# Fresh Whole Blood Transfusions in the Austere Environment

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The recommendations in this manuscript are only guidelines and are not a substitute for good clinical judgment.

## Abstract

The use of Fresh Whole Blood (FWB) transfusions can be a powerful tool for the Special Operations Forces (SOF) medic to treat uncontrolled hemorrhage. In fact, it may be the only tool currently available for hemostatic resuscitation, which along with hypotensive resuscitation, forms the basis for Damage Control Resuscitation (DCR). Until now, no comprehensive protocol has existed for conducting FWB transfusions in austere environments. The United States Special Operations Command (USSOCOM) sponsored Curriculum Evaluation Board (CEB), which is responsible for authoring the Tactical Emergency Medical Protocols (TMEPs) has produced a protocol. This article serves as its introduction.

### Introduction

This article provides a comprehensive review of a method for conducting FWB transfusions in austere environments. We discuss the FWB transfusion portion of the newly finalized Tactical Emergency Medical Protocol (TMEP) for the administration of blood and blood components, and explain the rationale behind this protocol. The next TMEP training supplement will include the protocol for administering blood and blood components. We also present a training method that address' the use of FWB transfusions in austere environments, and provide guidelines for SOF medics who may consider initiating a "walking blood bank".

### Background

Current guidelines and policies permit SOF medics to transfuse lifesaving, FWB using identification (ID) cards or tags to determine donors' and recipients' blood types.[1,2] An unfortunate risk in these methods of identification is an inaccuracy rate ranging from 1.8 to 11%.[3-5] Central Command (CENTCOM) Theater Guidelines allow for the transfusion of Food and Drug Administration (FDA) unlicensed (meaning untested) blood products collected in- theater when they are used for lifesaving measures.[6]

The guidelines state that rapid on-site screening tests should be utilized, to the maximum extent feasible, and also state that in life or death situations, diagnostic screening cards can be used to screen for potential donor and/or transfusion recipient ABO/Rh. We contend that the extent of on-site screening called for is not feasible and largely unnecessary in the SOF population. Medics need to be aware of at least one documented case of a patient contracting Hepatitis C Virus (HCV) from an unscreened blood transfusion, as well as some units collected from unscreened recipients that subsequently tested positive for HCV and human T-cell lymphotropic virus (HTLV).[7]

The Joint Theater Trauma System (JTTS) offers guidelines for transfusing FWB, and state that ID cards and tags should only be used as a last resort, and also highly encourage rapid viral testing prior to transfusion.[6] The authors of the TMEPs agree that there should be a level of screening, testing, and documentation; unfortunately, the JTTS recommendations are beyond what SOF medics can reasonably accomplish while conducting operations in the field or when planning a walking blood bank.

The recently published TMEP for the Administration of Blood and Blood Components directly addresses the disparity between what can be accomplished at a Military Treatment Facility (MTF) and what SOF medics can accomplish while forward-deployed. The purpose of this TMEP is to enable SOF medics to balance the highest standard of care — always our goal — and the expedient measures authorized during contingency operations and emergencies where life is at stake. Admittedly, this balance becomes a compromise between what is authorized, what is feasible, and what is judicious. We feel that the TMEP is in accordance with (IAW) current theater policies and applicable guidelines, and assert that the TMEP for the Administration of Blood and Blood Components offers the highest standard of care possible, given the tools currently available to SOF medics.[7] We are seeking and welcome feedback to modify this TMEP to increase the safety and effectiveness of the outlined procedures.

A walking blood bank consists of using personnel on hand as a resource for blood when the need arises instead of banking blood and blood products until needed. This technique is still used in times of conflict and has been advocated for use domestically during disasters and even terrorist attacks.[8-12] The technique of a walking blood bank is well-suited for SOF personnel who very often find themselves in undeveloped theaters of operation or austere environments where medical support is sparse or nonexistent. Fresh whole blood transfusions have rarely been used at or near the point of injury, but have proven to be effective when employed in the pre-hospital environment during military operations.[13-15]

### History

Type O whole blood was used in World War II (WWII), Korea, and Viet Nam, with few cases of immediate hemolytic transfusion reactions (IHTR).[16,17,18] The standard of care during the Vietnam War was to administer low-titer Type O whole blood to all patients who required a transfusion. Over 230,000 blood transfusions were performed in Viet Nam from 1967 to 1969. During this period, only one case of IHTR was reported from a transfusion with Type O whole blood, from a high-titer unit that was mistakenly released from the hospital. Fortunately, the patient had an uneventful recovery. In at least one location in Afghanistan, Type O FWB was

successfully administered to patients who had received Type O red blood cells (RBCs), and then needed FWB.[8] This method followed the rationale that administration of several units of Type O PRBCs with AB plasma (without AB antibodies), effectively changed the patient's circulating blood type to Type O with no AB antibodies. Therefore, little if any reaction was anticipated.

### Indications

In a randomized, double-blind, controlled trial, the use of FWB was compared to reconstituted blood. Fresh whole blood administration was associated with a significantly lengthier stay in the intensive care unit, greater perioperative fluid overload, and a trend toward an increased duration of mechanical ventilation, so FWB may not be the most prudent choice if other means are available.[19]

When you are considering whether or not to initiate a FWB transfusion, the severity of the casualty and the time until evacuation to surgical care should be your chief concerns. The TMEPs cite the indications recommended by the Committee on Tactical Combat Casualty Care (CoTCCC) almost verbatim, but other indications should be considered and could augment the CoTCCC recommendations. In addition to the recommendations of the CoTCCC, we also recommend initiating a FWB transfusion whenever a Massive Transfusion (MT) is clinically indicated, based on any one these significant risk factors: [20-24]

1. Heart rate greater than 105 beats per minute (BPM).
2. Systolic Blood Pressure (SBP) less than 110mm Hg
3. Severe blast injury or penetrating mechanism of injury (MOI)
4. Shock index (SI) >0.9. SI is calculated as follows: SI=HR/SBP.
5. If ultrasound is available, a positive FAST exam is usually a reliable indicator.

Other reliable risk factors for an MT have been identified, such as:

a. pH<7.25 (acidosis)
b. Hct<32.0% (hematocrit)
c. Hgb≤11 g/dL (hemoglobin)
d. INR>1.5 (international normalized ratio)

**(These measurements are not generally available to the SOF medic.)*

### Candidates, Screening and Typing

Arguably, the most important factor when considering transfusing FWB is prescreening. The best way to determine the correct type and safety of a donated unit of blood is the health status of the donor during collection. Thus, the first step in transfusing FWB is selecting a suitable donor. Optimally, donors should be screened IAW the current American Association of Blood Banks (AABB) guidelines. The safest donor is the donor most recently screened at an AABB-accredited facility, and found suitable to donate. The donor should be ABO-identical to the recipient to mitigate reactions resulting from incompatible antibodies found in the plasma of FWB.

An antigen is any substance that causes your body to create an antibody against it. An antibody is a protein produced by the body's immune system when it detects a potentially harmful substance (antigen). Fresh whole blood contains both antigens found on the surface of RBCs and antibodies found in the plasma.

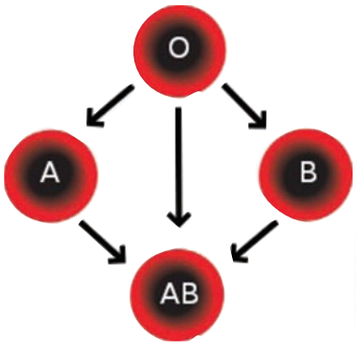


**Figure 1:** *RBC Compatibility diagram (Wikipedia, GNU licensed)*

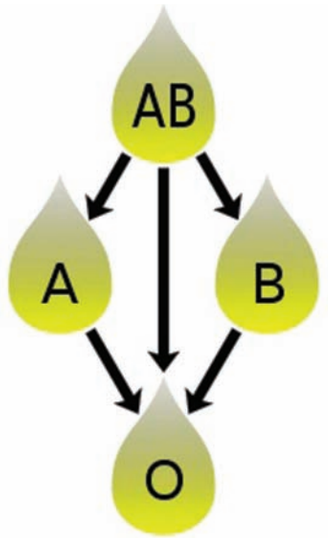


**Figure 2:** *Plasma Compatibility diagram (Wikipedia, GNU licensed)*

As seen in figures 1 and 2, when FWB is administered with ABO-compatible RBCs, you may actually be transfusing incompatible plasma, unless it is ABO-identical whole blood. The widespread belief that O-negative (O NEG) is the "universal donor" for blood is incorrect: O NEG may be the universal donor for packed red blood cells (PRBCs), but it is NOT for FWB. When you are transfusing FWB, you are giving RBCs *and* plasma. The compatibility of plasma is just the opposite of RBCs. When you are giving FWB with compatible RBCs and their accompanying surface antigens, you are possibly giving plasma with incompatible antibodies.

