Vital Signs Lecture Notes

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The Classic 4

‣ The classic 4 vital __signs__ are:

‣ Temperature: effective infection assessment
‣ Pulse: effective cardiovascular assessment
‣ Respiration: effective respiratory system and metabolism assessment
‣ Blood Pressure: effective cardiovascular assessment

‣ Vital __statistics__: height and weight

Body Temperature

‣ Expected: 97.2⁰ to 99.9º F (36.2⁰ to 37.7º C) with an average of 98.6º F (37º C)
‣ Temperature will vary throughout the day, usually being lowest in the early morning and rising as much as 1°F (0.6°C) in the early evening
‣ Temperature may rise by 1°F (0.6°C) or more with exercise, particularly on a hot day.
‣ Temperature typically varies by 1º F (0.6º C) or more throughout menses, peaking at ovulation
‣ An oral temperature above 100.4 °F (38°C) or a rectal or ear (aural) temperature above 101 °F (38.3°C) is considered a fever

http://www.webmd.com/first-aid/body-temperature

‣ **Abstract**
‣ **CONTEXT:**
‣ Oral temperature might not be a valid method to assess core body temperature. However, many clinicians, including athletic trainers, use it rather than criterion standard methods, such as rectal thermometry.
‣ **OBJECTIVE:**
‣ To critically evaluate original research addressing the validity of using oral temperature as a measurement of core body temperature during periods of rest and changing core temperature.
‣ **DATA SOURCES:**
‣ In July 2010, we searched the electronic databases PubMed, Scopus, Cumulative Index to Nursing and Allied Health Literature (CINAHL), SPORTDiscus, Academic Search Premier, and the Cochrane Library for the following concepts: core body temperature, oral, and thermometers. Controlled vocabulary was used, when available, as well as key words and variations of those key words. The search was limited to articles focusing on temperature readings and studies involving human participants.
‣ **DATA SYNTHESIS:**
‣ Original research was reviewed using the Physiotherapy Evidence Database (PEDro). Sixteen studies met the inclusion criteria and subsequently were evaluated by 2 independent reviewers. All 16 were included in the review because they met the minimal PEDro score of 4 points (of 10 possible points), with all but 2 scoring 5 points. A critical review of these studies indicated a disparity between oral and criterion standard temperature methods (eg, rectal and esophageal) specifically as the temperature increased. The difference was −0.50°C ± 0.31°C at rest and −0.58°C ± 0.75°C during a nonsteady state.
‣ **CONCLUSIONS:**
‣ Evidence suggests that, regardless of whether the assessment is recorded at rest or during periods of changing core temperature, oral temperature is an unsuitable diagnostic tool for determining body temperature because many measures demonstrated differences greater than the predetermined validity threshold of 0.27°C (0.5°F). In addition, the differences were greatest at the highest body temperatures. Oral temperature cannot accurately reflect core body temperature, probably because it is influenced by factors such as ambient air temperature, probe placement, and ingestion of fluids. Any reliance on oral temperature in an emergency, such as exertional heat stroke, might grossly underestimate temperature and delay proper diagnosis and treatment.
‣ PMID: 22488144 [PubMed – indexed for MEDLINE] PMCID: PMC3418963

‣ **Abstract**
‣ **INTRODUCTION:**
‣ Identifying fever can influence management of the emergency department (ED) patient, including diagnostic testing, treatment, and disposition. We set out to determine how well oral and tympanic membrane (TM) temperatures compared with rectal measurements.
‣ **METHODS:**
‣ A convenience sample of consecutively adult ED patients had oral, TM, and rectal temperatures performed within several minutes of each other. Descriptive statistics, Bland–Altman agreement matrices with 95% confidence interval (CI), and measures of test performance, including sensitivity, specificity, predictive values, and interval likelihood ratios were performed.
‣ **RESULTS:**
‣ A total of 457 patients were enrolled with an average age of 64 years (standard deviation: 19 years). Mean temperatures were: oral (98.3°F), TM (99.6°F), and rectal (99.4°F). The mean difference in rectal and oral temperatures was 1.1°F, although there was considerable lack of agreement between oral and rectal temperatures, with the oral temperature as much as 2.91°F lower or 0.74°F higher than the rectal measurement (95% CI). Although the difference in mean temperature between right TM and rectal temperature was only 0.22°F, the right TM was lower than rectal by up to 1.61°F or greater by up to 2.05°F (95% CI). Test performance varied as the positive predictive value of the oral temperature was 97% and for tympanic temperature was 55% (relative to a rectal temperature of 100.4°F or higher). Comparative findings differed even at temperatures considered in the normal range; among patients with an oral temperature of 98.0 to 98.9, 38% (25/65) were found to have a rectal temperature of 100.4 or higher, while among patients with a TM of 98.0 to 98.9, only 7% (10/134) were found to have a rectal temperature of 100.4 or higher.
‣ **CONCLUSION:**
‣ The oral and tympanic temperature readings are not equivalent to rectal thermometry readings. Oral thermometry frequently underestimates the temperature relative to rectal readings, and TM values can either under- or overestimate the rectal temperature. The clinician needs to be aware of the varying relationship between oral, TM, and rectal temperatures when interpreting readings.
‣ PMID: 22224147 [PubMed] PMCID: PMC3236177

