Intravenous Therapy with Blood Withdrawal

Creativeresol-ve Healthcare

Education Company

Course Overview & Course Requirements

This IV Therapy and Blood Withdrawal Course is a three day – 12hours - each class.

Each day has 30 minutes Lunch Break.

This course will certify you for IV Therapy and Blood Withdrawal. Learning Check and Group Discussion will be presented in each part to check that you have made most out of this course. Enjoy Learning!!!!

Behavioral Objectives

In the completion of this class, **YOU** will be able to:

- List the areas of anatomy primarily used in the initiation of Intravenous Therapy (IV).
- List the Physiological reasons for IV.
- Name the different equipment used and the reasons for their use.
- Name the different types of IV solutions used and the reasons for their use.
- List the use of Hyperalimentation and Lipid use, and what patients would require them.
- Know the major electrolytes, their functions, and symptoms of excess or deficit.
- Accurately calculate IV drip rates for manual flow control.

Behavioral Objectives

In the completion of this class, **YOU** will be able to:

- List the different sites available, means of protecting the sites and proper patient preparation for IV Therapy.
- List of the steps of the IV insertion procedure, with emphasis on the safety issues.
- Give reasons why a patient should need a Central catheter and the nurses role in the insertion of the line.
- Give reasons why a patient should require blood transfusions and the nurses role in the insertion of the line.
- List the complications and the trouble shooting measures of IV Therapy.
- Successfully fulfill the requirements of State of California LVN Board in the practical application of IV insertion.

History of IV Therapy

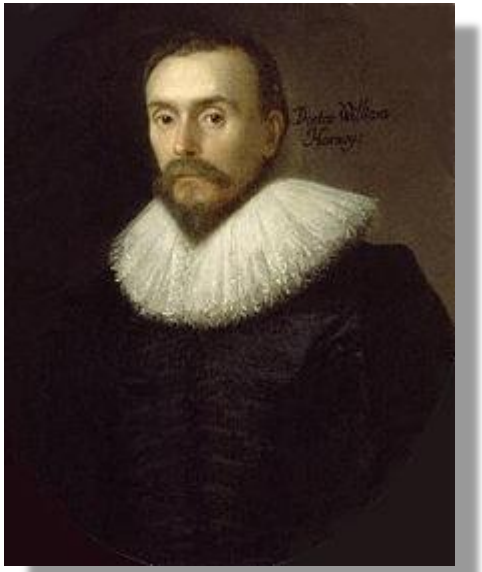
Origin of Intravenous Injection

1628 - – Dr. William Harvey and Christopher Wren, an architect- Met at the Royal Society

1662 – J.D. Major made first successful injection in man.

1665 - A dying animal was successfully transfused with the blood of another.

1667 - A Parisian 15 year old boy was first successful human transfused with the blood of a lamb. Led to many problems and death.



Dr. Harvey and Wren

History of IV Therapy

Origin of Intravenous Injection

- **1687** – Edict of Church and Parliament "animal to man transfusions prohibited in Europe" – 150 years lapsed.
- **1827 – 1912** John Lister and Florence Nightingale
- Antiseptic methods in surgery & patient care

John Lister and Florence Nightingale

History of IV Therapy

Early Modern Equipment

Metal needle was used prior to World War II.
1925 – D5W for Caloric Replacement.
1945 – Development of plastic catheter due to frequency of infiltrations.
NS – Used at first in early 1900's – fluid and electrolyte knowledge grew and today more than 200 commercially prepared IV fluids are available.
Glass container used first individually packed/prepared by hospital pharmacy – later by major company as enclosed unit.

Plastic containers introduced in 1970's.

History of IV Therapy

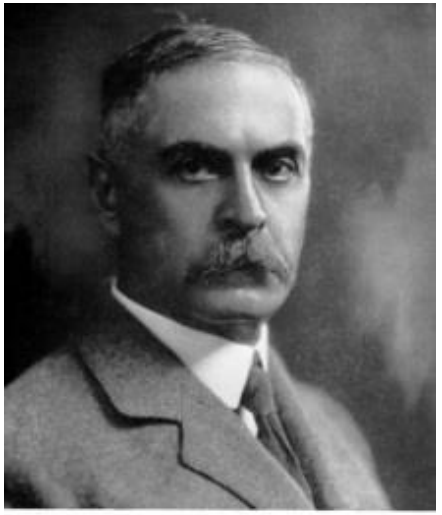
Landmark in Development of IV Process

1827 – 1900

Dr. James Blundell, English O.B., proved animal blood was unfit for man, only human blood is safe.

Dr. Karl Landsteiner proved not all human blood is alike.

Dr. James Blundell
(1791–1878)



K. Landsteiner

Dr. Blundell and Dr. Landsteiner

History of IV Therapy

Landmark in Development of IV Process

1940 – A nurse was assigned as I.V. Therapist at Mass General Hospital, prerequisite to perform venipuncture successfully.

1965 - University of Penn- nutrient given IV to dogs – research led to today's total parenteral nutrition. (Dr. Stanley Dudrick).

Dr. Stanley Dudrick

History of IV Therapy

Current Events

- 80% of hospitalized patients receive IV Therapy.
- Large percentage of medications are administered by IV
-IV Therapy becoming more widely used in extended care facilities and
in home care situations.
- More widespread use of long-term, central venous access.
- IV Therapy has become a sub-specialty in nursing.

A. National Intravenous Therapy Association. (N.I.T.A.) established standards of practice in 1985
B. Development of the IV Nurse Specialist
C.Infusion Nurses Society founded 1973 – leading organization in infusion therapy

RN versus LVN Scope of Practice Assessments

LVNs work under the direction of an RN (B&P Code, Section 2859). Prior to making patient care assignments to LVNs or CNAs, the RN must conduct a comprehensive patient assessment [Title 22, Section 70215(a)].

Assessment includes:

A. Data collection
   1. Done by the RN
   2. May be done by the LVN ["Basic assessment" – Title 16, Section 2518(a)]

B. Analysis, synthesis, evaluation of data **(RN only)**

LVN must report data to RN (LVN practices under the direction of a physician or RN – B&P Code, Section 2859).

Allied Health Responsibility

- **It is your responsibility as Allied Health Professional to verify your scope of practice regarding IV Therapy & Blood Withdrawal.**
- **It is a requirement for you to turn in by email educatesimplify@gmail.com your findings re: IV Therapy & Blood Withdrawal.**
- **IV Therapy for Allied Health Professionals**

***up to 34 CEUs for AHP

*** 20 for Radiology Technicians

RN versus LVN Scope of Practice Assessments

The RN cannot merely "sign-off" on data collected by the LVN. The RN must directly observe the patient, analyze, synthesis, and evaluate the data collected by him/herself and the LVN, make a nursing diagnosis, determine the appropriate interventions and make appropriate assignments of tasks and activities (Title 16, Section 1442.5).

"Evaluates the effectiveness of the care plan through observation of the client's physical condition and behaviour, signs and symptoms of illness, reactions to treatment and through communication with the client and health team members and modifies the plan as needed" (Title 16, Section 1443.5)

And

"The RN shall directly perform ongoing assessments as defined in Title 16, Section 1443.5 and shall document the findings in the patient record. The assessment shall be performed at least once a shift and upon receipt of the patient when he/she is transferred to another patient area" [Title 22, Section 70215(a)].

Verified from http://www.bvnpt.ca.gov/ 2015

RN versus LVN Scope of Practice Assessments

- Analysis, synthesis, and evaluation of data cannot be delegated to an LVN or UAP.

- Tasks and activities are assigned to the LVN by the RN based on the LVN's scope of practice and individual technical, manual competencies. The LVN is not an independent practitioner (B&P Code, Section 2859).

- Verified from http://www.bvnpt.ca.gov/

California Business and Professions Code Section 2860.5

A licensed vocational nurse when directed by a physician and surgeon may do all of the following:

(a) Administer medications by hypodermic injection.
(b) Withdraw blood from a patient, if prior thereto such nurse has been instructed by a physician and surgeon and has demonstrated competence to such physician and surgeon in the proper procedure to be employed when withdrawing blood, or has satisfactorily completed a prescribed course of instruction approved by the board, or has demonstrated competence to the satisfaction of the board.

Verified from http://www.bvnpt.ca.gov/ 2015 Update

California Business and Professions Code Section 2860.5

- (c) Start and superimpose intravenous fluids if all of the following additional conditions exist:

  (1) The nurse has satisfactorily completed a prescribed course of instruction approved by the board or has demonstrated competence to the satisfaction of the board.

  (2)The procedure is performed in an organized health care system in accordance with the written standardized procedures adopted by the organized health care system as formulated by a committee which includes representatives of the medical, nursing, and administrative staffs. "Organized health care system," as used in this section, includes facilities licensed pursuant to Section 1250 of the Health and Safety Code, clinics, home health agencies, physician's offices, and public or community health services. Standardized procedures so adopted will be reproduced in writing and made available to total medical and nursing staffs.

  Verified from http://www.bvnpt.ca.gov/ 2015 Update

LVN Scope of Practice and the Administration of IV Medications/Solutions

The Business and Profession Code, Section 2860.5 and California Code of Regulations, Article 8, Section 2542, are sections of the law that define LVN scope of practice in relationship to IVs.

These sections state that an LVN who is IV certified, may start peripheral IVs and superimpose intravenous solutions of electrolytes, nutrients, vitamins, infusion of blood and blood products.

The registered nurse is authorized to assign and supervise these activities and functions. LVNs do not have statutory authority to administer IV medications. In addition, an LVN does not have statutory authority to administer any intravenous agent via a central line. This applies to all practice settings.

Verified from http://www.bvnpt.ca.gov/ 2015 Update

LVN Scope of Practice and the Administration of IV Medications/Solutions

In other words, since LVNs do not have statutory authority to administer IV medications through either peripheral or central lines, this skill must not be delegated/assigned to them.

Furthermore, since LVNs do not have statutory authority to superimpose any agent through a central line, this skill must not be delegated/assigned to them. The RN can never delegate/assign these skills to the LVN or supervise the LVN performing these skills. For an RN to make such a delegation/assignment or supervise the LVN in these tasks would be a violation of the California Nursing Practice Act.

In conclusion, the RN is not authorized to delegate/assign to the LVN the administration of IV medication through a peripheral or central line. The RN is also not authorized to delegate/assign to the LVN the administration of any agent into a central line. Furthermore, the RN cannot supervise the performance of any of these tasks by the LVN.

Verified from http://www.bvnpt.ca.gov/ 2015 Update

Radiology Scope of Practice and the Administration of IV Medications/Solutions

- (a) (1) Notwithstanding Section 2052 of the Business and Professions Code or any other law, a radiologic technologist certified pursuant to the Radiologic Technology Act (Section 27) may, under the direct supervision of a licensed physician and surgeon, and in accordance with the facility's protocol that meets, at a minimum, the requirements described in paragraph

- (2), perform venipuncture in an upper extremity to administer contrast materials, manually or by utilizing a mechanical injector, if the radiologic technologist has been deemed competent to perform that venipuncture, in accordance with paragraph

- (3), and issued a certificate, as described in subdivision (b).

Radiology Scope of Practice and the Administration of IV Medications/Solutions

- (2) (A) In administering contrast materials, a radiologic technologist may, to ensure the security and integrity of the needle' s placement or of an existing intravenous cannula, use a saline-based solution that conforms with the facility's protocol and that has been approved by a licensed physician and surgeon. The protocol shall specify that only contrast materials or pharmaceuticals approved by the United States Food and Drug Administration may be used and shall also specify that the use shall be in accordance with the labeling.

- (B) A person who is currently certified as meeting the standards of competence in nuclear medicine technology pursuant to Article 6 (commencing with Section 107150) and who is authorized to perform a computerized tomography scanner only on a dual-mode machine, as described in Section 106976, may perform the conduct described in this subdivision.

Verified from http://www.bvnpt.ca.gov/ 2015 Update

Radiology Scope of Practice and the Administration of IV Medications/Solutions

- (3) Prior to performing venipuncture pursuant to paragraph (1), a radiologic technologist shall have performed at least 10 venipunctures on live humans under the personal supervision of a licensed physician and surgeon, a registered nurse, or a person the physician or nurse has previously deemed qualified to provide personal supervision to the technologist for purposes of performing venipuncture pursuant to this paragraph. Only after completion of a minimum of 10 venipunctures may the supervising individual evaluate whether the technologist is competent to perform venipuncture under direct supervision. The number of venipunctures required in this paragraph are in addition to those performed for meeting the requirements of paragraph (2) of subdivision (d). The facility shall document compliance with this subdivision.

Verified from http://www.bvnpt.ca.gov/ 2015 Update

Radiology Scope of Practice and the Administration of IV Medications/Solutions

- (b) The radiologic technologist shall be issued a certificate as specified in subdivision (e) or by an instructor indicating satisfactory completion of the training and education described in subdivision (d). This certificate documents completion of the required education and training and may not, by itself, be construed to authorize a person to perform venipuncture or to administer contrast materials.

- (c) (1) "Direct supervision," for purposes of this section, means the direction of procedures authorized by this section by a licensed physician and surgeon who shall be physically present within the facility and available within the facility where the procedures are performed, in order to provide immediate medical intervention to prevent or mitigate injury to the patient in the event of adverse reaction.

Radiology Scope of Practice and the Administration of IV Medications/Solutions

- (2) "Personal supervision," for purposes of this section, means the oversight of the procedures authorized by this section by a supervising individual identified in paragraph (3) of subdivision (a) who is physically present to observe, and correct, as needed, the performance of the individual who is performing the procedure.

Radiology Scope of Practice and the Administration of IV Medications/Solutions

(d) The radiologic technologist shall have completed both of the following:

(1) Received a total of 10 hours of instruction, including all of the following:

(A) Anatomy and physiology of venipuncture sites.

(B)Venipuncture instruments, intravenous solutions, and related equipment.

(C) Puncture techniques.

(D) Techniques of intravenous line establishment.

(E) Hazards and complications of venipuncture.

(F) Postpuncture care.

(G) Composition and purpose of antianaphylaxis tray.

(H) First aid and basic cardiopulmonary resuscitation.

(2)Performed 10 venipunctures on a human or training mannequin upper extremity (for example, an infusion arm or a mannequin arm) under personal supervision. If performance is on a human, only an upper extremity may be used.

Radiology Scope of Practice and the Administration of IV Medications/Solutions

- (e) Schools for radiologic technologists shall include the training and education specified in subdivision (d). Upon satisfactory completion of the training and education, the school shall issue to the student a completion document. This document may not be construed to authorize a person to perform venipuncture or to administer contrast materials.

- (f) Nothing in this section shall be construed to authorize a radiologic technologist to perform arterial puncture, any central venous access procedures including repositioning of previously placed central venous catheter except as specified in paragraph (1) of subdivision (a), or cutdowns, or establish an intravenous line.

Radiology Scope of Practice and the Administration of IV Medications/Solutions

- (g) This section shall not be construed to apply to a person who is currently certified as meeting the standards of competence in nuclear medicine technology pursuant to Article 6 (commencing with Section 107150), except as provided in subparagraph (B) of paragraph (2) of subdivision (a).

- (h) Radiologic technologists who met the training and education requirements of subdivision (d) prior to January 1, 2013, need not repeat those requirements, or perform the venipunctures specified in paragraph (3) of subdivision (a), provided the facility documents that the radiologic technologist is competent to perform the tasks specified in paragraph (1) of subdivision (a).

Word Definitions:

IV Therapy

Intravenous therapy or IV therapy is the giving of substances directly into a vein. The word intravenous simply means "within a vein". Therapies administered intravenously are called often specialty pharmaceuticals.

Intravenous therapy may be used to correct electrolyte imbalances, to deliver medications, for blood transfusion or as fluid replacement to correct, for example, dehydration.

Compared with other routes of administration, the intravenous route is the fastest way to deliver fluids and medications throughout the body. Some medications, as well as blood transfusions and lethal injections, can only be given intravenously.

Word Definitions:

Blood Withdrawal - the process of removing blood from the body. Blood is most commonly obtained from the median cubital vein, which lies within the cubital fossa anterior to the elbow. This vein lies close to the surface of the skin, and there is not a large nerve supply.

Vein puncture - the process of obtaining intravenous access for the purpose of intravenous therapy or obtaining a sample of venous blood.

Venipuncture is one of the most routinely performed invasive procedures and is carried out for two reasons, to obtain blood for diagnostic purposes or to monitor levels of blood components .

Blood analysis is one of the most important diagnostic tools available to clinicians within healthcare.

Its data is relied upon in the clinical setting for interpretation of a myriad of clinical signs and symptoms and developing skills in venipuncture can facilitate holistic and timely treatment.

Review of Human Body Systems

Cardiovascular System

The cardiovascular/circulatory system transports food, hormones, metabolic wastes, and gases (oxygen, carbon dioxide) to and from cells. Components of the circulatory system includes:

- blood: consisting of liquid plasma and cells
- blood vessels (vascular system): the "channels" (arteries, veins, capillaries) which carry blood to/from all tissues. (Arteries carry blood away from the heart. Veins return blood to the heart. Capillaries are thin-walled blood vessels in which gas/ nutrient/ waste exchange occurs.)
- heart: a muscular pump to move the blood

Review of Human Body Systems

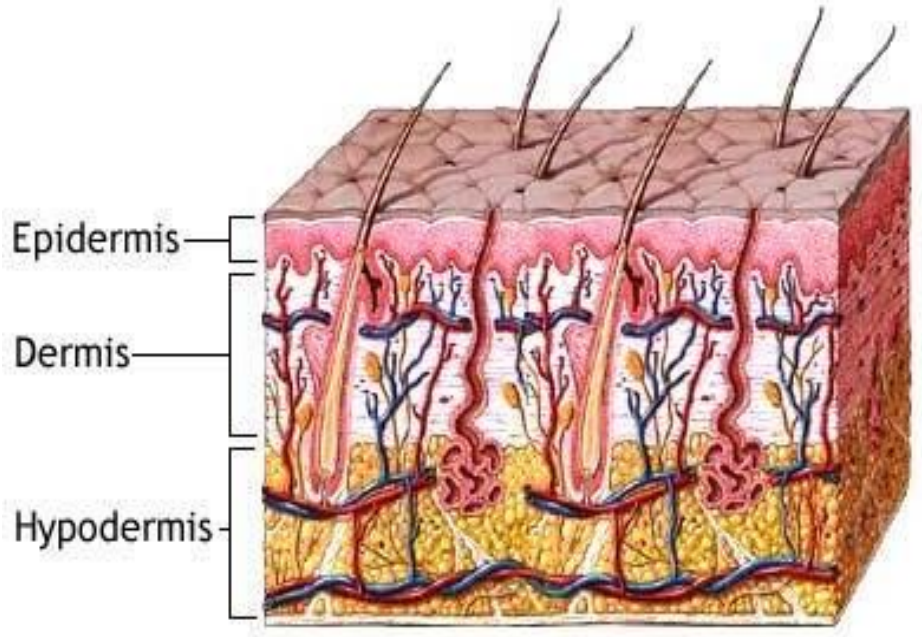
Integumentary System

The skin is the largest organ of the body, with a surface area of 18 square feet.

Its two main layers are the epidermis (outer layer) and dermis (inner layer).

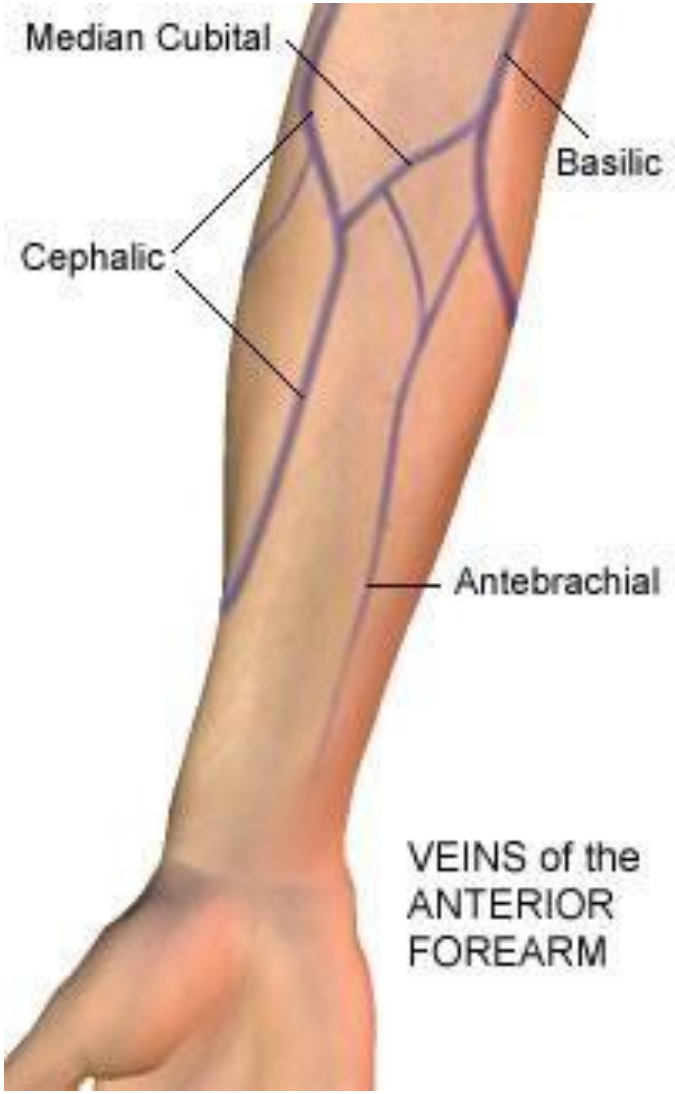
The epidermis has several strata (layers) that contain four cell types.

- Keratinocytes produce keratin, a protein that gives skin its strength and flexibility and waterproofs the skin surface.
- Melanocytes produce melanin, the dark pigment that gives skin its color.
- Merkel's cells are probably involved with touch reception.

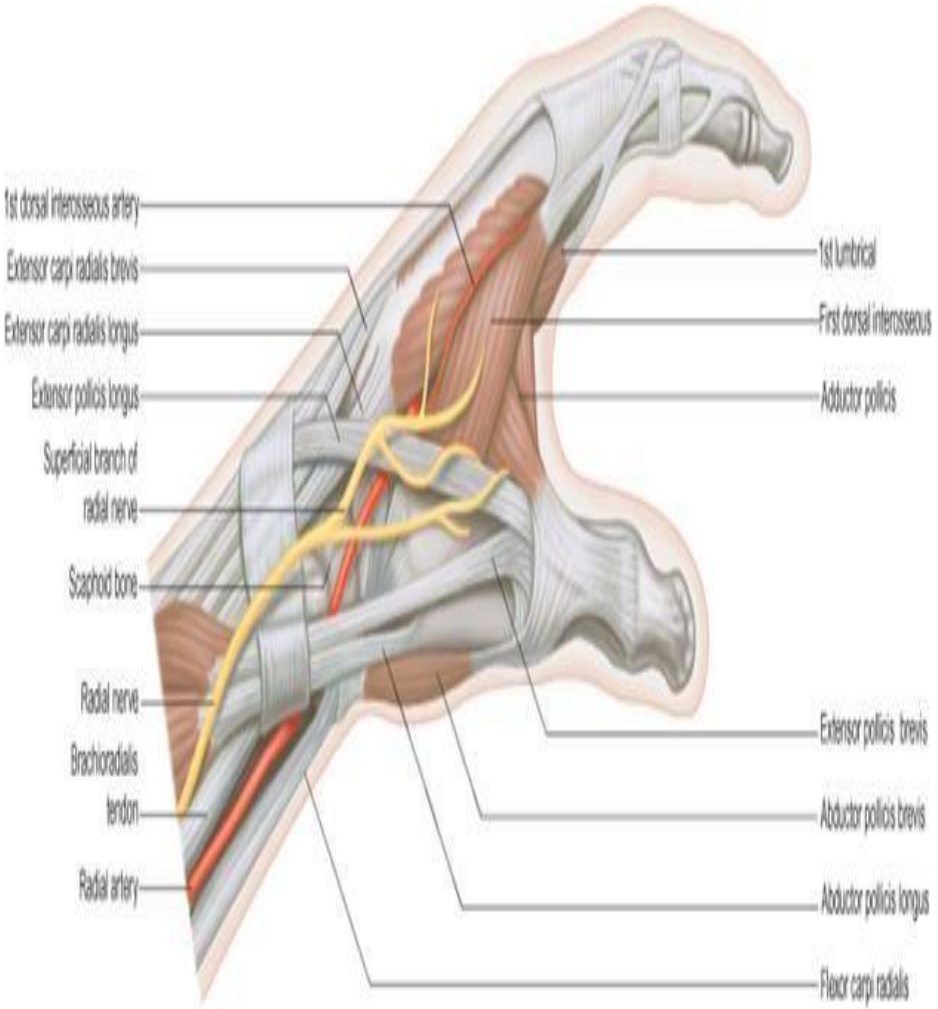


A.D.A.M.

