General Physical Examination Techniques for the Rheumatology Clinic

This manual has been developed as an overview of the general examination of the rheumatology patient. Certain details have been specifically omitted because they have no relevance when examining a stable out patient in the rheumatology clinic.

Vital Signs

1. Heart rate
2. Blood pressure
3. Weight

1. Heart Rate
There are two things you want to document when assessing heart rate: The actual rate and the rhythm.

Rate: count pulse for at least 15 – 30 seconds (e.g., if you count the rate for 15 seconds, multiply this result by 4 to determine heart rate). The radial pulse is most commonly used to assess the heart rate. With the pads of your index and middle fingers, compress the radial artery until a pulsation is detected.

<table>
<thead>
<tr>
<th>Normal</th>
<th>60-100 bpm</th>
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</thead>
<tbody>
<tr>
<td>Bradycardia</td>
<td>&lt;60 bpm</td>
</tr>
<tr>
<td>Tachycardia</td>
<td>&gt;100 bpm</td>
</tr>
</tbody>
</table>

2. Heart Rhythm
The rhythm should be regular.
A regularly irregular rhythm is one where the pulse is irregular but there is a pattern to the irregularity. For example every third beat is dropped.
An irregularly irregular rhythm is one where the pulse is irregular and there is no pattern to the irregularity. The classic example of this is atrial fibrillation.

3. Blood Pressure
Blood pressure should be measured in both arms, and should include an assessment of orthostatic change

How to measure the Brachial Artery Blood Pressure:
- Patient should be relaxed, in a supine or sitting position, with the arms positioned correctly (at, not above, the level of the heart)
- Remember that measurements should be taken bilaterally
- Choice of appropriate cuff size for the patient is important to accuracy of measured blood pressure. Cuffs that are too short or too narrow may give falsely high readings. Similarly, using a regular-size cuff on an obese arm may also lead to incorrectly diagnosed hypertension.
- Palpate the brachial artery to confirm the presence of a viable pulse
• Position the inflatable bladder, centering the indicated line on the cuff over the brachial artery.
• Attach the cuff so that the lower border rests approximately 2.5 cm above the antecubital fossa
• Auscultation should be performed over the area of the brachial pulse, medial to the biceps tendon
• Before you proceed with measuring the blood pressure, estimate the systolic pressure initially by palpating the radial artery. To do this, localize the radial pulse, then rapidly inflate the cuff until you feel the radial pulse disappear. Add 30 mmHg to the pressure indicated on the manometer (the indicated pressure is an estimate of the systolic pressure). This sum should also be used as your target inflation pressure, in order to prevent patient discomfort from unnecessarily high cuff pressures. (This method also avoids the auscultatory gap, which may be present in patients with hypertension or aortic stenosis). 
• Now you are ready to measure blood pressure. Place the bell of the stethoscope lightly over the area of the brachial artery. (Note that because Korotkoff sounds are relatively low pitch, they are heard better with the bell instead of the diaphragm).
• Inflate the cuff rapidly to the target pressure previously determined, then slowly deflate the cuff at a rate of approximately 2-3 mmHg per second (i.e. not too fast, but not too slow, either!). Note the pressure at which you hear the first Korotkoff sounds - this is the systolic pressure.
• Continue deflating the cuff slowly until the pressure at which you no longer hear any sounds this is the diastolic pressure. Continue listening as you further deflate the cuff, to confirm that the sounds have indeed completely disappeared.
• Remember to deflate the cuff completely to zero pressure
• Report the systolic and diastolic pressures to the nearest 2 mmHg
• Blood pressure readings should be taken in both arms. Variability in pressure of 5 mmHg, up to 10 mmHg, may be normal.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Systolic Pressure (mmHg)</th>
<th>Diastolic Pressure (mmHg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt; 120</td>
<td>&lt; 80</td>
</tr>
<tr>
<td>Prehypertension</td>
<td>120 – 139</td>
<td>80 – 89</td>
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<tr>
<td>Hypertension – Stage I</td>
<td>140 – 159</td>
<td>90 – 99</td>
</tr>
<tr>
<td>Hypertension – Stage II</td>
<td>&gt;160</td>
<td>&gt;100</td>
</tr>
</tbody>
</table>

Blood pressure can vary with age, sex, diurnal rhythm, weight, exercise, stress, intake of various substances (e.g., smoking), and race, among many other variables.