‣ **Abstract**
‣ **BACKGROUND:**
‣ This study assessed the agreement between infrared tympanic membrane (TM), axillary, corrected axillary (+0.5 degrees C), oral, and corrected oral (+0.3 degrees C) to rectal thermometry as reference standard in neutropenic adults. The sensitivity and specificity of the mentioned thermometers in detecting rectal fever (> or =38 degrees C) were also analysed.
‣ **METHOD:**
‣ This is a comparative diagnostic test study. A total of 400 sets of blinded simultaneous temperature readings were measured from 21 haemato-oncology in-patients with neutropenia following chemotherapy. Three-hundred sets were then randomly sampled. Agreements were analysed using random two-way intraclass correlation (ICC). Sensitivity and specificity were analysed using contingency 2x2 table.
‣ **FINDINGS:**
‣ Both right and left TM thermometry have good correlation with rectal thermometry; 0.810 (95% CI, 0.748–0.855) and 0.770 (95% CI, 0.713–0.815) respectively. Axilla thermometry has weak agreement (ICC 0.486 (95% CI, 0.118–0.689)) with rectal thermometry. The sensitivity (sn) and specificity (sp) in detecting rectal fever (> or =38 degrees C) were: right TM (sn) 0.712 (95% CI, 0.586–0.814), (sp) 0.957 (95% CI, 0.920–0.978); oral (sn) 0.561 (95% CI, 0.433–0.681), (sp) 0.983 (95% CI, 0.954–0.995); and axilla (sn) 0.348 (95% CI, 0.238–0.477), (sp) 0.996 (95% CI, 0.973–0.999).
‣ **INTERPRETATION:**
‣ Single tympanic membrane thermometry is in good agreement with rectal thermometry. It is more sensitive than oral or axillary thermometry in detecting rectal fever.

Differences in noninvasive thermometer measurements in the adult emergency department.

Bodkin RP1, Acquisto NM2, Zwart JM1, Toussaint SP3.

Abstract

PURPOSE:

Detection of accurate temperature in the emergency department (ED) is integral for assessment, treatment, and disposition. The primary objective was to compare temperature measurements from noninvasive temperature devices in the adult ED. The secondary objective was to evaluate the discrepancy between febrile and afebrile patients.

METHODS:

This was a prospective observational study of adult patients presenting to the ED. Patients who required a temperature measurement based on standard of care were included. Data collection included oral and temporal artery (TA) temperature measurement taken consecutively. Data were evaluated using the paired Student's t test.

RESULTS:

A total of 100 patients were identified. Mean oral temperature was 37.51°C (SD ±1.25), and mean TA temperature was 37.03°C (SD ±0.94). The mean difference was 0.48°C (SD ±0.8), P < .0001. Overall, 49% of patients had a difference in temperature measurements greater than or equal to 0.5°C. There were 47 febrile patients, determined by a measurement greater than 38°C on oral or TA thermometer. The mean temperature difference in these patients was 0.87°C (SD ±0.85) compared with a mean temperature difference of 0.12°C (SD ±0.55) in the afebrile patients, P < .0001. A total of 57% of fevers recorded by the oral thermometer were not recorded by the TA thermometer.

CONCLUSIONS:

There was a statistically significant difference in measured temperatures between oral and TA thermometers and a clinically significant difference in 49% of patients. Febrile patients had a greater discrepancy and variability between noninvasive temperature measurements. Caution should be taken when evaluating temperature measurements with these noninvasive devices.