The Veins – Location, Location, Location



Be aware of the Radial Artery/ Ulnar Nerve



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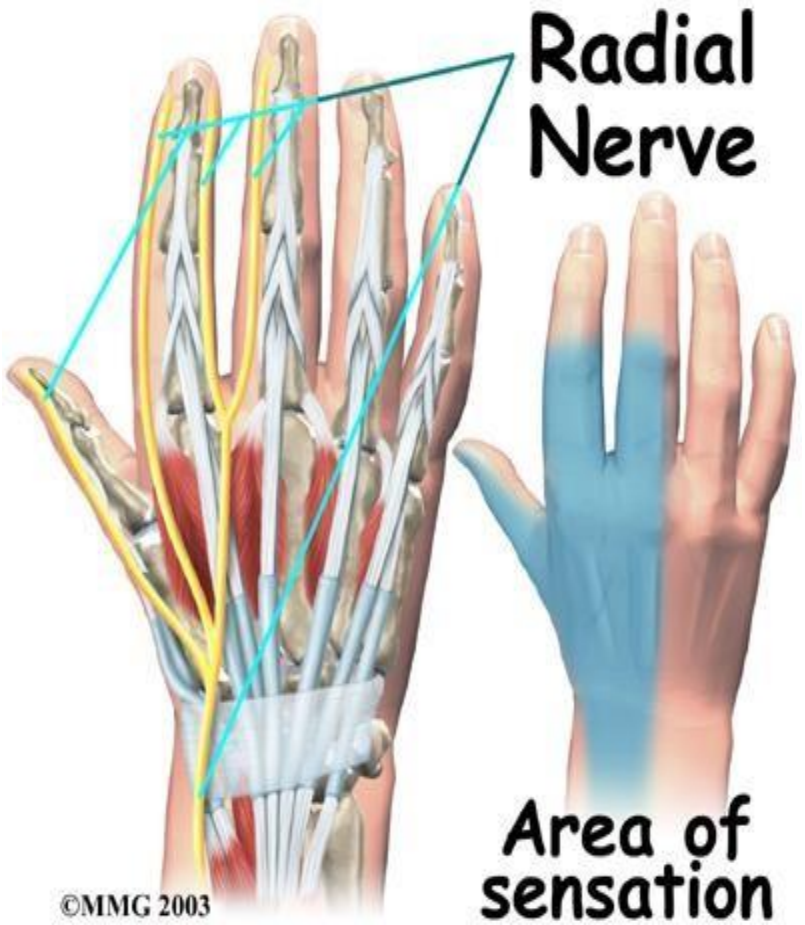


Fluids and Electrolytes - Video

Fluid Compartments: For adult weight, body fluids is 60%. For infants, it is 80%. Minor changes can be critical to the patient.

1.Intracellular - Largest compartment; hold 40% of a person's body weight.
Intracellular area contains 25 liters of fluid.

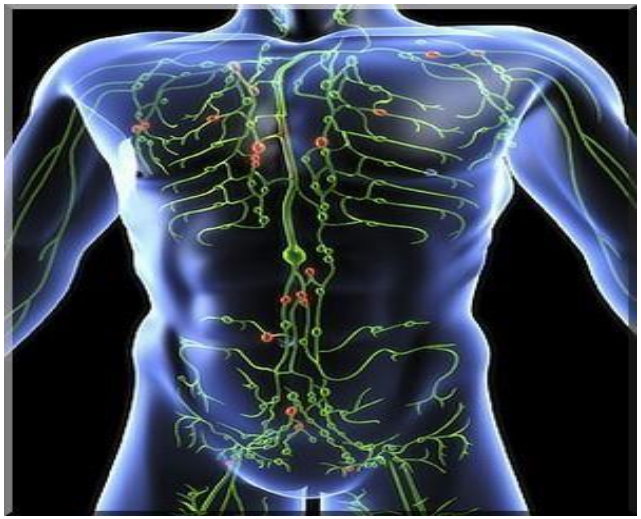
2. Extracellular - has three compartments that holds 15 liters:

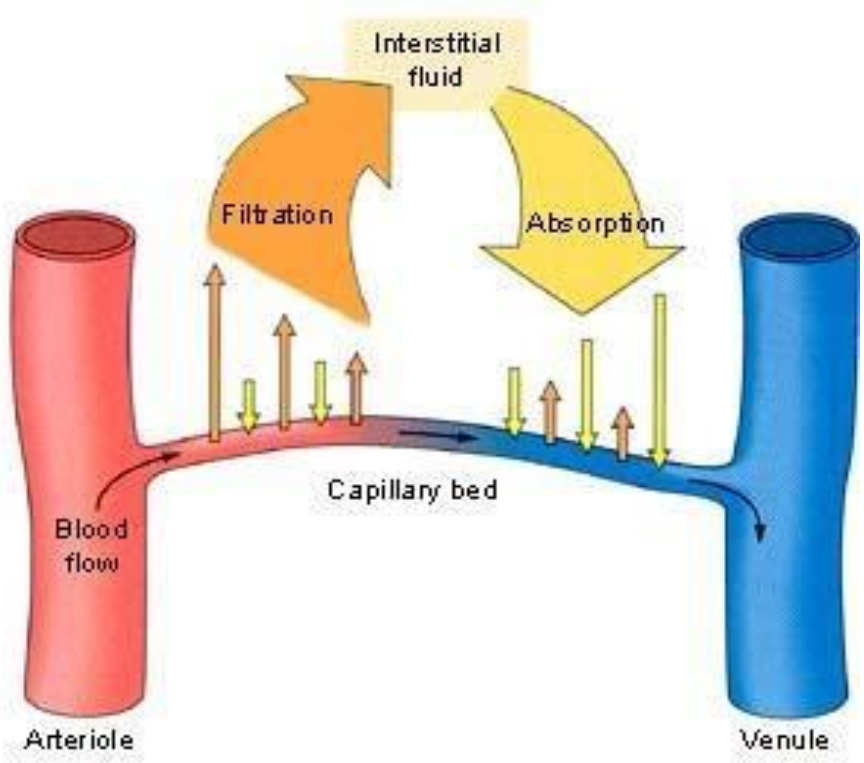
   a. Plasma - intravascular compartment within the arteries and veins. Makes up 5-7% of the total body weight. Total of 5 L of fluid contained in the intravascular area.

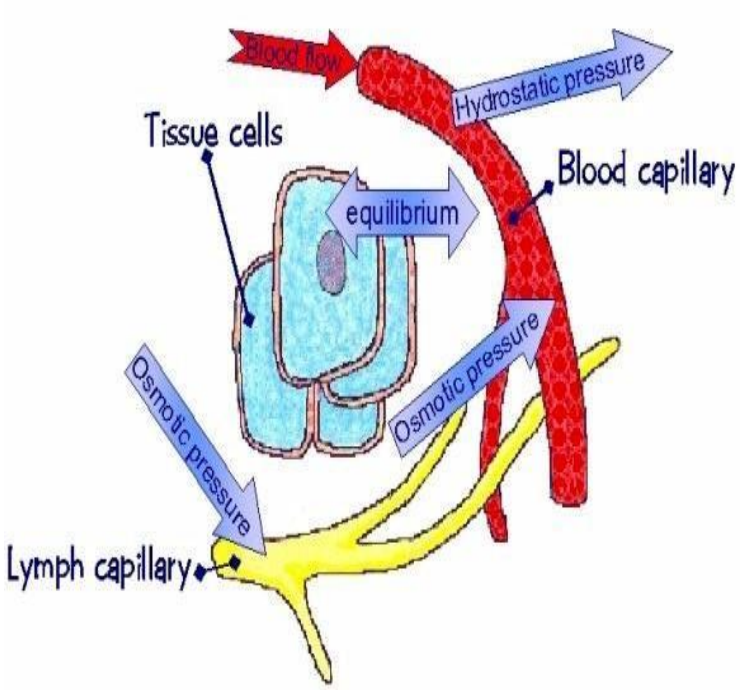
   b. Interstitial Fluid - spaces between the cells. Makes up approximately 15% of the total body weight.

   c.Lymphatic system - makes up approximately 2-5% total body weight.

Fluids and Electrolytes





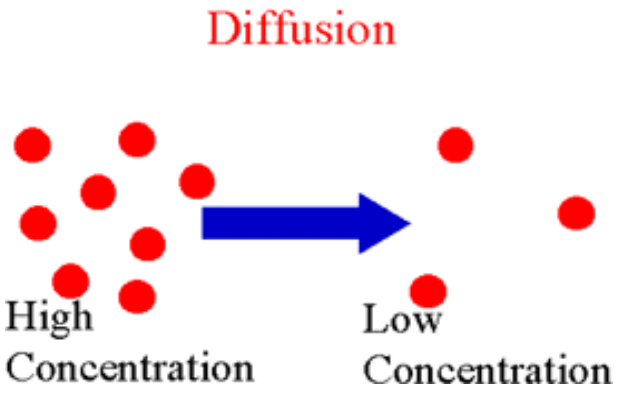


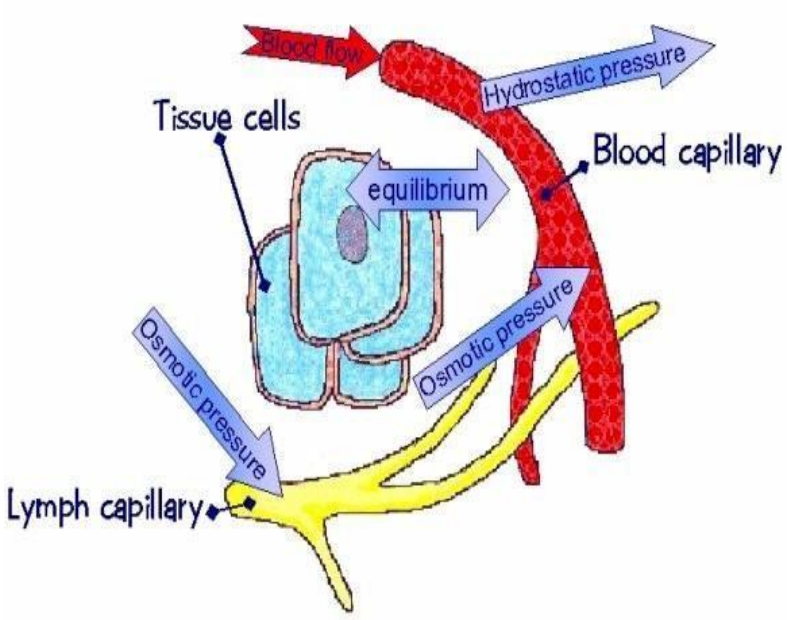
Fluids and Electrolytes

DIFFUSION

Diffusion refers to the movement of a chemical substance from an area of high concentration to an area of low concentration.

This process mainly occurs in gases, liquids and solutions.





OSMOSIS

Osmosis is the movement of water, which goes down the concentration gradient, across a semipermeable membrane when equilibrium cannot be achieved by diffusion of solute molecules.

Fluids and Electrolytes

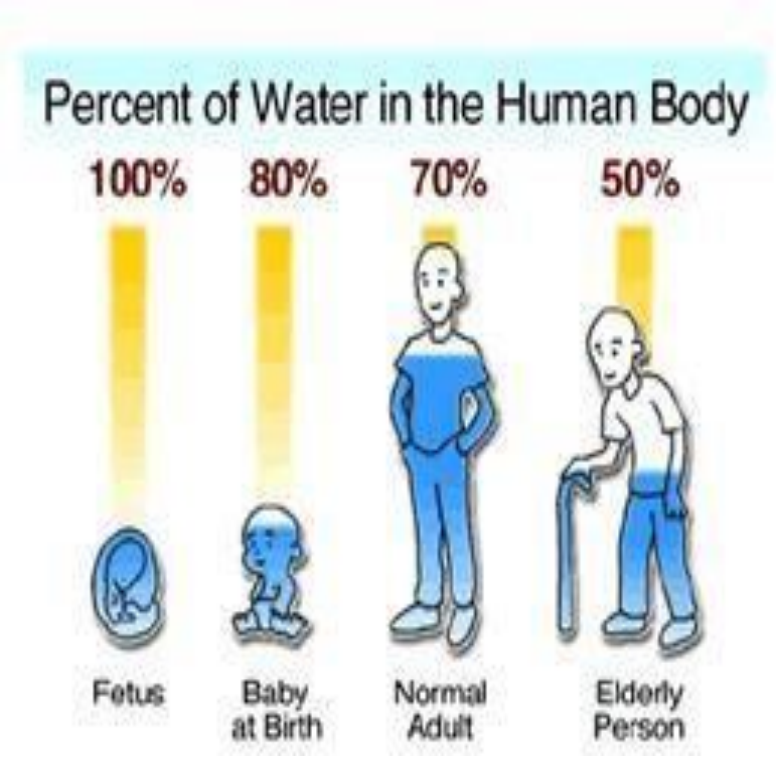
Percentage of water in the Body

Adipose - depending on the amount of fat in a person's body, the fat tissue should be essentially water free. The leaner the body, the MORE water the body contains.

Adult male - water makes 60% - 70% of the body weight in an adult male.

Adult female - 54% - 60% of the body weight in a female.

Newborn - 80% total body weight in an infant. Until the infant is 12 months old, the baby will then have highest percentage of body water.



Fluid losses-up to:
5% of fluid loss is considered moderate
10% loss is serious
20% loss can be fatal

Calculate Daily Fluid Intake

- 68 KG
- 150 lbs = 150 divide by 2.2 = 68 Kg
- kg x 100 ml = 360 ml/day

- 68 kg
- 1500 ml + 960 ml = 2460 ml
- 68 – 20 = 48 kg
- 48 x 20 = 960 ml

Fluids and Electrolytes

Body Regulating Systems

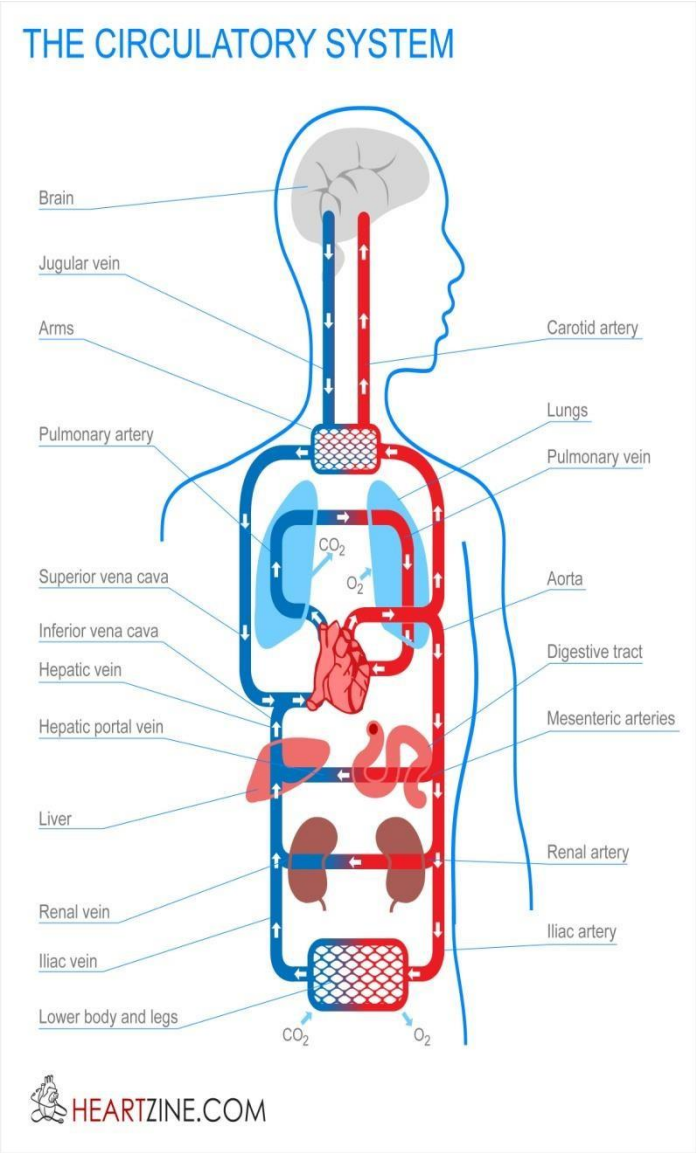
1.Kidneys-main monitor of fluid balance through re-absorption and excretion, depending on the regulating systems signals.

2.Heart - aids the kidneys to their job by the amount of the blood it pumps to the body systems.

3. Skin - daily loss estimated with the sensible loss of the lungs, fluids lost here through perspiration.

4.Pituitary - when stimulated, the pituitary releases a water saving hormone, anti diuretic hormone (ADH), this causes the kidneys to reabsorb water and concentrates the urine.

5. Large intestines - approximately 100 - 200cc of fluid a day can be lost through the intestines through feces.

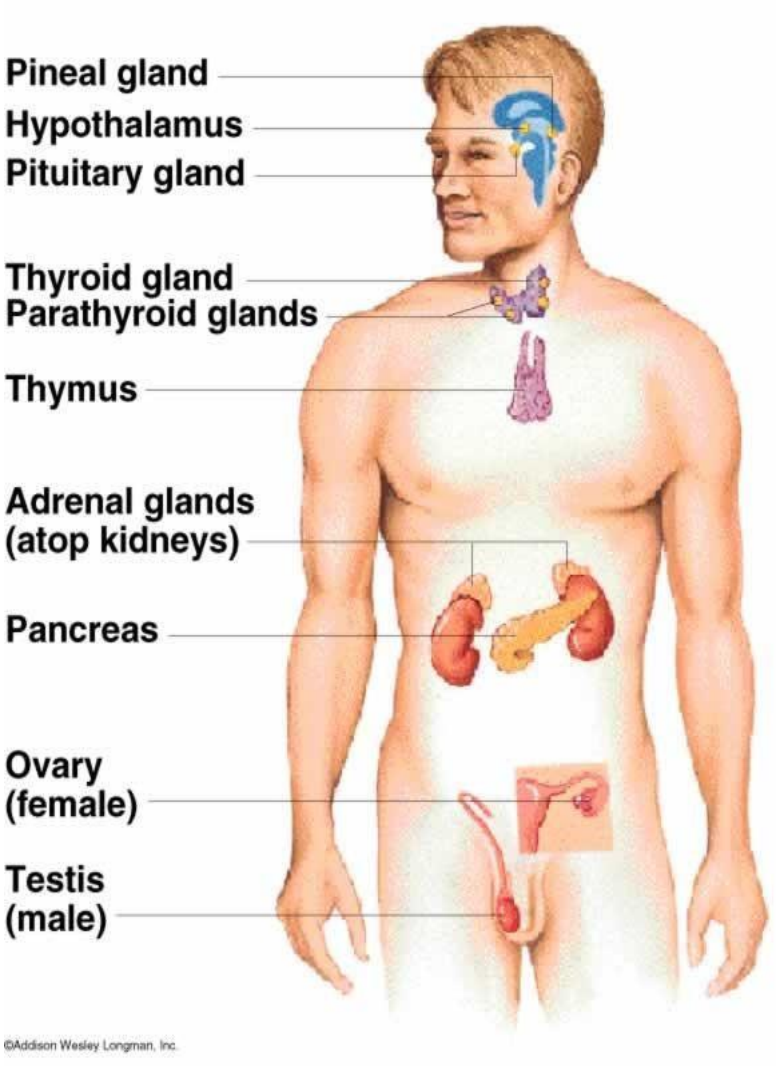


Fluids and Electrolytes

6.Adrenal Cortex - stimulation of this gland causes the hormone Aldosterone to be released, this causes the conservation of NA+, and Cl- excretion of K+ and water reabsorption.

7.Parathyroid - when stimulated, releases the hormone, parathyrone, regulates the Ca and Mg levels, this area is stimulated by the adrenal cortexes release of aldosterone and aids in the conservation of the body's water.

8.Lung - through insensible loss, loss will increase or the respiration rate increases or if the weather is hot. If there is injury to the skin from a burn etc.



Fluids and Electrolytes

Fluid Balance

-is the concept of human homeostasis that the amount of fluid lost from the body is equal to the amount of fluid taken in.

Euvolemia is the state of normal body fluid volume.

Fluid loss and Gain

Water Loss

Insensible Loss - water loss that we are usually unaware of. It is due to transepidermal diffusion: water that passes through the skin and is lost by evaporation, and evaporative water loss from the respiratory tract.

Sensible Loss - the person is aware of such as through wound drainage, GI tract losses and urination.

Fluid Gain

The intake of fluid into our system

The body's homeostatic control mechanisms, which maintain a constant internal environment, ensure that a balance between fluid gain and fluid loss is maintained. The hormones ADH (Anti-diuretic Hormone, also known as vasopressin) and Aldosterone play a major role in this.

Dehydration

Dehydration is an excessive loss of body fluid.

3 main types of Fluid Loss:

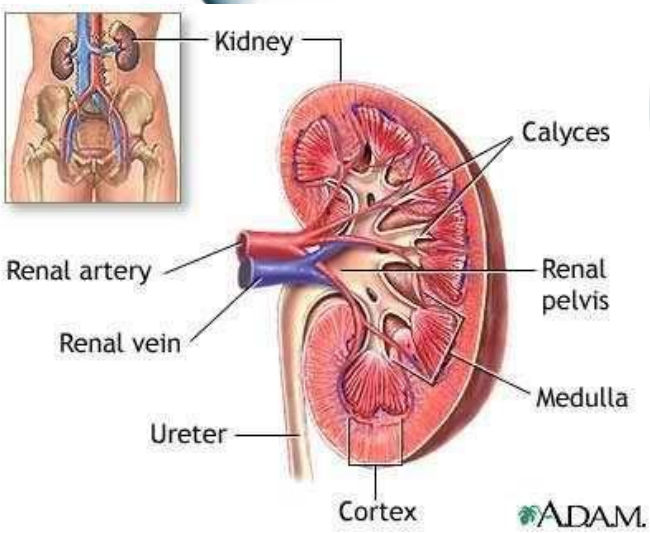
- ✓Hypotonic or hyponatremic (primarily a loss of electrolytes, sodium in particular)
- ✓Hypertonic or hypernatremic (primarily a loss of water)
- ✓Isotonic or isonatremic (equal loss of water and electrolytes).

Correction of a dehydrated state is accomplished by the replenishment of necessary water and electrolytes (rehydration, through oral rehydration therapy or fluid replacement by intravenous therapy).

Balance

Acid/Base Balance

1. **Acid-base homeostasis** is the part of human homeostasis concerning the proper balance between acids and bases, in other words, the pH.
2. The body is very sensitive to its pH level, so strong mechanisms exist to maintain it. Outside the acceptable range of pH, proteins are denatured and digested, enzymes lose their ability to function, and death may occur.



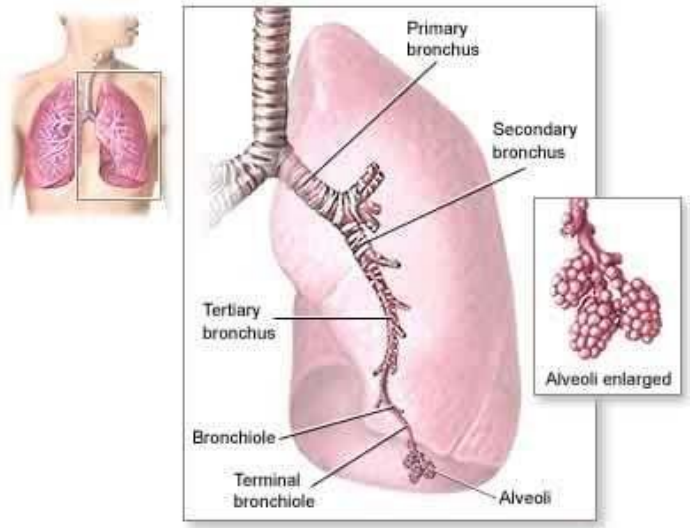
Regulatory system

1.Kidneys-increase or decrease the re-absorption of fluids & electrolytes, depending on the signals the body gives it.

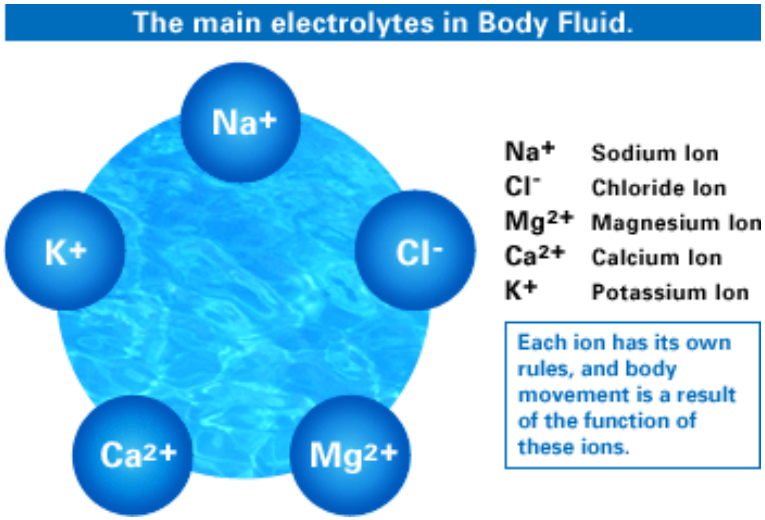
2.Lungs-helps keep the acid/base balance by increasing or decreasing the resp. rate, this will change the C02 of the blood

3.Blood buffer system-controls the ion balance by adding acids or bases, when needed.