**Weight**

It is important to weigh patients at each visit. As visits are often 3 to 6 months apart this will provide an accurate assessment of the patients weight trend. For example, it’s important to know how much weight a patient is gaining on prednisone or if they’re losing weight secondary to their disease.
The Head & Neck

1. Skin & Hair
Start with general inspection of the skin and hair noting any abnormalities.

- **Facial wrinkles:** A wrinkle, is a fold, ridge, or crease in the skin. Skin wrinkles typically appear as a result of aging processes, habitual sleeping positions, loss of body mass, or temporarily, as the result of prolonged immersion in water. Age wrinkling in the skin is promoted by habitual facial expressions, aging, sun damage, smoking, poor hydration, and other factors. Facial wrinkles may be lost in some rheumatic diseases such as systemic sclerosis.

- **Cushingoid Appearance (Moon Facies):** A rounded face with a double chin, prominent flushed cheeks, and fat deposits in the temporal fossa and cheeks, which is typical of higher dose prednisone use.

- **Actinic (solar) Keratoses:** Thick, scaly, or crusty patches of skin caused by sun damage. May progress to squamous cell cancer so important to look for.

- **Rosacea:** Rosacea typically begins as redness on the central face across the cheeks, nose, or forehead, but can also less commonly affect the neck, chest, ears, and scalp. In some cases, additional symptoms, such as semi-permanent redness, telangiectasia (dilation of superficial blood vessels on the face), red domed papules (small bumps) and pustules may develop. Can be triggered by sunlight or certain foods. Often find this gets confused with a malar rash of lupus.

- **Acne:** Acne can be another manifestation of prednisone use. It typically appears on the face, back, chest, shoulders, and neck. The commonest manifestation is a pustule characterized by an erythematous base with an overlying pocket of pus.

- **Malar rash:** The malar rash of lupus is red or purplish and mildly scaly. Characteristically, it has the shape of a butterfly and involves the bridge of the nose. Notably, the rash spares the nasolabial folds of the face, which contributes to its characteristic appearance. It is usually macular with sharp edges and not itchy. The rash can be transient and photosensitive. It may be progressive and involve other parts of the facial skin.

- **Discoid rash:** Discoid lupus erythematosus (DLE) is a chronic, scarring, atrophy producing, photosensitive dermatosis. DLE may occur in patients with systemic lupus erythematosus (SLE), and some patients (< 5%) with DLE progress to SLE. It is important to note that discoid lupus is usually not associated with SLE. This rash is photosensitive and if it appears on the scalp can result in scarring and permanent hair loss.

- **Heliotrope rash:** A violaceous eruption on the upper eyelids and in rare cases on the lower eyelids as well, often with itching and swelling. It is one of the most specific signs of dermatomyositis although it is uncommon.

2. Eyes
“The eyes look red” is a “catch-all” phrase used to describe ocular inflammation. Is there a pattern to the erythema that can help sort out if it is conjunctivitis, scleritis, episcleritis etc?

- **Conjunctivitis:** Inflammation of the conjunctiva, which is the outermost layer of the eye and extends to cover the inner surface of the eyelids. This is also called “pink
“eye” and is commonly caused by viral infections or allergic reactions. It can, more rarely, be caused by bacterial infections. When the eyelid is involved it is called blepharoconjunctivitis (blepharitis is inflammation of the eye lid). The eyes feel painful, itchy, and gritty and are accompanied by hyperemia of the conjunctiva (red) and watering of the eye. If there is purulent discharge then the likely etiology is bacterial.

- **Episcleritis:** Inflammation of the episclera. This is the layer between the conjunctiva and the sclera (white of the eye). Inflammation from episcleritis is often not painful but the erythema can be striking. It is typically a self-limited condition. It can be seen in patients with vasculitis, RA, and polychondritis. This is not usually a serious condition and can respond to simple NSAIDs.

