## Need to Know Lab Values

| *Labs* | *Normal Ranges* | |
|---|---|---|
| *Sodium* | 136-145 | $Na^+$ swells the body |
| *Potassium* | 3.5-5 | $K^+$ pumps the heart |
| *Chloride* | 98-106 | $Cl^-$ maintains serum osmolarity |
| *Calcium* | 9-10.5 | Ca contracts the muscles & maintains bone density |
| *Magnesium* | 1.3-2.1 | $Mg^+$ mellows the muscle |
| *Albumin* | 3.5-5 | Used to determine liver function; tells how much protein the body is getting |
| *Creatinine* | (M)= 0.6-1.3; (F)=0.5-1.1 | Is excreted by the kidneys; >1.3 = bad kidneys |
| *BUN* | 10-20 | Urea is a by-product of protein metabolism; tests kidney function |
| *Glucose* | 74-106 | Hypogly = Brain die |
| *RBC* | (M)= 4.7-6.1; (F)= 4.2-5.4 | Low = anemia, renal disease, vitamin B deficiency |
| *Hemoglobin* | (M)= 14-18; (F)= 12-16 | <7 = blood transfusion |
| *Hematocrit* | (M)= 42-52; (F)= 37-47 | Low = over-hydrated; high = dehydrated |
| *Platelets* | 150,000-400,000 | AsaParin, CloPidogrel |
| *WBC* | 5,000-10,000 | High = infection/trauma |
| *Basophils* | 25-100 | Releases histamines, kinins, & heparin in areas of tissue damage; Causes signs & symptoms of inflammation |
| *Neutrophils* | Segs: 2,500-8,000 | Nonspeccific ingestion & phagocytosis of microorganisms & foreign proteins |
| *Neutrophils* | Bands: 250-500 | Immature neutrophils |
| *Lympho-cytes* | 1,000-4,000 | |
| *Monocytes* | 100-700 | Destruction of bacteria & cellular debris; matures into macrophage |
| *Eosinophils* | 50-500 | Releases vasoconstrictive amines during allergic reactions & in response to parasitic infection |

## Need to Know Vocab

| *Term* | *Definition* |
|---|---|
| *Adventitious Lung Sounds* | Abnormal sounds that originate in the lungs & airways |
| *Afterload* | the pressure or resistance that the ventricles overcome to eject blood through the semilunar valves & into the peripheral blood vessels |
| *Anabolism* | The use of energy to change simple materials into complex body substances & tissue |
| *Anti-embolism Hose (TED hose)* | Tightly fitting elastic stockings that are used to promote blood flow of venous return & prevent edema in the lower extremities, DVT, venous stasis, & pulmonary embolism |



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| Need to Know Vocab (cont) | |
|---|---|
| *Apnea* | Absence of breathing for several seconds |
| *Arteriosclerosis* | A thickening or hardening of the arterial wall that's often associated with aging |
| *Atelectasis* | The collapse of all of part of a lung |
| *Atherosclerosis* | The build up of plaque in coronary arteries around the heart (is a type of arteriosclerosis) |
| *Basal Metabolic Rate (BMR)* | The minimum amount of energy required to maintain body functions in the resting, awake state |
| *Bradypnea* | Abnormally slow breathing (<10 BPM) |
| *Borborygmus* | Increased high-pitched bowel sounds, especially loud, gurgling sounds, result from increased motility of the bowel |
| *Bruits* | "Swooshing" sounds over the abdominal aorta, the renal arteries, & the iliac arteries |
| *Cachexia* | Physical wasting |
| *Cardiac Index* | Can be calculated by dividing cardiac output by the body surface area; Normal range is 2.8-4.2 |
| *Cardiac Output* | Calculated by multiplying the heart rate in bpm times the stroke volume in liters per beat; is the amount of blood pumped from the left ventricle each minute |
| *Catabolism* | The breaking down of substances from complex to simple, resulting in a release of energy |
| *Chyme* | Semiliquid product of digestion that travels from the stomach through the intestines |
| *Contractility* | The ability of atrial & ventricular muscle cells to shorten their fiber length in response to electrical stimulation |
| *Coronary Artery Disease* | Narrowing of the arteries by atherosclerosis, spasms, or congenital malformations |
| *Dual X-Ray Absorptiometry (DXA)* | Measures bone mineral density; Spine & hip are most often assessed on a central DXA; Calculates T-score (0= healthy, -1 to -2.5= osteopenia, & <-2.5= osteporosis |
| *Dysphagia* | Difficulty swallowing |
| *ECG/EKG* | A recording of the electrical current generated by the heart during depolarization & repolarization; Test results are interpreted for HR & rhythm, lack of blood supply, abnormalities of conduction system, & arrhythmias |
| *Guaiac-based Fecal Occult Blood Test* | Tests for blood in the stool; more likely to yeild a false positive than fecal immunochemical test due to requiring an active component of guaiac |
| *Hemoptysis* | The presence of blood in the sputum |