4. Electrolytes



Electrolytes



LABORATORY RESULTS MAY VARY FROM EACH HOSPITAL, BE SURE TO CHECK THE STANDARDS AT YOUR FACILITY.

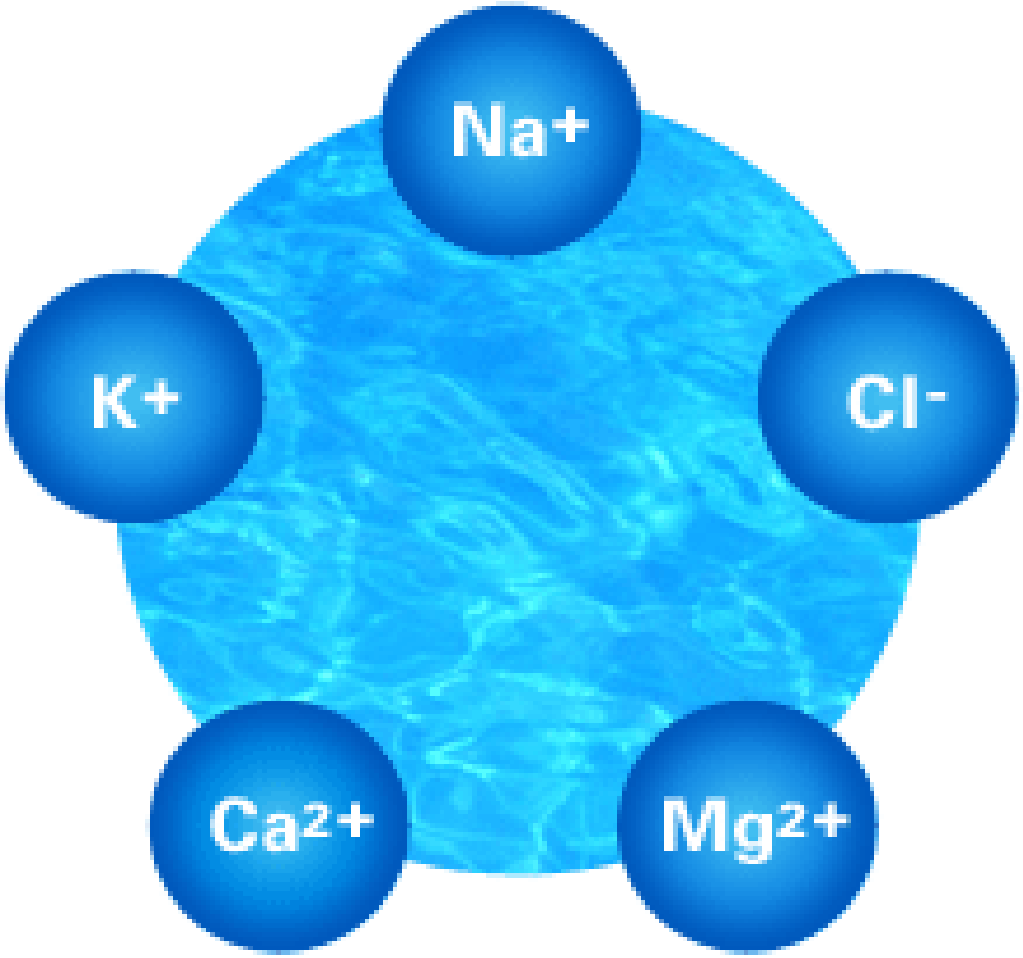
Chemically, electrolytes are substances that become ions in solution and acquire the capacity to conduct electricity.

Electrolytes are present in the human body, and the balance of the electrolytes in our bodies is essential for normal function of our cells and our organs.

Commonly called ***"ions",*** ions with a "+" charge are called "cations", eg. NA+. K+, CA++, MG++.
Ions with a "-" charge are called "anions", HC03, Phosphorous

Electrolytes

The main electrolytes in Body Fluid.



Na^+	Sodium Ion
Cl^-	Chloride Ion
Mg^{2+}	Magnesium Ion
Ca^{2+}	Calcium Ion
K^+	Potassium Ion

Each ion has its own rules, and body movement is a result of the function of these ions.

Types of Electrolytes

Potassium
Potassium is the major positive ion (cation) found inside of cells.

The chemical notation for potassium is K+. The proper level of potassium is essential for normal cell function. Among the many functions of potassium in the body are regulation of the heartbeat and the function of the muscles.

A seriously abnormal increase in potassium (hyperkalemia) or decrease in potassium (hypokalemia) can profoundly affect the nervous system and increases the chance of irregular heartbeats (arrhythmias), which, when extreme, can be fatal.

The normal blood potassium level is 3.5 - 5.0 milliEquivalents/liter (mEq/L), or in international units, 3.5 - 5.0 millimoles/liter (mmol/L).

Hyperkalemia

Increased potassium is known as hyperkalemia. Potassium is normally excreted by the kidneys, so disorders that decrease the function of the kidneys can result in hyperkalemia.

Hyperkalemia can also be caused by shifting of K+ of crush injuries and burns.

Hyperkalemia Symptoms-tingling & numbness in the extremities, decreased heart rate, ECG changes, diarrhea , anxiety& nausea.

Treatment-stop K+ replacement if patient is on it.
Kayexalate enemas, and if severely high, dialysis can be done.

Hyperkalemia

Hypokalemia, or decreased potassium, can arise due to kidney diseases; excessive loss due to heavy sweating, vomiting, or diarrhea, eating disorders, certain medications (potassium-wasting diuretic therapy), or other causes.

Hypokalemia can also be caused by diuretics, GI suction & overuse of laxatives.

1. Symptoms-malaise, apathy, muscle cramps, postural hypotension, increased heart rate & abdominal distension.

2. Treatments- Mild: K+ oral supplements.
   Potassium replacement by IV. There is a whole set of rules.

Sodium

Sodium is the major positive ion (cation) in fluid outside of cells. The chemical notation for sodium is Na+.

When combined with chloride, the resulting substance is table salt. Excess sodium (such as that obtained from dietary sources) is excreted in the urine.

Sodium regulates the total amount of water in the body and the transmission of sodium into and out of individual cells also plays a role in critical body functions.

Many processes in the body, especially in the brain, nervous system, and muscles, require electrical signals for communication. The movement of sodium is critical in generation of these electrical signals. Too much or too little sodium therefore can cause cells to malfunction, and extremes in the blood sodium levels (too much or too little) can be fatal.

Sodium & Fluid Excess

Common Situations when there's Too Much Fluid in our system:

Fluid volume excess, or hypervolemia, occurs from an increase in total body sodium content
and an increase in total body water.

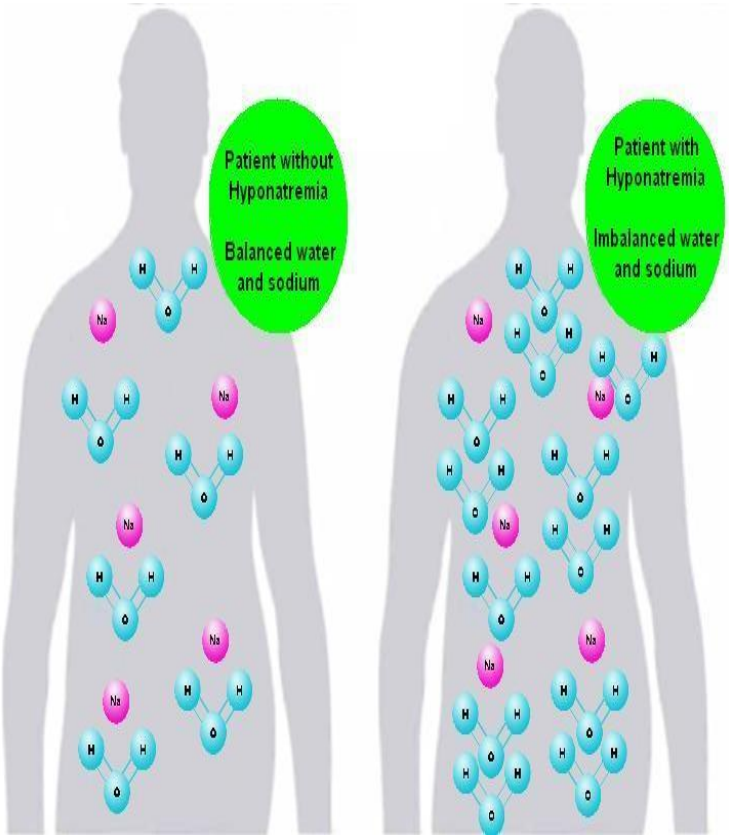
This fluid excess usually results from compromised regulatory mechanisms for sodium and water as seen in congestive heart failure (CHF),
kidney failure, and liver failure.

It may also be caused by excessive intake of sodium from foods, intravenous (IV) solutions,
medications, or diagnostic contrast dyes.

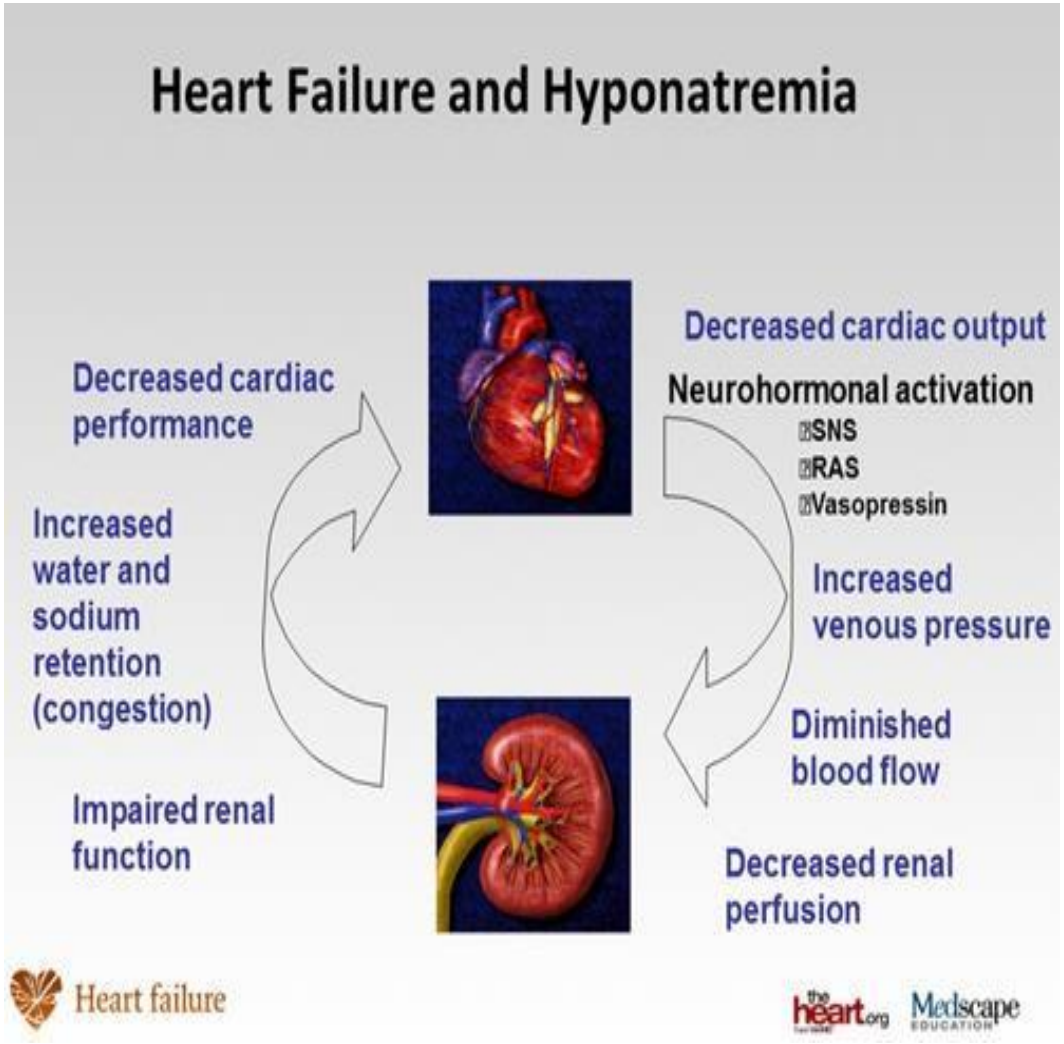
When 2-4 kg of fluid is retained , edema forms.

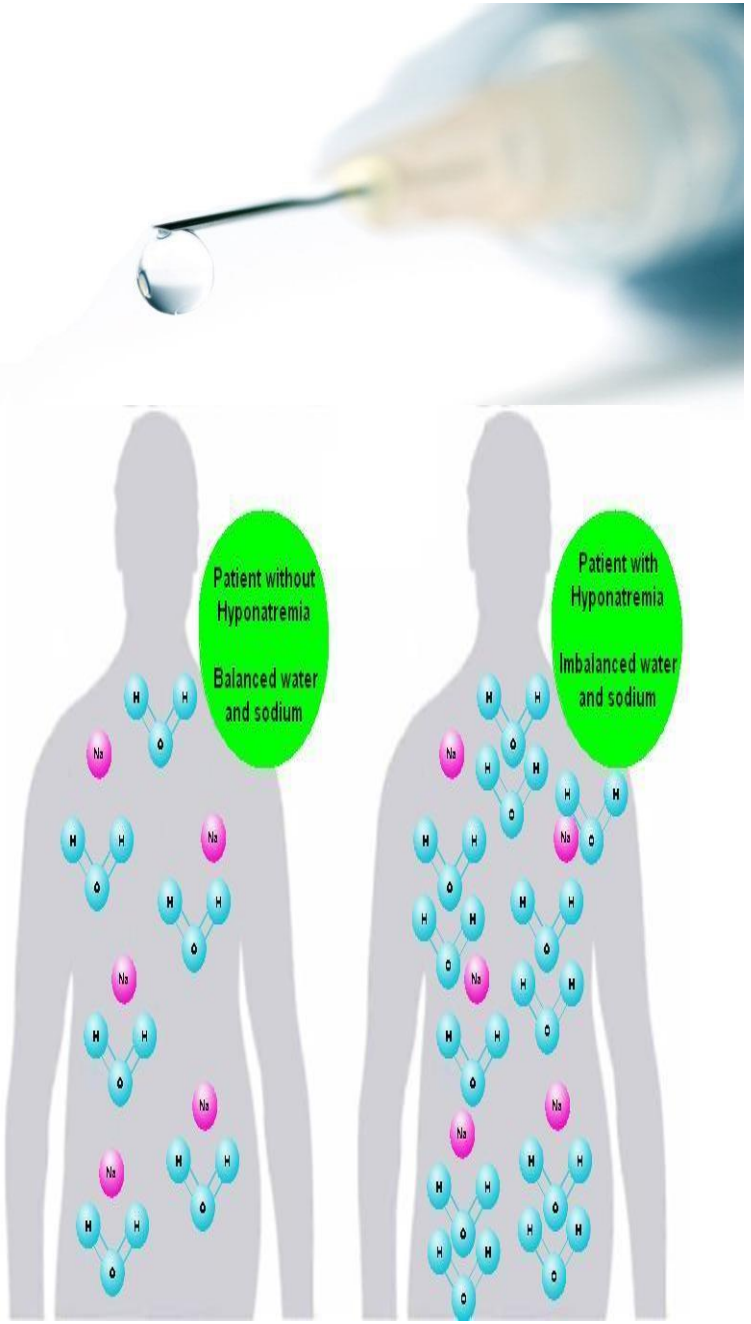
What happens to the Sodium level?

- Hyponatremia occurs



Hyponatremia



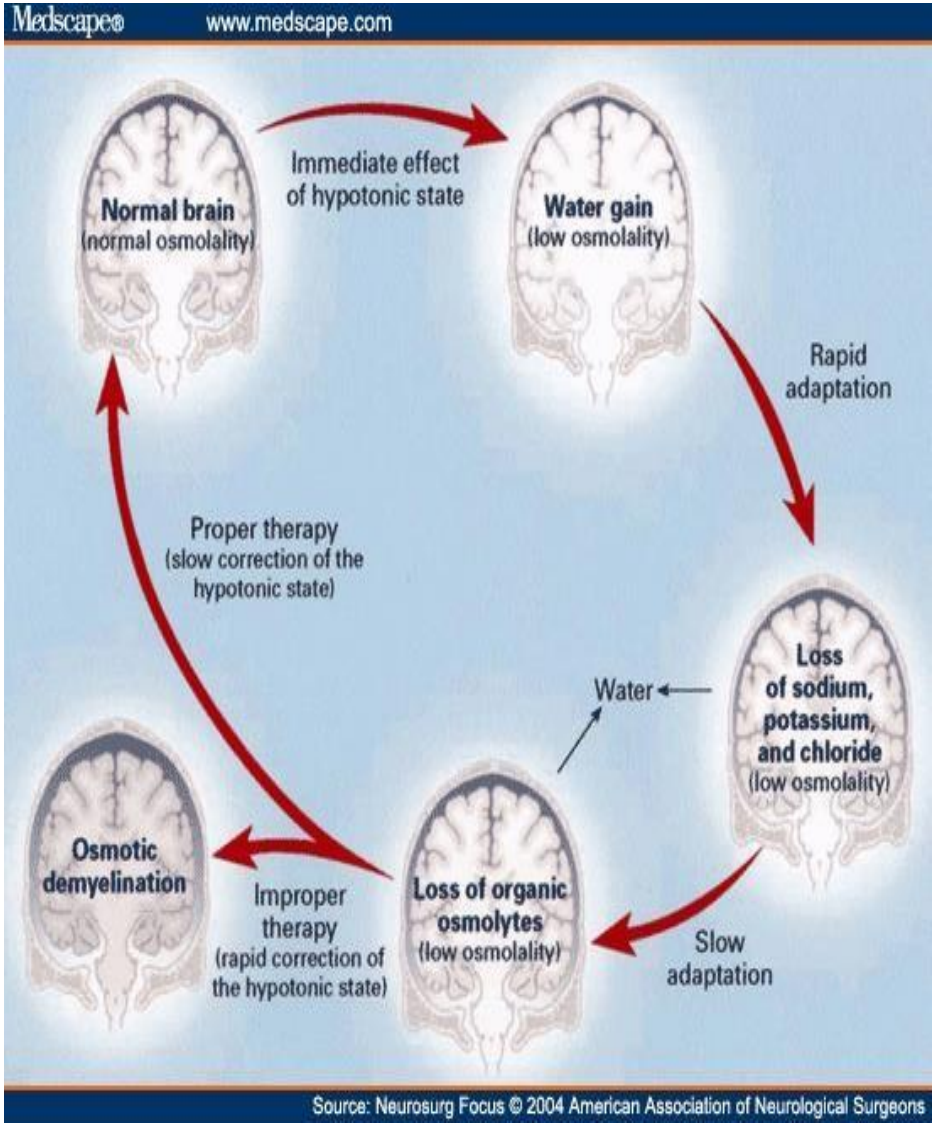


Hyponatremia

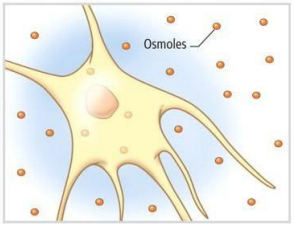
A decreased concentration of sodium (hyponatremia) occurs whenever there is a relative increase in the amount of body water relative to sodium.

- Signs & Symptoms-
- Na+ < 115 affects CNS cells: Headache, Feeling exhausted, muscle cramps, sensation of taste impaired
- Treatment – Replace sodium and correct fluid excess, orally or parenterally. Diuretics to excrete excess fluids. Correct any other electrolyte losses.

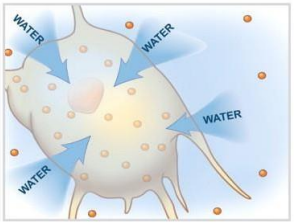
- A Normal blood sodium level is 135 - 145 milliEquivalents/liter (mEq/L), or in international units, 135 - 145 millimoles/liter (mmol/L).



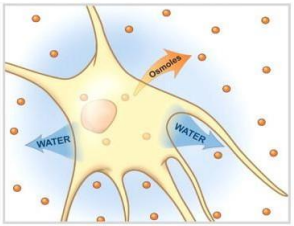
The danger of overly aggressive correction of hyponatremia



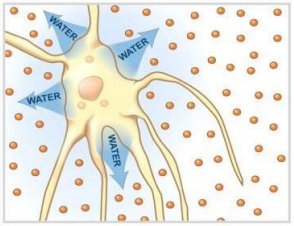
Normal state. The extracellular fluid is in osmotic equilibrium with the intracellular fluid, including that of the brain cells, with no net movement of water across the plasma membrane.



Acute hyponatremia. If the extracellular fluid suddenly becomes hypotonic relative to the intracellular fluid, water is drawn into the cells by osmosis, potentially causing cerebral edema.

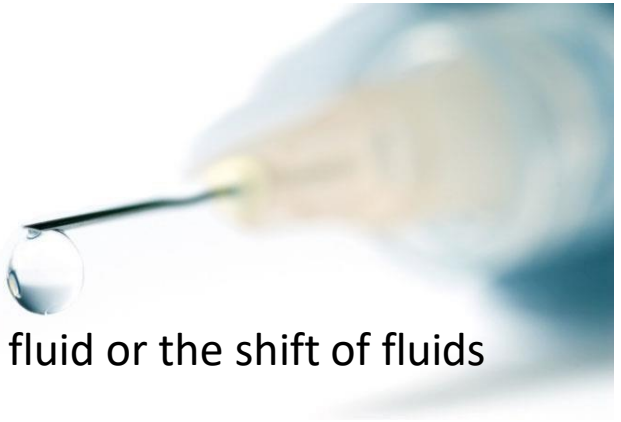


Adaptation. Over the ensuing few days, brain cells pump out osmoles, first potassium and sodium salts and then organic osmoles, establishing a new osmotic equilibrium across the plasma membrane and reducing the edema as water moves out of the cells.



Overly aggressive therapy with hypertonic saline after adaptation has occurred raises the serum sodium level to the point that the extracellular fluid is more concentrated than the intracellular fluid, drawing more water out of the brain cells and causing the syndrome of osmotic demyelination.

Sodium & Fluid Deficit



Common Situations when there's "Too little Fluid ":
Fluid volume deficit, or hypovolemia, occurs from a loss of body fluid or the shift of fluids into the third space, or from a reduced fluid intake.

Common sources for fluid loss are vomitting, diarrhea, increased sweating, GI suctioning, polyuria, increased perspiration, and decreased fluid intake

Fluid volume deficit may be an acute or chronic condition managed in the hospital, outpatient center, or home setting. The therapeutic goal is to treat the underlying disorder and return the extracellular fluid compartment to normal.

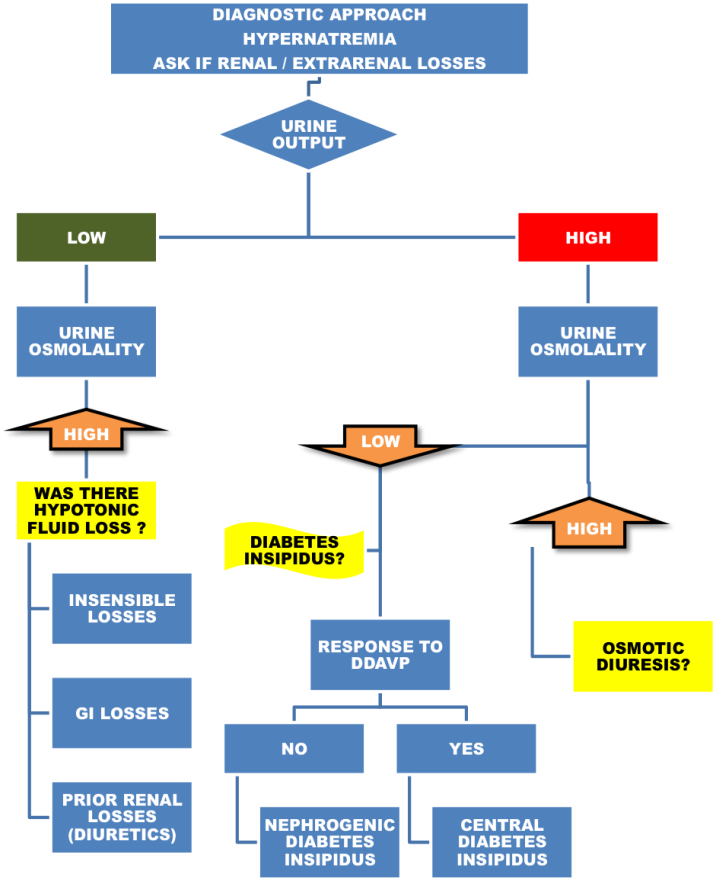
Treatment consists of restoring fluid volume and correcting any electrolyte imbalances.