- **Scleritis:** This is a much more serious condition than episcleritis and is actual inflammation of the “white of the eye” or sclera. It can be seen with vasculitis or rheumatoid arthritis. Redness of the sclera and conjunctiva, sometimes changing to a purple hue are typically noted. The condition can be painful with ocular pain that may radiate to the temple or jaw. The pain can be described as deep or boring. It is often accompanied by photophobia, tearing, and, at times, a reduction in visual acuity. Scleritis is a very serious condition and, if left untreated, can result in rupture of the globe. Treatment typically involves a combination of local and systemic immunosuppressives.

- **Keratoconjunctivitis Sicca:** Typical symptoms of keratoconjunctivitis sicca are dryness, burning, and a sandy-gritty eye irritation that gets worse as the day goes on. Symptoms may also be described as itchy, scratchy, stinging or tired yes. Other symptoms are pain, redness, a pulling sensation, and pressure behind the eye. There may be a feeling that something, such as a speck of dirt, is in the eye. The resultant damage to the eye surface increases discomfort and sensitivity to bright light. Both eyes usually are affected.

- **Anterior Uveitis:** Symptoms of anterior uveitis include significant ocular discomfort, photophobia or sensitivity to light, blurred vision, floaters, and headaches. Signs of anterior uveitis include dilated ciliary vessels called the “ciliary flush”.

### 3. Oral cavity

- **Angular Cheilitis:** Angular cheilitis or angular stomatitis is an inflammatory lesion at the labial commissure, or corner of the mouth, and often occurs bilaterally. The condition manifests as deep cracks or splits. In severe cases, the splits can bleed when the mouth is opened and shallow ulcers or a crust may form. Angular cheilitis is often a result of a fungal (candidal) infection.
• **Herpes Labialis:** Also known as a cold sore. Often begins as vesicles at the interface of the border of the skin and lip. The lesions often extends to involve both the mucosal surface of the lip and the skin. They can be painful and become larger ulcerative lesions.

• **Aphthous Stomatitis:** This condition is characterized by the repeated formation of ulcers on the mucous membrane of the oral cavity (the lining of the mouth. Symptoms range from a minor nuisance to interfering with eating and drinking. Recurrent ulceration is seen with rheumatic diseases such as systemic lupus erythematosus.

• **Xerostomia:** Xerostomia is the subjective feeling of dryness in the mouth which may be associated with a change in the composition of saliva, reduced salivary flow (hyposalivation), or have no identifiable cause. As it is a subjective feeling it is difficult to examine. Related issues with xerostomia include altered taste (dysgeusia), halitosis, and oral candidiasis. Patients may drink water frequently or complain of dysphagia especially with dry foods. Patients often come into the examination room with a bottle of water and this is the best sign of this condition.

4. **Lymph nodes**

There are eight groups of lymph nodes that should be examined in the head and neck. Lymphadenopathy can be seen with infectious, autoimmune, and malignant conditions. Common autoimmune conditions associated with lymphadenopathy include systemic lupus erythematosus and Sjogren’s syndrome. The lymph nodes of the head and neck are as follows:

• Submental – in the midline, just behind the tip of the mandible
• Submandibular – midway between the angle of the mandible and the tip of the mandible
• Preauricular – in front of the ears
• Posterior Auricular – behind the ears, superficial to the mastoid process
• Occipital – found posteriorly, at the base of the skull
• Anterior Cervical – superficial to and along the sternomastoid muscle
• Posterior Cervical – along the anterior ridge of the trapezius
• Supraclavicular – along the upper edge of the clavicle, deep in its formed angle

One area of confusion for lymph nodes comes from the submandibular salivary glands that are always present but often confused as enlarged lymph nodes by the layperson.
5. Thyroid Gland
The thyroid gland is found in the neck, below the thyroid cartilage (which forms the laryngeal prominence, or "Adam's apple"). The isthmus (the bridge between the two lobes of the thyroid) is located inferior to the cricoid cartilage.

