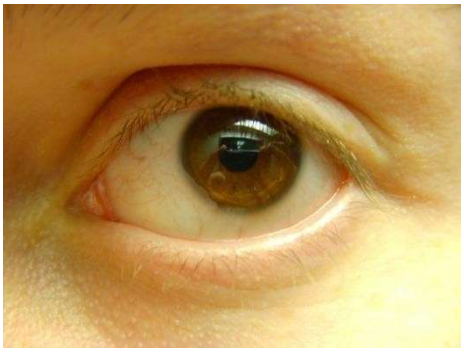
The eye exam is very hard and takes a lot of practice. Ideally the rooms should be dark.

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 halfway 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

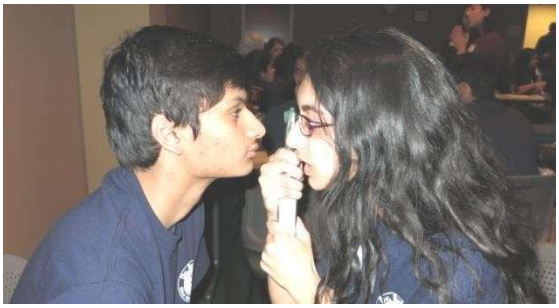
Corneal reflections are a simple way to see if the eyes are aligned. Stand about 3 feet directly in front of your patient and shine a light at your Patient's eye. The corneal reflections should be centered over the pupils. Asymmetry suggests extraocular muscle pathology. Extraocular movement is a simple 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

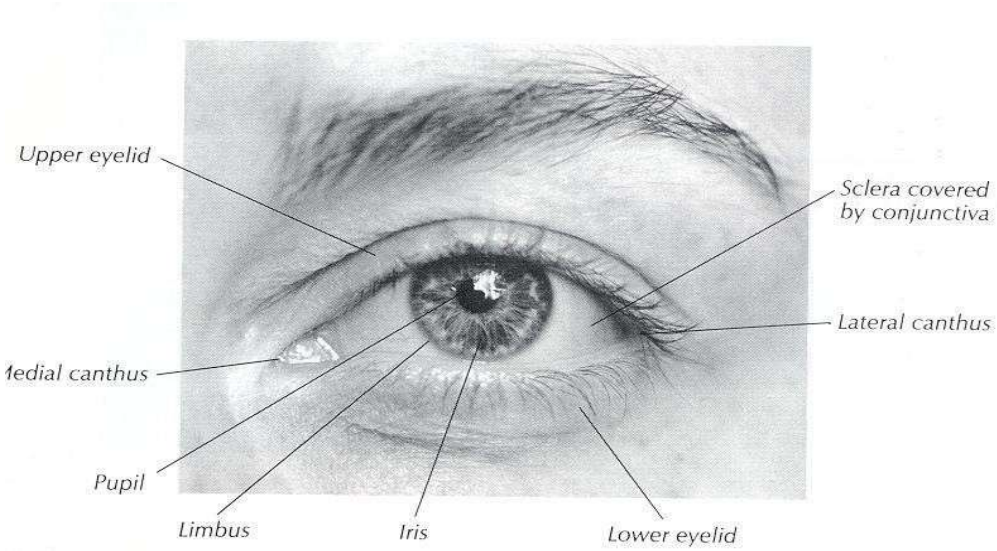
The ophthalmoscope used in our program varies with size and features. All have a dial for controlling brightness, an aperture setting for the size and type of beam and a dial for the lens strength measured in diopters (the number at the base of the scope head). If you wear glasses take them off, if you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

