Blood Transfusion

Components of Blood

* Formed elements-Cells
  + Erythrocytes (RBCs)
  + Leukocytes (WBCs)
  + Thrombocytes (platelets)
* Plasma
  + 90% water
  + 10% solutes
  + Proteins, clotting factors

**What can we give?**

* Whole blood
* Packed RBC (PRBC)
* Platelets
* Fresh Frozen Plasma (FFP)
* Granulocytes
* Cryoprecipitate
* Factor VIII
* Albumin

Antigens

* Definition: a substance capable of stimulating the production of an antibody and then reacting with that antibody in a specific way
* Inherited
* Found on red cells
* ABO, Rh (D antigen)

Antibodies

Definition: protein produced by the immune system that destroys or inactivates a particular antigen

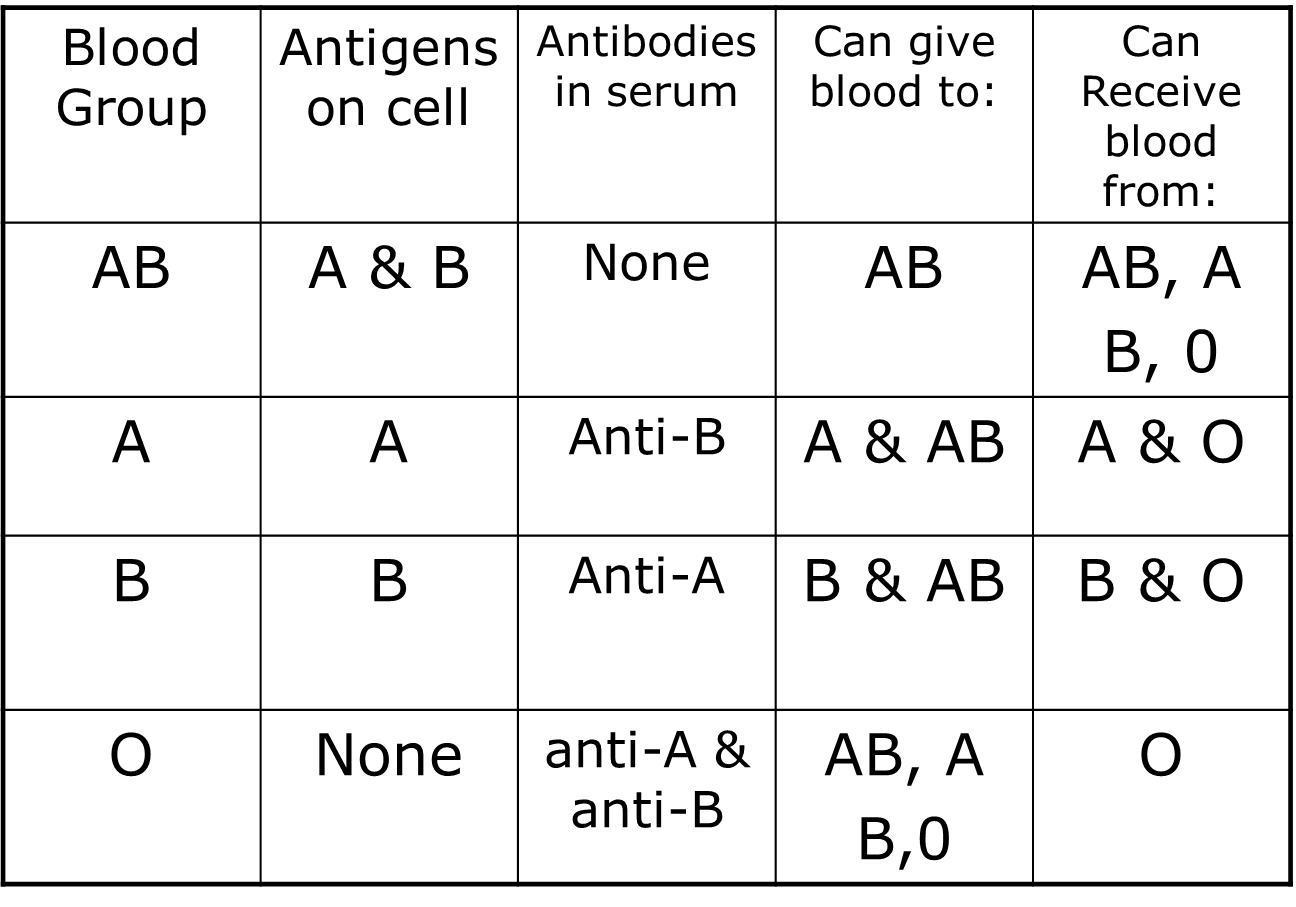
Produced as a result of antigenic reactions

Found in plasma

Agglutination

* Caused by reaction between antigens and antibodies
* Type & screen
* Type & cross

Giving and Receiving



Ways to Give & Receive

* Autologous
* Intraoperative
* Postoperative
* Homologous
  + Volunteer
  + Designated donation

Blood Components Key points

All blood MUST be infused within 4 hours

Catheter size: 22- to 14-gauge with 20- to 18-gauge appropriate for general populations

Must use filter specific for blood

Administration set changed with every unit

**Blood Components Whole blood**

* volume — 500 cc (approx.)
* Rarely used
* Must be ABO compatible
* Acute massive blood loss >25%
* Raises Hgb by 1 g/dL
* Raises Hct by 3%

Blood Components (Packed Red Cells)