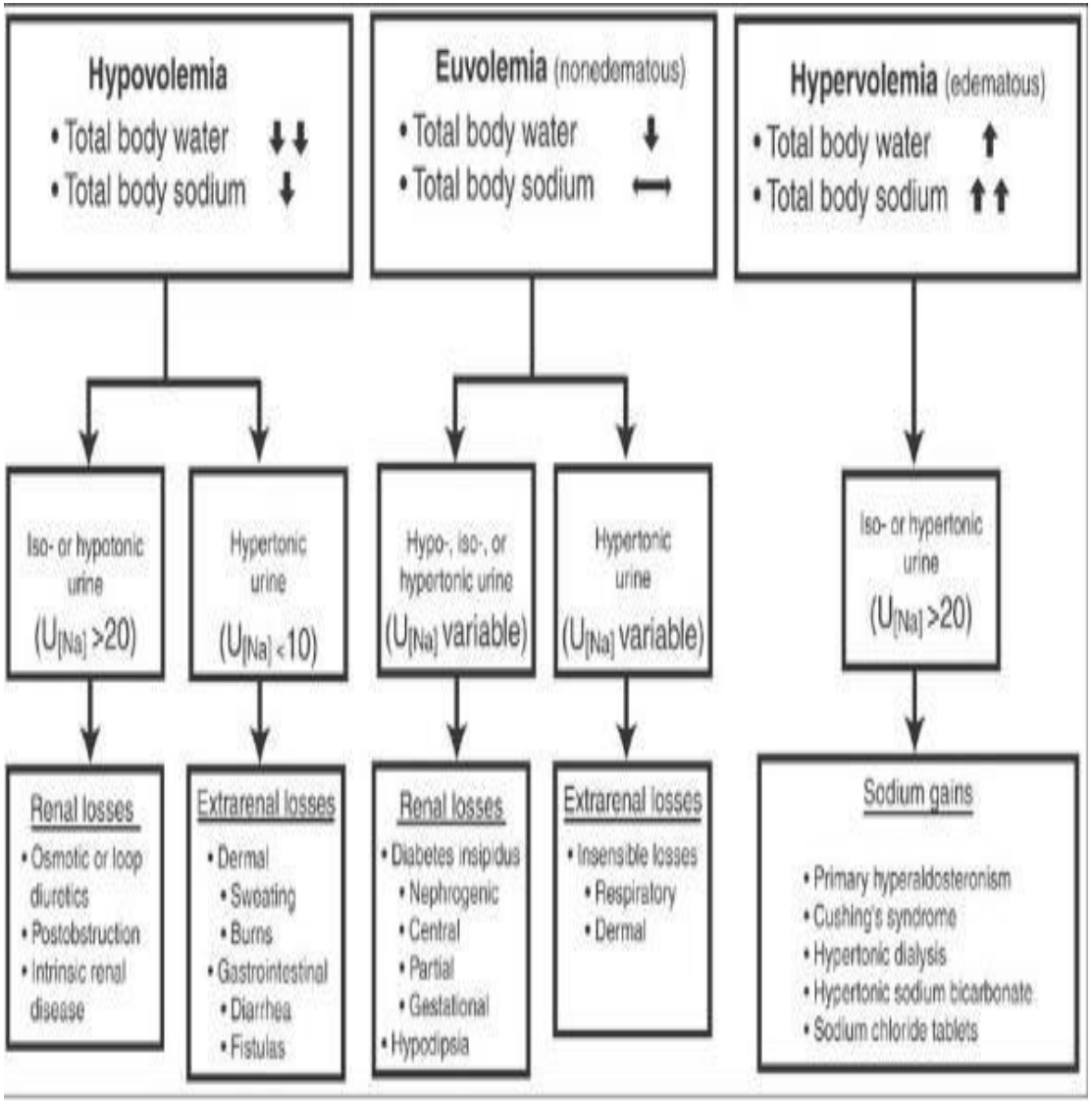
Early recognition and treatment are paramount to prevent potentially life-threatening hypovolemic shock. Elderly patients are more likely to develop fluid imbalances.

What happens to the Sodium level?

- Hypernatremia occurs

OPTIONAL – NOT on TEST





OPTIONAL – NOT on TEST

	SIADH	RSWS	Hypovolemia
Volume status	euvolemic	hypovolemic	hypovolemic
Serum sodium	low	low	low
Urinary sodium	>40 mmol/l	>>40 mmol/l	<20 mmol/l
Plasma osmolality	low	low	low
Urine osmolality	>plasma osmolality	>plasma osmolality	>plasma osmolality
Urine output	decreased	increased	decreased
ADH levels	elevated	decreased*	elevated

*Only in the absence of volume depletion

Hypernatremia

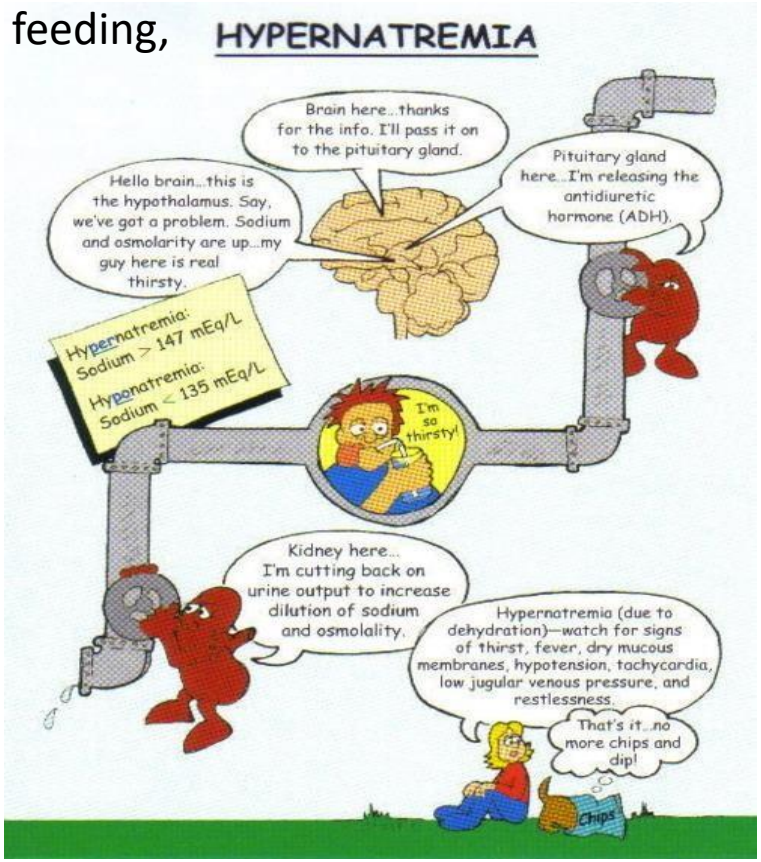
Increased sodium (hypernatremia) in the blood occurs whenever there is excess sodium in relation to fluid volume.

Administration causes of hypernatremia : hypertonic tube feeding, administration of sodium-containing solutions, etc.

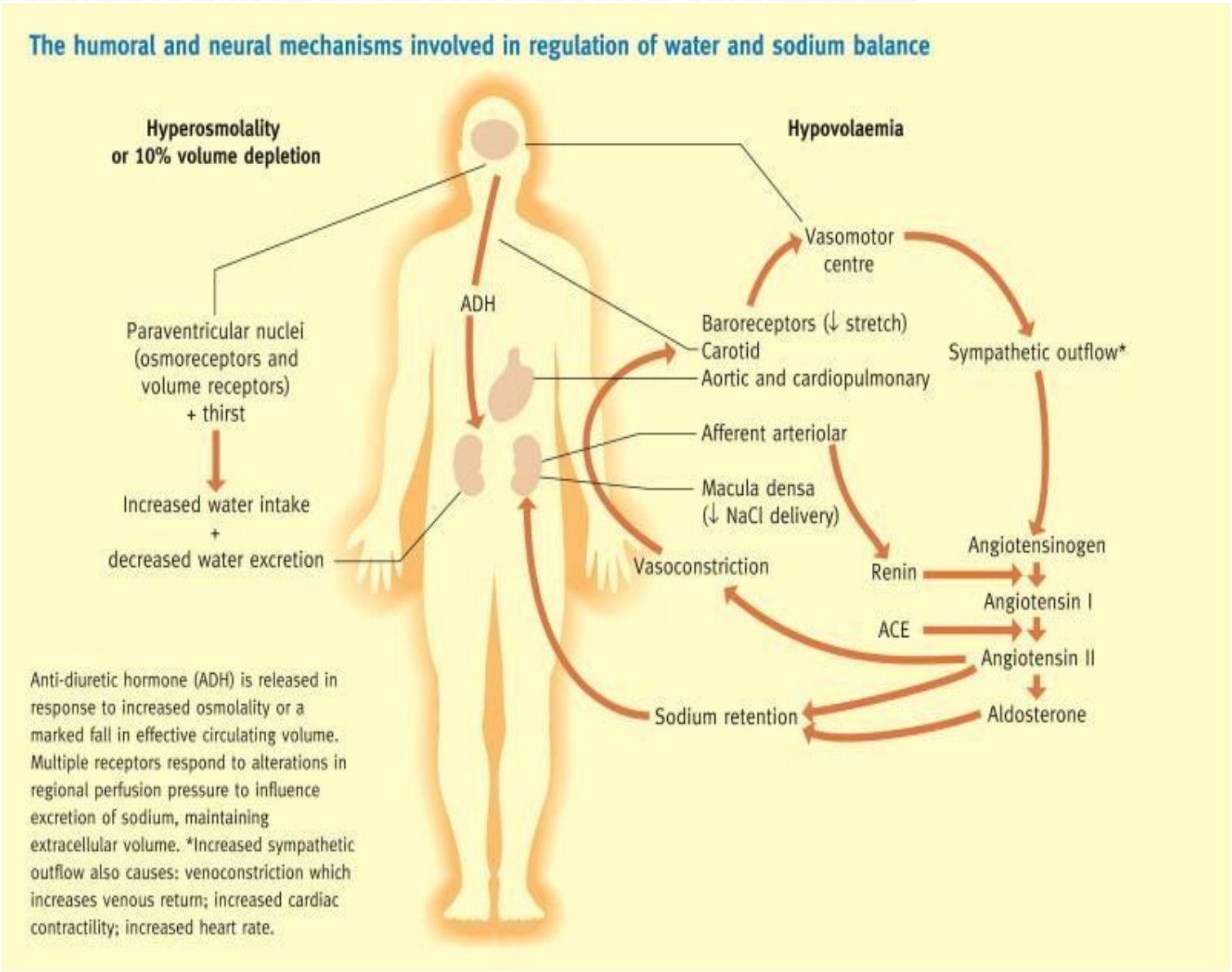
Signs and symptoms: Na+> 145 mEq/L

Marked thirst, temperature increase, swollen tongue, red, dry sticky membranes, disorienation, irritability, hyperactivity

Treatment: Infuse hypotonic saline solution or D5W



Why do we become thirsty?



Chloride

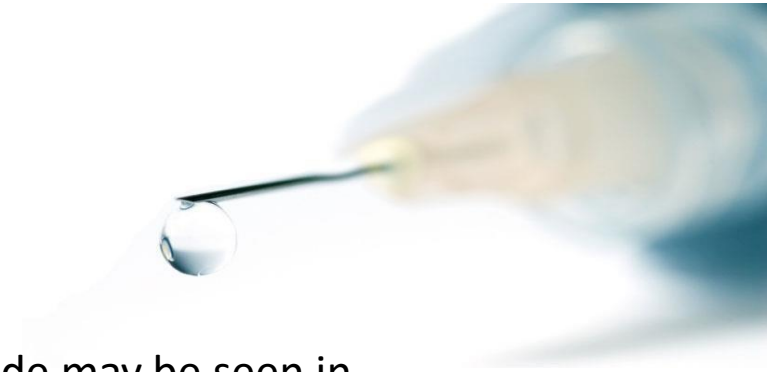
Chloride

Chloride is the major anion (negatively charged ion) found in the fluid outside of cells and in the blood. An anion is the negatively charged part of certain substances such as table salt (sodium chloride or NaCl) when dissolved in liquid.

Sea water has almost the same concentration of chloride ion as human body fluids. Chloride also plays a role in helping the body maintain a normal balance of fluids. The balance of chloride ion (Cl-) is closely regulated by the body.

Significant increases or decreases in chloride can have deleterious or even fatal consequences

Chloride



Increased chloride (hyperchloremia): Elevations in chloride may be seen in diarrhea, certain kidney diseases, and sometimes in overactivity of the parathyroid glands.

Often hyperchloremia does not produce any symptoms.

However, hyperchloremia is sometimes associated with excess fluid loss such as vomiting and diarrhea.

Hypercholoremia can be seen in DKA patients.

As with most types of electrolyte imbalance, the treatment of high blood chloride levels is based on correcting the underlying cause.

If the patient is dehydrated, therapy consists of establishing and maintaining adequate hydration.

The normal serum range for chloride is 98 - 108 mmol/Ls.

Chloride

- **Decreased chloride (hypochloremia):** Chloride is normally lost in the urine, sweat, and stomach secretions. Excessive loss can occur from heavy sweating, vomiting, and adrenal gland and kidney disease.
- Symptoms:
- Stupor, decreased CNS, weakness, if severe, coma
- hypertonicity of the muscles, spasms of the extremities, & decreased respirations.
  - Treatment- chloride PO or IV give K+IV, (where K+ goes, Cl goes!)

Calcium

Majority of calcium reserve in the bones. Decreased levels stimulate release from the bones. Reabsorbed by the kidneys & GI.
90% of the reserve is in the bones.

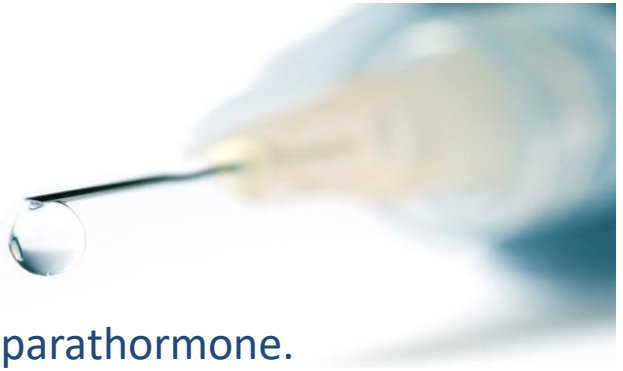
Deficiency
HYPOCALCEMIA, caused by hypoparathyriod, excess GI suction, vitamin D deficiency, pancreatitis, magnesium deficiency, chronic laxative ingestion.

- Symptoms-perioral paraesthesia, carpopedal spasms, cardiac arrhythmias, seizures.
- Treatment-replace & treat cause, possibly give parathormone to stimulate release of calcium from the bones.

Excess
HYPERCALCEMIA-caused by Hyperparathyroid, tumor on thyroid, vitamin D overdose, prolonged immobility, antacids.

- Symptoms-lethargic anorexia, constipation, deep bone pain, arrhythmias, Ua calculi
- Treatment-increase hydration with normal saline, give calcitonin to decrease the release of calcium, give phosphate, PO, IV or enemas.

Magnesium



Normal Value:
1.5-2.5 Meq/liter, regulated by the parathyroid & release of parathormone.

a.Function-aids in metabolism, activates enzymes in the liver & bones, converts ATP to ADP, to produce energy.

b. Deficiency- caused by chronic alcoholism, prolonged malnutrition or starvation, prolonged GI suction, prolonged TPN or IV fluids without magnesium.

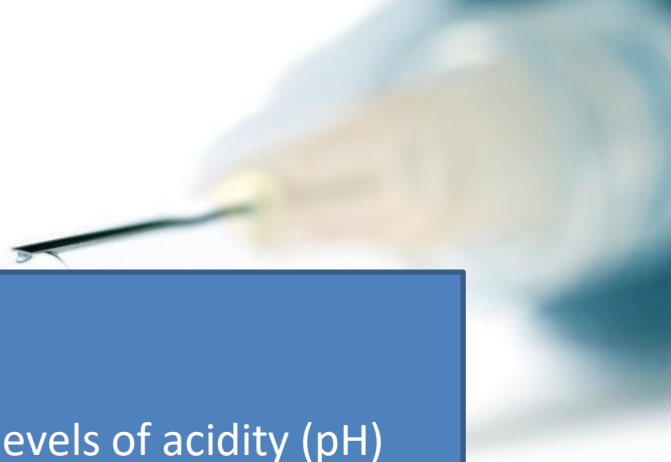
1. Symptoms - tremors, disorientation, muscle cramps, neuromuscular & CNS irritability.

2. Treatment-
Treat cause & give Mg. sulfate IM or IV usually added to 1 L of D5W.

c. Excess-caused by renal failure, excess use antacids, milk of Magnesia.

d. Treatment – administer calcium gluconate to antagonize action of magnesium, dialysis if severe.

Bicarbonate



Bicarbonate

The bicarbonate ion acts as a buffer to maintain the normal levels of acidity (pH) in blood and other fluids in the body. Bicarbonate levels are measured to monitor the acidity of the blood and body fluids.

The acidity is affected by foods or medications that we ingest and the function of the kidneys and lungs.

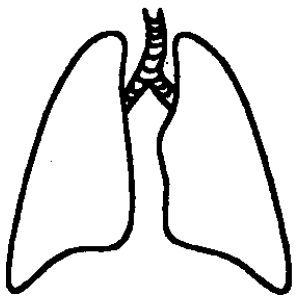
The chemical notation for bicarbonate on most lab reports is HCO3- or represented as the concentration of carbon dioxide (CO2) in ABGs.
The normal serum range for bicarbonate is 22-26 mmol/L. (*reference)

The bicarbonate test is usually performed along with tests for other blood electrolytes. **Disruptions in the normal bicarbonate level** may be due to diseases that interfere with respiratory function, kidney diseases, metabolic conditions, or other causes.

Lungs [C02] and Kidneys [Hc03]

$$CO_2 + H_2O \rightleftharpoons H_2CO_3^- \rightleftharpoons H^+ + HCO_3^-$$

Lungs



Kidneys

Electrolyte Normal Values

Phosphate
2-4.5 Meq/liter

Bicarbonate
22-26 mEq/L

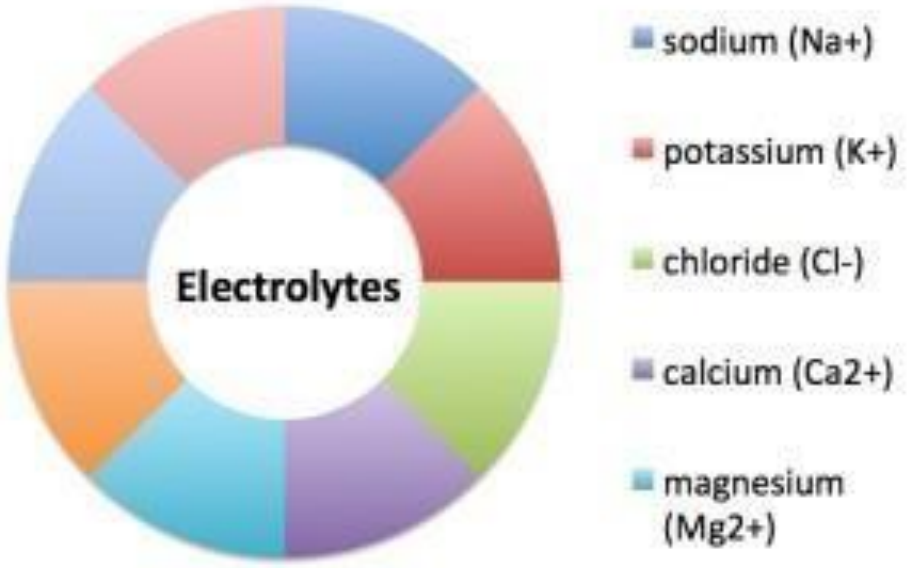
Calcium
8.9-10.4 mg/dL

Chloride
100-110 Meq/liter

Magnesium
1.5-2.5 Meq/liter

Potassium
3.5-5.0 mEq/L

Sodium
135-145 mEq/L



Need for IV

INDICATIONS:

Fluid and electrolyte replacement

- Administration of medicines
- Administration of blood/blood products
- Administration of Total Parenteral Nutrition
- Haemodynamic monitoring
- Blood sampling

Need for IV

TO SIMPLIFY:

- To *maintain* fluid balance (replace insensible water losses + sweat + urine output when patients are NPO or otherwise unable to drink as much as they need to for replacement)

- To *replace* volume losses (i.e., surgical blood volume loss, losses from the GI tract from vomiting or diarrhea)

- To *repair* imbalances (electrolyte imbalances, acidosis/alkalosis).

Advantages of IV

- Immediate / Therapeutic effect
- Control over the rate of administration / dilute infusions / prolonged action
- Patient cannot tolerate drugs / fluids orally
- Some drugs cannot be absorbed by any other Route
- Pain and irritation is avoided compared to some substances when given SC/IM

Disadvantages/Complications of IV

- Cannot recall drug/Reverse action of drug/may lead to toxicity
- Phlebitis: Mechanical/chemical irritation Thrombophlebitis
- Infiltration and Extravasation
- Microbial contamination/Infection
- Circulatory overload Insufficient control of administration may lead to speed shock / Decrease blood pressure, tachycardia, cyanosis
- Anaphylaxis/ Allergic reactions Itching, rash, shortness of breath

Disadvantages/Complications of IV

Infusion Phlebitis - inflammation of the vein associated with infusion phlebitis is seen in this photograph.

* SEE Phlebitis Score Hand-Out

Infiltration- regular monitoring of infusion sites, choice of correct access device/intravenous dressing and the use in-line pressure monitors may help to reduce the extent to which infiltration occurs.

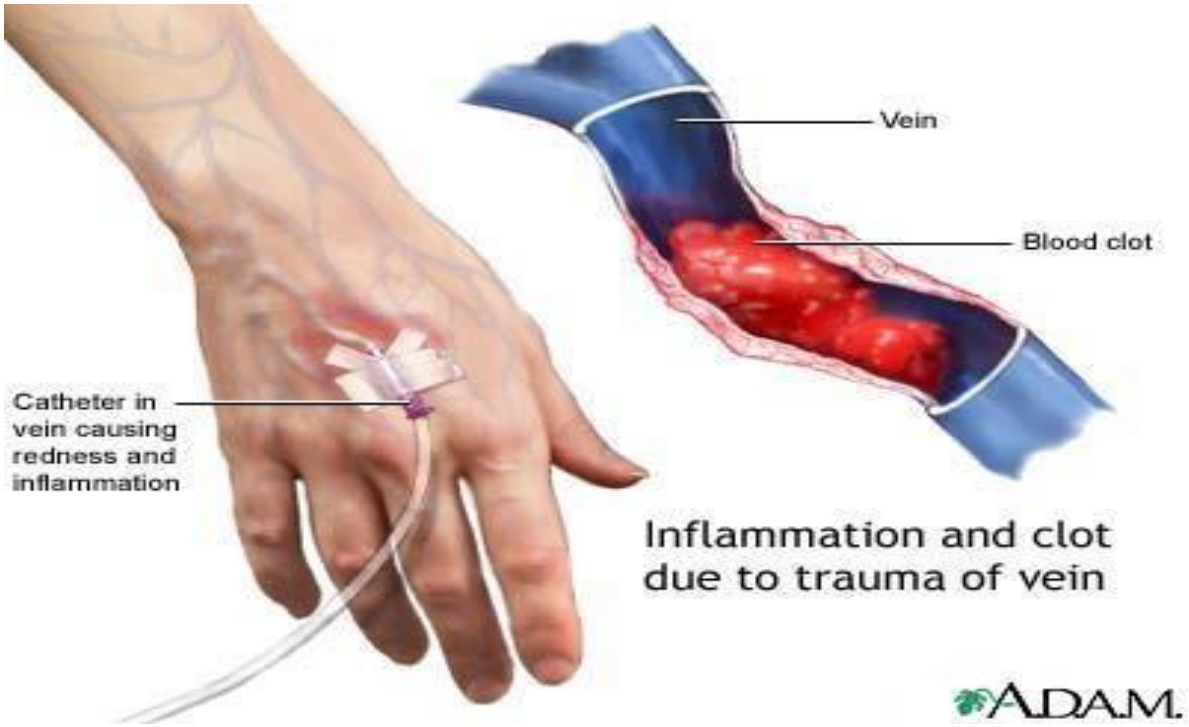
Disadvantages/Complications of IV

Extra-vasation - the inadvertent administration of a vesicant substance into the tissues can have disastrous outcome.