Historical Considerations for Fever

▸ How can you tailor the 18 HPI?

  ◦ When did it start?
  ◦ How long has it lasted?
  ◦ How does it change?
  ◦ Has there been a known illness exposure or injury?
  ◦ Other symptoms, such as sweating, chills, nausea, vomiting, fatigue, dizziness, mood changes?

Body Temperature Differences

▸ Recent ingestion of hot or cold substances can alter the temp
  ◦ Factitious fever
▸ Patients who are tachypneic (fast breathers, usually through the mouth) usually have lower temperatures

Causes of fever/pyrexia

▸ The most common cause of a fever is infection—and it is a pretty reliable sign
▸ Fever can also be present in inflammatory conditions or autoimmune conditions like lupus, rheumatoid, scleroderma

Descriptions of Fevers

▸ Remittent Fever
  ◦ Daily elevated temperature (>38 C or 100.4 F)
  ◦ Returns to baseline but not to normal

▸ Intermittent Fever (Periodic Fever)
  ◦ Intermittently elevated temperature (>38 C, 100.4 F)
  ◦ Return to baseline and to normal
  ◦ Examples:
    • PFAPA Syndrome: Fever every 3-4 weeks
    • Relapsing Fever (Borrelia species): Every 2-3 weeks
    • Malaria: Fever every other or every third day
    • Rat Bite Fever: Fever every 3 to 5 days
    • Hodgkin's Disease: Pel-Ebstein Fever (~16%)
    • Cyclic Neutropenia: Fever every 3 weeks

Descriptors of fever

▸ Factitious fever: self-induced fever

▸ Relapsing fever: multiple febrile attacks lasting about 6 days, separated by afebrile periods (usually infection like TB, malaria)

▸ Charcot's intermittent fever: fever accompanied by chills, RUQ pain, and jaundice (due to stones obstructing common duct)

Descriptors of fever

- Hectic fever: fever characterized by a daily afternoon spike, often with facial flushing; usually seen with TB

- Continued or sustained fever: fever of some duration without remissions; usually seen with gram – sepsis or CNS damage

- Ephemeral fever: febrile period lasting no more than one or two days

Descriptors of fever

- Essential fever: FUO (fever of unknown origin); it is a temp of 100.4° F (38° C) for 3 weeks or longer without an identifiable cause
- In adults, this is most commonly due to infection (closed space abscess or disseminated TB, HIV, endocarditis, fungal)
- Less commonly, it is due to cancer (lymphomas), autoimmune diseases, and drug reactions

Extreme pyrexia

- Hyperpyrexia is a temp greater than 105° F or 40.6° C
- Usually caused by CNS disorders of the thermoregulating centers
- These disorders are usually caused by heat stroke, CVA, brain injury after cardiac arrest
- Infections of the CNS (encephalitis, meningitis) can lead to malignant hyperthermia

Temperatures lower than normal

- Hypothermia is a body temperature below 98.6° F (strictly speaking)
- Temperatures lower than normal can be caused by chronic renal failure and patients receiving antipyretics (acetaminophen) and NSAIDs

Temperature and Pulse association

- Usually, fever is accompanied by an increase in the pulse
- Why?
- Generally, for every degree of increased temp, the pulse is increased by 10 bpm
- An increase in heart rate may not occur if the fever is a reaction to drugs and in some infections like typhoid fever, legionellosis, mycoplasmal pneumonia

Pulse

- The SVC and IVC return the blood to the right atrium
- The blood then travels to the right ventricle through the tricuspid valve
- The right ventricle contracts to force the blood into the pulmonary artery (systole)
- The blood then travels through smaller and smaller vessels in the lungs to the alveoli

Pulse

‣ From the lungs, the blood comes back to the heart from pulmonary veins into the left atrium
‣ From the left atrium the blood passes through the mitral valve into the left ventricle
‣ The left ventricle contracts, forcing a volume of blood (stroke volume—SV) through the aortic valve into the aorta
‣ From the aorta, the blood travels to the arteries, capillaries, veins, back to the SVC and IVC

Pulse

‣ The heart beat is transmitted through two systems

‣ Arterial system
‣ Venous system

Arterial Pulse and Pressure

‣ The arterial pulses are the most palpable and are <u>sometimes</u> visible
‣ The arteries are tough, have more distensibility, and more tensile strength