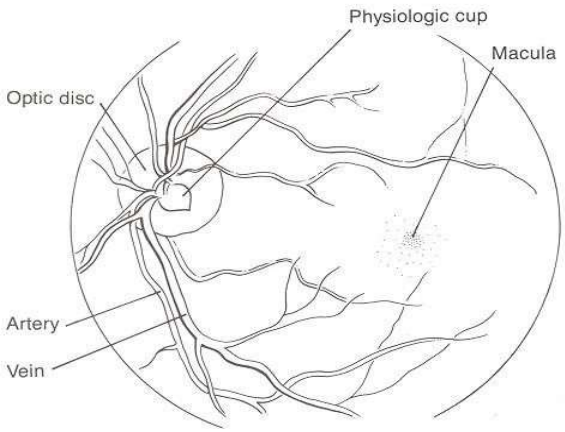


Darken the room as much as possible. Adjust the ophthalmoscope so that the light is no brighter than necessary. Adjust the aperture to a plain white circle. Set the diopter dial to zero s. Use your left hand and left eye to examine the patient's left eye. Use your right hand and right eye to examine 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?

Dr. Rubin's Mini Medical School Experiences

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

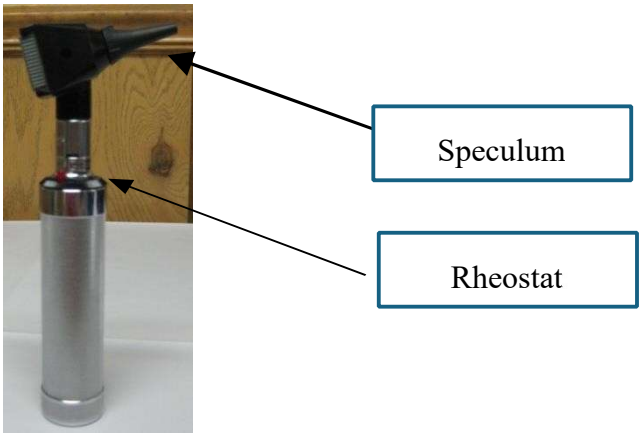
Examine the external ear and the area around it. Make a visual inspection of the ear and palpate any abnormality detected.

Any red or inflamed areas? Any blue or bruised area? 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 for 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.

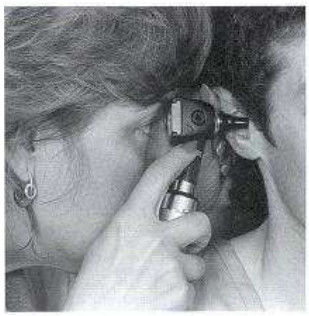
Red or Green switch used to turn on the light and control brightness _ press and slide.



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.

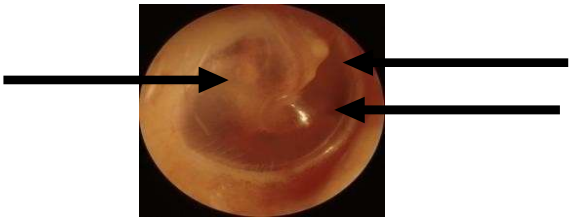




Step 3: With your other hand gently pull the external ear away from the head to straighten the ear canal: for adults pull it back and up, for children pull it back and down.

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?



This is a normal ear. 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 the parts of the ear drum? (The umbo, malleus, incus, pars tensa, pars flaccida?)
Is the ear drum normal? Red? Bulging?
Is there a hole in the ear drum? What does the hole mean?

Dr. Rubin's Mini Medical School Experiences

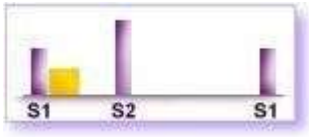
Experience 4: Heart and Lung Sounds

The complete examination of the heart and lungs is beyond our scope today. However, by hearing the normal and many abnormal sounds that are heard routinely, you will appreciate the complexity of his procedure. Your teaching assistant will show you how to use the stethoscope. The placement of the stethoscope on the patient makes a big difference in what you will hear. Today we will demonstrate on a model where to lay the scope but play a number of normal and abnormal heart and lung sounds on sound speakers thus making it easy for you to hear these sounds.