Bruising - may occur at any time during an episode of intravenous therapy.

Disadvantages/Complications of IV

Superficial Thrombophlebitis is swelling (inflammation) of a vein caused by a blood clot.



Disadvantages/Complications of IV

- Drug incompatibilities
- Needle phobia
- Administration time
- Body image
- Technical problems
  - Air in line
  - Blood in the giving set
  - Empty container

IV Success techniques for Difficult Veins

IV THERAPY TIPS & TRICKS

#43

FOR THE REST OF THE IV TIPS, VISIT NURSESLABS.COM/IVTIPS/

For older patients and pediatric patients. They have smaller and fragile veins than normal adults do. Use small gauges that can still aid proper venous flow. Choose the right site for insertion. Probably the safest location is in the hands, but be sure to stabilize it because pediatric patients are fond of gesticulating, and elderly patients are prone to falls.

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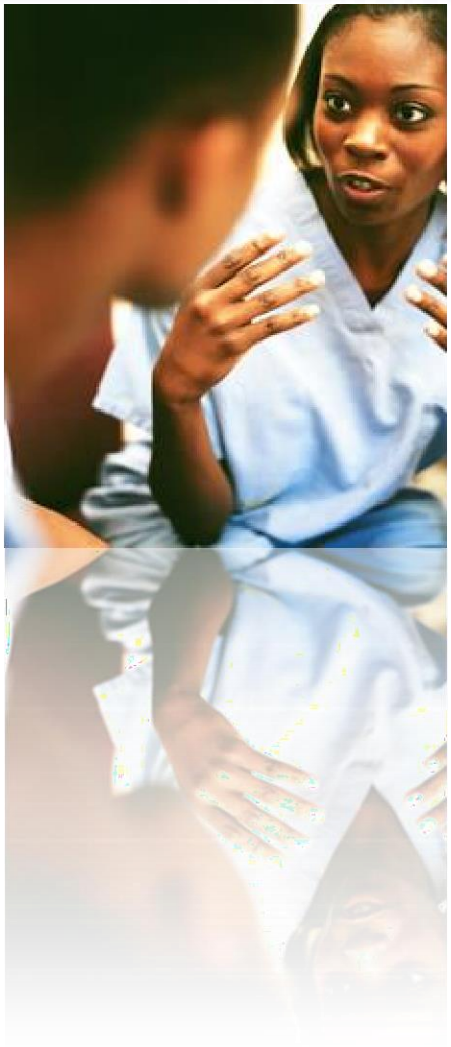
FOR ALL YOUR NURSING NEEDS

“Prep your Patient”



- Pre-Plan
- Gather supplies
- Explanation of procedure to the patient
- Gain patient’s consent
- Understand the associate risks
- Use aseptic non touch technique “ANTT”
- meaning – Alcohol is **last** to touch BEFORE Needle
- Know how to use the products/infusion sets
- Examine infusions while they are running
- Avoid unnecessary interference with the lines

“ Safety, Safety and more Safety”

Safe Practice

- Know when to seek extra help
- Safe disposal of equipment
- Clinical incident Reporting

Documentation

- Not documented, not done
- Should be a comprehensive record including type of access device, location and condition
- of entry site Visual
- Infusion Phlebitis Score
- Prescription should be clear, detailing route medication dose and frequency
- IV insertion order

- Review Phlebitis Score PDF

What does Tonicity of IV Fluids mean?

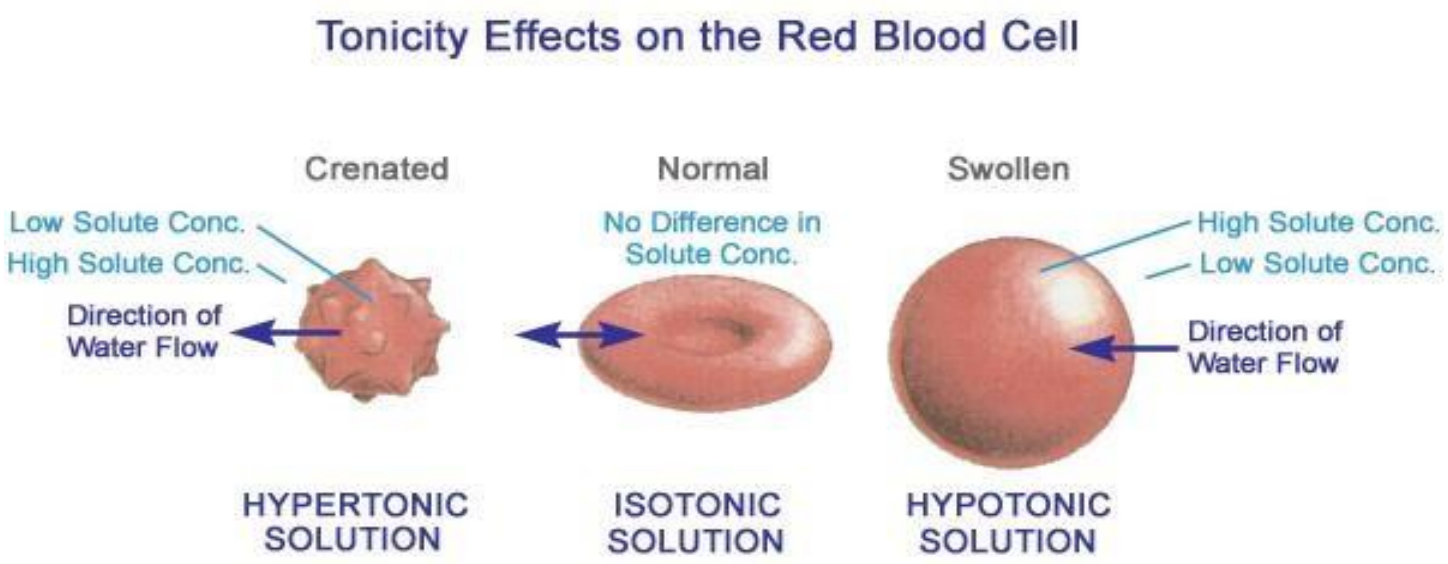
Definition: The tonicity of an IV solution relates to how the red blood cells respond when the solution is added

Isotonic Fluid moves equally between compartments
Cell volume remains the same
Fluid is moving equally into and out of the compartments

Hypotonic
Fluid moves into the cells
Fluid moves into RBC causing cell rupture (hemolysis)
Fluid moves from the vascular space into the cells.
The major problems with administering hypotonic IV solutions is the hemolyis and swelling of the cells in the brain that occurs

Hypertonic
Fluid is pulled out of the cells
Fluid moves out of the cell causing crenation (shrinking) of the RBC
Fluid is pulled out of the cells and into the vascular system, so increases intravascular volume.

Or we can just take a look at Cool Graphics

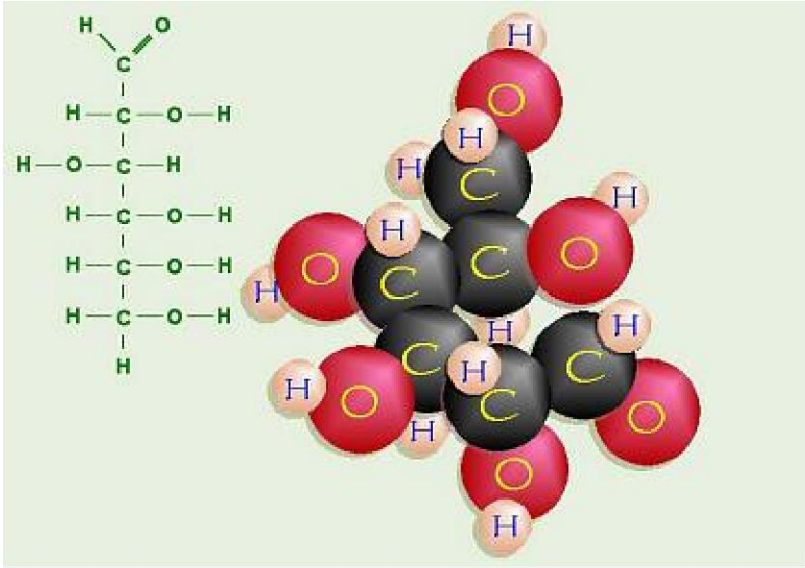


Solutions

Carbohydrates in water

Used for:

- Prevents dehydration
- Prevents and treats ketosis
- *Promotes sodium diuresis (particularly following excessive administration of electrolyte solution)
- Supplies calories (for energy)
- Vehicle for IV medication
- D5W-Isotonic
- D10 W-Hypertonic



Carbohydrates in Sodium Chloride solution

Used for:

- Promotes diuresis
- Corrects moderate fluid loss
- Prevents alkalosis
- Provides calories and sodium chloride
- Treats sickle-cell crisis
- D5 0.2 NaCl D5 0.45NaCl-Hypertonic D5 0.9 NaCl-Hypertonic

Solutions

Sodium Chloride solution

Used for:
Treats alkalosis
Corrects excessive fluid loss
Treats diabetic ketoacidosis , treats adrenocortical insufficiency
Treats vomiting from pyloric stenosis
***Used before or during blood administration – 0.9 NaCL ONLY**

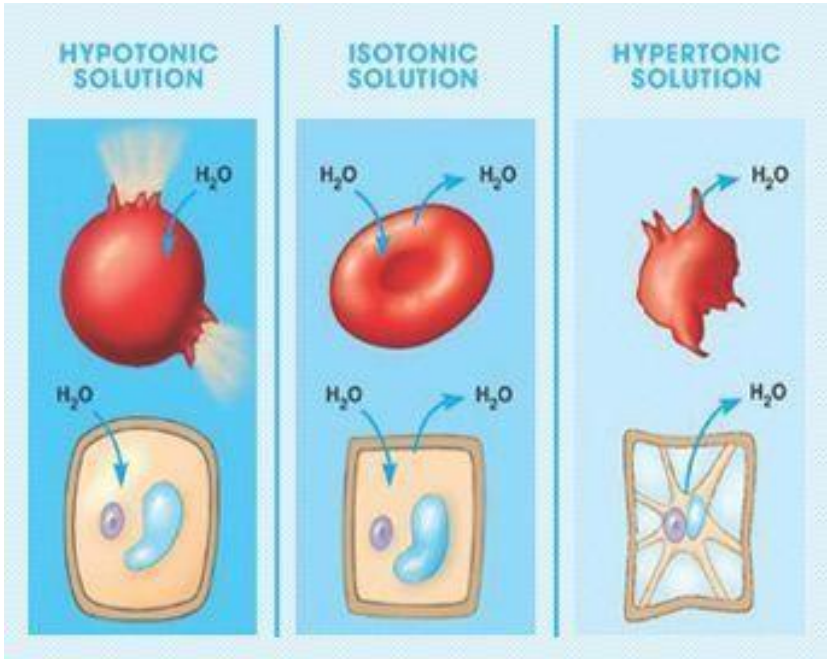
0.45 NaCl, 0.9 NaCl or NSS- 3% NaCL

Electrolyte solutions

Used for:
Treats dehydration
Treats electrolyte imbalance
Restores normal fluid balance after extracellular fluid shift ♦Replaces fluid lost through vomiting or GI suction
D5 Lactated Ringers-Hypertonic
(D5LR) Lactated Ringers-Isotonic (LR, Hartmann's) D5 Ringers-Hypertonic
(D5R) Ringers-Isotonic

IV Fluid Tonicity

0.9% NaCl (normal saline)	isotonic
0.25% NaCl	hypotonic
0.45% NaCl	hypotonic
2.5% dextrose	hypotonic
Lactated Ringer's solution	isotonic
D5W (acts as a hypotonic solution in body)	isotonic
D5 NaCl	hypertonic
D5 in Lactated Ringer's	hypertonic
D5 0.45% NaCl	hypertonic



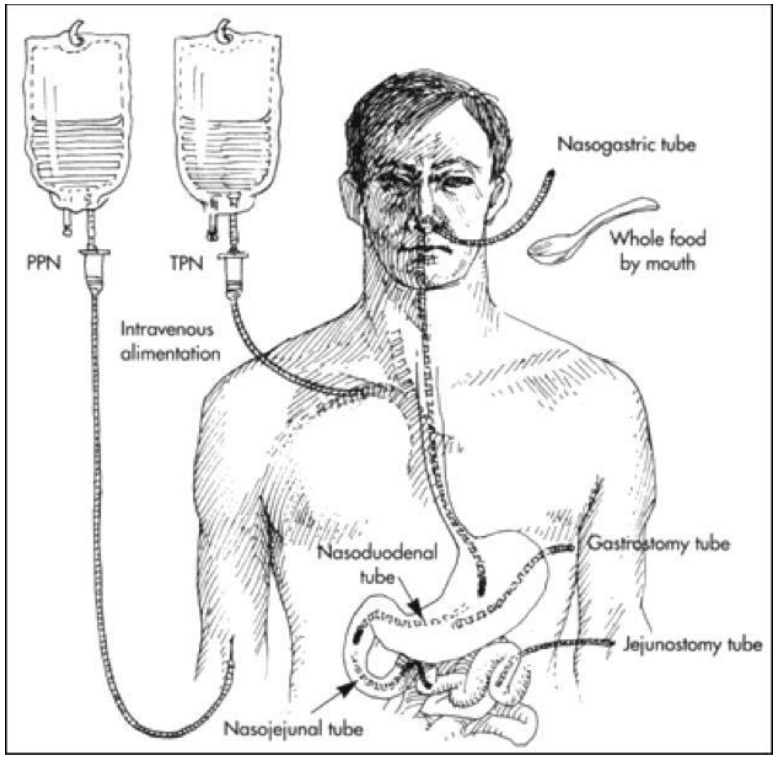
Total Parenteral Solution "TPN"

Parenteral nutrition is by definition given IV.

Partial parenteral nutrition supplies only part of daily nutritional requirements, supplementing oral intake. Many hospitalized patients are given dextrose or amino acid solutions by this method.

Total parenteral nutrition (TPN) supplies all daily nutritional requirements.
TPN can be used in the hospital or at home. Because TPN solutions are concentrated and can cause thrombosis of peripheral veins, a central venous catheter is usually required.

Parenteral nutrition should NOT be used routinely in patients with an intact GI tract. Compared with enteral nutrition, it causes more complications, does not preserve GI tract structure and function as well, and is more expensive.



“TPN” Infusion Procedure

The preferred method of delivering PN is with a medical infusion pump.

A sterile bag of nutrient solution, between 500 mL and 4 L, is provided. The pump infuses a small amount (0.1 to 10 mL/hr) continuously in order to keep the vein open.

Feeding schedules vary, but one common regimen ramps up the nutrition over one hour, levels off the rate for a few hours, and then ramps it down over a final hour, in order to simulate a normal metabolic response resembling meal time.

This should be done over 12 to 24 hours rather than intermittently during the day.

"TPN" Infusion Procedure

Chronic PN is performed through a central intravenous catheter, usually through the subclavian or jugular vein with the tip of the catheter at the superior vena cava without entering the right atrium.

Another common practice is to use a PICC line, which originates in the arm, and extends to one of the central veins, such as the subclavian with the tip just above the right atrium.

In infants, sometimes the umbilical vein is used.

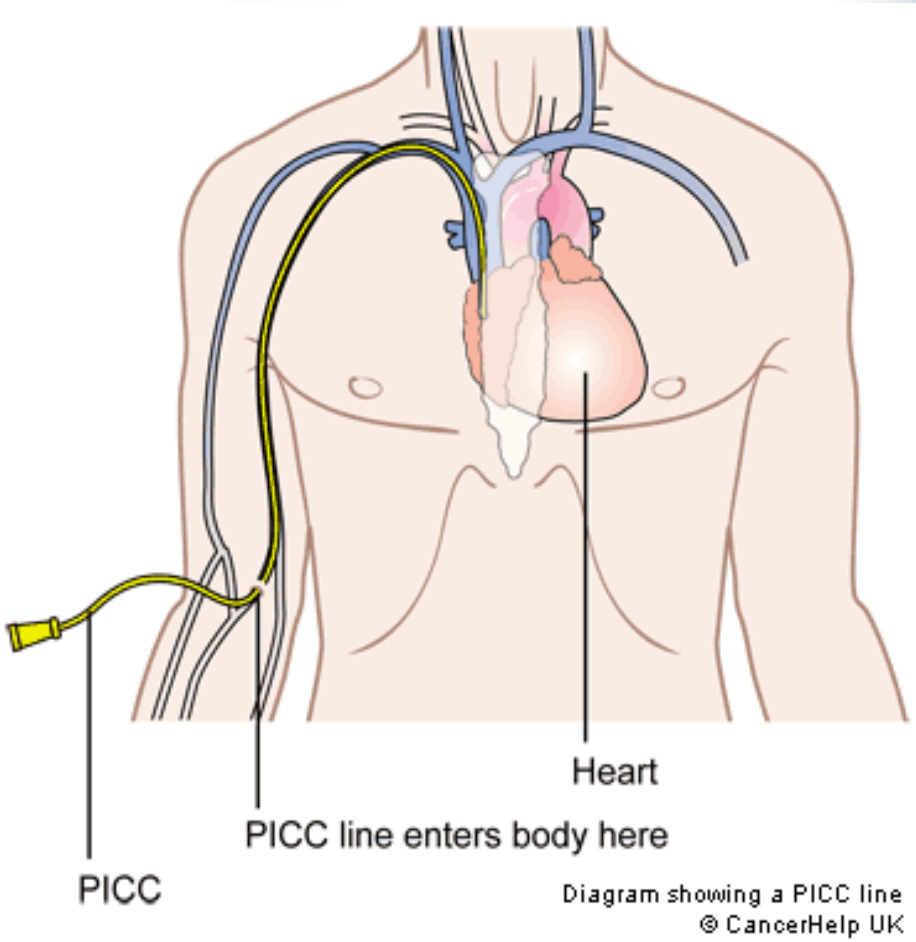


Diagram showing a PICC line
© CancerHelp UK

"TPN" Care

Because the **central venous catheter** needs to remain in place for a long time, strict sterile technique must be used during insertion and maintenance.

External tubing should be changed **q 24** h with the first bag of the day.

In-line filters have not been shown to decrease complications.

If TPN is given outside the hospital, patients must be taught to recognize symptoms of infection, and qualified home nursing must be arranged.

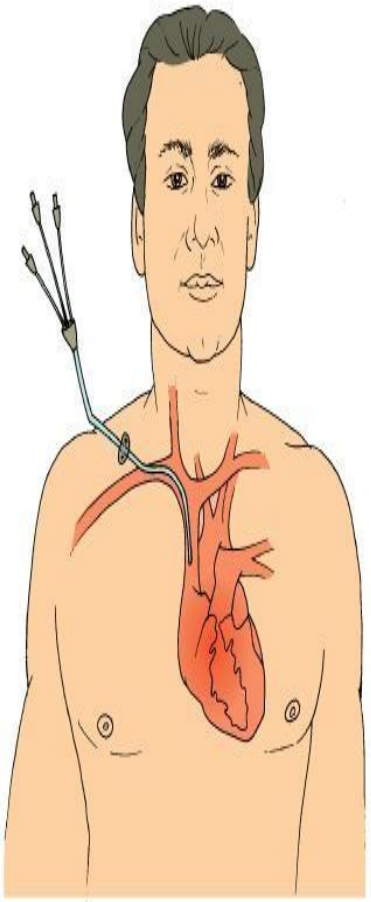
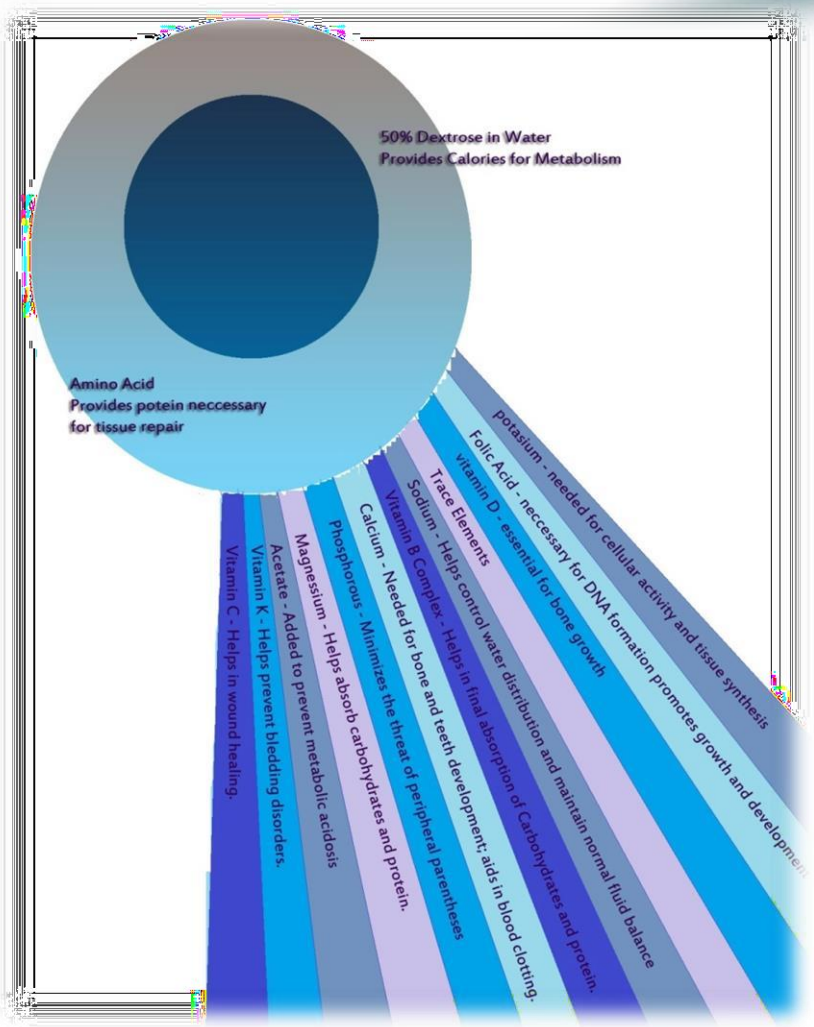


Figure 46-10 Placement of triple-lumen nontunneled percutaneous central venous catheter.