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| Need to Know Vocab (cont) | |
|---|---|
| *Hypercapnia* | Abnormally high levels of $CO^2$ in the blood (>45 mmHg in arterial blood), may have respiratory depression when supplemental oxygen levels are too high |
| *Hyperlipidemia* | Elevation of plasma cholesterol, triglycerides, or both |
| *Hyperventilation* | Over-expansion of the lungs, characterized by rapid & deep breaths; $CO^2$ levels increase & alkalosis happens |
| *Hypoventilation* | Under-expansion of the lungs, characterized by shallow, slow respirations |
| *Ischemia* | Reduced blood flow |
| *Kwashiorkor* | Lack of protein accompanied by fluid retention |
| *Macronutrients* | Nutrients that are needed in large amounts |
| *Marasmus* | A protein & caloric deficiency |
| *Mean Arterial Pressure* | Factors that influence MAP include: Total blood volume (viscosity), Cardiac output (HR x Stroke volume), & Size & integrity of the vascular bed, especially in capillaries |
| *Metabolism* | The process of chemically changing nutrients, such as fats & proteins, into end products that are used to meet the energy needs of the body or stored for future use, thereby helping maintain homeostasis |
| *Micronutrients* | Nutrients that are needed by the body in limited amounts |
| *Osteomalacia* | Bone loss & softening caused by lack of calcification; Cause = lack of vit D |
| *Osteoporosis* | Chronic disease of cellular regulation in which bone loss causes significant decreased density & possible fracture; Caused by: lack of $Ca^+$ & estrogen or testosterone |
| *Peripheral Artery Disease* | Is a result of systemic atherosclerosis; Is a chronic condition in which partial or total arterial occlusion decreases perfusion to the extremities |
| *Peripheral Vascular Disease* | Includes disorders that change the natural flow of blood through the arteries and veins of the peripheral circulation, causing decreased perfusion to body tissues; is an umbrella term |
| *Peristalsis* | Wavelike muscular movement through the digestive tract |



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| Need to Know Vocab (cont) | |
|---|---|
| *Postural Drainage* | A therapeutic way to position a patient to use gravity to help mobilize respiratory tract secretions; Improves ventilation & perfusion & normalizes the functional residual capacity of the lungs |
| *Preload* | The degree of myocardial fiber stretch at the end of diastole & just before contraction; Is determined by the amount of blood returning to the heart from both sides |
| *Pulse Deficit* | When a patient's radial pulse is slower than the apical pulse because of cardiac contractions that are weak or ineffective at pumping blood to the peripheral tissues & extremities |
| *Pulse Intensity* | The strength of the pulse with each beat; Described as normal (able to palpate with normal pressure), diminished (weaker than expected/difficult to palpate), absent (unable to palpate), or bounding (may be able to see pulsation; does not disappear with palpation); rated on a scale of 0-3 with 0 being absent & 3 being Bounding |
| *Pulse Pressure* | The difference between the systolic & diastolic values |
| *Renin-Angiotensin System* | Regulates BP & fluid balance through vasoconstriction & excretion or reabsorption of sodium |
| *Sequential Compression Devices* | Inflatable sleeves that wrap around the legs of patients & are attached to an air source that inflates & deflates, creating a massaging action for the lower extremities |
| *Stroke Volume* | The amount of blood ejected by the left ventricle during each contraction; A decrease in SV can result from an increase in afterload without the benefit of compensatory mechanisms, thus leading to a decrease in cardiac output |
| *Tachypnea* | Increased respiratory rate of >24 BPM in an adult with quick shallow breaths |