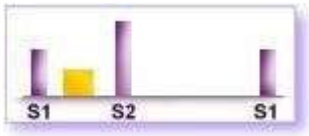
The Heart:

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.

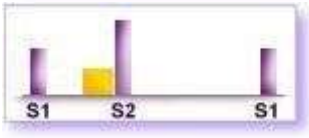
Heart Murmurs



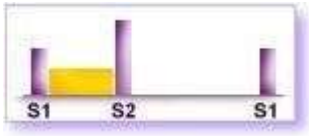
Early Systolic Murmur - begins with S1 and ends before or about the middle of systole.



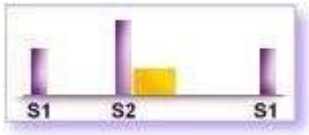
Mid Systolic Murmur - begins after S1 and ends before S2.



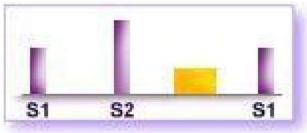
Late Systolic Murmur - begins at about the middle of systole and ends at the time of S2.



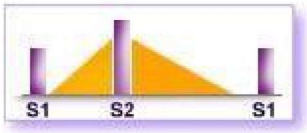
Holosystolic Murmur - begins with S1 and ends with, or continues somewhat beyond, S2.



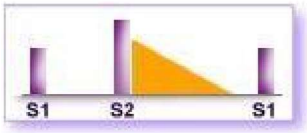
Early Diastolic Murmur - begins with S2.



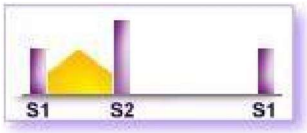
Mid Diastolic Murmur - begins after S2.



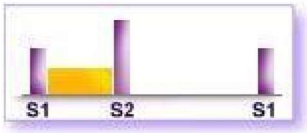
Continuous Murmur - has both systolic and diastolic components.



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

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.

When listening to the lungs you may hear diminished sounds or no sound reflecting a decrease in 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 **(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.

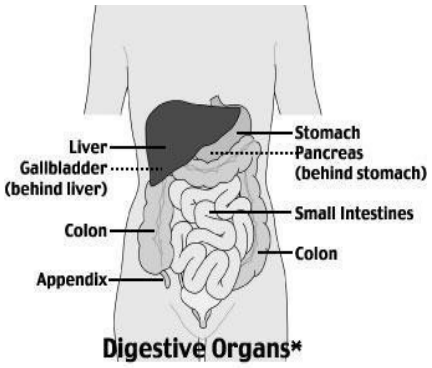
Rhonchi: These are louder and harsher than the fine crackles. They are associated with excessive secretion in the upper airways. They are heard in patients with bronchitis.

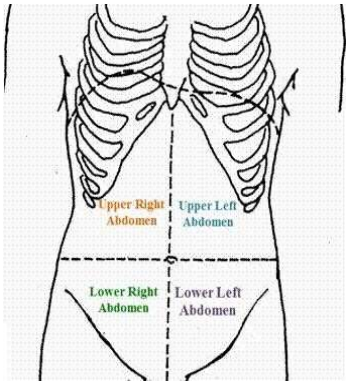
Strider: This is a harsh, high pitched inspiratory sound over the larynx. It can often be heard without the stethoscope and are caused by croup or epiglottitis.

Dr. Rubin's Mini Medical School Experiences

Experience 5: 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 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 6: Neurologic Exam

(Cranial Nerves/Peripheral Nerves/ Reflexes/ Hearing and Vibrations)

The nervous system is divided into two systems: Central consisting of 12 nerves and the peripheral consisting of 31 spinal nerves.

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 not blocked. Then either use a bar of soap or coffee grinds to test each nostril. I have provided coffee grinds for you to use today. Ask the patient to close his or her eyes and place bottle of coffee by the open nostril and ask the patient to smell the scent. 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 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 crisscross 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 easy sensation is vibration but you could also check pain and heat. Take the low frequency turning fork and place it on the hands and feet and ask if the patient feels the vibrations.