- **Anterior Inspection:** The patient should be seated or standing in a comfortable position with the neck in a neutral or slightly extended position. Cross-lighting increases shadows, improving the detection of masses. To enhance visualization of the thyroid, you can: Extending the neck, which stretches overlying tissues. Have the patient swallow a sip of water, watching for the upward movement of the thyroid gland.

- **Posterior Palpation:** The patient is examined in the seated or standing position. Standing behind the patient, attempt to locate the thyroid isthmus by palpating between the cricoid cartilage and the suprasternal notch. Move your hands laterally to try to feel under the sternocleidomastoids for the fullness of the thyroid. Have the patient swallow a sip of water as you palpate, feeling for the upward movement of the thyroid gland.
**Respiratory Examination**

Clinically, the respiratory system is divided into the upper respiratory tract (URT, includes the nose and pharynx), and the lower respiratory tract (LRT, consisting of the larynx, trachea, bronchi, alveoli, etc.). The right lung has three lobes (upper, middle, lower), while the left lung is comprised of two lobes (upper, lower). The right middle lobe, which lies between the right 4th and 6th ribs, can only be assessed anteriorly. The diaphragm is the primary muscle of breathing. Contraction (and descent) of the diaphragm expands the thoracic cavity. Thoracic expansion results in a decrease in intrathoracic pressure, drawing air into the lungs. The expiratory phase is largely passive, and begins once inspiratory effort ceases, as recoil of the chest wall and lungs. Under conditions necessitating greater respiratory effort, accessory muscles can be recruited to assist.

1. **Inspection**

You should always first begin this examination by quickly assessing for any signs of respiratory distress. This is true even in the out-patient clinic. First clues are that the patient can’t catch their breath or they’re having trouble speaking in full sentences. It just isn’t normal. Listen for stridor, a high pitched sound from constriction of the upper airways, or wheezing from the lower airways. Look for any evidence of cyanosis such as blue lips or pale nail beds and look to see if the patient has come in with an oxygen tank (i.e. is the oxygen working?) Finally, look to see if the patient is recruiting any accessory muscles to help them breath such as the sternocleidomastoids or a retraction of the intercostal muscles.

Take a quick look at the skin overlying the anterior and posterior chest. The things to make note of include:
- Acne that may be due to steroids
- Scars from prior lung or heart surgery
- Other rashes

2. **Percussion**

Now you can proceed with percussion of all lung fields, including the apices. This is done over the posterior lung fields so you should be behind the patient. Ask them to cross their arms over the opposing shoulder (if they’re able to). Compare symmetric areas of the chest (i.e., percuss one side of the chest and then the other at each level). Percussion is an important technique that helps establish whether the underlying tissues are air-filled, fluid-filled, or solid. Recall that normal lungs produce a resonant percussion note.
Findings on Chest Percussion Examples of potential causes

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<table>
<thead>
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<tbody>
<tr>
<td><strong>Flatness</strong></td>
<td>Large pleural effusion</td>
</tr>
<tr>
<td><strong>Dullness</strong></td>
<td>Lobar pneumonia, pleural effusion, hemothorax, empyema, atelectasis, tumour</td>
</tr>
<tr>
<td><strong>Hyperresonance</strong></td>
<td>Emphysema, pneumothorax, asthma</td>
</tr>
<tr>
<td><strong>Tympany</strong></td>
<td>Large pneumothorax</td>
</tr>
</tbody>
</table>

3. Auscultation
As the final component of the posterior chest examination, auscultate the chest, listening for breath sounds and the presence of adventitious sounds, including crackles and wheezes. Ask the patient to breathe deeply through an open mouth (also remind them to indicate if they start to feel light-headed or faint). Using the diaphragm of the stethoscope, listen for the intensity and pitch of the breath sounds, along with the relative duration of inspiration and expiration. Use the same technique as for percussion, moving from one side to the other, comparing symmetrically. Normal breath sounds are described as vesicular, and are heard as rustling. Listen for any decreased breath sounds. Breath sounds over the trachea and bronchi (bronchial breath sounds) have a different quality than those heard over normal lung parenchyma. Bronchial breath sounds may also be heard over areas of consolidation or dense fibrosis.
Cardiovascular Examination