Unlike other antigens, the body doesn't require a first exposure to the A and B antigens to become sensitized and then begin forming A and B antibodies.[25] For individuals who do not have the corresponding antigens, the A and B antibodies begin forming at birth, and are at full strength after about 30 days. This is due to the fact that that there are sugars that are identical to the surface antigens found on the RBCs of the A, B, and AB blood types. Humans are normally exposed to these sugars in foods or microorganisms, which causes the necessary immune response to produce the A and B antibodies. This is not the case with the Rh antigen, to which a person must be exposed to in order to produce the Rh antibodies.

Pregnant females and previous transfusion recipients should be avoided as donors if possible, because they may have been exposed to the Rh antigen from a fetus or the blood they received during a transfusion. A previously pregnant donor, or one who has received a blood transfusion in the past should, however, be considered for donation in austere environments. The concern is the possibility of the presence of incompatible antibodies, so these donors should not be entirely ruled out for two reasons:

First, the possible benefit of this lifesaving procedure outweighs the minimal risk that the prospective donor may have received Rh-positive blood that produced antibodies in their Rh-negative blood.

Second, the effects from receiving incompatible antibodies are not usually as detrimental as the effects from receiving incompatible antigens.

A reaction caused by incompatible antigens is considered a "major reaction", while those from incompatible antibodies usually cause a "minor reaction".[26-28] As little as 30ml of blood containing incompatible RBCs can be fatal.[29] An infusion of incompatible plasma can also be fatal, but despite this danger, there are many cases of a patient receiving several units of incompatible plasma with only minimal, non-fatal side-effects.[16] Regardless of this, the aim is to have no reaction at all. A reaction from incompatible antibodies, however, is usually less severe than a reaction caused by receiving incompatible antigens.[30]

Under optimal conditions, it is safest to screen donors via questionnaire just prior to donation, but it is not always possible. If you consider establishing a "walking blood bank," then you should have the screening questionnaires on file well before the FWB may be needed. This preparation will shorten the FWB collection time during emergency situations.

A blood typing card (Eldoncard®) is suggested in the JTTS guidelines as confirmation of the donor's and recipient's blood type prior to transfusion. We suggest that identification with an Eldoncard® be completed well in advance of operations, and that the laminated card be carried in Soldiers' individual first aid kit (IFAK) as an integral part of planning for a "walking blood bank". The Eldoncard® has shown to have a 99.7% accuracy, which is higher than the accuracy percentage of ID cards and tags (89-98.2%).[31] All members of a SOF unit that are potential donors or recipients should have laboratory confirmation of blood type done and placed in their individual treatment records. One SOF unit reviewed a significant portion of their treatment records, and consistently found blood typing errors; however, the reviewers did not find any conflicting laboratory reports, and attributed the typing errors to patient reporting and not to laboratory or documentation errors.[32]

Joint Theater Trauma System guidelines also call for blood samples to be taken during collection.[2] As with many conventional military medical guidelines and practice recommendations, this is not suitable for SOF medics, for several reasons. First, the type and amount of blood tubes required for collection and analysis changes often, and sometimes without notice. Second, the samples taken in the field are difficult to label and handle appropriately, and therefore, should not be considered reliable. We suggest that the recommended blood sampling and testing be done retrospectively instead.

### Whole Blood Crossmatch

Accurate ABO-Rh typing reduces the risks of transfusion reactions to 0.2%. Crossmatching lowers the risk to 0.05%.[33] This is only a reduction of 0.0015%, or 15 reactions out of 10,000 transfusions. The whole blood crossmatch is not a full crossmatch procedure, which involves mixing washed donor RBCs with recipient plasma and vice versa to look for a "major" and then "minor" reaction, respectively. The whole blood crossmatch only looks for the "major reaction" involving the antigen on the donor RBCs and the antibodies in the recipient's plasma reacting. No statistics exist regarding the increased safety resulting from the use of a whole blood crossmatch. It can be argued that the crossmatching procedure may not be feasible or worthwhile for SOF medics, but it is the standard of care, and the equipment and skills required are within the scope of training for SOF medics, so it is included in the TMEP.[34]

**Figure 3:** *Whole blood Crossmatch procedure being conducted by adding one drop of whole blood to four drops of the recipient's plasma. (Author's collection)*

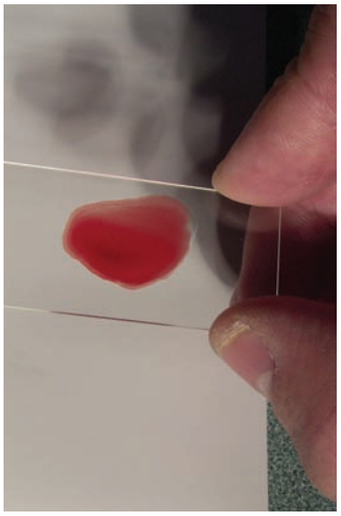

**Figure 4:** *Compatible reaction. (No agglutination.) (Author's collection)*

**Figure 5:** *Incompatible reaction. (Agglutination) (Author's collection)*

The crossmatching procedure consists of taking four drops of the recipient's plasma that has been separated from a FWB sample, and combining it with one drop of the donor's FWB. This is known as the "tile test," because the recommended procedure is to use a glazed white tile in order to have a smooth surface with a contrasting background.[35] The same effect can be accomplished by performing the test on a smooth piece of glass placed against a bright white background (figures 3 and 4). If the donor RBCs are incompatible then the antibodies in the plasma will react with the incompatible antigens on the surface of the RBCs and cause clumping of the RBCs and antigens as well as destruction of the RBCs. This clumping is known as agglutination (figure 5) and can cause fatal Disseminated Intravascular Coagulation (DIC). If any agglutination is observed, the transfusion should not be conducted.

**Figure 6:** *Blood typing cards. (Author's collection)*

**Figure 7:** *Blood collection equipment. (Author's collection)*

**Figure 8:** *Blood administration equipment. (Author's collection)*

## Equipment

As seen in figures 6 thru 8, transfusion-specific equipment carried by SOF medics consists of only a blood collection bag, filtered administration set, and a blood typing card (Eldoncard®). To protect the anticoagulant, the blood collection bag should be maintained in the foil-protective cover until use. A blood collection bag designed for single-use containing either Citrate Phosphate Dextrose (CPD) or CPD Adenine (CPDA-1) must be used. The blood collection bag can be the Terumo® type with a mark that indicates when the bag is full, or the collected amount can be measured by alternate means as described in the TMEP. The filtered administration set can be the Y-type or a straight set, but must filter to at least 170 microns.

The straight set may be less complicated to use, because there is no need to prime another portion of the line with saline, as with a Y-type set. The straight set must be removed from the normal saline (NS) priming bag and then inserted into the unit of collected FWB, and this step can increase the risk of contamination. The prospect of carrying a few more light items to allow for FWB transfusions is a more attractive option for SOF medics than other methods that are currently available. A single SOF unit has had a protocol for the use of freshly thawed Fresh Frozen Plasma (FFP) for more than five years, but has yet to use it in the field due to the increased logistical constraints as it is only good for 24 hours at room temperature or five days refrigerated.

Tranexamic acid (TXA) and/or Fibrinogen could be of potential benefit to the SOF medic for hemostatic resuscitation, but temperature storage ranges are narrower than the environments in which a SOF medic would normally find themself, and thus r8quire special handling.[36-36] The potential use of TXA or Fibrinogen for hemostatic resuscitation is beyond the scope of this article and protocol.

## Procedure

Once a suitable donor has been located and properly identified, immediate collection should begin. In any tactical situation, the safety of the donor is important. The operational effectiveness of donors is not of concern, as donating a unit of FWB has not been shown to negatively affect the physical performance of a donor.[39] Once the donor is selected, initiate the collection IAW the TMEP.

## Training Method

The Special Operations Combat Medical Skills Sustainment Course (SOCMSSC) has trained medics in the use of FWB transfusions since 2004, by collecting a unit of blood from one volunteer donor and reinfusing the blood back into the same donor once per class as a demonstration.[40] This accounts for about 125 classes to date. As a precaution against possible clot formations, the donor is given 81mg of aspirin a few hours prior to collection. To date there have been no serious reactions. The most common complication was an inability to use the collected blood because the bag was not full enough (approximately 15% incidence). The incidence of this over the last two years has dropped to approximately 5% or less, after implementing control measures to ensure the vacuum of the blood bag collection unit was not lost and the constriction band was left in place throughout the collection. A single case of suspected mild citrate toxicity was reported, presumably from an area of high citrate concentration within the blood that resulted from incomplete mixing. It is thought that this area of high citrate concentration was infused into the patient from an incompletely mixed bag that was rolled in order to reinfuse the entire contents of the blood collection bag back into the patient.