Arterial Pulse and Pressure

‣ The arterial pulses are the result of ventricular systole (ejection of blood from the left ventricle into the aorta)
‣ This produces a pressure wave through all the arteries
‣ We call this pressure wave a pulse
‣ SV x R (heart rate) = CO (cardiac output)
‣ CO is a measure of the heart's ability to adapt to a changing environment

Pulse

‣ Pulse = heart rate
‣ Normal is 60–100 beats per minute (bpm)
‣ Below 60 is …
   ◦ bradycardia
‣ Above 100 is …
   ◦ tachycardia

Arterial Pulse and Pressure

‣ The pulse is felt as a forceful wave that is smooth and rapid on the ascending portion of the wave
‣ The pulse becomes domed, less steep, and slower on the descending part of the wave
‣ The closer the artery to the heart, the more forceful and definitive the pulse
‣ Which <u>accessible</u> artery is closest to the heart?
   ◦ The carotid artery

Where can you take the pulse?

‣ The arteries easiest to palpate are the ones closest to the surface

‣ Temporal
‣ Carotid
‣ Brachial
‣ Radial
‣ Femoral
‣ Popliteal
‣ Posterior tibial
‣ Dorsal pedis

Which ones should you palpate?

‣ The pulse diminishes the farther the vessel is from the heart
‣ The pulses in the extremities evaluate the sufficiency of the entire arterial circulation
‣ The proximal pulses are better for evaluating the heart activity

Pulse

‣ You must evaluate the modifiers/descriptors/ characteristics of the beat
  ◦ Rate: (bpm)
  ◦ Rhythm: (regular pattern or irregular pattern)
  ◦ Amplitude: (force, 0-4 on next slide)
  ◦ Contour: (waveform: should be pliable, smooth, domed if not hardened by atherosclerosis)

Pulse amplitude

‣ Pulse amplitude is described on a scale of 0 to 4:
‣ 4 = bounding
‣ 3 = full, increased
‣ 2 = expected
‣ 1 = diminished, barely palpable
‣ 0 = absent, not palpable
  ◦ Pulse amplitude is described as expected for that vessel, not compared to other vessels

Respiration

‣ Respiration is the measure of the full respiratory cycle (from inhalation to exhalation)
‣ We evaluate three (3) components of the respiratory cycle:
  ◦ Rate (breaths per minute)
  ◦ Rhythm (regular or irregular pattern {regular or irregular})
  ◦ Depth (shallow, moderate, or deep---most subjective)

‣ Normal adult respiration is 12-20 breaths per minute (not bpm)

Respiratory abnormals

‣ The major abnormalities are increases or decreases in rate
‣ Tachypnea
‣ Bradypnea
‣ Who gets tachypnea and why is it a big deal?
  ◦ MC in elderly with COPD
  ◦ Its presence is so common that it may not be specific, but...its absence could be diagnostic
  ◦ For example—92% of patients with PE have tachypnea. Without it, PE is unlikely.

Bradypnea

- Is bradypnea as clinically significant as tachypnea?

- May be seen in patients with hypothyroidism (MC) and in CNS lesions, sedative or narcotic use

Pursed-lip breathing

- Commonly observed in patients with COPD, usually emphysema
- Pts. with emphysema have reduced lung elasticity and alveolar hyperinflation
- Therefore, they have higher risk for airway closure and air trapping
- As a result, they use pursed-lip breathing, which increases intra-airway pressure by inducing auto-PEEP (positive end-expiratory pressure)
- This prevents airway closure
- This pattern is often accompanied by audible expiratory sounds like wheezing or grunting

Depth of breathing abnormals

- Hyperpnea is an increase in the rate and the tidal volume (produces rapid and deep respiration)
- Classic form is Kussmaul breathing, seen in patients with metabolic acidosis (diabetic ketoacidosis)
- Patients attempt to compensate for pH by hyperventilating

Mnemonic for Kussmaul

- **MAKE UP** a **L**ist:
- **M**ethanol poisoning
- **A**spirin intoxication
- **K**etoacidosis
- **E**thylene glycol ingestion
- **U**remia
- **P**araldehyde administration
- **L**actic acidosis

Hypopnea

- Hypopnea is characterized by shallow respirations
- It is a hallmark of impending respiratory failure or of obesity-hypoventilation (AKA: Pickwickian syndrome)
- Pickwickian syndrome: obese pt with excessive daytime sleepiness and elevated blood CO2 (PCO2)