TPN

Examples of total parenteral nutrition solutions[5]

Substance	Normal patient	High stress	Fluid-restricted
Amino acids	85 g	128 g	75 g
Dextrose	250 g	350 g	250 g
Lipids	100 g	100 g	50 g
Na^+	150 mEq	155 mEq	80 mEq
K^+	80 mEq	80 mEq	40 mEq
Ca^{2+}	360 mg	360 mg	180 mg
Mg^{2+}	240 mg	240 mg	120 mg
Acetate	72 mEq	226 mEq	134 mEq
Cl^-	143 mEq	145 mEq	70 mEq
P	310 mg	465 mg	233 mg
MVI-12	10 mL	10 mL	10 mL
Trace elements	5 mL	5 mL	5 mL



Blood

Blood Physiology

Functions

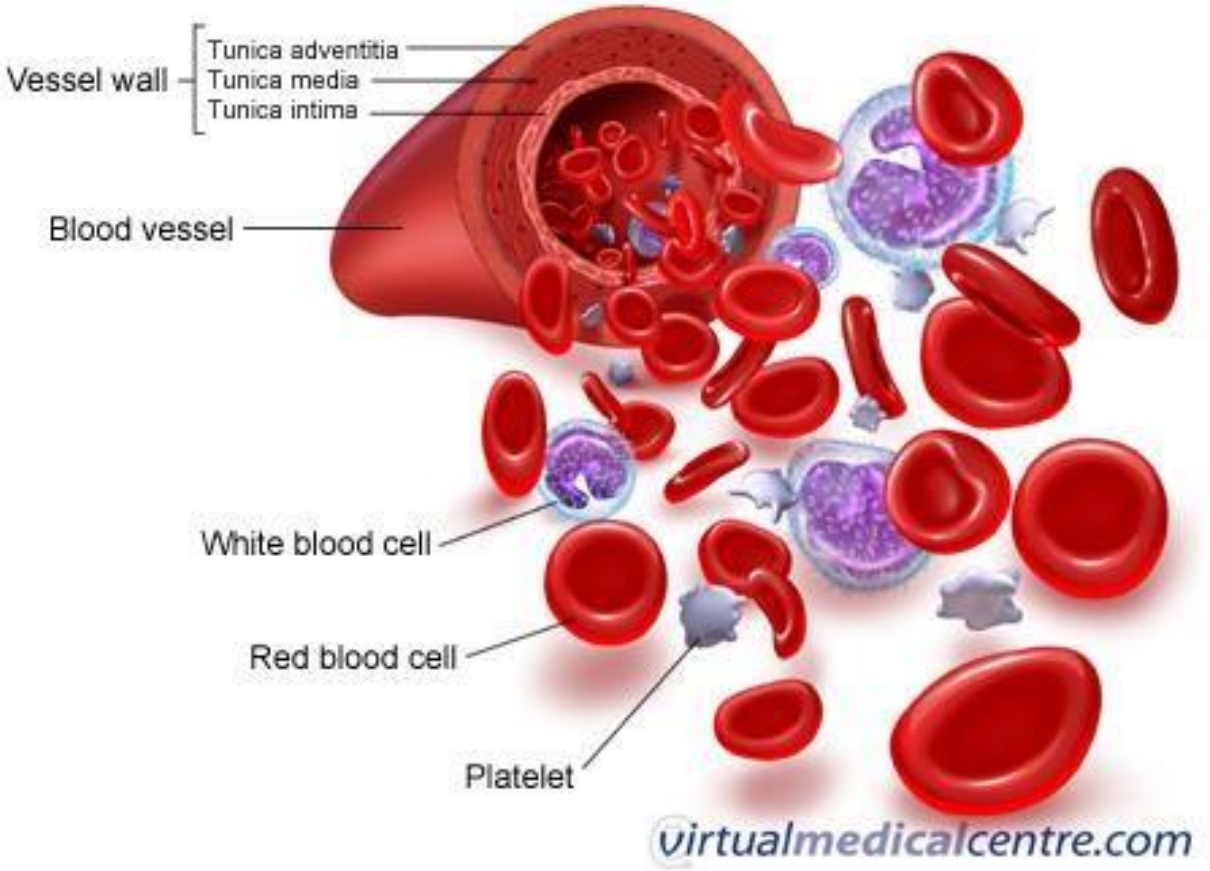
- Supplies 02
- Transports cellular waste
- Defense against infections
- Regulates body temperature
- Acid base balance

Formed elements - the actual cellular components of blood (special connective tissue)

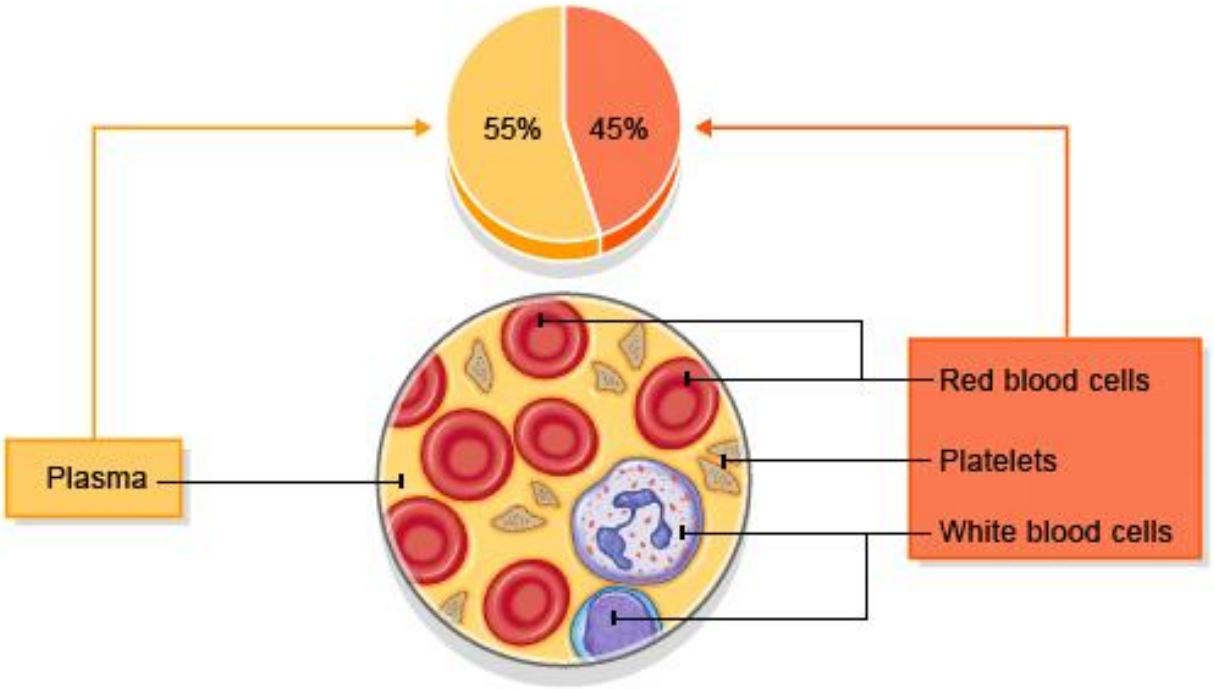
a. erythrocytes - red blood cells
b. leukocytes - white blood cells
c. platelets - cell fragments for clotting

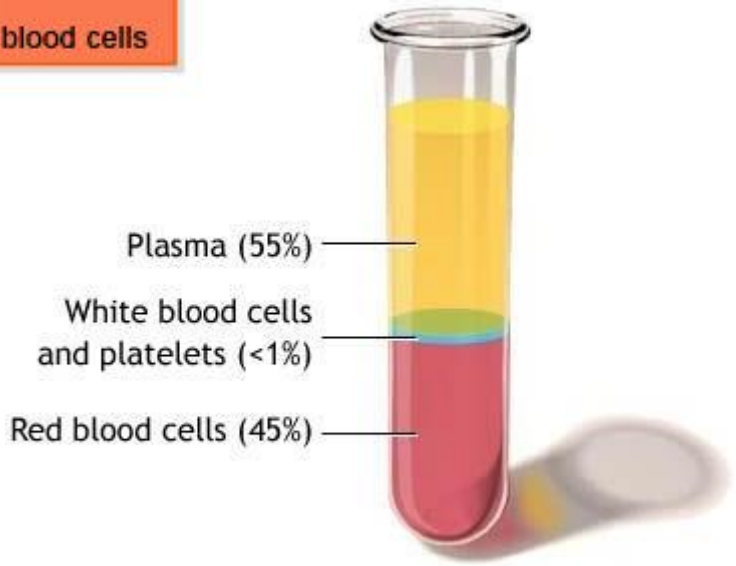
Blood plasma - complex non-cellular fluid surrounding formed elements; protein & electrolytes

Blood Composition

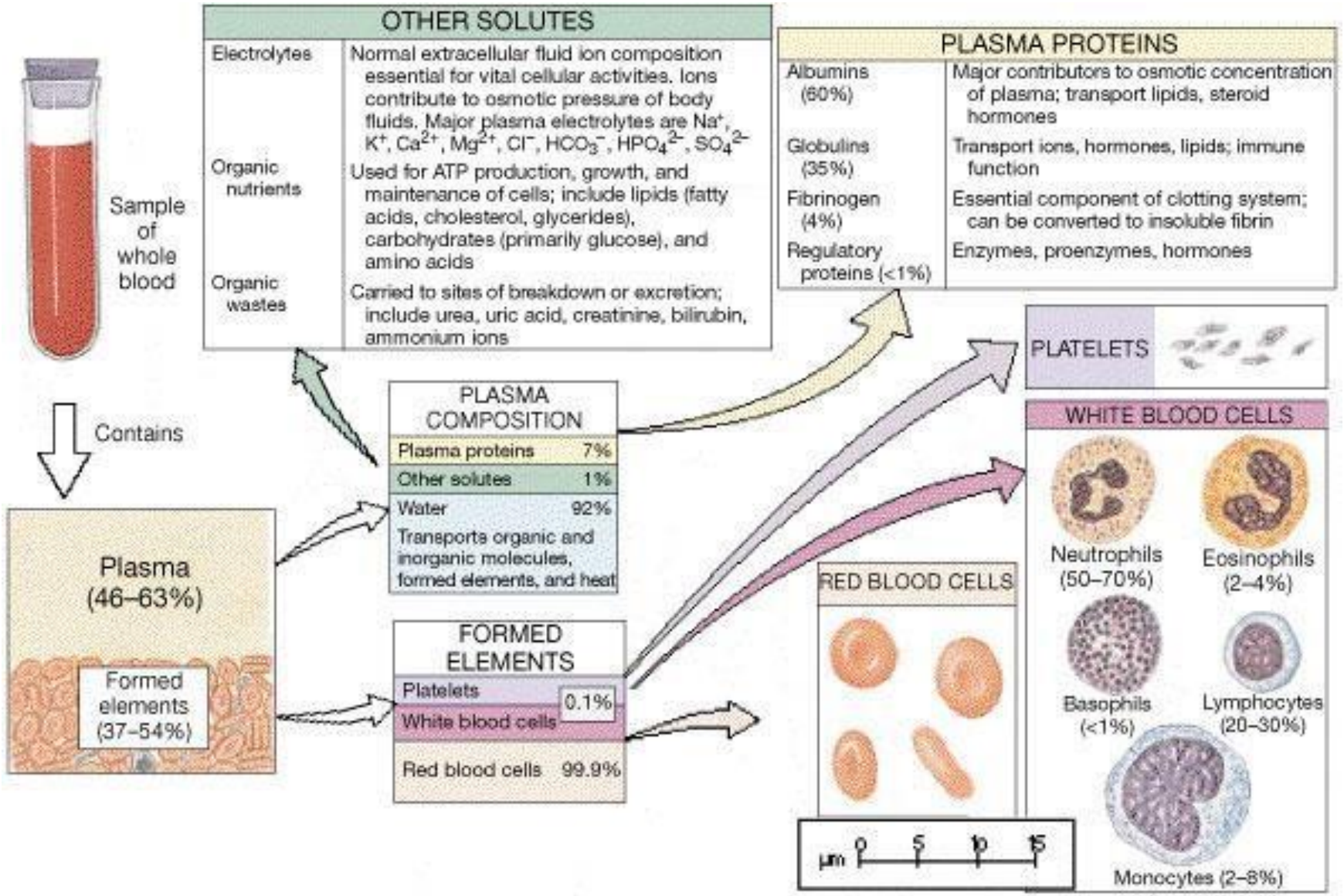


Blood Composition

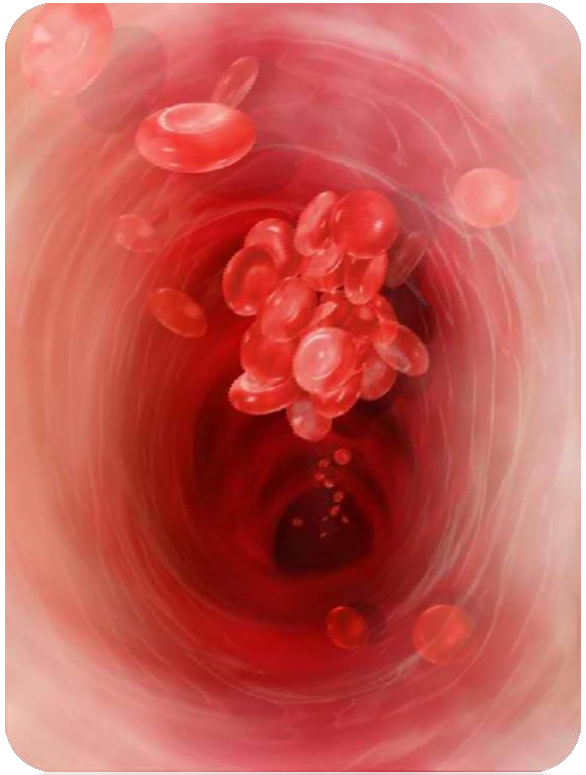




Blood Composition



Blood Immunohematology

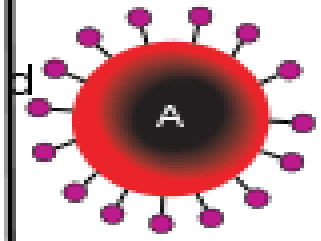
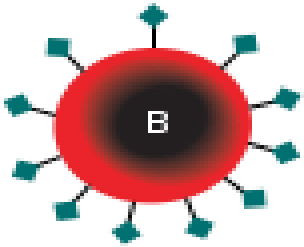
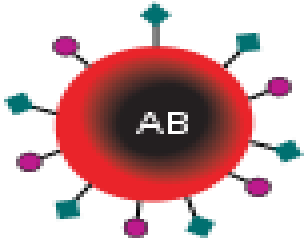
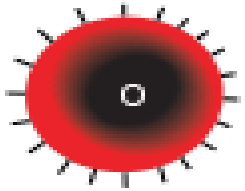


Definition- The study of antigen-antibody reactions and their effect on blood.

Antigen- a substance that can initiate an immune response and induce the formation of a corresponding antibody. The established major antigens found in blood are inherited such as those in the ABO system and the Rh system. Others are introduced into the body in exogenous sources i.e. Blood transfusions.

Antibody- immunoglobulin molecule produced in response to a specific antigen.

ABO Blood groups and Blood Compatibility

	Group A	Group B	Group AB	Group O
Red blood cell type				
Antibodies present	 Anti-B	 Anti-A	None	 Anti-A and Anti-B
Antigens present	A antigen	B antigen	 A and B antigens	None

Blood Immunohematology

Hematology Tests

Hematocrit (Hct)

40-52% (Male)

37-46% (Female)

31-43% (Child)

Hemoglobin (Hgb)

13.2-16.2 gm/dL (Male)

12.0-15.2 gm/dL (Female)

Red Blood Cell Count (RBC)

4.3-6.2x10^6/µL (Male)

3.8-5.5x10^6/µL (Female)

3.8-5.5x10^6/µL (Infant/Child)

White Blood Cell Count (WBC)

4.1-10.9x10^3/µL

Platelet Count (Plt)

140-450x10^3/µL

ABO Blood groups and Blood Compatibility

A "type and cross" determines compatibility between patient serum and donor red blood cells.

1. A full crossmatch procedure takes about 45 minutes to complete and cannot be shortened.

2. Units are refrigerated until used.

3. A unit of blood must be properly labelled and the label MUST be checked before use.

ABO Blood groups and Blood Compatibility

Every unit crossmatched is removed from the general inventory and reserved for the patient for 72 hours.

Units which are crossmatched unnecessarily will deplete Blood Bank inventories and can result in blood shortages, such as those which occurred in California after the earthquake.

Blood shortages can result in cancellation of elective surgical procedures.
Blood will ordinarily not be released for transfusion until compatibility testing is completed.

Blood Transfusion

A blood transfusion is the transfer of blood or blood products from one person (donor) into another person's bloodstream (recipient).

Steps in Blood Transfusion

Refer to Equipment Hand-out

Blood Transfusion Checklist

Transfusion Reactions

A hemolytic transfusion reaction is a serious problem that occurs after a patient receives a transfusion of blood. The red blood cells that were given to the patient are destroyed by the patient's own immune system.

Steps after reaction

1) Turn off Blood
2) Hang Normal Saline
3) Take Vital Signs
4) Call attending
5) Position Patient
6) Call blood bank
7) Send blood and tubing to Lab
8) Urine Test
9) I and O
10) Meds if ordered
11) Documentation

What do you call the state of normal body fluid volume?

Types of white blood cells.

It refers to the study of antigen-antibody reactions and their effect on blood.

They are commonly called "ions".

One of the disadvantages of IV: swelling of surrounding tissues due to IV fluid leakage

List components of blood and name which component in charge of clotting.

It is a immunoglobulin molecule produced in response to a specific antigen.

The kind of water loss wherein the person is aware of such as through wound drainage, GI tract losses and urination.

LEARNING CHECK!

Percentage of water in the total body weight of an infant.

It is a situation wherein the red blood cells that were given to the patient are destroyed by the patient's own immune system.

It is the complex non-cellular fluid surrounding formed elements; protein & electrolytes.

Give the 3 main types of fluid loss/dehydration.

What body system transports food, hormones, metabolic wastes, and gases (oxygen, carbon dioxide) to and from cells?

The percentage of water in an adult female body.

Practice Time!!
Group Practice/ Group Discussion

- Review Solutions LVN'S can and cannot legally administer.
- Preparation- correct identifying IV fluid packs.
- Proper verification or checking of patients medication chart.

EQUIPMENT

Universal Precautions for Infection Control in IV Therapy

Universal precautions refers to the practice, in medicine, of avoiding contact with patients' bodily fluids, by means of the wearing of nonporous articles such as medical gloves, goggles, and face shields.

Universal Precautions for Infection Control in IV Therapy

Universal precautions are designed for doctors, nurses, patients, and health care support workers who are required to come into contact with patients or bodily fluids. This includes staff and others who may not come into direct contact with patients.

PPE = Personal Protective Equipment

Examples of PPE

Gloves – replace immediately when visibly soiled, torn, cut, or punctured; not be worn outside contaminated areas

Protective clothing/Footwear – shall be worn as an effective barrier against blood and OPIM

Face shields and eye protection – shall be worn whenever splashes, spray, spatter, droplets, or aerosols may be generated causing eye, nose, mouth contamination

Mouthpieces and resuscitation devices

Setting Up the IV System – The Basics

I. Order

Activity

1. Each "Stick Buddy/ies" Group will be assigned an order

2. Each group will READ BACK the order & mark "rb" on top

WRITE order in correct form RB _____ T.O. Prescriber Name, Your name Licensure, Date and Time

08/21/15 1040 D5.45NS 1000 ml over 12 hrs

3. Each group will calculate and answer the following:

A. Manual or Drip Rate (drop/minute)

B. Pump Rate (ml/hour)

C. Tonicity of ordered fluid

Writing Order Check

ONLY for FLUIDS

- 0.5 and above = Round Off to Next Whole Number

- 0.4 and below = Round off to the LOWER whole Number

CALCULATING DRIP RATE

Factors Affecting Drip Rate
- **Fluid**
- **Height**
- **Administration Set**
- **IV Set**
- **Patient**

- In the age of machines, we barely have to do this
- anymore… but if you ever need to go old school, here is how to calculate the drip rate (drops/minute):

$$\frac{\text{Volume to be infused (mL)}}{\text{Time (minutes)}} \times (\text{gtt/mL}) = \textbf{gtt/min}$$

Drip Factor = (gtt/mL) Of the TUBING which is found on the manufacturers packaging

- Example: Volume = 4000 ml
- Time = 24 hours
- Drip factor of tubing = 15 gtt/ml.

So…. [4000mL/(24h x 60min/h)] X 15gtt/ml = approx 42 drops/min

Manual Drip Rate

* working formula – numbers may change

$$\frac{\text{Volume to be infused (mL)}}{\text{Time (minutes)}} \times (\text{gtt/mL}) = \textbf{gtt/min}$$

- Order:
- D5 LR 1000 ml over 8 hours
- Drip Factor = 15 gtt/ml
- Convert Hours to Minutes:
- 8 hrs x 60 = 480
- 1000/480 x 15 = 31.25 gtt/min = 31 gtt/min

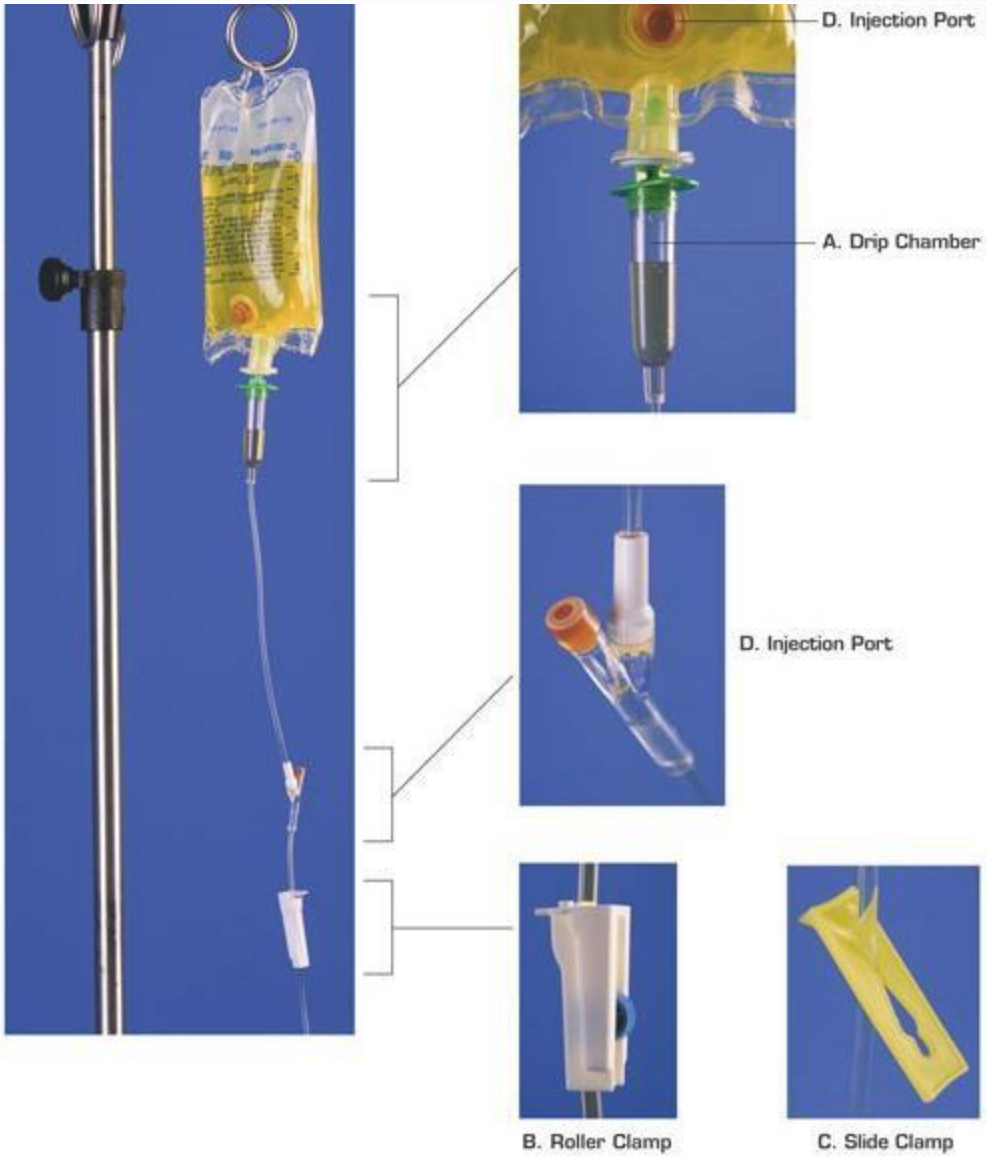
Pump Rate

* working formula – numbers may change

Formula: **Volume = ml/hr**
Hours

- Order = D5W 1000 ml to be infuse in 12 hrs
- Formula = 1000/12 = 83 ml/hr
- Order = D5 .45 NaCL 1000 ml in 12 hours
- Formula = 1000/12 = 83 ml/hr
- Order = NS 1000 ml in 10 hours
- Formula = 1000/10 = 100 ml/hr