## Reactions

There are several reactions that may result from a FWB transfusion and the most common are covered in the TMEP. The recommended treatments for transfusion reactions might be beyond the capability of the normal equipment and drugs carried by

**Figure 9:** *Special Forces medic prepares to reinfuse recently collected Warm Fresh Whole Blood collected during a field training exercise. (Author's collection)*

the SOF medic. Despite this limitation, transfusion reaction interventions and equipment use are covered in the Army Special Forces medic qualification course and the Special Operations Independent Duty Corpsman Course. The drugs and equipment are also contained in the Army Special Forces medic's tactical medical set and tactical laboratory set.

For those reasons, the standard treatments are outlined to allow the medic to strive for the highest standard of care. The authors of the TMEP reasoned that the SOF medic may very well find themselves in an austere environment with robust medical capabilities from organic or indigenous assets, but without rapid medical evacuation (MEDEVAC) capabilities. Within this environment, it may be necessary to manage these reactions and perform several FWB transfusions. Fresh whole blood transfusions have been successfully conducted in the African continent.[13, 15] The idea of resuscitating a patient while awaiting MEDEVAC in the middle of Africa should hasten any healthcare provider to consider a FWB transfusion as a very viable if not essential treatment measure.

### Canine Considerations

Despite statements to the contrary, canines do have naturally occurring antibodies to the antigens that are found on their RBCs.[41] These naturally occurring antibodies can cause IHTR. Canines have an entirely different set of blood type antigens and cannot be typed using human blood typing supplies, but the aforementioned whole blood crossmatch procedure can be performed in the same manner. Optimally, canines should be typed and crossmatched prior to transfusion; however, for expediency, the normal standard of care is to allow them to receive a whole blood transfusion from any potential donor provided that neither the donor nor the recipient has ever received a blood transfusion.

Due to canines' smaller size, no more than 250ml of blood should be collected from a single donor. A regular collection bag containing 63ml of CPD or CPDA-1 is used. Although this creates a high level of citrate in the donated unit, it should not be a cause for concern unless the blood is given faster than 500ml within five minutes or the recipient has compromised liver circulation where the citrate is otherwise easily metabolized. Human blood products cannot be used in canines.[42]

### Walking Blood Bank

As stated earlier, prescreening is paramount for blood donation safety. In order to effectively plan for a walking blood bank, the SOF medic should plan well prior to deployment. Prescreening should be the cornerstone of this planning. The American Red Cross tests a unit of blood donated in the United States for the following:

1. ABO and Rh Types
2. Antibody titers
3. Hepatitis B virus (HBV)
4. Hepatitis C virus (HCV)
5. HTLV-I/II
6. Human Immunodeficiency Viruses 1 and 2 (HIV-1/2)
7. Syphilis
8. West Nile Virus (WNV)
9. Chagas' Disease

As stated earlier, all SOF personnel who may be considered for donation as part of a walking blood bank should be tested to determine their ABO Rh type and they should carry a laminated Eldoncard® in their IFAK, but what about antibody titers? The most commonly antibodies encountered are from a prior transfusion or pregnancy. To reiterate, these potential donors should be identified through questioning and only used as a last resort. The concern for a high titer could also be decreased as long as ABO-identical blood is transfused. The decision to test potential donors for high titers is probably as much a commander's decision as a decision of medical personnel. The potential need for a FWB transfusion should be weighed against the added time and expense of testing individuals for high titers.

SOF personnel are routinely vaccinated against Hepatitis B Virus (HBV), but what about Hepatitis C Virus (HCV)? There is no vaccine for HCV, and SOF personnel are not tested for HCV. The occurrence of HCV found in units of donated blood by military personnel was the highest among all of the blood-borne diseases. As you will recall, the aforementioned single transmission of a blood-borne disease during transfusion was from HCV.[9] Therefore, it is prudent to test all personnel for HCV who may be considered as donors for a walking blood bank. Although there has not been a documented case of HTLV transmission from unscreened donors, the incidence of HTLV positive donors among deployed and non-deployed donor is similar to that of HCV positive donors (0.6-0.12% versus 0.6-0.7%).

Therefore, it is probably prudent to test prospective donors for HTLV. SOF personnel are normally tested for Human Immunodeficiency Viruses 1 and 2 (HIV-1/2) every 1-2 years and 120 days prior to deployment.[43-45] This is probably sufficient to ensure a safe donation, but as with all these recommendations, should not preclude retrospective testing IAW current policies or with rapid screening tests at the time of donation. SOF personnel are tested for syphilis during physicals and are presumed negative if they are not symptomatic. While syphilis is a serious infection, it is curable, unlike the majority of blood-borne diseases tested, and should be identified with retrospective testing. The incidence of both West Nile Virus and Chagas' disease in the United States is so low that it is probably not beneficial to prescreen potential SOF donors.[46, 47]

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**DISCLAIMER**

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Win Kerr is currently the primary instructor for the block of instruction covering FWB transfusions at SOCMSSC.

# ADMINISTRATION OF BLOOD AND BLOOD COMPONENTS PROTOCOL

**SPECIAL CONSIDERATIONS:**

1. 

Blood and blood components should only be administered by personnel who are trained in the proper procedure and the identification and management of transfusion reactions. As little as 30ml of incompatible blood or packed red blood cells (PRBCs) can cause a fatal hemolytic reaction.
2. 

There is NO "universal donor" for whole blood; it must be ABO type specific.
3. 

Use only collection bags designed for the collection of whole blood (WB) and administration sets designed for the administration of blood and blood components. Failure to do so may lead to fatal thromboembolic events.
4. 

The only solutions approved by the FDA and AABB for use with blood and blood components are normal saline (NS) and Plasma-Lyte 148. Although Lactated Ringer's (LR) and other solutions have been shown to be compatible under certain circumstances, they are not approved for use by the FDA or AABB.[1-4] Any time an incompatible solution has been administered use a new catheter and administration set or flush the catheter and administration set with 50ml of NS before administering blood.
5. 

Sterile technique must be followed when performing transfusions in the field to prevent subsequent infection.

**INDICATIONS:**

If the patient is in shock, especially in the presence of known or suspected non-compressible hemorrhage, then resuscitate with 2 units of plasma followed by PRBCs in a 1:1 ratio. If blood components are not available AND you are trained and comfortable with the procedure, collect and transfuse fresh whole blood. Resuscitate and attempt to maintain a palpable radial pulse or clinical improvement. If BP monitoring is available, maintain target systolic BP of 80-90mmHg (at least 90mmHg in the presence of TBI).

**OVERVIEW:**

1. Whole blood (WB) is blood that has not been modified except for the addition of an anticoagulant. WB provides FFP:RBC:PLTSs in a 1:1:1 ratio. FWB will have a shelf-life of 24 hours and should be transfused immediately or stored at 33 to 43 degrees F (1 to 6 degrees C) within 8 hours after collection, unless otherwise directed by medical staff due to insufficient or no red blood cell (RBC) or plasma product inventory. It should be tested with rapid test kits to decrease the risk of infectious disease transmission. Identify a blood donor who is ABO identical with the intended recipient.

2. WB is sometimes referred to fresh whole blood (FWB) if it has been recently collected. However, there is no time standard as to when it is no longer considered to be fresh. It is also referred to as warm fresh whole blood (WFWB) when it is still warm following collection. WB is separated into different components.

   Any separated component, including PRBCs, is considered a blood component and therefore **CANNOT** be correctly referred to as blood. Blood refers to WFWB, FWB, and WB.

3. The following are in use by SOF medics.
   a. Fresh frozen plasma (FFP)
   b. Packed red blood cells (PRBCs)
   c. Warm fresh whole blood (WFWB)

12 August 2011

d. Fresh whole blood (FWB)
e. Whole blood (WB)

4. Prior to initiation of transfusion, the following will be checked:
   a. Vital signs (T, P, R, BP). Measure, evaluate and record baseline vital signs. Every effort should be made to monitor temperature as an increase in temperature may be the first indicator of a transfusion reaction.
   b. Casualty blood type should be confirmed.
      i. In an emergency, establish ABO/Rh of recipients and donors via local testing or previous testing.
      ii. EldonCard® tests should ONLY be used to confirm previous results obtained using the ABO/Rh test tube method.


**Identification tags for ABO/Rh verification should be utilized as a last resort only. Accurate identification and verification of the donor's blood and the intended recipient may be the single most important step in ensuring transfusion safety.**

   c. Active warming loss prevention should be used to prevent casualty hypothermia.

**TRANSFUSIONS:**

1. Ideally blood products should be warmed to approximately 98.6 degrees F (37 degrees C) prior to transfusion. Do not exceed 102 degrees F (39 degrees C) as this may cause an inflammatory reaction and lyse some of the red cells.


Do not use warmers directly against the fluid bag because of the risk of hemolysis or damage to the blood or blood product. Blood or blood components should not be warmed in a microwave, unless it is specifically designed for that purpose.