Dr. Rubin's Mini Medical School Experiences

Experience 7: Needles: Injections and IV Cath insertion

Injections

There are many routes for injections: 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 of every patient's medical needs. For our program we will limit our simulation to an intramuscular injection on foam objects.

Follow these steps:

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. Do not squeeze when performing 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 gently remove your needle – since the ball 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:

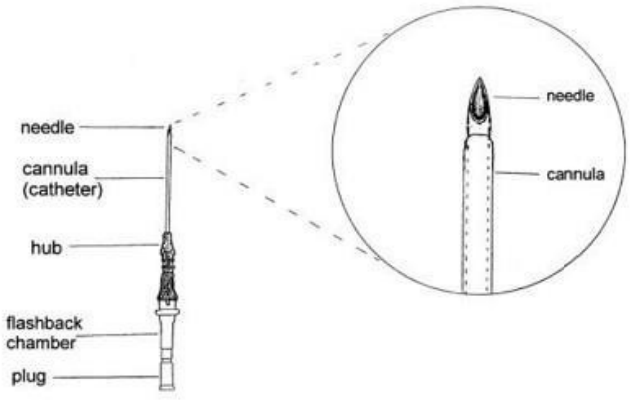
1. The patient cannot take a medicine by mouth
2. There is no other route is available for the drug needed
3. To restore & maintain fluid & electrolyte balances
4. To transfuse blood & blood products

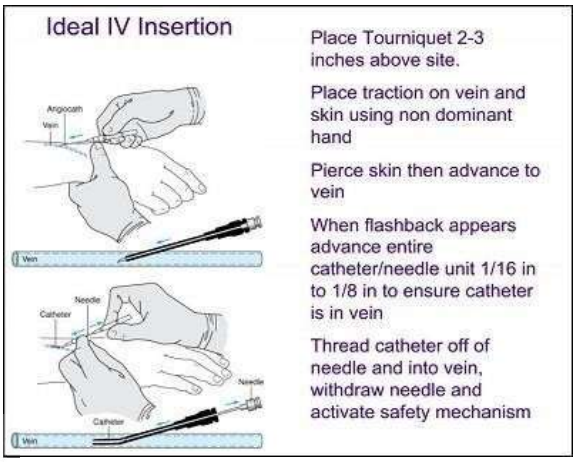
5. To deliver nutrients & nutritional supplements
6. When the administration of continuous or intermittent medication is required
7. When administration of a bolus medication
8. When administration of anesthetics is required for the surgery
9. For the administration of diagnostic reagents: radiopaque 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, 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 catheter 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 catheter to the patient and label the site.