* must be ABO compatible
* Volume — 250 – 300 mL (approx.)
* Use for chronic symptomaticanemia
* NOT used for volume expansion
* Raises Hgb 1 g/dL and Hct 3%
* Use only 0.9% sodium chloride as primer
* Use 170 micron filter
* Administer over4 hours (usually 2 hours)

Leukocyte Reduced RBCs

* Filter: leukocyte filter
* Need physician’s order
* Filter 99% of WBCs that cause febrile reactions

Blood Components: platelets

* Use: control bleeding in platelet deficiency
* Use in thrombocytopenia
* Administration: 1 unit (30 – 50 mL) over 5 – 10 min.
* ABO compatibility not required but preferred.
* 1 unit raises platelet count 5 – 10,000
* Administer 6-8 units/time
  + Apheresis = single donor

Plasma Derivatives: FFP

* Plasma
  + Liquid portion of blood; does not contain RBCs
* Fresh frozen plasma
  + Prepared from whole blood separating and freezing plasma within 8 hours of collection
  + FFP may be stored up to 1 year
  + Does not provide platelets
  + Typical volume is 200 – 250 mL
* Use: procoagulant deficiencies, DIC, massive transfusions in trauma

Plasma Derivatives: Albumin

* plasma protein that supplies 80% of plasma’s osmotic activity
* Does not transmit viral disease because of extended heating process
* Available as 5% or 25% solution
* Glass bottle: administration set w/air vent.

Alternatives to Blood Transfusions

* Augmentation of volume with colloid solutions
* Autologous cell salvage
* RBC substitutes
* Modified hemoglobin or hemoglobin-based oxygen carriers
* Perfluorocarbons (PFCs)
* Erythropoietic stimulating agents (ESAs)
* White cell growth factors
* Hematinics

**Administration of Blood Components**

* **Key points**
  + Assessment
  + Preparing for transfusion
  + Obtaining blood from lab
  + Checking unit with another nurse
  + Initiation of transfusion
  + Monitoring
  + Disposal

Assessment of Patient Prior to Initiation of Blood Transfusion

* Check hospital P&P
* Consent in chart
* Review any parameters set by physician
* Vital sign base line
* Assessment of lungs and kidneys
* Laboratory values
* Patient history of transfusions

**Preparation for Transfusion**

* Initiate IV with appropriate catheter; in most situations, 20- to 18-gauge
* If IV infusing, check patency and cannula size
  + Saline lock: flush to check patency
* Start primer of 0.9% sodium chloride with Y administration set
* Y set has 170 micron filter

Obtain Blood Component from Lab

* Pick up only one unit from lab at a time!
* Clerical errors most common transfusion complication
* Sign for blood – checking
  + Name, identification number of patient
  + Transfusion donor number
  + Expiration date of component
  + ABO and Rh compatibility

Preparation for Administration

* Check with another licensed person compatibility information
  + Name, identification number of patient
  + “paper to armband” then
* “paper to blood bag”
  + Transfusion donor number
  + Expiration date of component
  + ABO and Rh compatibility
* Obtain set of vitals prior to initiation

Administration

* Wear gloves to hang blood
* Spike bag and hang
* Turn off sodium chloride
* slowly begin infusion
* Stay with patient a minimum of 15 minutes

Rate of Infusion

* Dr. order?
* Age of patient
* Purpose of infusion
* Other medical conditions (CHF)
* Current IV rate
* “slow” rate for 1st 15 min.
  + Craven: 10 gtts/min (60 ml/hr)
  + Phillips: 2 ml/min (120 ml/hr)
  + Berman et al Skills book: 20 gtts/min (120 mL/hr)
* Must be infused w/in 4 hours

Monitoring of Transfusion

* Check vitals per hospital P&P
  + Reflected on blood transfusion slip
* Assess kidneys and lungs throughout
* Observe for signs and symptoms of transfusion reactions

Transfusion reactions

|  |  |
| --- | --- |
| **Immune**   * Acute hemolytic * Delayed hemolytic * Nonhemolytic febrile * Allergic | **Non-Immune**   * Circulatory overload * Hyperkalemia * Hypothermia * Citrate toxicity * Bacterial contamination * Coagulation imbalances * Transmission of infectious disease |

Transfusion Reactions

* Immediate
  + Hemolytic transfusion reactions
  + Non-hemolytic transfusion reactions
    - Febrile
    - Allergic

Hemolytic transfusion reactions

|  |  |
| --- | --- |
| * Wrong blood to wrong patient * Occurs within 5 – 15 min. of initiation of transfusion * Death * DIC | CMs   * Fever (w/ or w/out chills * Hypotension * Pain: lumbar, flank, chest * Tachycardia * Tachypnea * Hemoglobinuria |

Suspected Hemolytic Reaction?

* Stop transfusion
* Do NOT flush w/NS flush bag
* Disconnect blood tubing, then flush.
* Prepare to treat shock
* Follow hospital guidelines:
  + Notify MD
  + Save blood bag
  + Call lab
  + Blood sample
  + Urine sample

Febrile reactions

* Cause: reaction to antibodies in blood in reaction to leukocytes
* Signs and symptoms : fever, chills, HA
* Treatment: stop blood, notify RN, notify physician
* Treat with antipyretic medication
* Use leukocyte filter

Allergic reactions

* Cause: antibody formation against plasma proteins
* Signs and symptoms are varied : hives, itching, respiratory distress
* Treatment: stop blood, notify RN, notify physician
* Treatment: antihistamines