2. Blood and blood components may be pressure infused using a pressure infuser that encases the entire blood collection bag. Do not use a BP cuff for pressure infusion as they deliver uneven pressure.

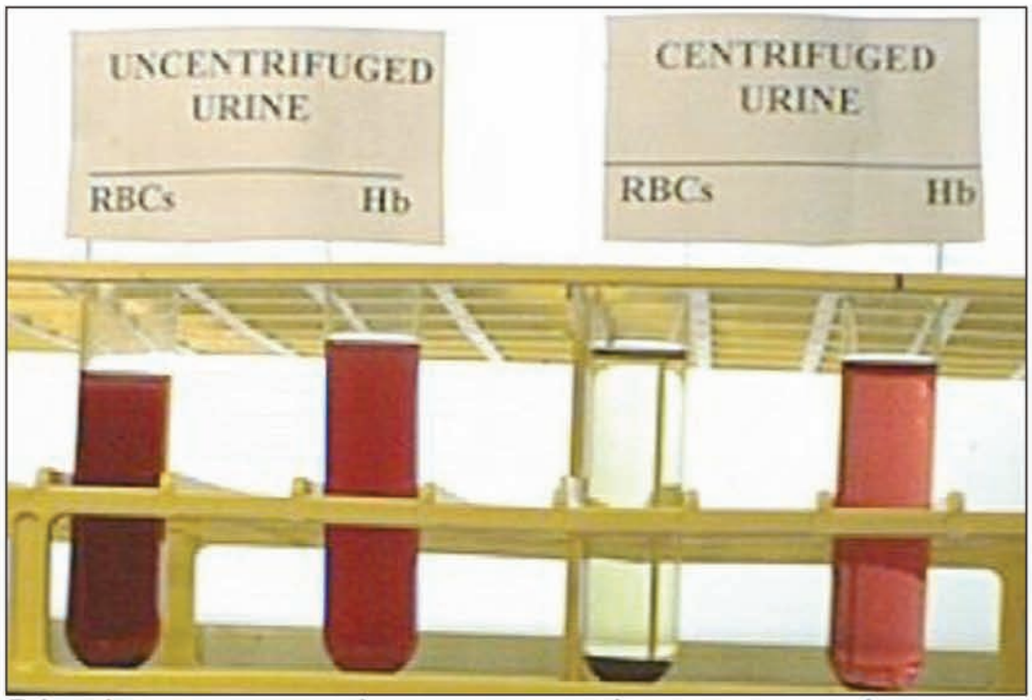

Do not exceed 300mmHg with the pressure infusion device.

3. The largest bore IV catheter should be used. An IO device may be used. Ensure that a strong flush is done and good flow is obtained prior to using an IO infusion.

4. When performing any administration of blood or blood components the patient should be continuously monitored for signs and symptoms of an immunologic blood transfusion reaction. The first 10 to 15 minutes of any transfusion are the most critical.
   **a. Anaphylactic Reaction**
      i. Shock
      ii. Hypotension
      iii. Angioedema
      iv. Respiratory distress
   **b. Acute Hemolytic Transfusion Reaction**
      i. Acute Hemolytic Reaction usually has onset within 1 hour
      ii. Evidence of disseminated intravascular coagulopathy (DIC) – oozing from blood draw, IV sites.
      iii. Flushing, especially in the face
      iv. Fever and increase in core temp of more than 2 degrees F (1 degree C)
      v. Shaking, chills (rigor)
      vi. Flank pain or the acute onset of pain in the chest (retrosternal), abdomen and thighs
      vii. Wheezing, dyspnea
      viii. Anxiety, feeling of impending doom
      ix. Nausea and vomiting
      x. Hypotension

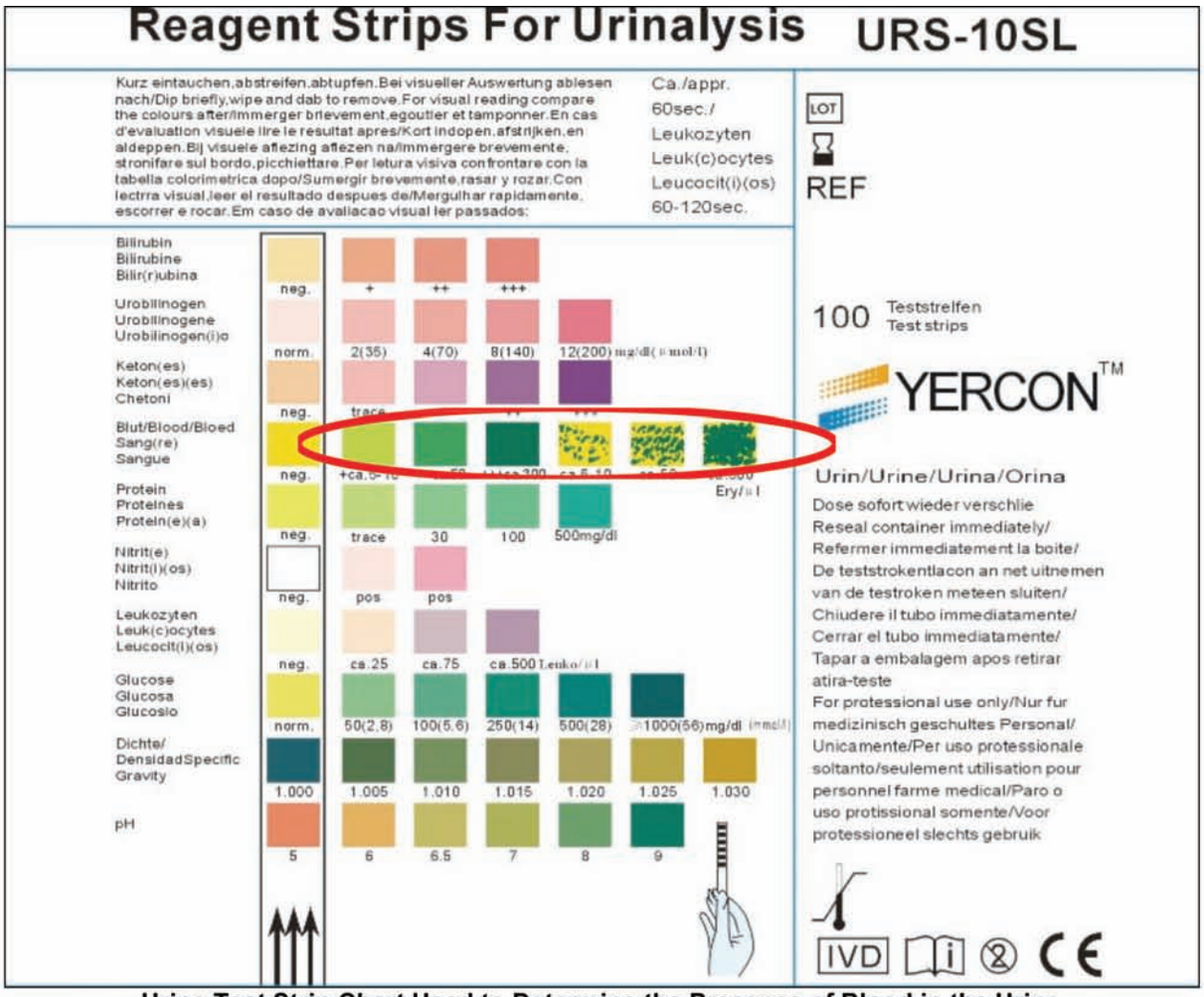
xi. Pain, inflammation, and/or warmth at the infusion site

xii. Red or Brown Urine (hemoglobinuria): The onset of red urine during or shortly after a blood transfusion may represent hematuria (indicating bleeding in the lower urinary tract (tube #1 below) or hemoglobinuria (indicating an acute hemolytic reaction, tube #2 below). If freshly collected urine from a patient with hematuria is centrifuged, red blood cells settle at the bottom of the tube, leaving clear yellow urine supernatant (see tube #3 below). If the red color is due to hemoglobinuria, the urine sample remains red after centrifugation (see tube #4 below).