## Oxygenation Devices

| *Device* | *Flow Rate* | *Percentage of Oxygen* |
|---|---|---|
| *Simple Nasal Cannula* | 1 L/min | 24% |
| | 2 L/min | 28% |
| | 3 L/min | 32% |
| | 4 L/min | 36% |
| | 5 L/min | 40% |
| | 6 L/min | 44% |
| *Simple Face Mask* | 5 L/min | 40% |
| | 6 L/min | 45% |
| | 7 L/min | 50% |
| | 8 L/min | 55% |
| | >8 L/min | 60% |
| *Partial Rebreather Mask* | 6-15 L/min | 70-90% |
| *Trach Mask* | Similar to Nasal Cannula | |
| Face Tent | Rate & Oxygen % Vary | |
| Venturi Mask | 4-12 L/min | 24-60% |
| High-Flow Nasal Cannula | 20-60 L/min | Up to 100% |
| Nonrebreather Mask | 10-15 L/min | 60-100% |

## Morse Fall Scale

| *Item* | *Scale* |
|---|---|
| 1. History of falling; immediate or within 3 months | No - 0 |
| | Yes - 25 |
| 2. Secondary diagnosis | No - 0 |
| | Yes - 15 |
| 3. Ambulatory aid | Bed rest/nurse assist - 0 |
| | Crutches/cane/walker - 15 |
| | Furniture - 30 |
| 4. IV/Heparin Lock | No - 0 |
| | Yes - 20 |
| 5. Gait/Transferring | Normal/bedrest/immobile - 0 |
| | Weak - 10 |
| | Impaired - 20 |

## Morse Fall Scale (cont)

| | |
|---|---|
| 6. Mental status | Oriented to own ability - 0 |
| | Forgets limitations - 15 |

Low Risk = 0-24; Moderate Risk = 25-44; High Risk = 45+

## Braden Scale

| | | | | |
|---|---|---|---|---|
| **Sensory Perception** | 1. Completely limited | 2. Very limited | 3. Slightly limited | 4. No impairment |
| **Moisture** | 1. Constantly moist | 2. Very moist | 3. Occasionally moist | 4. Rarely moist |
| **Activity** | 1. Bedfast | 2. Chairfast | 3. Walks Occasionally | 4. Walks frequently |
| **Mobility** | 1. Completely immobile | 2. Very limited | 3. Slightly limited | 4. No limitations |
| **Nutrition** | 1. Very poor | 2. Probably inadequate | 3. Adequate | 4. Excellent |
| **Friction & Shear** | 1. Problem | 2. Potential problem | 3. No apparent problem | |

To be placed at moderate risk a patient must score 12-14, to be placed at low risk a patient must score 15-16

## Pressure Injury Stages

| *Stage* | *Characteristics* |
|---|---|
| *Stage 1* | Intact, nonblistered skin with nonblanchable erythema, or persistent redness in area that has been exposed to pressure |
| *Stage 2* | Partial thickness wound that involves epidermis &/or dermis, but does not extend below the level of the dermis |
| *Stage 3* | Full thickness wound that extends into the subcutaneous tissue, but does not extend through the fascia to bone, muscle, or connective tissue |
| *Stage 4* | Full thickness wound, but deeper than stage 3; involves exposure of muscle, bone, or connective tissue |



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## Pressure Injury Stages (cont)

| | |
|---|---|
| *Unstag-eable* | Full thickness wound where the amount of necrotic tissue in th wound bed makes it impossible to asses the depth of the wound or any involvement of underlying structures |
| *Suspected Deep Tissue injury* | An area of intact skin that is purple/maroon or a blood filled blister; The true depth of damage is not readily apparent on initial inspection |

## Normal Ranges for Vital Signs

| *Vital Sign* | *Range* |
|---|---|
| *Pulse* | 60-100 bpm |
| *Temperature* | 96.4-99.6$^{o}$F |
| *Respirations* | 12-20 |
| *Oxygen Saturation* | >95% |
| *Systolic Blood Pressure* | 90-<120 |
| *Diastolic Blood Presure* | 60-<80 |