The left and right ventricles act as pumps, pushing blood into the systemic and pulmonary arterial systems, respectively. With each contraction, the left ventricle ejects a volume of blood into the aorta and on into the arterial tree. The resulting pressure wave is felt as the arterial pulse. The primary factors influencing arterial pressure include left ventricular stroke volume, cardiac contractility, compliance of the aorta and arterial system, peripheral vascular resistance, and volume of blood in the arterial tree. Blood pressure in the arterial system varies during the cardiac cycle, peaking in systole and falling in diastole. These changing pressure levels are measured with the blood pressure cuff. Blood pressure levels can vary considerably throughout a 24-hour period, and in response to various conditions (such as physical activity, emotional stress, tobacco, coffee, etc.).

The heart sounds result from vibrations and turbulent blood flow which accompanies the closing heart valves and flowing blood. Their timing relates to events within the cardiac cycle. At the onset of systole, contraction of the ventricles increases intraventricular pressure, which results in the closing of both the mitral and tricuspid valves (heard as the first heart sound, S1). Once the left ventricle ejects most of its blood volume into the aorta, the pressure begins to fall. When the pressure falls low enough, the aortic and pulmonary valves close, which is heard as the second heart sound (S2). Diastole is the period of ventricular relaxation.

Pressures on the right side of the heart are significantly lower than those in the left side of the heart. In addition, events on the right side of the heart occur in slight delay in comparison to those on the left. This delay may result in audible splitting of the second heart sound, the first emanating from left-sided aortic valve closure, and the second from closure of the pulmonary valve on the right side of the heart. Physiological splitting of S2 may be especially prominent on inspiration, as more blood is drawn into the chest and must be pumped through the right ventricle.

Heart murmurs arise due to turbulent blood flow, and may be either pathological or innocent. Murmurs result most commonly from stenotic or regurgitant (or insufficient) heart valves. Each distinct type of murmur has specific, often distinguishing, features, and may be heard best in certain areas of the chest. The locations on the chest wall where murmurs are heard help to identify the valve from which they originate. Sounds arising from the mitral valve are usually heard best at and around the cardiac apex. Those associated with the tricuspid valve are heard best at or near the lower left sternal border. Murmurs arising from the pulmonary valve are usually heard best in the 2nd and 3rd left interspaces close to the sternum. Aortic murmurs may be heard anywhere from the right 2nd interspace to the apex.

Venous pressure changes can be assessed by measuring the jugular venous pressure (JVP), which reflects right atrial pressure. The JVP is best measured from the internal jugular vein on the right side of the neck. The pulsations observed in the internal jugular veins are composed of two peaks and two troughs.
1. **General Inspection**
After taking the vital signs, it may be prudent to make a few objective observations of the patient:

- Does the patient look ill or well?
- Does the patient appear to be in any respiratory distress?
- Is there any central cyanosis?
- Note the general appearance of the patient, including their nutritional status

2. **Carotid Pulse**
The best place to locate the carotid artery is just lateral to the larynx, medial to the sternomastoid muscle. Auscultate bilaterally for the presence of carotid artery bruits. Ask the patient to hold their breath and listen for the presence of a bruit. Sometimes murmurs can radiate from the heart up into the carotids and be confused with bruits. Listening for carotid bruits is important in conditions like Takayasu arteritis or giant-cell arteritis.

3. **Jugular Venous Pressure (JVP)**
Sometimes in the out-patient clinic patients will present with shortness of breath, considerable peripheral swelling with the appearance of overt congestive heart failure. The jugular venous pressure provides an estimate of pressures in the right side of the heart and thus of volume overload. Most patients won’t come into the clinic like this, it is rare but does happen. This isn’t usually part of my routine examination except in patients where I’m concerned about heart failure or higher right sided pressures such as patients with pulmonary hypertension (Systemic sclerosis, SLE etc).