**Uncentrifuged and Centrifuged Urine Samples**
(Retrieved from http://img.medscape.com/pi/emed/ckb/hematology/197800-206885-156.jpg)

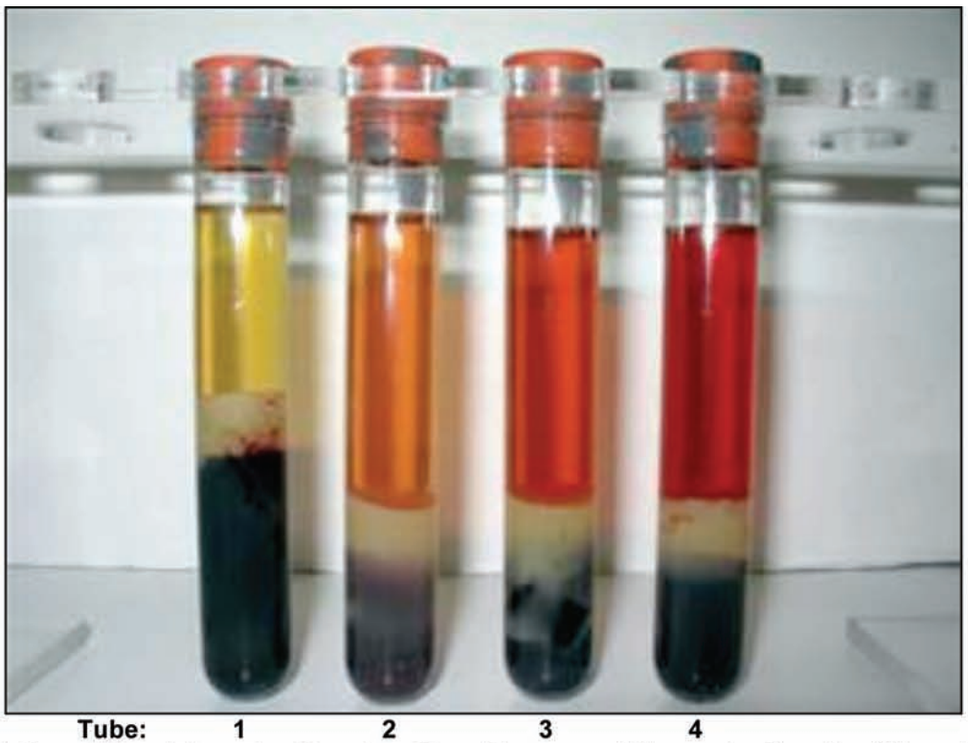
xiii. Alternatively, urine tests strips can reveal the presence of blood in the urine. This may represent hemoglobinuria (indicating an acute hemolytic reaction) or hematuria (indicating bleeding in the lower urinary tract).




**Urine Test Strip Chart Used to Determine the Presence of Blood in the Urine**
(Retrieved from
http://yerconlab.en.alibaba.com/viewimg/picture.html?picture=http://i00.i.aliimg.com/photo/v0/388114640/urine_dipstick_test_URS_8A_5mm_color.jpg)

xiv. Plasma in a sample of centrifuged anticoagulated venous blood is normally clear (tube #1 below), but will be pink-red if significant intravascular hemolysis (e.g., hemoglobinemia) has occurred within the previous few hours (tubes 2-4 below).

12 August 2011



**Tube: 1 2 3 4**

**Centrifuged Blood Samples Showing Clear Plasma and Worsening Levels of Hemolysis**
(Retrieved from http://pediatrics.med.unc.edu/education/uncpeds/conferences/uploads/Ped Transfusion Med Noon Conference.pptx)

**c. Febrile Non Hemolytic Reactions**
- i. Fever not as severe as with an acute hemolytic reaction
- ii. Chills
- iii. Dyspnea

**d. Urticarial Reactions -** Urticaria

**e. Other transfusion related signs and symptoms**
- i. Flushing (especially in the face), urticaria, or edema
- ii. Increased pulse or respiratory rate
- iii. Nausea, vomiting or diarrhea
- iv. Pain and/or edema at the infusion site
- v. Headache
- vi. Feeling of impending doom

**f. Citrate Toxicity**
- i. Mild
  - (a) Perioral and periorbital paresthesia
  - (b) Metallic taste in the mouth
  - (c) "Tingling" sensation around the mouth or in the extremities
- ii. Severe
  - (a) Carpopedal spasms
  - (b) Twitching
  - (c) Chills
  - (d) Stomach cramps
  - (e) Pressure in the chest
  - (f) Hypotension and possible cardiac arrhythmia
  - (g) Nausea and/or vomiting
  - (h) Tetany
  - (i) Laryngeal spasm
  - (j) Seizures
  - (k) Bradycardia
- iii. Treatment

12 August 2011

(a) **Mild Toxicity -** Slow or stop transfusion until symptoms subside. Ensure proper mixture and concentration of citrate

(b) **Severe Toxicity -** 10 ml of a 10% solution of Calcium Gluconate SLOW IV push.

(c) WARNING Do not rapidly infuse Calcium nor give more than one dose without the ability to monitor electrolytes. This may lead to cardiac arrhythmias.

5. Treatment of Immunologic Blood Transfusions Reactions.

WARNING **The first step in treating ALL transfusion related issues is to STOP the transfusion and save all of the blood products and equipment used for administration and typing for follow up testing.**

**a. Anaphylactic Reactions**

i. Epinephrine 0.5ml of 1:1000 IM
ii. Airway maintenance and oxygenation
iii. Resuscitate hypotensive patients with IV fluids.

**b. Acute Hemolytic Transfusion Reaction (AHTR)**

i. Immediately STOP the transfusion
ii. Initial Treatment
(a) Secure and maintain airway
(b) Begin an IV infusion of Lactated Ringer's (LR).

WARNING DO NOT run any fluid through the line that was carrying blood.

(c) The goal of fluid resuscitation is to maintain a urine output of 100-200ml/hr until the urine is clear of hemolyzed RBCs.

(d) Administer mannitol 20% (Osmitrol®) 20gm IV over 5 minutes using a blood administration filter to prevent infusion of mannitol crystals. If diuresis does not occur, repeat the 20gm dose once. The patient should receive a Foley catheter to monitor urine output.

(e) If mannitol 20% (Osmitrol®) is unavailable or does not produce diuresis, administer furosemide (Lasix®) 40-80mg initially and titrate later doses to maintain urine output of 100-200 cc/hr.

(f) However, if urine output is not obtained within 2 to 3 hours of administration of fluid, consider the development of *acute renal failure* and discontinue further fluids.

(g) Consider using acetaminophen (Tylenol®, Ofirmev® [IV]) 1gm PO, PR, or IV (every 6 hours to treat discomfort associated with fevers. (Avoid the use of aspirin or other NSAIDS).

(h) Administer 25-50mg of diphenhydramine (Benadryl®) IM, or IV to treat the associated histamine release from AHTR and help manage the chills and rigor.

WARNING Antihistamine (IV administration) must never be mixed with blood or blood products in the same transfusion lines.

iii. SAVE the rest of the donor blood and any typing information available and evacuate with the patient. This will allow for ABO and further diagnostic testing at the medical treatment facility.

**c. Febrile Non Hemolytic Reactions**

i. Treat with antipyretics. Acetaminophen (Tylenol®, Ofirmev® [IV]) 1gm PO, PR, or IV (avoid the use of aspirin and other NSAIDS).
ii. If symptoms abate and there is no evidence of an acute hemolytic reaction consider restarting the transfusion.

12 August 2011

iii. Pretreatment with antipyretics and antihistamines is recommended in this protocol and commonly done although there is no evidence that is decreases the incidence of fever and urticaria associated with transfusions.

**d. Urticarial Reactions**

i.  Treat with 25-50mg diphenhydramine (Benadryl ®) IM or PO.

ii. If symptoms abate and there is no evidence of an acute hemolytic reaction consider restarting the transfusion.

**ADMINISTER FFP:**

1. Keep FFP frozen at -0.4 degrees F (-18 degrees C) or below.

2. Do not rough handle FFP before thawing because the bags can be easily cracked, broken, or damaged.

3. FFP should be thawed in a water bath with the FFP bag wrapped in a plastic overwrap bag to protect the ports from contamination and to lessen the risk of contaminating the water bath if the FFP bag is broken or cracked (See Enclosure #2: Suggested Packing List). Thaw FFP at 98.6 degrees F (37 degrees C) or by using a method and/or equipment that is intended (validated) for such use. Do not exceed 107 degrees F (42 degrees C).

4. Turn the plasma during the thawing process and ensure that all fibrin clots are dissolved.

5. The plasma should be administered as rapidly as possible after thawing. Keep plasma refrigerated at 33 - 43 degrees F (1 - 6 degrees C) prior to administration.

6. Thawed plasma can be stored for 3 days at 33 to 43 degrees F (1 to 6 degrees C) and then should be returned to the MTF for use. If thawed plasma cannot be returned to and MTF for use then it should be discarded after storage at 33 to 43 degrees F (1 - 6 degrees C) for 5 days. Thawed plasma can only be kept for 30 minutes at room temperature (68 to 75 degrees F [20 to 24 degrees C]).