Dr. Rubin's Mini Medical School Experiences

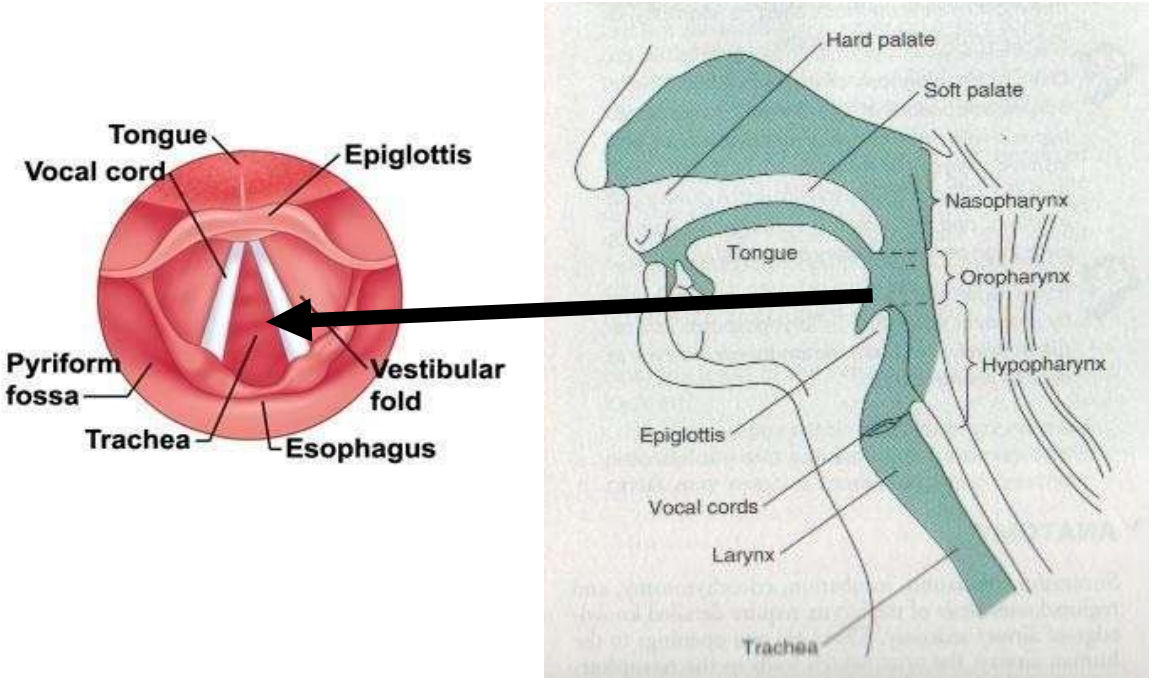
Experience 8: Intubation

Patients are often in need of assisted breathing. This occurs 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 stylet. 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 you are not in the trachea, pull out the ET tube and repeat the procedure. Your tube was in the esophagus and the patient died.



Dr. Rubin' s Mini Medical School Experiences

Experience 9: Knots

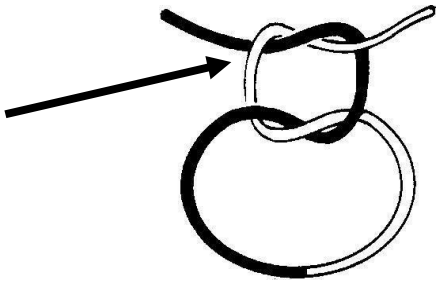
There are 2 basic knots used for surgery: the square knot and the surgeon's knot. There are 2 basic ways to tie a knot: the free hand and the instrument tie.

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 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. 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 and The Surgeon's Knot

The suture is on top rather than under



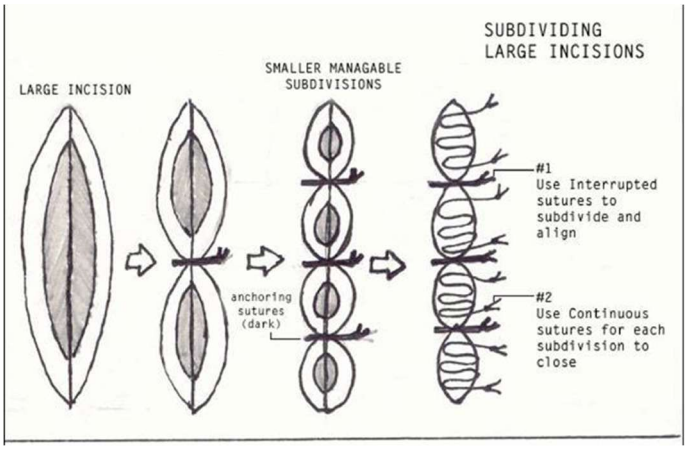
The Granny Knot is a slip knot **(you do not want this knot)**