The jugular venous pressure is most often measured in the internal jugular vein. The usual starting point for assessing the JVP is to elevate the head of the bed to 30°. Ask the patient to turn their head slightly to the left (away from the side of the neck you are examining), ensuring that the neck muscles are relaxed. Try to identify the pulsations (usually found between the two heads of the sternomastoid muscle) of the internal jugular vein. Consider how varying the elevation of the head of the examining table may affect your assessment, namely the height of the observed pulsations on the neck. You may have to raise or lower the head of the bed until you can see the pulsation in the lower half of the neck.

In patients who are hypovolemic, the JVP may be low, which may require you to lower the head of the bed to see the point of oscillation best. By contrast, in volume-overloaded or hypervolemic (heart failure) patients, you may anticipate that the JVP will be high, requiring you to instead raise the head of the bed. Remember the features that distinguish jugular pulsations from those originating from the carotid artery (see table). Once you have identified the jugular venous pulsation, measure the vertical distance from the sternal angle to the upper border of the identified pulsation. Normal JVP is usually less than 4 cm above the sternal angle.
<table>
<thead>
<tr>
<th>Internal Jugular Vein</th>
<th>Carotid Artery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not palpable</td>
<td>Palpable</td>
</tr>
<tr>
<td>Biphasic waveform (2 peaks)</td>
<td>Single waveform (1 peak)</td>
</tr>
<tr>
<td>Pulse obliterated when pressure applied</td>
<td></td>
</tr>
<tr>
<td>Height drops on inspiration and also when patient’s head elevated</td>
<td>No effect</td>
</tr>
<tr>
<td>Height increases with hepatojugular reflex and also when elevation of patient’s head decreases</td>
<td></td>
</tr>
</tbody>
</table>

4. **Auscultation of the Precordium**
Auscultation of the precordium can be challenging. Can you hear the physiologic splitting of S2 or did you hear that S3 or S4? It can be overwhelming so we’ll keep it simple. Listen for S1 and S2 and note if there are any abnormalities with the rhythm. Then listen for murmurs. It won’t be the end of the world if you miss an S3 but if you miss an obvious murmur then that is a problem.

Listen to the heart in each of the four areas of the heart valves.
- The diaphragm is better for picking up the relatively high-pitched sounds of S1 and S2, the murmurs of aortic and mitral regurgitation, and pericardial friction rubs.
- The bell is more sensitive to the low-pitched sounds including the murmur of mitral stenosis.

Make note of the following:
- S1 and S2. If you cannot tell which is the 1st and 2nd heart sound, continue to auscultate while palpating the carotid pulse (S1 just slightly precedes the carotid pulsation). Also note the intensity, and any splitting of S2.
- Systolic and diastolic murmurs. Heart murmurs, once detected, should be described according to the following characteristics:
  - **Timing**: Is it a systolic or a diastolic murmur? Again, palpating the carotid pulse as you listen can help you with timing. Systolic murmurs are most commonly described as pansystolic, mid-systolic, or late systolic. Diastolic murmurs are usually early, or mid-diastolic. **Note that systolic murmurs are MUCH more common.**
  - **Shape**: Crescendo, decrescendo, crescendo-decrescendo, or plateau
  - **Location of Maximal Impulse**: This is determined by the site where the murmur originates. Find the location by exploring the area where you hear the murmur.
  - **Radiation**: Explore the area around a murmur and determine where else you hear it. Murmurs usually radiate to the carotids or axillae (i.e., in the direction of the blood flow that is causing the sound).
- **Intensity**: Murmurs can be graded on a scale from 1 to 6. Note that grades 4 to 6 require the added presence of a palpable thrill.
  - Grade 1 – Very faint, heard only after listener has ‘tuned in’
  - Grade 2 – Quiet, but heard immediately after placing the stethoscope on the chest
  - Grade 3 – Moderately loud
  - Grade 4 – Loud, with palpable thrill
  - Grade 5 – Very loud, with thrill. May be heard when the stethoscope is partly off the chest.
  - Grade 6 – Very loud, with thrill. May be heard with stethoscope entirely off the chest.
- **Pitch**: Categorized as high, medium, or low.
- **Quality**: Described as blowing, harsh, rumbling, and musical.