7. AB is the universal donor for plasma.

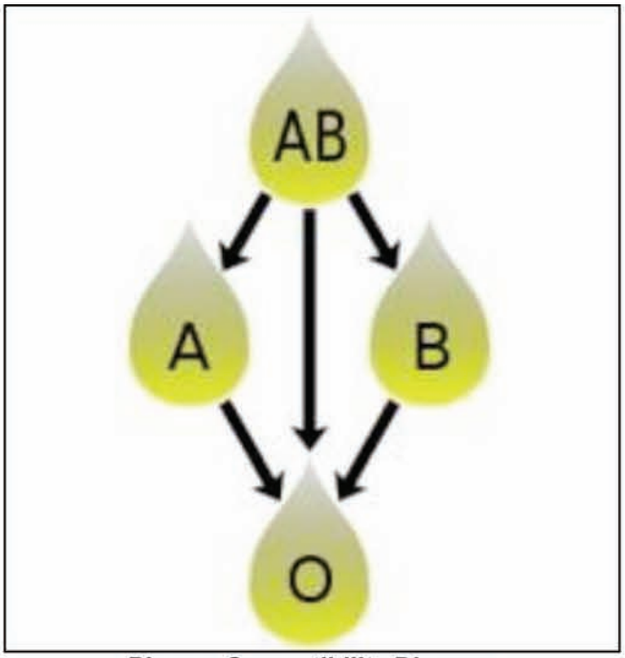
8. FFP is normally supplied as type AB or A.

9. Rh factor is not a concern when administering FFP.

10. Ensure compatibility of recipient.

11. Administer 2 units of FFP and then begin administering PRBCs in a 1:1 ratio if available. You may bolus or pressure infuse FFP immediately.

12 August 2011




**Plasma Compatibility Diagram**
(Retrieved from http://en.wikipedia.org/wiki/File:Plasma-donation.svg)

**PERFORM A WHOLE BLOOD (FWB) TRANSFUSION:**

1. LOCATE A SUITABLE DONOR.
   a. Identify a blood donor who is ABO identical with the intended recipient.
   b. Rh+ (positive) patients may receive either Rh+ (positive) or Rh- (negative) blood.
   c. Rh- (negative) patients should receive Rh- (negative) blood if possible.
   d. Rh- (negative) females with childbearing potential must be given priority for Rh- (negative) blood to avoid the risk of Rh sensitization.
   e. When appropriate, set up a "walking blood bank" with pre-screened donors prior to deployment.
   f. The single most important way of protecting the patient and donor is to conduct a thorough donor interview for infectious disease risk factors, determination and qualification of the heath of the donor on the day of donation (see Enclosure #1: Donor Questionnaire).
   g. Donor should preferably be U.S. military.
   h. The safest donor candidate is one with recent laboratory confirmation of blood group/type and no evidence of transfusion transmissible disease. Prior blood donors are preferred.
   i. Females who have been pregnant in the past, even if they did not reach full term should only be used as a last resort because of the increased risk of *transfusion related acute lung injury* (TRALI) (1 in 10,000-60,000).
   j. Personnel who have received blood transfusions in the past should only be used as a last resort because of the increased risk of a transfusion reaction.
   k. It is highly recommended, to perform rapid, on-site viral marker screening tests of potential blood donors using screening immunoassays for infectious diseases (e.g., HIV, HBsAg, HCV) before blood is transfused. If testing is not possible prior to transfusion, rapid, on-site viral marker testing should be performed as soon as possible and the results recorded appropriately. NSNs for rapid viral marker screening assays are listed in suggested packing list (See Enclosure #2: Suggested Packing List).
   l. Retrospective testing for infectious disease markers will be performed on all donor specimens. This testing will be completed at an FDA-approved, DoD laboratory IAW FDA/AABB standards.
   m. The donor should report to the nearest MTF capable of performing blood sample collection and processing IAW the applicable theater.

n. Send donor pilot tubes to a supporting theater Blood Support Detachment for transport via established channels to an FDA-approved DoD reference testing laboratory. This should be done as soon as feasible.

o. WARNING GROUNDING procedure. Army Regulations (AR) and Air Force Instructions (AFI) both mandate that aircrew personnel not fly within 72 hours following blood donation. Office of the Chief of Naval Operations Instructions (OPNAVINST) prohibit aircrew personnel from being regular blood donors and mandates that aircrew personnel not participate in flight duties for 4 days following blood donation. OPNAVINST also mandates that flight personnel in combat or performing shipboard duties not donate blood for 4 weeks prior to flying and states that the flying unit commander must approve donations of blood, plasma or bone marrow by aircrew members. (AR 40-8 dtd 16 May 2007, AFI 11-202V3 dtd 22 October 2010, OPNAVINST 3710.7T dtd 23 November 2009). All other donors should be given light duty or quarters for at least 72 hours following donation.

p. Every effort should be made to send all blood collection and administration equipment as well as all blood typing tests and any viral tests performed along with the patient for retrospective testing and documentation

.

2. Perform collection.

a. Clean donor's arm with povidone iodine or appropriate alternate antiseptic agent for at least one minute at least 3 inches in diameter from the anticipated site of the venipuncture.

b. Donor blood should be drawn from an arm vein into an in-date, intact commercial single unit whole blood collection bag. The bag is 600ml capacity and contains 63ml of CPD or CPDA-1 anticoagulant and is intended to collect 450ml of blood +/- 10%.


Do not overfill the bag as overfilling of the bag could lead to clotting.

c. Place a constricting band around the donor's arm or alternatively a blood pressure cuff inflated to 40-60mmHg.

d. Place a hemostat or pinch the line approximately 6 inches from the needle prior to removing the needle cap.


Failure to clamp or pinch the line prior to removing the needle cap will lead to loss of negative pressure in the collection bag and could lead to incomplete filling of the bag and contamination.


Do not infuse blood from an incompletely filled collection bag because the citrate level will be too high and may lead to citrate toxicity.

12 August 2011

**Clamping – the line must be clamped approximately 6 inches from the needle to avoid losing the vacuum in the collection bag when the cap is removed.**

e. Perform venipuncture. Twist off the needle cover and inspect the needle for barbs or other defects. Pull the skin taut below the venipuncture site. Insert the needle bevel up at an angle of 30-45 degrees and pierce the skin with a smooth, quick thrust at the selected point of entry. When the bevel is completely under the skin, lower the angle of the needle to approximately 10º or less and, with a steady push, advance needle to penetrate the vein wall. Thread needle approximately ½ inch inside the vein to maintain a secure position and to lessen the chance of a clot forming.

WARNING You may see little or no "flash" of blood in the collection line until you remove the clamp or pinch in the line. You should feel a "pop" when the vein is entered. If there is no flash when the clamp or pinch is removed then the needle may be partially withdrawn and venipuncture reattempted. **Do not fully remove the needle from under the skin without a clamp or pinch in the line or you will lose negative pressure.**

f. Place the collection bag below the donor's heart and release the clamp or pinch in the line.

g. Remove the tourniquet or blood pressure cuff as soon as blood flows adequately to prevent stasis.

WARNING **If the flow is sluggish, leave the tourniquet in place longer.** This may be necessary to ensure good back pressure from venous return and will lessen the possibility of incomplete filling of the collection bag. Don't leave the tourniquet on for more than 3 minutes.

h. Tape the needle down at the hub and tape the line to the patient's skin to prevent it from being pulled out.

i. Begin rocking the bag as soon as blood flow begins and continue gently rocking the bag about every two minutes during collection to ensure thorough mixing of the citrate with the blood to prevent areas of high citrate concentration. Make every attempt to insulate the collection bag and keep it off of the ground in order to keep the collected blood warm.

j. Remove about 450ml of blood (enough so the bag is almost full). Overfilling the bag may cause clotting. A trip scale should be used for accuracy (measure 450 +/- 50gm plus weight of blood bag). Alternatively, an 11 inch piece of 550 cord (NSN 4020-00-246-0688) can be used to estimate when the blood collection bag is adequately filled. With the bag lying on a flat surface place the 11 inch piece of cord under the bag and wrap it around the width of the bag. When you are able to bring the ends of the cord together to the point where they will just barely meet without compressing or lifting the bag, the bag is adequately filled.

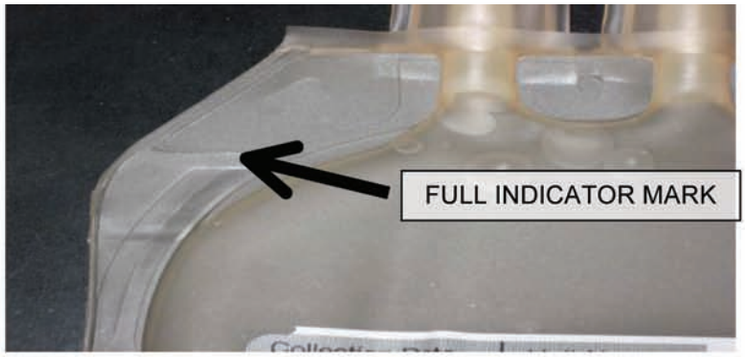
k. Also, a Terumo Single Blood Bag can be used (See Enclosure #2: Suggested Packing List). This bag already has a mark to indicate when a bag is filled.

l. If at a fixed facility a blood trip scale can be constructed with a counterweight of 585 grams. The counterweight can be approximated by adding 450ml of fluid to a blood collection bag and tying off the collection tubing.