Dr Rubin's Mini Medical School Experiences

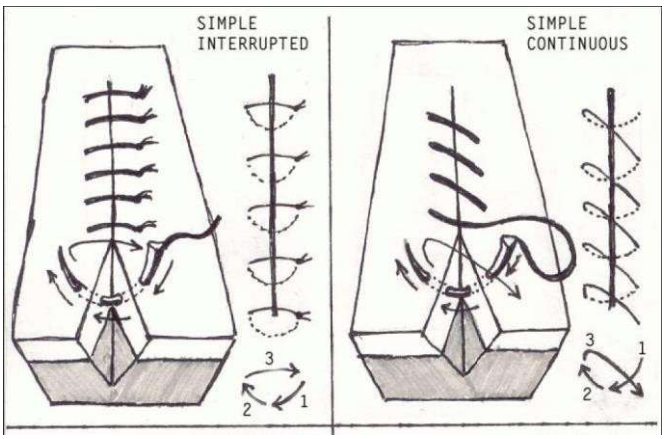
Experience 10: Laceration Repair

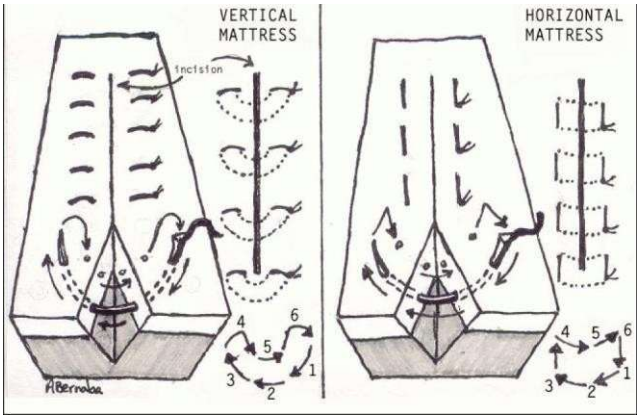
You have a suturing board, needle holder, forceps and suture. In the real world gloves are worn when you suture. Do you know why?

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 11: 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 after medical school as a resident or fellow. Before performing laparoscopy, training will is done by simulation. We are using the Ethicon simulation portable training simulator used by most 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.
2. Pick up a plastic bead and put it on a pole.
3. Pick up a rubber band and attach it to the two poles.
   If you can complete these tasks, then try to unravel a tootsie roll or peel an asparagus.

Dr. Rubin's Mini Medical School Experiences

Experience 12: X-Rays

1.2% of physicians specialize in radiology. Generally, radiologists are different from other physicians because they 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. Many x-ray test are today 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 Xray (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 angles forming a slice over a particular part of the body. A computer 2-D and 3D 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.

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

You are the physician. Which test would you order to evaluate the patient?

Dr. Rubin's Mini Medical School Experiences

Experience 13: Introduction to Dental Medicine and Surge

There are 2 medical degrees generally recognized in the US: the Medical Doctor (M.D.) and the Doctor of Osteopathic Medicine (D.O.). There are 3 specialty medical degrees offered: Doctor of Medical Dentistry (D.M. D.), the Doctor of Podiatric Medicine and Surgery (D.P.M.), and the Optometric Doctor (O.D.).

This experience provides a glimpse of the dental profession.

With the help of your TA, first examine the mouth of your manikin. You will have 4 tools: the mirror, the probe, the explorer and the scaler.

First look at the gums, tongue and teeth of your manikin. Use the mirror and explorer to probe the teeth looking for a cavity- that might be an obvious black dot or it might be found with the explorer becoming stuck in a small hole.

Teeth are prone to decay from bacteria in your mouth which thrive on sugar in your diet. Tooth decay will eventually erode your teeth and cause gum disease and tooth loss.

After examining the teeth, use the probe to check the gums.

Now that you found a cavity, the dentist would drill out the defect and fill in the space with a compound. Today the most common compound is a resin all composite.

For today's experience, I have 3 D printed a sample tooth for you to drill. We will use low power drills to drill out the cavity. Once done, the dentist would fill in the defect with composite. This chemical is only safe in a dental office with proper ventilation. So for today, will use a 3D pen to fill in the hole and use the dental drill to shave off the excess for proper fit. In a real patient, the dentist would use a paper to indicate where file down the repaired tooth.