5. **Peripheral Pulses**
In rheumatology the examination of the peripheral pulses can be useful in the determination of vascular disease such as atherosclerosis or vasculitis. In this sense we would be looking for a loss of the peripheral pulse of difficulty detecting it. We could also listen for a bruit over the pulse.
- **Dorsalis Pedis**: Located between the bases of the 1st and 2nd metatarsals, on the superior surface of the foot.
- **Posterior tibial**: Posterior to the medial malleolus
- **Popliteal**: Deep within the popliteal fossa
- **Femoral**: Inferior to inguinal ligament, at midpoint between ASIS and pubic symphysis
- **Radial**: Anterolateral aspect of wrist; medial to radial styloid process
- **Brachial**: Medial to biceps tendon in the antecubital fossa
- **Carotid**: (described above)

6. **Peripheral Edema**
Also assess the patient for any peripheral edema. Make a note of any swelling at the ankles (and the sacrum, if the patient has been bedridden), and how high it extends. Assess for pitting edema, which is best tested over the anterior surface of the tibia.
Abdominal Examination

The abdomen can be descriptively divided into quadrants, with imaginary lines crossing at the umbilicus: right upper (RUQ), left upper (LUQ), right lower (RLQ), and left lower (LLQ).

The digestive organs, including the esophagus, stomach, small intestine, colon, and associated organs (liver, gall bladder, spleen, and pancreas), all lie within the abdominal cavity. The kidneys, ureters, and bladder are also found in the abdomen. The internal surface of the abdomen is lined by parietal peritoneum, while the abdominal organs are covered by visceral peritoneum. Retroperitoneal organs include the ascending and descending colon, kidneys, and a part of the duodenum.

To perform the abdominal exam properly, the patient must be relaxed, and the abdomen fully exposed to the symphysis pubis. The patient should be lying flat, with arms relaxed at his/her sides. If the patient raises or stretches their arms, this will contract the abdominal wall muscles making palpation challenging. Before you proceed with palpation, ask the patient whether they are experiencing any pain, and, if so, to point to the area. The area indicated by the patient should be palpated last. Try to warm your hands before touching the patient’s abdomen. During the abdominal exam, it is important to remember to watch the patient’s face for any signs of discomfort or pain.

1. **Auscultation**

Auscultation of the abdomen is primarily performed to assess bowel sounds. It can also be used to assess for bruits primarily from the aorta. In a regular clinic visit I usually don’t do this unless there is a specific reason. In patients with connective tissue disorders and gastrointestinal involvement (systemic sclerosis) this should be done. In patients with large-vessel vasculitis aortic bruits can rarely be heard.

Place the diaphragm of your stethoscope gently on the abdomen. Listen for bowel sounds (low-pitched, intermittent gurgling sounds) in all four quadrants of the abdomen, noting their frequency and character. You should also listen with the diaphragm in the area of the abdominal aorta (just above and slightly lateral to the umbilicus), along with the common iliac and renal arteries, for vascular bruits.

2. **Percussion**

Percussion of the abdomen aids in the assessment of enlarged abdominal organs or masses. Always remember to first ask about any areas of pain and/or tenderness, and to assess these areas last. Percuss all four quadrants of the abdomen to assess the distribution of tympany and possibly scattered areas of dullness.
It is important to perform percussion carefully, and note any large areas of dullness which may be indicative of an underlying mass or enlarged organ.

3. Palpation
Palpation of the abdomen should include two components: light and deep palpation. Gentle palpation is helpful in identifying tenderness, muscular rigidity/guarding, and some superficial organs and masses.

Your hand should be kept relatively flat, fingers joined together, and parallel to the abdomen. Palpate the abdomen with a light, gentle, dipping motion, covering all quadrants. If you notice any guarding, attempt to distinguish voluntary guarding from involuntary muscle spasm. Deep palpation is usually necessary to delineate abdominal masses.