Never collect more than one unit from an individual.

**Measurement:** *Bring the ends of an 11" piece of cord together around the bag until they just meet.*

12 August 2011




**Terumo Single Blood Bag**

**Blood Trip Scale Made from a Balance Beam Scale with Improvised Counterweight**
(Photo courtesy LTC Shawn C. Nessen, MD)

3. Once the bag is adequately filled, clamp the line with a hemostat and remove the needle. Then double knot the collection line between the hemostat and blood bag and cut between the knots. '
4. If appropriate for the tactical situation, infuse 500ml of Hextend® into the donor for volume replacement.

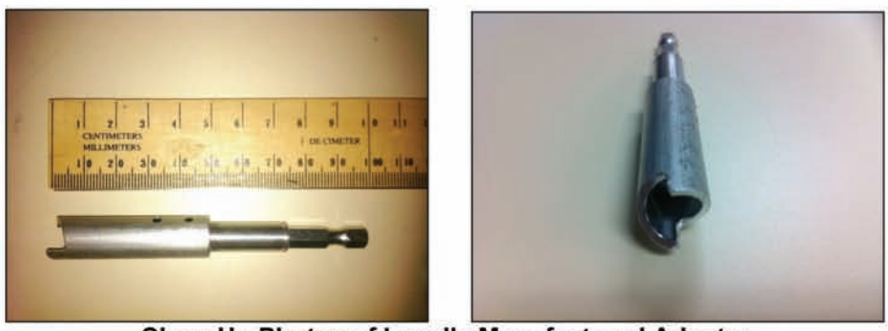
12 August 2011

5. Donor should lie down during collection because of the risk of syncope.
6. Donor should take food and drink immediately after donation.
7. Donor must wait at least 56 days between donations.


Make no attempt to bank blood. Collected blood should be transfused immediately, and must be used within 24 hours. Unused blood may be re-infused into the donor, but must be discarded after 24 hours. Do not attempt to re-infuse unused blood into the donor unless the collection bag has been completely filled or it may lead to citrate toxicity. **DO NOT RE-INFUSE BLOOD INTO THE DONOR IF YOU ARE IN DOUBT ABOUT THE IDENTITY OF THE DONOR. THE DONOR MUST SIGN THE BAG UPON COLLECTION AND YOU AND THE DONOR MUST CONFIRM THE SIGNATURE PRIOR TO RE-INFUSION. IF ANY DOUBT WHATSOEVER EXISTS, DISCARD THE COLLECTED BLOOD!**

8. If necessary, confirm blood types using the EldonCard® blood typing kit. Unless you have recent laboratory confirmation of blood group/type, confirmation using an EldonCard® is HIGHLY recommended.
    2. Once you have found a suitable donor and initiated a blood collection, confirm the donor and recipient blood types with an EldonCard® blood typing kit.
    3. Perform blood typing with an EldonCard® blood typing kit in accordance with the manufacturer's instructions.

**Hand Cranked Centrifuge Connected to Cordless Drill Using Locally Manufactured Adapter**



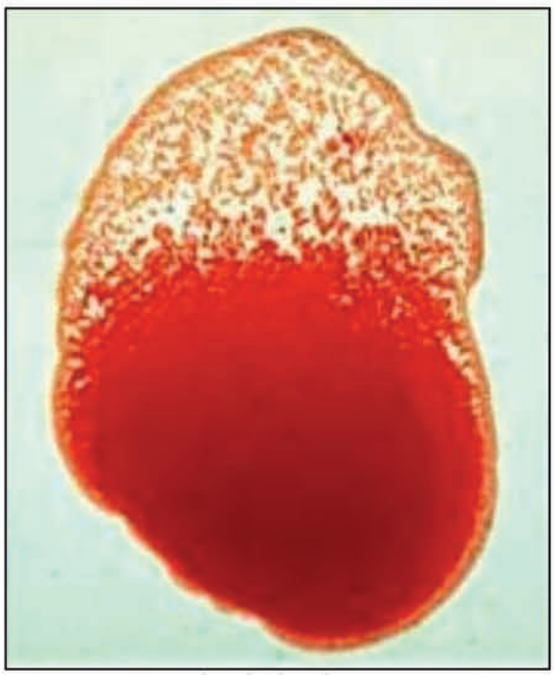

**Close Up Photos of Locally Manufactured Adapter**

9. If you are performing a WB transfusion and there is any doubt about the ABO typing, consider performing a whole blood cross-match test if possible.
    a. If you have access to a method of separating the plasma from a blood sample, you can attempt to perform a whole blood cross-match. This increases the safety of a WB transfusion.

12 August 2011

b. After separating, take four drops of the recipient's plasma and place them on a smooth white tile, glass slide or a clean smooth piece of glass.
c. Take one drop of whole blood from the donor and add it to the recipient's plasma and gently mix using the tip of a needle or other sterile instrument.
d. If using a glass slide or piece of glass, place the mixture of plasma and whole blood against a bright white background.
e. Wait four minutes and observe the mixture for signs of agglutination. The test should be performed no colder than room temperature 68 degrees F (18 degrees C) and optimally at 98.6 degrees F (37 degrees C). Stirring the mixture should help determine if there is any agglutination. A magnifying lens can aid in determining if there is agglutination present.

If any sign of agglutination is present then the transfusion should not be performed.



**Agglutination**
(Retrieved from http://www.vetmed.wsu.edu/courses_vm551_crd/images/agglutination.JPG)

**CANINE CONSIDERATIONS**

1. Canines have naturally occurring antibodies to the antigens that are found on their RBCs. These naturally occurring antibodies can cause IHTR.

2. Canines have an entirely different set of blood type antigens and cannot be typed using human blood typing supplies, but the aforementioned whole blood crossmatch procedure can be performed in the same manner. Optimally canines should be typed and crossmatched prior to transfusion; however, for expediency the normal standard of care is to allow them to receive a blood transfusion from any potential donor provided neither the donor nor the recipient has ever received a blood transfusion.

3. Due to the smaller size of canines no more than 250ml of blood should be collected from a single donor. A regular collection bag containing 63ml of CPD or CPDA-1 is used. Although this creates a high level of citrate in the donated unit, it should not be a cause for concern unless the blood is given faster than 500ml in five minutes or the recipient has compromised liver circulation where the citrate is normally easily metabolized.

4. Human blood products cannot be used in canines.

12 August 2011

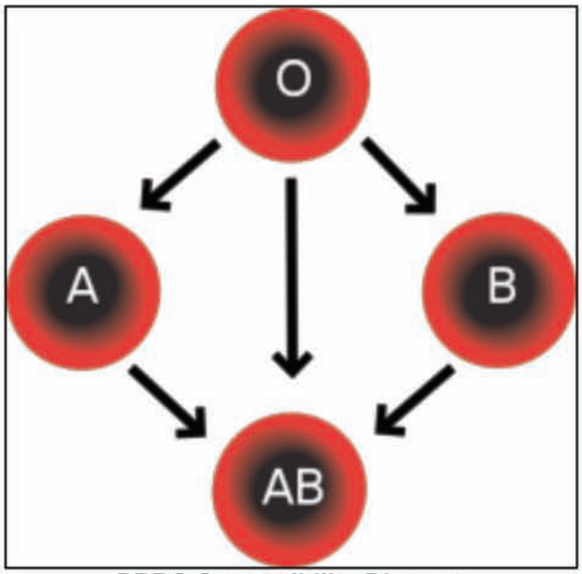
**ADMINISTER BLOOD (WB, FWB, WFWB) OR PRBCs:**

1. Store WB and PRBCs at 34-43 degrees F (1-6 degrees C). WB should only be stored at these temperatures if is not going to be transfused immediately but never longer than 24 hours. Refrigeration of WB has shown to decrease platelet function.

2. Ensure compatibility of recipient.

3. When administering PRBCs, the first choice is ABO type specific (identical) and Rh compatible. If this is not available, use O type blood.

   WARNING **Type O blood is the "universal donor" for PRBCs.**




**PRBC Compatibility Diagram**
(Retrieved from http://en.wikipedia.org/wiki/File:Blood_Compatibility.svg)

4. In a patient with a history of allergies or an allergic transfusion reaction, give (Benadryl®) 25-50mg IV (through a separate line), IM, or PO prophylactically just before or at the beginning of the transfusion.

   WARNING Antihistamine must never be mixed with blood or blood products.