Apnea

- Apnea is the absence of respiration for at least 20 seconds while the patient is awake or 30 seconds while the patient is asleep
- Seen in pts with neuromuscular dysfunction (central apnea) or airway obstruction interrupting REM sleep (obstructive sleep apnea)

Orthopnea

- Orthopnea means upright respiration (orthos=upright)
- Orthopnea is seen MC in pts with CHF (usually left-sided)
- Sitting upright pools blood in dependent areas, thereby decreasing venous return

Blood pressure

- The standard measure of blood pressure is the indirect method, using a sphygmomanometer (sphygmo=pulse, manos=scanty, metron=measurement)
- May be palpatory or auscultatory
- The "Gold Standard" is the direct measurement, using a rigid wall catheter

BP

- Unrecognized hypertension may lead to CVD and decrease life expectancy
- Hypertension affects as many as 1 in 5 North American adults
- It is usually clinically silent in the early phases
- Thus, only regular and accurate readings can detect it in time to initiate effective therapy

How important is accuracy?

- Erroneous overestimates of BP may cause a person of normal BP to be labeled hypertensive
- This can lead to significant economic, medical, and psychological repercussions
- Erroneous underestimates can allow hypertension (HTN) to go undetected

Korotkoff sounds

- *Phase 1:* The first appearance of faint, repetitive, clear tapping sounds that gradually increase in intensity for at least two consecutive beats is the **systolic blood pressure**.
- *Phase 2:* A brief period may follow during which the sounds soften and acquire a swishing quality.
- *Auscultatory gap:* In **some** patients, sounds may disappear altogether for a short time.
- *Phase 3:* The return of sharper sounds, which become crisper to regain, or even exceed, the intensity of phase 1 sounds. The clinical significance, if any, of phases 2 and 3 has not been established.
- *Phase 4:* The distinct, muffling sounds, which become soft and blowing in quality (mid-diastolic pressure)
- *Phase 5:* The point at which all sounds finally disappear completely is the **diastolic blood pressure** (end-diastolic pressure)

The auscultatory gap

- The *silent or auscultatory gap* occurs when the sounds disappear between the systolic and diastolic pressures. The importance of the gap is that unless the systolic pressure is palpated first, it may be underestimated.
- The presence of a silent gap should be recorded on the case sheet or blood pressure chart.
- For example: 124/94/82 (AG from 110 to 99)

What does the systolic number measure?

‣ Systole occurs when the ventricles contract and the tricuspid and mitral (AV) valves close

‣ It is a measure of cardiac output and how hard the heart is working to eject the blood (stroke volume)

What does the diastolic number measure?

‣ Diastole occurs when the ventricles relax and the tricuspid and mitral valves open

‣ Diastolic pressure is a measure of the peripheral vascular resistance (resting resistance)

Normal BP ranges

‣ The "classic" BP is 120/80

‣ But, how frequently does this exact measurement occur?

BP ranges

‣ We consider normal systolic **range** to be:
  ◦ 100–140 mmHg

‣ We consider normal diastolic **range** to be:
  ◦ 60–90 mmHg

‣ You need to evaluate the possibilities that both could be high, both could be low, one could be high, one could be low

At what point do we consider it "hypertension"?

‣ A BP measurement greater than 140 systolic **and/or** greater than 90 diastolic is considered hypertension

‣ But, we shouldn't give the diagnosis (DX) of hypertension based on the first measurement only

Guidelines for diagnosing hypertension

‣ You should not diagnose hypertension based on one measurement of the BP
‣ There are several factors that affect the BP in addition to what we've already mentioned
  ◦ "White coat hypertension": higher BP
  ◦ Defense mechanism: higher BP due to anxiety
  ◦ Blood pressure varies in individuals according to the time of day, meals, smoking, anxiety, temperature, and the season of the year. It is usually at its lowest during sleep

- **Systolic hypertension is the most prevalent risk factor in heart failure, stroke and kidney failure**. It is clear that lowering systolic pressure is associated with better outcomes in cardiovascular and renal disease
- Systolic hypertension interacts with other major risk factors, such as high cholesterol and diabetes, which also increase with age, to **amplify the age-related risk of cardiovascular events**

Hypotension

- Hypotension is classically considered BP under 90/60
- But, what may be low for some, could be normal for others

Causes of hypotension

- When the blood pressure is too low, there is inadequate blood flow to the heart, brain, and other vital organs.