You may find it helpful to use your other hand to assist in providing additional pressure during palpation. Ask the patient to breathe through the mouth. Identify any masses and note their location, size, shape, consistency, tenderness, and pulsations.

4. The Liver
The size and shape of the liver can be estimated by percussion and also, to a certain extent, by palpation.

The vertical liver span should be mapped out via percussion in the right midclavicular line:

- Start at a level below the umbilicus, and lightly percuss upwards, noting the level at which the percussion note changes from tympanic to dull. This level should demarcate the lower border of the liver.
- Now identify the upper border of the liver by lightly percussing from lung resonance down towards liver dullness.
- The distance between the upper and lower margins represents the liver span. Normal liver span is 6-12 cm in the right midclavicular line.

Proceed with palpation of the liver:

- Begin palpating from the lower right quadrant (right iliac fossa) up towards the costal margin, just lateral to the rectus muscles.
- Using your right hand, palpate gently inwards and upwards (towards the patient’s head) during inspiration. Your hand should be moving slowly superiorly (forward/upward) during expiration.
5. The Spleen
Percussion and palpation of the spleen should also be attempted. The spleen is normally hidden behind the ribcage and therefore inaccessible to palpation. In splenomegaly, however, the spleen drops downward and diagonally into the left upper quadrant, thereby replacing the tympanic abdomen with the dullness of a solid organ.

In normal patients, the lowest interspace in the left anterior axillary line is usually tympanic on percussion. Confirm this by percussing the 10th intercostal space in the left anterior axillary line. Ask the patient to take a deep breath, and percuss this space again. A change in percussion note from tympany to dullness on inspiration suggests splenic enlargement (Castell’s Sign).

An enlarged spleen is also palpable below the costal margin. To position yourself for palpation of the spleen, reach with your left hand around the patient to press up the left lower rib cage. With your right hand, palpate diagonally towards the left costal margin, pressing in toward the spleen. Begin palpation low enough (i.e. start in the RLQ, near area of appendix) so that you are below a potentially enlarged spleen (i.e. do not begin too close to the costal margin). Be sure to ask the patient to take deep breaths to try and feel the edge of the spleen as it drops down to meet your fingertips. Note any tenderness, and assess the contour of the spleen. Alternatively, you may also have the patient lie on the right side so that gravity may bring the spleen forward and into a palpable location.

6. The Aorta
You can attempt to elucidate the span of the abdominal aorta, an especially important assessment in patients over 50 years of age. Press firmly deep in the upper abdomen, slightly to the left of midline, trying to assess the width of the aorta with one hand on each side. A normal aorta is not more than 3.0 cm wide.

7. Examining for Ascites
When examining the abdomen, it is important to assess for the presence of ascites. On inspection, a protuberant abdomen with bulging flanks suggests the possibility of ascitic
fluid. Percussion of an abdomen filled with fluid gives a dull note. Percussion should be used to map the border between tympany and dullness.

There are several additional maneuvers that can help to confirm the presence of ascites. One such technique is called shifting dullness. After determining the borders of dullness on the abdomen, ask the patient to turn onto one side (decubitus position). Wait for any potential fluid to settle in the abdomen, then percuss to mark out the margins of tympany and dullness once again. In a person with ascites, the border between dull and tympanic will shift more than 5 cm. Another procedure that can be done is testing for a fluid wave. You will require the assistance of the patient for this procedure. Ask the patient to press the ulnar edge of their hand firmly down the midline of the abdomen, which will prevent the transmission of a wave through the abdominal fat. While you tap sharply with your fingertips on the lateral side of the abdomen, feel on the opposite side for an impulse transmitted through the fluid.

8. **Examining for Lymphadenopathy**
Palpate the inguinal region for enlarged lymph nodes. The patient should be lying down with their knees slightly flexed. Use the pads of your fingers to gently roll over the skin both above and below the inguinal ligament. Note that some enlargement of nodes in this area is normally found.