Equipment


D. Injection Port
A. Drip Chamber
D. Injection Port
B. Roller Clamp
C. Slide Clamp

Equipment

Fluid Container and IV sets

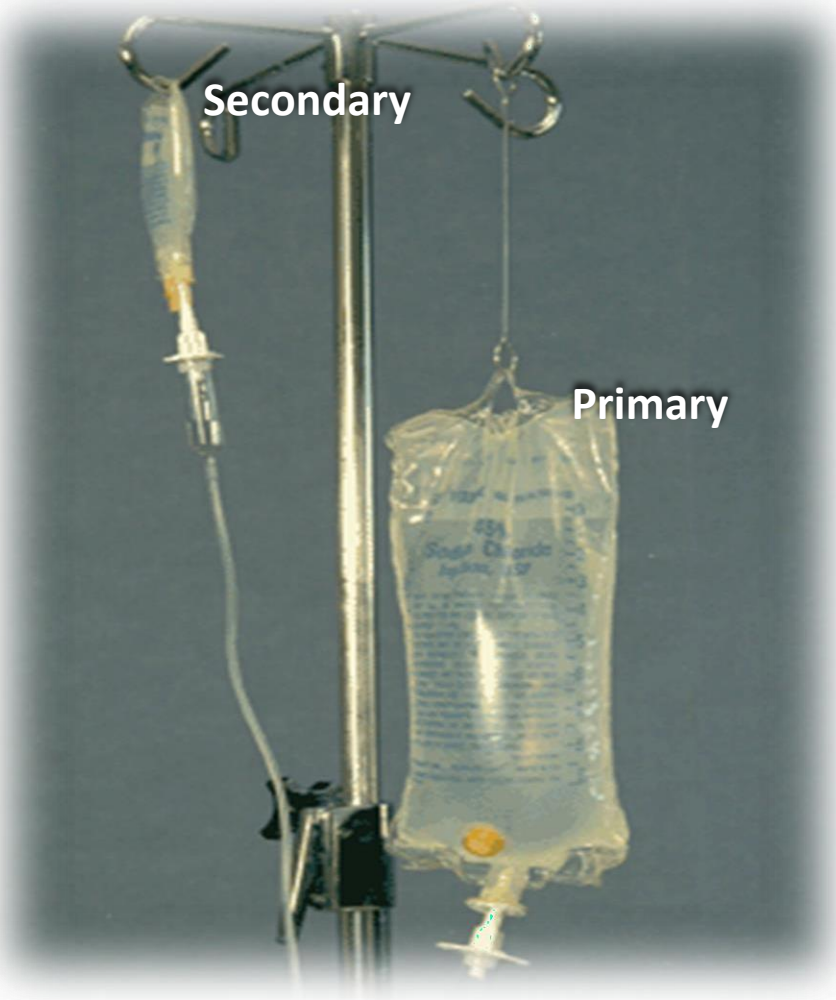
Types of Fluid Containers

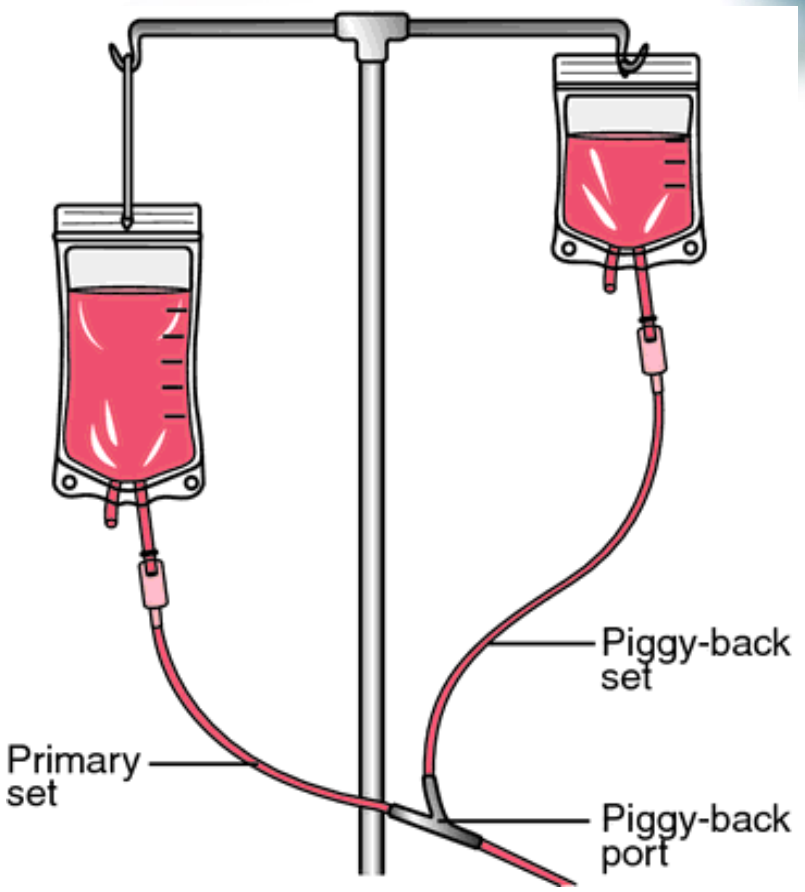
- Glass
- Plastic

Administration sets: Change every 72 hours

- Spike (piercing pin)
- Drip chamber Types: Micro
  Macro
- Tubing
- Regulator clamp (roller clamp)
- Injection port (y-site or secondary)

Proper Positioning of Primary and Secondary IV Bags





- 50 cc antibiotic bag to be infused 30 min
- Pump
- 250 cc in 1 hr
- _____ cc in 0.5 hr
- 50 cc/30 min x 60 min/1 hr = 500 cc/hr
- Volume / Time x 60/1 =

Setting up a Fluid System

- Proper selection of equipment
  - solution, as ordered
  - infusion tubing
  - filter, if needed
  - secondary piggyback device, if needed
- Inspect the container and solution
  - check the label
  - look for chips, cracks or tears
  - check the clarity of the solution
  - is there a protective cap on the port?
- Preparing the solution
  - open the container, use aseptic technique
  - add medication if needed, use aseptic technique
  - label the container
- Attach the primary tubing
  - choose the correct tubing
  - Push the spike into the port
  - invert the container and hang on the pole

Equipment for IV

Continuation…

Prime the Tubing

- Attach filter, if needed
- Do Not remove protective cap from tubing unless fluid does not flow
- squeeze the drip chamber until 1/2 full. Let the fluid run through the tubing until **NO AIR remains in the tubing**
  - Close the clamp
  - label and mark the container
  - properly identify the patient with the medication sheet before hooking the fluid to the patient's IV site

PRIMING IV PUMP

Young and Old

For Pediatrics:

- Use smaller gauges of catheters.
- Other sites may be used.
- Control fluid delivery with Volutrol or Buretrol.

For Geriatrics:

- It may be necessary to use a Volutrol or Buretrol IV set to prevent fluid overload.
- Smaller catheters may be required.
- Skin and veins may be fragile.
- Closely monitor fluids.

II. Setting up the Primary Line

Introduction :- 4 Main Types of Tubing

- Primary
- Secondary
- YBlood Tubing
- Buretrol

Activity

A. Each "Stick Buddy/ies" Group will be given 4 types of tubing

B. Each group will find &answer the following:

For Each Tubing Type:

1. Drip Factor

2. Number of injection ports

3. Length & Manufacturer

4. Purpose or indication
* what is the tubing used for ?

Instructor to check off on
Tubing Activity Answers

Next Activity

Stick Buddies to combine Blood Transfusion Steps

2 Pair of Stick Buddies will be randomly assigned to read their Complete Blood Transfusion Steps out LOUD

Setting Up the IV System – The Basics

III. IV Start

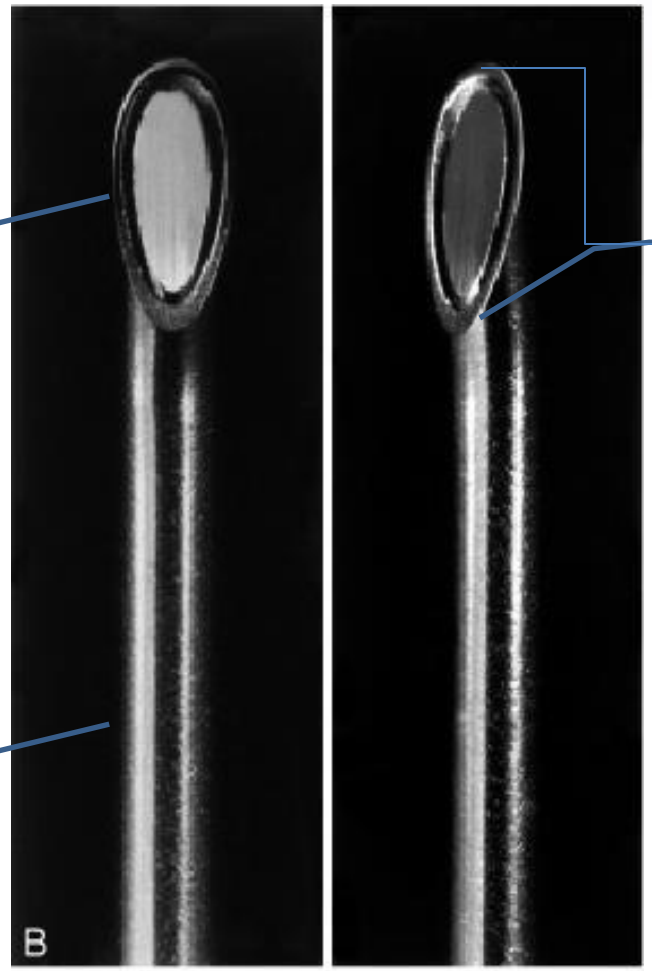
Needle

Peripheral IV Choices

Size	Flow Rate	Uses
14G	240ml/min	Trauma Patients, Rapid, Large-volume replacement
16G	180ml/min	Trauma Patients, Major Surgery, Intra partum/Post partum, GI bleeds, Multiple blood transfers, High volume of fluids
17 G	125ml/min	Newly added
18G	90ml/min	Blood products, delivery of irritant medications, major surgery, contrast study
20G	60ml/min	General use, IV maintenance, IV antibiotics, IV analgesia
22G	36ml/min	Small or Fragile veins, Cytotoxic therapy
24G	20ml/min	For paediatric usage
26G	13ml/min	Newly added

Setting Up the IV System – The Basics

Equipments



Lumen

Shaft

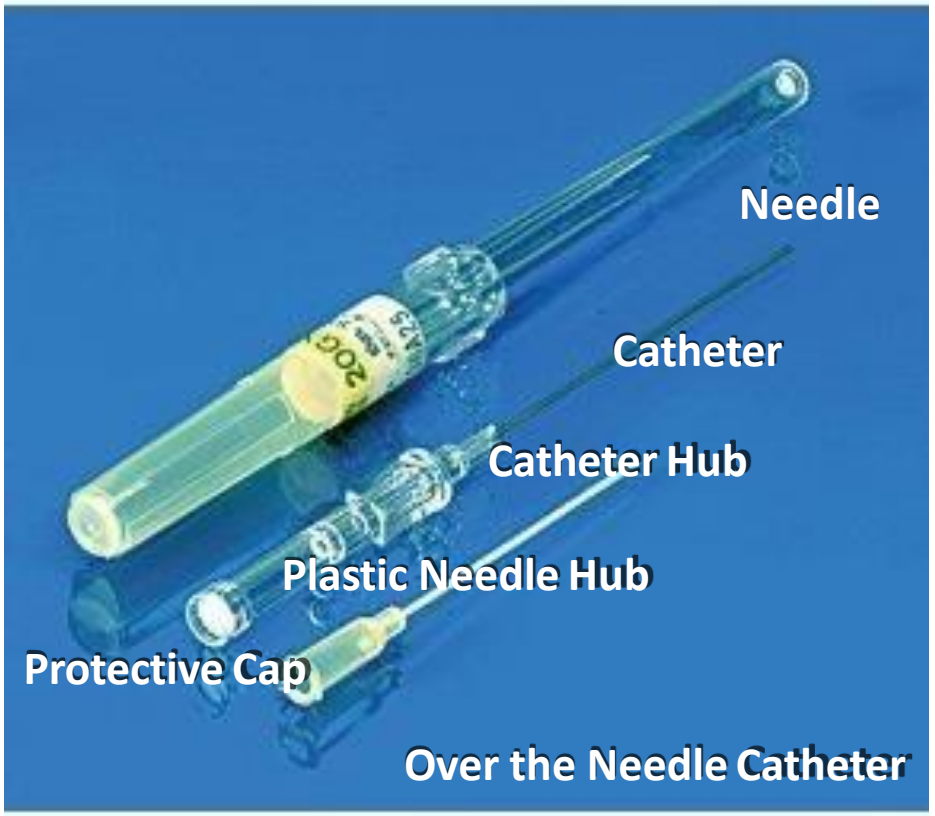
Bevel

Equipment

Blood Vacutainer

Advantages

Disadvantages



Basic Equipment

Armboards

I.V. Start Kit

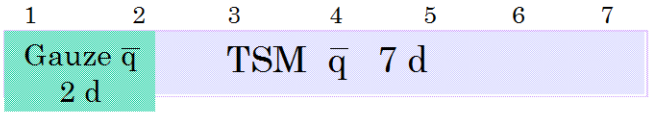
Sharps Container

Pole

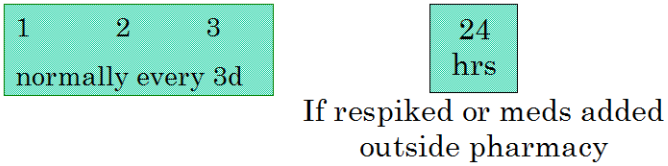
Gloves

Peripheral IV Site Routine Care

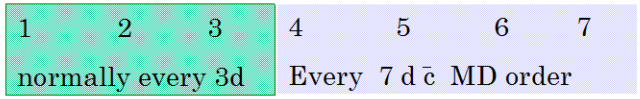
Changing dressings



Changing bags and tubing



Changing Sites



Physician orders are required if a peripheral catheter is left in the same site for more than 3 days.

It is best to have the pharmacy add medications to the infusion bags under laminare flow to reduce contamination

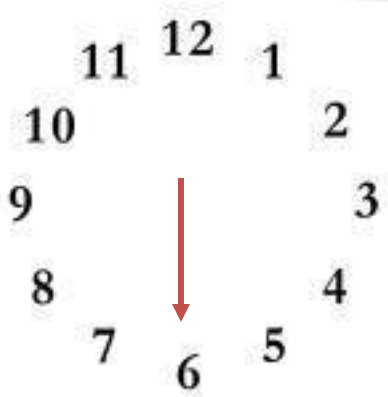
Peripheral IV Site Routine Care

Flushing intervals and amounts

- Peds: q **4 - 6hrs.**

<22ga 1ml 0.9%NS followed by

1ml heparinized (10units/ml) saline

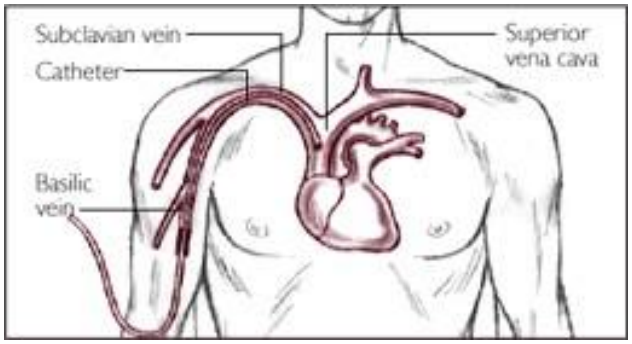


- Adults: q **6-8hrs**
w/1ml. 0.9%NS

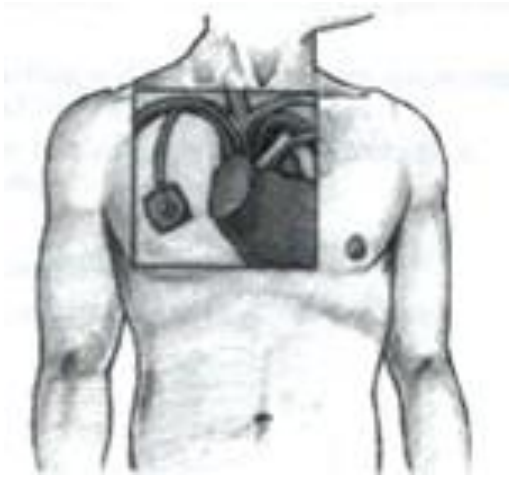
[3ml heparinized saline for OB]

CENTRAL LINES

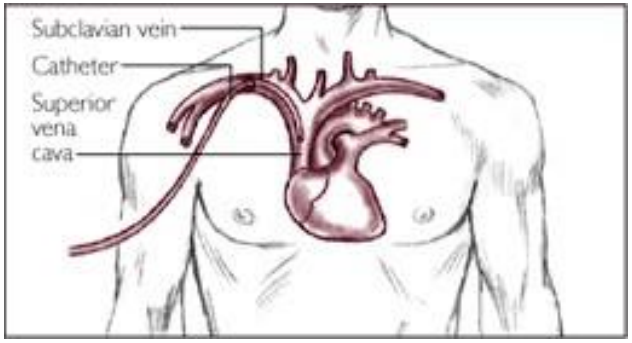
Central Venous Catheter Sites



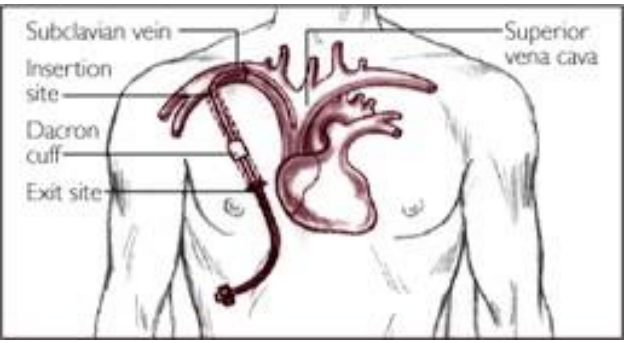
PICC (Peripherally inserted Central Catheter)



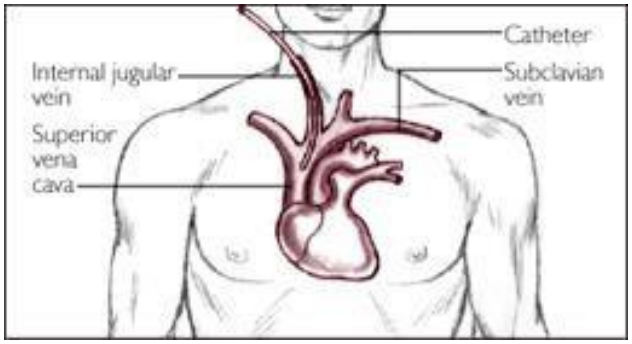
Implanted Port (single or double lumen)



Percutaneous(Subclavian)

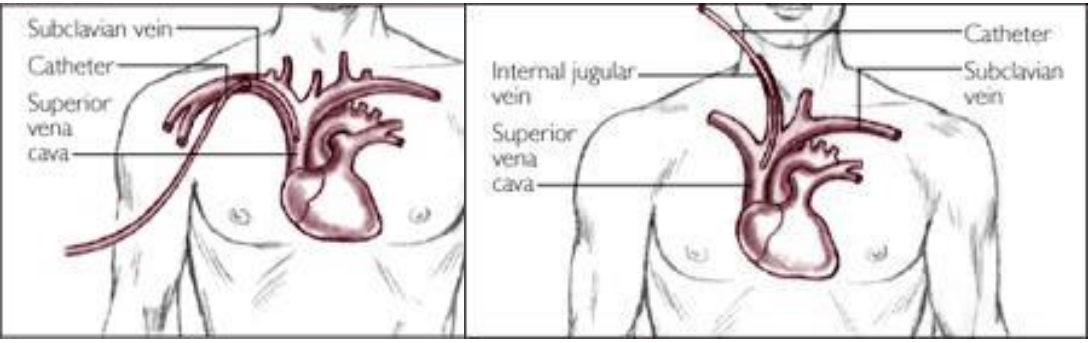


Tunnelled (Hickman)

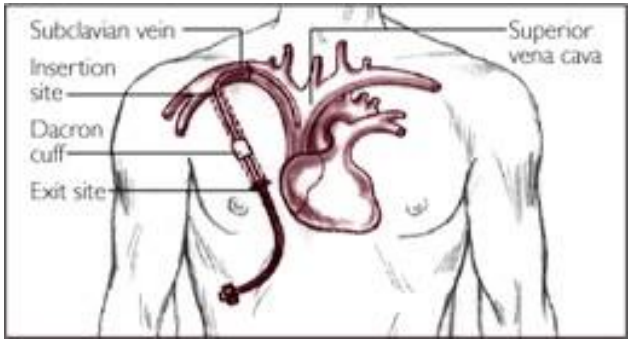


Percutaneous (IJ-Int. Jugular)

CVC Care/Maintenance



Percutaneous

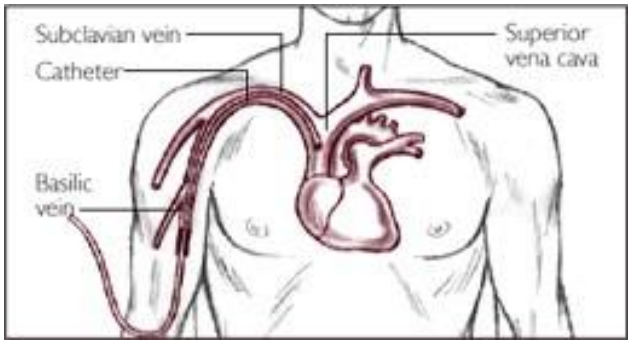


Tunneled

- Flush after each access or daily for catheters>21ga, q 6 hrs <21 ga

-adults: 10ml saline

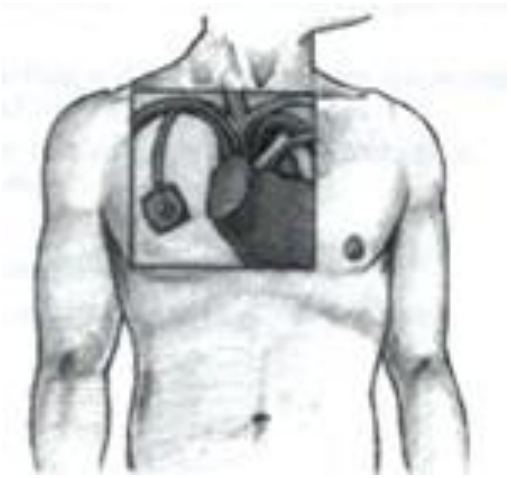
- peds/neonates: 5ml saline (preservative free for infants <1yr)



PICC

- Transparent dressing change q 7 days & prn

CVC Care/Maintenance



Implanted Port

- Flush after each use and weekly while accessed; monthly when not acessed
  - 10ml saline (preservative free for pts. <1yr)
  - followed by 4.5ml-5ml heparinized saline
    100units/ml for adults
    10units/ml for peds

- Transparent dressing/ access needle change q 7days

CENTRAL-LINE CATHETER PROTOCOL

Customer/Patient Name: (Last) (First) (Middle)	Customer/Patient #	Date
Facility Name:	Room # / Wing	DOB
Attending Physician: (Last) (First) (Middle)	Social Security #	Weight / Height
DIAGNOSIS	ALLERGY HISTORY	

DEVICE TYPE: ☐ Tunneled (☐ Closed Ended * ☐ Open Ended **) ☐ Non Tunneled (☐ Closed Ended * ☐ Open Ended **) ☐ PICC (☐ Closed Ended * ☐ Open Ended **) ☐ Implanted Venous Port (☐ Closed Ended * ☐ Open Ended **)

TYPE OF INFUSION: ☐ Continuous ☐ Intermittent ☐ Maintenance ☐ TPN (Total Parenteral Nutrition)

NUMBER OF LUMENS: ☐ One ☐ Two ☐ Three ☐ Other _____

ON ADMISSION - PICC gauge _____ Total Catheter Length _____ External Catheter Length _____

Anatomical Tip Location _____ Update changes in Medical record

FLUSHING PROTOCOL: *Use SASH Technique* **

Use At Least 10 ML Barrel Size Syringe for All IV devices.

☐ **Continuous Infusion** - No Flushing Required

☐ **Intermittent Meds - Open Ended Catheters**
- ☐ All Central Devices
  - 5 ML NSS Before Med
  - 5 ML NSS After Med
  - *Then*
  - 5 ML **10 Units/ML** Heparin Flush
- ☐ **Closed Ended Catheters**
  - 5 ML NSS Before Med
  - 5 ML NSS After Med

☐ **No Meds - Catheter Is Not in Use**

All lumens need to be flushed Q 24 Hours
- ☐ Open Ended Catheters (non valved) - Flush Q 24 Hours
  - 5 ML NSS
  - 5 ML **10 Units/ML** Heparin Flush
- ☐ Closed Ended Catheters (valved) - Flush Q 24 Hours
  - 5 ML NSS
- ☐ Tunneled and Non-Tunneled - All lumens Q 24 Hours
- ☐ PICC - All lumens Q 12 Hours
- ☐ Implanted Ports When Accessed - Flush Q 24 Hours with
  - 5 ML NSS
  - 5 ML 100 Units/ML Heparin Flush
- ☐ Implanted Ports When NOT Accessed - Flush Q Month
  - 5 ML NSS
  - 5 ML 100 Units/ML Heparin Flush

TREATMENT PROTOCOLS:

Change Tubing: ☐ Q 24 Hours Primary and Secondary Intermittent ☐ Q 72 Hours Primary and Secondary Continuous ☐ Q 24 Hours Total Parenteral Nutrition (TPN)

Label With Name / Date / Time

Once a Secondary Administration set is detached from the Primary Administration set, the Secondary Administration set should be considered a Primary Intermittent set

Change Intermittent Tubing Cover With Each Use

☐ Change Needleless Connection Device:
- ☐ Q 7 days and PRN
- ☐ After Blood Draws
- ☐ Q Day If Total Parenteral Nutrition Infusing

☐ Change Non-coring Needle Implanted Port Q 7 Days with dressing change, if in use

☐ Change Dressing:
- ☐ 24 Hrs Post Insertion catheter *Then* Q 7 days and PRN
- ☐ Established lines Q 7 days and PRN
- ☐ Gauze Dressing Q 48°

☐ PICC Catheters:
- ☐ Measure Arm Circumference _____ inches above insertion site on admission, PRN, Q 7 days with dressing change
- ☐ Measure External Catheter Length on admission, with each dressing change and PRN

☐ Observe Site At Least Q 2 Hours (with continuous fluids) and PRN - Document In Notes Q Shift

☐ Monitor Intake and Output for Continuous Infusion

Anaphylaxis Protocol According to Center Policy and Procedure

Date Medication Required: _____ Time Medication Required: _____ First Dose From IV INTERIM/STAT SYSTEM ☐ Yes ☐ No

FLUID / MEDICATION ORDERS / STOP DATE

☐ May use Device for Blood Draws

** Use Saline Only For Closed Ended (valved), Catheter has no clamps.*
*** Use Saline/Heparin for Open Ended (non valved), Catheter has clamps.*

Nurse Signature:	Date:	Time:	Routing:
Physician Signature:	Date:	Time:	
Noted By:	Date:	Time:	

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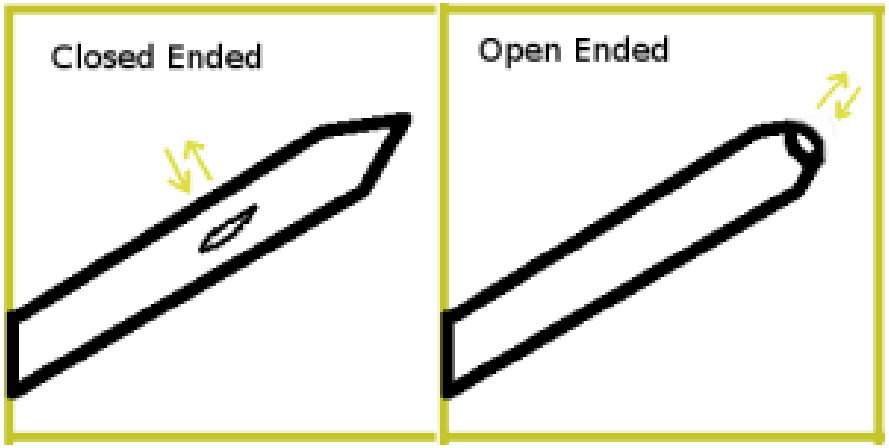
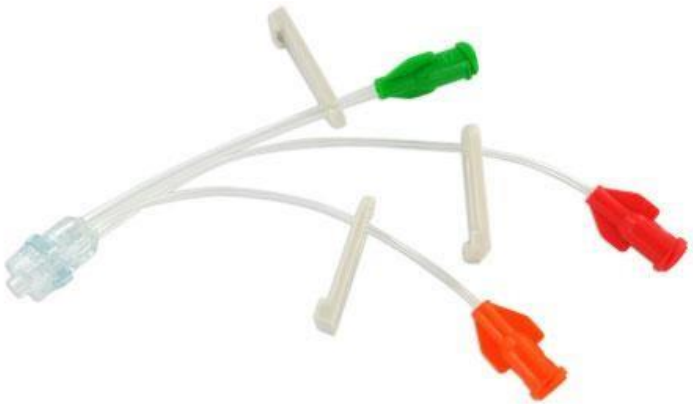
OPEN-ENDED VS CLOSE-ENDED PICC

An **open-ended PICC** has an open end, which allows fluid and medications to be pushed in, and blood to be drawn out.