## Glasgow Coma Scale

| *Response* | *Level of Arousal* | *Points* |
|---|---|---|
| *Eye Opening* | Spontaneous | 4 |
| | To verbal command | 3 |
| | To pain | 2 |
| | None | 1 |
| *Verbal* | Oriented | 5 |
| | Confused but able to answer questions | 4 |
| | Inappropriate responses, words discernible | 3 |
| | Incomprehensible speech | 2 |
| | None | 1 |
| *Motor* | Obeys Commands | 6 |
| | Purposeful movement to painful stimulus | 5 |
| | Withdrawals from pain | 4 |
| | Abnormal (spastic) flexion, decorticate posture | 3 |
| | Extensor rigid response, decerebrate posture | 2 |
| | None | 1 |

Fully alert & oriented people score 15 pts. A score of <7 reflects a patient who is comatose.

## Breath Sounds

| *Breath Sound* | *Character* | *Association* | *Site* |
|---|---|---|---|
| *Crackles (coarse)* | Lower-pitched, coarse, rattling sounds caused by fluid or secretions in large airways; likely to change with coughing or suctioning | Bronchitis, pneumonia, tumors, pulmonary edema | Right & left lung bases |
| *Crackles (fine)* | Popping, discontinuous sounds caused by air moving into previously deflated airways; sounds like hair being rolled between fingers near the ear; "Velcro" sounds late in inspiration usually associated with restrictive disorders | Asbestosis, atelectasis, interstitial fibrosis, bronchitis, pneumonia, chronic pulmonary disease | Right & left lung bases |
| *Pleural Friction Rub* | Loud, rough, grating, scratching sounds caused by the inflamed surfaces of the pleura rubbing together; often associated with pain on deep inspirations; heard in lateral lung fields | Pleurisy, TB, pulmonary infarction, pneumonia, lung cancer | Anterior lateral thorax |



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| Breath Sounds (cont) | | | |
|---|---|---|---|
| *Rhonchi* | Lower-pitched, coarse, continous snoring sound; arise from the large airways; both inspiration & expiration | Thick tenacious secretions, sputum production, obstruction by a foreign body, tumors | Over the trachea & bronchi, but can be referred to all lung fields |
| *Stridor* | Intense, high-pitched & continuous monophonic wheeze or crowing sound, loudest during inspiration when airways collapse due to lower internal lumen pressure; often heard without the aid of a stethoscope | Turbulent airflow in upper airway, may be indicative of serious airway obstruction from epiglottis, croup, a foreign body lodged in the airway, or a laryngeal tumor | Trachea & large airways |
| *Wheeze* | Squeaking, musical, continuous sounds associated with air rushing through narrowed airways, may be heard without stethoscope, Arise from the small airways, Usually do not clear with coughing, Heard on expiration | Inflammation, bronchospasm (bronchial asthma), edema, secretions, pulmonary vessel engorgement (as in cardiac "asthma") | All lung fields |

| Pain | |
|---|---|
| ***Chronic Pain*** | Postoperative pain that persists >3 months & pain (not following surgery) lasting >6 months; It interferes with daily functioning & is accompanied by distress on a continuing basis |

| Pain (cont) | |
|---|---|
| ***Acute Pain*** | Lasts <3-6 months, depending on specific circumstances can be caused by a pH alteration, which results in depletion of oxygen to tissue, pressure on tissues, over stretching of body cavities with fluid or air, or external injury to tissues |
| ***Referred Pain*** | Originates in 1 area but hurts in another area, such as pain from a myocardial infarction |
| ***Radiating Pain*** | Extends from the source to an adjacent are of the body; Ex: GERD- pain in stomach radiates up the esophagus |
| ***Visceral Pain*** | Arises from the organs of the body & occurs in conditions such as appendicitis, pancreatitis, inflammatory bowel disease, bladder distention, & cancer |
| ***Somatic Pain*** | Results from injury to skin, muscles, bones, & joints. Occurs in conditions such as sunburn, lacerations, fractures, sprains, arthritis, & bone cancer |
| ***Neuropathic Pain*** | Results from nerve injury, & the pain continues even after the painful stimuli are gone |
| ***Phantom Pain*** | Occurs when the brain continues to recieve messages from the area of an amputation |
| ***Psychogenic Pain*** | Pain that is perceived by an individual but has no physical cause |



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