- Medications used for surgery
- Anti-anxiety agents
- Treatment for high blood pressure
- Diuretics
- Heart medicines
- Some antidepressants
- Narcotic analgesics
- Alcohol
- Fatigue
- Anxiety
- Depression
- Dehydration
- Heart failure
- Heart attack
- Changes in heart rhythm (arrhythmias)
- Fainting
- Anaphylaxis (a life-threatening allergic response)
- Shock (from severe infection, stroke, anaphylaxis, major trauma, or heart attack)
- Advanced diabetes

- Normal responses of pulse and blood pressure to prolonged standing are as follows:
- <u>Normal systolic BP</u>: recumbent: 100-142; Standing (4 min): 94-141; Orthostatic change: -19 to +11
- <u>Normal diastolic BP</u>: recumbent: 55-90; Standing : 61-97; Orthostatic change: -9 to +22
- <u>Normal Pulse</u>: recumbent: 54-96; Standing : 62-108; Orthostatic change: -6 to +27.

- <u>Orthostatic systolic hypotension</u>: fall in systolic blood pressure of 20 mm Hg or more.
- <u>Orthostatic diastolic hypotension</u>: fall in diastolic BP of 10 mm Hg or more.
- <u>Orthostatic diastolic hypertension</u>: rise in diastolic BP to 98 mm Hg or higher.
- <u>Orthostatic narrowing of pulse pressure</u>: fall in pulse pressure to 18 mm Hg or lower.
- <u>Orthostatic postural tachycardia</u>: increase in heart rate of 28 bpm or to greater than 110 b/min.
- *Reference: Streeten DHP. Orthostatic disorders of the circulation. New York: Plenum, 1987:116.*

Pulse pressure

- The pulse pressure is the difference between the systolic and the diastolic pressures
- For example 120/80 would give a pulse pressure of 40 (120-80)

- The normal pulse pressure range is 30-40 mmHg

Widened (high) pulse pressure (>40 mmHg)

▸ Pathophysiology
  ◦ Suggests reduced large artery vascular compliance
  ◦ Best blood pressure marker for cardiovascular risk
▸ Causes
  ◦ Isolated systolic hypertension
  ◦ Aortic Regurgitation
  ◦ Thyrotoxicosis
  ◦ Patent Ductus Arteriosus
  ◦ Arteriovenous fistula
  ◦ Beriberi heart
  ◦ Aortic Coarctation
  ◦ Anemia
  ◦ Emotional state

Narrowed pulse pressure (<30 mmHg)

▸ Causes
  ◦ Tachycardia
  ◦ Severe aortic stenosis
  ◦ Constrictive pericarditis
  ◦ Pericardial effusion
  ◦ Ascites

How frequently should you take the BP?

▸ At the initial visit, you should take both the palpatory and auscultatory BP in both arms
  ◦ On subsequent checks, unless a cardiovascular or stroke event is suspected, usually an auscultatory measurement will do
▸ If the BP is elevated above 140/90, a second reading should be taken after 1-2 minutes
▸ For patients in whom sustained increases of blood pressure are being assessed, a number of measurements should be made on different occasions before definite diagnostic or management decisions are made (3 consecutive visits)

Sustained blood pressure elevation

▸ Repeat measurement at least once at each visit on the same arm
▸ Make several measurements at different visits
▸ Make each measurement carefully
▸ Deliver your care and consider referral to a cardiovascular specialist and counseling for lifestyle and diet modifications

Why take measurements in both arms?

▸ The pulse should always be palpated bilaterally
▸ A difference between arm pulses may be a clue to coarctation of the aorta, anatomical variants and alterations to the pulse after surgical or cardiological procedures, such as cardiac catheterization

▸ Bilateral pulses should be taken in both the upper extremities and lower extremities

Differences in BP in both arms

▸ You should allow a variation of up to 10 mmHg from right arm to left arm

▸ Congenital conditions in the differential diagnosis include coarctation of the aorta and thinning (effacement) of one of the subclavian, axillary, or brachial arteries
▸ Acquired arterial conditions include aortic dissection, atheroma, thrombus, embolus, and extrinsic compression (as might be seen in association with a mass in the upper chest)