A **closed-ended PICC** instead has a thin slit-like valve on the side that provides the same function.





Central Venous Catheters

	Percutaneous	Tunneled	PICC's	Implanted Ports	Dialysis
Insertion	MD @ bedside w/x-ray confirmation	MD in OR under fluoroscopy	MD/trained RN @bedside w/x-ray confirmation	MD in OR under fluoroscopy	MD in OR under fluoroscopy
Location	Visible externally. Enters subclavian, ext. juglar,or int. juglar vein near clavicular area	Visible ext. usually midway bet. clavicle and nipple. Tunneled under skin & threaded through subclavian or IJ	Visible externally around antecubital fossa, upper arm or neck	Completely internal. Titanium or plastc port is implanted in a surgically created pocket and catheter is threaded into subclavian or int. juglar vein. Access is through skin into self sealing port using special non coring needle	Visible externally. Arm or leg placement
Material/Cost	Polyurethane $200-$400	Silicone $3500-$5000	Silicone / polyurethane $350-$500	Silicone catheter. Port is titanium or plastic w/self sealing diaphragm $3500-$5000	Various materials
Lumen	2-3	2-3	1-2	1-2	2-3
Sutured	Yes/entire life	Yes, until internal Dacron cuff healed	No	Yes	Yes
Duration	Short term 4-10 days	Long term	Long term	Long term	Mid term
Flushes	5-10ml NaCl after use and daily	5-10ml NaCl after use and daily	5-10ml NaCl after use and daily	10ml NaCl followed by 4.5ml heparinized saline (adults-100units/ml; peds-10units/ml) after ea. use or monthly if not accessed	Done ONLY by IV team or dialysis nurses
Brands/ Names	Arrow Howe, Triple Lumen, Subclavian, IJ	Hickman, Broviac	PICC, PIC, EDPC, Arrow Howe, Gesco, PASV	Bard, Accces Port-A-Cath	Bard, Tesio, Vescath, Quinton
Discontinue	MD or speically trained RN @ bedside	MD in OR	Specially trained RN @ bedside	MD in OR	MD in OR

IV FLOW PROBLEMS

READ ON YOUR OWN
NO TEST QUESTIONS
ASK QUESTIONS

IV Medication Administration

- Many medications require patient monitoring that cannot be done on units where the nurse/patient ratios are greater than 1:2

- A patient can be moved to a unit where the ratio is appropriate for invasive/frequent monitoring or another nurse can be brought to care for the patient during the med administration

All Medications Cannot Be Administered on All Units

General Care Units: Can give meds requiring only basic physical assessment data

Stepdown Units: Can give meds that require more invasive or frequent monitoring than is available on general care units

Intensive Care Units: Can give meds that require more invasive or frequent monitoring than is available on the Stepdown units.

IV Medication Administration

Sample page from an Acute Care Hospital

See "APPROVED FOR" section. You will find certain medications are only for certain units

DRUG	APPROVED FOR: ICU	APPROVED FOR: Step Down	APPROVED FOR: Gen Care	GR Guardrails	Standard Concentration	Suggested Administration Rate [1]	COMMENTS
Nitroglycerin	X	X No titration of infusion		GR	100mcg/ml	**Adult Infusion** 25 mcg/min titrated to patient comfort; Maximum 400 mcg/min **Ped Infusion**: 0.25-0.5 mcg/kg/min	Cardiac monitoring required, Monitor blood pressure, heart rate, ekg
Nitroprusside	X			GR	50mg/250ml	**Adult Infusion** 0.2-10 mcg/kg/min **Ped Infusion**: Initial dose: 0.3-0.5 mcg/kg/min; Max: 10 mcg/kg/min	Protect from light; Monitor Blood pressure, heart rate; monitor for cyanide and thiocyanate toxicity; monitor acid-base status as acidosis can be the earliest sign of cyanide toxicity; monitor thiocyanate levels if requiring prolonged infusion (>3 days) or dose ≥ 4 mcg/kg/minute or patient has renal dysfunction; monitor cyanide blood levels in patients with decreased hepatic function; cardiac monitor and blood pressure monitor required
Norepinephine	X	X No titration	Adult Telemetry bed, no titration, max dose 1 mg/hr with charge nurse approval based on staffing	GR	4mg/250ml	**Adult Bolus** 8-12 mcg/min **Adult Infusion** 2-4 mcg/min **Peds Infusion**: 0.05-0.5 mcg/kg/min	Max concentration 64 mcg/ml ; Requires cardiac monitoring, BP, HR, EKG, UOP, If intra arterial monitoring available, monitor CVP, serum electrolytes, monitor skin temp and color of extremities, avoid extravasation
Octreotide	X	X	X	GR	50, 100, 500 mcg/ml	**Adult Infusion** 10-50 mcg/hr **Peds Infusion for GI bleed**: 1 mcg/kg bolus followed by 1 mcg/kg/hr	Infusion for esophageal varices in adults.
Ondansetron	X	X	X		4mg/5ml	**Adult Bolus** 4mg over 2 min	Monitor blood pressure, pulse. May cause headache, drowsiness, and dizziness.

Alternate infusion rates permitted under the direct supervision and presence of a Physician. Above guidelines to support safe administration of IV medications. NOTE: This list includes only selected drugs requiring special assessment or monitoring. This list is not exhaustive – refer to other references as needed.

"Troubleshooting"- Safe tips of fixing of IV problems.

- **Possible contamination**
- **IV Catheter Defects**
- **IV Catheter Insertion Problems**
  - Catheter should enter smoothly- No resistance
  - If resistance, remove catheter and needle at the same time
  - Use opposite arm for second attempt.
  - Use new catheter each time.
  - Slight blood flash back - Patient could be dehydrated.
  - No flash back, but you think your in the vein- run a little fluid, watch for infiltration.
  - Good flash back, but fluid running slow- bevel of catheter might be against the wall of the vein.
  - If a hematoma forms, take catheter out and hold pressure at site for 5 min.

"Troubleshooting"- Safe tips of fixing of IV problems.

Flow rate problems

1. Site - check for infiltration, cracks in the catheter or tubing, tourniquet on, taped too tight.
Tubing- kinked, clamp on, particles in tubing, patient lying on tubing, tubing too long?
Filter- has it been on too long, is it needed? Change with each bottle.

Air vent- needed on glass bottles and volume controlled sets only. If it gets wet- it won't run the fluid effectively.

Container- empty? Fluid cold? Cracks in bag or bottle? Particles in fluid?

Secondary IV solutions or volume controlled sets

IVPB empty and main IV clamp turned off.
IVPB bag higher than main IV bag.
Tubing too long.
Air bubbles in tubing.
Drip chamber not full enough.

Extravasation Injury

Fluid and medications flowing into the surrounding tissues. Know medications and their antidotes.

"Troubleshooting" – Blood Transfusion

Blood Transfusion Problems

- If the blood stops running
- Check for a hematoma at the insertion site.
- The blood been hanging longer than 4 hours? Blood clotted.
- Is the tubing primed with saline?
- Is unit empty? Run saline until you get the next unit.

If hematoma develops

- Stop the transfusion, discontinue the IV catheter and restart in a new site.
- Hold pressure at the site.
- Warm soaks and elevate the site.

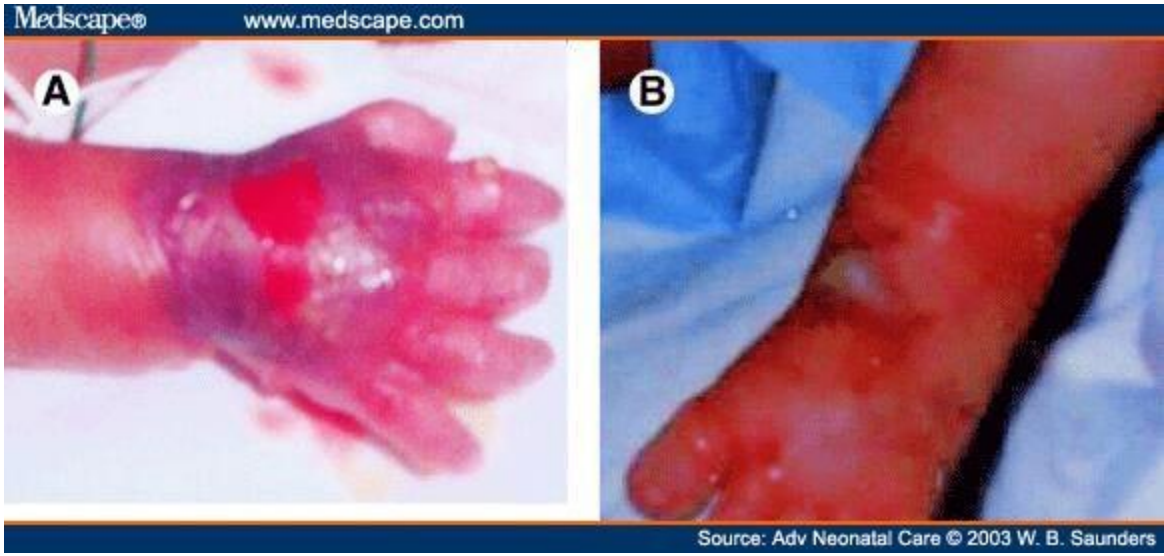
When one unit is finished and the second one not available

- Run saline through the filter and tubing until the second unit is ready.
- Change tubings if next bag is delayed by 20 minutes or more

"Troubleshooting"- Safe tips of fixing of IV problems.

When an error does occur

- Take immediate corrective action to assist the patient with side effects.
- Call the doctor
- Call your supervisor
- Notification form
- Document



BLOOD WITHDRAWAL

"Troubleshooting"- Safe tips of fixing of IV problems.

- **IV Pump Problems**
  - Air in the line- Prime tubing properly
  - Infusion complete- Machine will KVO and pump a little fluid to keep the line open, while it beeps to let you know there is a problem.
  - Low battery- will beep and alert to low battery. Keep plugged in while patient is in bed.
  - Occlusion- Pump will alert you. Check clamps, wheels on tubing, patient lying on tubing, or infiltration.
  - Rate changed on pump? Family or patient tampering with the pump?
  - Keeps beeping- can't find a problem? Maybe malfunction! Just a machine. Not always correct. Know how to calculate rate to keep an eye on the fluid level for your shift.

Procedures –Venipuncture – Self-Read

Evacuated Tube System

A. Test Requisition

B. Check with nurse caring for patient

C. Knock first before entering the room, introduce yourself and explain the test.

D. Identify patient

E. Wash hands

F. Prepare Equipment needed

G. Put on gloves

H. Apply tourniquet

I. Select the site

J. Clean the site

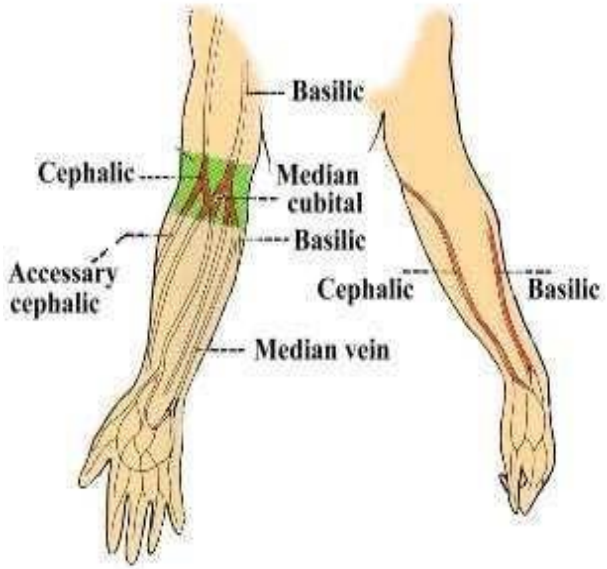
1. Alcohol wipe
2. Allow to dry (15 -30 secs), Don't blow dry
3. Don't touch site after cleaning

K. Securely fasten needle to evacuated tube holder

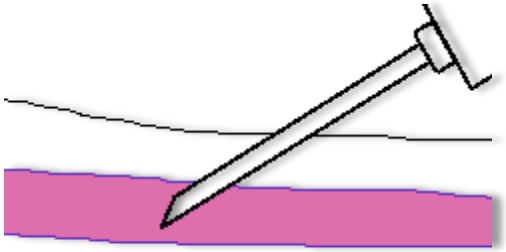
L. Have appropriate tubes close at hand

-have bandage available

- have tape available

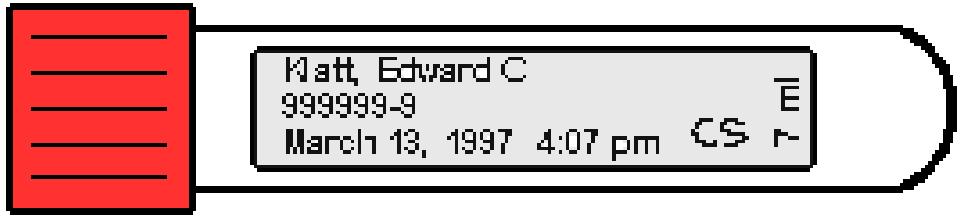


Procedures -Venipuncture



M. Remove needle guard Sheath
N. Anchor vein
O. Insert needle into vein (15-30 degree angle)
P. Fill Tubes (maintain steady hold on apparatus so the needle will not advance through the vein)

Q. Remove tourniquet
R. Remove needle and immediately apply pressure to the insertion size with gauze, cotton ball or bandaid
S. Dispose of needle
T. ***Label Tubes ****
   1. Patient's Information
   2. Date and Time
   3. Phlebotomist initials.
U Recheck patient's arm
V. Thank the patient
W. Remove gloves and wash hands
X. Transport specimens to lab
Y. Clock in specimens



Infection control and Safety – Self Read

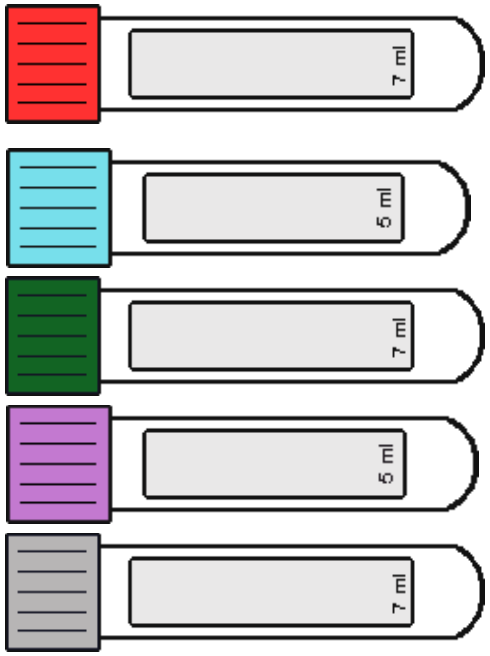
- ***S***pecimen Handling
  - Check the lab slip for draw time
  - Tubes with additives should be gently inverted 5 to 10 times for proper mixing
  - Vigorous shaking can damage blood cells
  - Transport tubes with rubber stoppers and in upright position
  - Non blood specimens should be transported in a leak proof container.
  - Call for pick up for specimens that needs to remain chilled

Order of Blood Draw

- **Evacuated Tube System:**

to avoid contamination of non additive tubes by additive tubes, this order should be followed:

1. Blood culture tubes
2. Red stopper or red/gray stopper: non additive and gel separator, respectively
3. Light blue stopper: sodium citrate, or tubes for coagulation studies
4. Green or green/gray stopper: heparin (anticoagulation)
5. Lavender stopper: EDTA (potassium or sodium)
6. Gray Stopper : Flouride



Order of Blood Draw

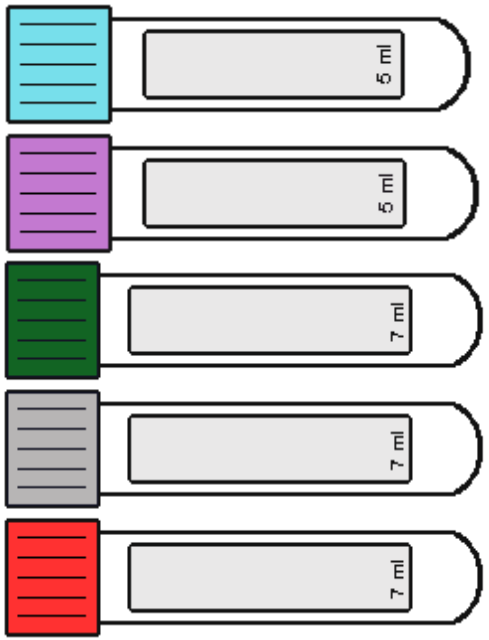
- **Syringe System**

  Blood starts to clot as soon as it is withdrawn from the vein. The freshest blood is the blood that is aspirated last.

  Therefore, with the exception of blood cultures, it is important to transfer the blood into the anticoagulant tubes first.

  The preferred order is as follows:

  1. Blood Culture tubes
  2. **Light Blue** stopper: Sodium Citrate
  3. **Lavender**: EDTA
  4. **Green**: Heparin
  5. **Gray**: Flouride
  6. **Red** or red/gray stopper: Serum



Blood Culture Draw

Ideally, 20 mL of blood is drawn and split between an aerobic bottle and an anaerobic bottle.

For pediatric draws, 1 to 2 mL blood may be submitted in an aerobic bottle. Use the following aseptic technique:

1. Clean the blood collection site with alcohol.
2. Disinfect the site with iodine and allow to dry 1 to 2 minutes.
3. Clean the diaphragm of the bottles with alcohol.
4. Do not touch the phlebotomy site after disinfection.
5. Draw blood with a sterile syringe and needle.
6. Immediately transfer 20 mL of blood to each bottle.
7. Mix the bottles by inversion to prevent blood from clotting.
8. Remove iodine from the patient's arm with alcohol.

Order of Draw as Recommended by CLSI

		Blood Culture	Aerobic followed by Anaerobic - if insufficient blood for both culture bottles, use Aerobic bottle only	Use blood culture collection packs only
	Cat. No. KFK119 Draw Volume 2.7ml	Citrate	Coagulation Studies, INR + KCCT, D-Dimer, Fibrinogen	Tube must be full Mix 3-4
	Cat. No. KFK168 Draw Volume 6ml	Serum	Bacteriology and Viral Serology, Selenium, Zinc, 17 OHP, Androgens, Androstendione, IGF1/IGFBP3, DHAS, GH, Vit D, Insulin, C peptide, Antibiotic Assays. Cryoglobulin (2 Red + EDTA)	Immunology requests except C3D Mix 8-10
	Cat. No. KFK114 Draw Volume 6ml	SST™ II	Aldosterone, B12, Ferritin and S. Folate, Downs Screen and all routine Biochemistry profiles except those mentioned elsewhere	Tube must be full Mix 5-6
	Cat. No. KFK099 Draw Volume 6.5ml	Heparin	Carboxyhaemoglobin Methaemoglobin Cytogenetics	Tube must be full Mix 8-10
	Cat. No. KFK171 Draw Volume 4ml	EDTA	FBC, Platelets, Sickle Test, Malaria, HbA1c, Hb Electrophoresis. The following tests require a separate tube and need to be sent to the laboratory straight away: Tacrolimus, Mycophenolate, Viscosity, Cyclosporin, Lead, C3D, Ammonia, ACTH, ESR, Chromosomes, Renin, Cryoglobulin (+2x Red), CTX	Tube must be full Mix 8-10
	Cat. No. KFK277 Draw Volume 6ml	Cross Match	Blood Group Cross Matching	Tube must have four patient identifiers and be signed Mix 8-10
	Cat. No. KFK250 Draw Volume 2ml	Fluoride Oxalate	Blood Glucose Ethanol Lactate	Tube must be full Mix 8-10

Practice Time!!

Need to know if

1. You're absorbing the info [Mind]
2. Practiced the skills [Body]

Safety Precautions

1. Make Sure to sign
"Dealing with Accidental Needle Sticks" Form

2. Watch VIDEOS
   A.
   B.
   C.
   D.

Priming IV Steps

1. Wash Hands
2. Verify Order & Allergies
3. Know Why
4. Select Equipment
   - Solution as ordered
   - Infusion tubing
5. Inspect container & solution
6. Prepare solution
   - Open container – aseptic
7. Close Roller Clamp
8. Remove spike cap
9. Spike
10. Attach primary tubing
11. Drip chamber ½ full
12. Prime tubing until end

Blood Transfusion Steps

1. There's a need
2. Know Why
   - i.e. Low RBC levels
3. Verify or See Order
   - Get one if none
4. Signed Consent
5. Call for Type & Crossmatch
6. Verify Blood bank ID on pt
7. Prepare Y tubing& Prime Y tubing
   - 0.9 NS ONLY – above filter
8. Get Blood to unit–check
9. Get another licensed provider to verify:
   a) two IDs: blood bank #, Pt ID
   b) blood type of donor,
   c) blood type of pt
   d) ABO/RH compatability
   e) Unit #
   f) expiration date

10. Blood need to be given in 30 min after getting from bank
    - VS are taken 15 min before and after start of infusion
    - Assess Heart &Lung sounds
11. every 30 mins during infusion
12. 30 mins after infusion is complete.
    - Blood must infuse within 4 hrs.
    - Do not give meds in blood tubing
    - Sign of a reaction? Stop transfusion
11. Blood tubing & bag is sent to the Blood Bank/Lab.
14. Physician is notified
15. IV line is kept patent w/ NS.

IV insertion Steps

1. Wash Hands
2. Verify Order & Allergies
3. Know Why
4. Select Equipment
   - gloves
   - alcohol
   - gauze 2X2's
   - I.V. catheter
   - Tegaderm or other appropriate dressing
   - tape
   - IV fluid and/or heparin lock connector

5. ID Patient
   - Get consent & reassure
6. Lay out Equipment
   - All within Reach
7. Look for VEIN
8. Decide
9. Bevel Up & Tight Skin
10. Read the skin & adjust your angle of insertion accordingly
11. Flashback ? Insert enough needle to anchor then Advance Catheter ONLY
12. Tourniquet OFF
13. Pressure
14. Connect Lock/syringe
15. Tape IV and tubing to last @ least 72 hrs
16. SHARPS

Blood Withdrawal Steps

1. Wash Hands
2. Verify Order & Allergies
3. Know Why
4. Select Equipment
   - Blood Draw Needle
   - alcohol , gloves, gauze 2x2
   - Vacutainer
   - Test Tubes
   - LABELS !
   - Bandage
5. ID Patient
   - Get consent & reassure
6. Lay out Equipment
   - All within Reach
7. Look for VEIN
8. Decide
9. Bevel Up & Tight Skin
10. Insert 1st tube
11. STEADY Hand for 2nd tube
12. Done? Tourniquet OFF
13. LABEL !
14. SHARPS !