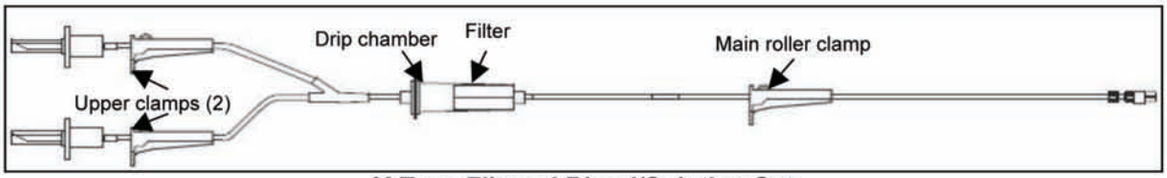
5. In a patient with a history of a febrile reaction acetaminophen (Tylenol®, Ofirmev® [IV]) 1gm PO, PR, or IV may be given prophylactically before the transfusion.

6. Prepare the blood or PRBCs and the blood administration set.

   WARNING Always use an administration set specifically designed for the administration of blood and blood components. The administration set should filter between 170-260 microns. There is no set number of units that can be delivered before an administration set must be switched out. An administration set should be changed when it becomes clogged or after 24 hours. The number of units that an administration set can deliver before becoming clogged depends on the level of filtration and the amount of microagglutins that have formed. The older the blood or PRBCs the higher the amount of microagglutins there will be. A 170 micron set can reliably deliver 3 to 4 units of blood or

12 August 2011

PRBCs before the filter becomes clogged and must be changed. A 260 micron set can reliably deliver about 6 to 8 units of blood or PRBCs before it becomes clogged and must be replaced.




**Y-Type Filtered Blood/Solution Set**
(Retrieved from http://www.alarismed.com/images/products/42081e.jpg)

a. Close all three clamps on the "Y" tubing.
b. Aseptically insert one of the tubing spikes into the container of NS. Invert and hang this container about 3 feet above the level of the patient.
c. Open the clamp on the NS line, prime the upper line and filter and fill the drip chamber half full.
d. Open the clamp on the empty line on which you will eventually hang the blood or PRBCs. NS will flow up the empty line to prime that portion of the tubing.
e. Once the blood line is primed with fluid, close the clamp on the blood line.
f. Leave the clamp on the NS line open.
g. Open the main roller clamp to prime the lower infusion tubing and then close it.
h. Expose the port on the blood or PRBC pack and insert the remaining spike into the blood or PRBC port and hang the blood or PRBCs at the same level as the NS container.
i. If "Y" type recipient tubing is not available, use regular infusion tubing for the NS and the available blood recipient tubing for the blood or PRBC pack. Prime each set with NS. Attach a sterile, large bore (16- or 18-gauge) needle to the end of the blood tubing, and "piggyback" the blood or PRBCs into the NS line below the level of the roller clamp. Hang the blood or PRBC pack at least 6 inches higher than the NS.

7. Connect the blood line.
   a. Patients receiving blood or blood components must have two IV sites in the event of complications or emergencies.
   b. Establish one or two new IV sites as needed.
   c. Use a large gauge IV catheter (14, 16, or 18) to enhance the flow of blood or PRBCs and prevent hemolysis of the cells.
   d. If the patient already has two IV sites, aseptically switch one of the existing IV lines with the filtered blood line or piggyback the filtered blood line into an existing IV line.

8. Begin the infusion of blood or PRBCs.
   a. Attach the primed infusion set to the catheter, tape it securely, and open the main roller clamp.
   b. Close the roller clamp to the NS, and open the roller clamp to the blood or PRBCs.


Ensure you that you close the roller clamp to the NS prior to opening the roller clamp to the blood or PRBCs or the blood or PRBCs will flow into the NS. If the blood or PRBCs become mixed with the NS, shut off the roller clamp to the NS and deliver the blood or PRBCs.

   c. The viscosity of PRBCs (especially if they are cold and using an in-line blood warmer) may cause difficulty in delivery through long tubing sets and filters. Using 300ml of NS to back fill the PRBCs will improve delivery. Whole Blood usually does not require dilution for effective delivery.
   d. Adjust the flow rate with the main roller clamp.
      I) Set the flow rate to deliver approximately 10-30ml of blood or PRBCs over the first 15 minutes.
      II)Monitor the vital signs every 5 minutes for the first 15 minutes and observe the casualty for indications of an adverse reaction to the blood or PRBCs.

12 August 2011

Anytime an adverse reaction is suspected, immediately stop the blood or PRBCs and infuse NS.

III) If after the first 15 minutes no adverse reaction is suspected and the vital signs are stable, open the main roller clamp or set at the desired flow rate. You may bolus or pressure infuse the blood or PRBCs at this time.

9. Monitor and evaluate the patient throughout the procedure.
   a. Monitor vital signs every 15 minutes.
   b. Compare the vital signs with previous and baseline vital signs.
   c. Observe the casualty for changes that indicate an adverse reaction to the blood or PRBCs.
   d. If a reaction is suspected, stop the blood or PRBCs, infuse LR through a separate IV line, and identify and treat the reaction.

When a transfusion reaction occurs or is suspected, no more fluid should be infused through the IV line or catheter. The unused blood or PRBCs and recipient tubing should be sent along with the patient for testing.

10. Discontinue the infusion of blood or PRBCs when the patient's vital signs have stabilized or the transfusion is finished.
   a. Close the clamp to the blood or PRBCs and open the clamp to the NS.
   b. Flush the tubing and filter with approximately 50ml of NS to deliver the residual blood or PRBCs.
   c. After the residual blood or PRBCs have been delivered, run the NS at a TKO rate or hang another solution, as needed.
   d. Take and record the vital signs at the completion of the transfusion and continue to monitor until evacuation.

11. Document the procedure. Ensure you document the infusion of any blood or blood component, to include the number, component type, and blood type of units infused on the casualty card (DA FORM 7656) and send this with the patient to the MTF.

**DISPOSITION:**
*Urgent* evacuation is indicated for any casualty requiring the administration of blood or blood components.

*Urgent* evacuation is indicated in any patient who has an acute hemolytic reaction while undergoing a blood transfusion.

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12 August 2011

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12 August 2011

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# Enclosure #1- QUESTIONNAIRE

## EMERGENCY WHOLE BLOOD DONATION RECORD

**(Modified Version of the DD Form 572)**

Blood Unit Number

Use Donor SSN if ISBT # Not Available

MTF/Location: _____ Donation Date: _____

Donor's Full Name: _____ Rank: _____ Branch: USA USAF USN USMC CIV

SSN: _____ Date of Birth: _____ Sex: M / F Ht/Wt: _____ (> 110 lbs) ABO/Rh (Blood Type) :_____

Deployed Unit/Location: _____ Local DSN Phone: _____ Redeployment Date: _____

Current Residence: Bldg/Tent # _____ RM # _____

Home Address (Stateside) _____

Home Phone Number: (____) _____ Email: _____

| | | | | | |
|---|---|---|---|---|---|
| Y | 21. N | Female Donors: Are you pregnant now, or have you been Pregnant in the last 6 weeks? | Y | 36. N | Have you ever had Chagas' disease, babesiosis, or Leishmaniasis? |
| Y | 22. N | Are you feeling well and healthy today? | Y | 37. N | In the past 12 months, have you been given a rabies shot? |
| Y | 23. N | Have you read and do you understand all the donor information presented to you, and have all your questions been answered? | Y | 38. N | In the past 12 months, have you had an accidental needle stick or come in contact with someone else's blood? |
| Y | 24. N | Do you understand that if you are in a high risk group, you may have the AIDS virus and you can give it to someone else even though you may feel well and have a negative AIDS test? | Y | 39. N | In the past 12 months, have you had a tattoo, ear or skin piercing, or acupuncture? |
| Y | 25. N | Have you ever given blood under another name or Social Security Number? | Y | 40. N | In the past 12 months, have you had close contact with a person with yellow jaundice or hepatitis or been given Hepatitis B Immune Globulin (HBIG)? |
| Y | 26. N | In the past 8 weeks have you given blood, plasma or platelets? | Y | 41. N | Have you ever had yellow jaundice, liver disease, hepatitis, or a positive test for hepatitis? |
| Y | 27. N | Have you ever been refused as a blood donor or told not to donate blood? | Y | 42. N | In the past 4 weeks, have you had any shots or vaccinations? |
| Y | 28. N | In the past 12 months have you been under a doctor's care, had an illness, or surgery? | Y | 43. N | In the past 8 weeks, have you received a smallpox vaccination or had close contact with the vaccination site of anyone else? |
| Y | 29. N | In the past 12 months, have you received blood, blood products, or a tissue transplant including any you may have donated for yourself (autologous)? | Y | 44. N | In the past month, have you taken Finasteride (Proscar, Propecia) or Isotretinoin (Accutane, Amnesteem, Claravis, Sotret) or in the past 6 months, have you taken Dutasteride (Avodart) |
| Y | 30. N | In the past 3 years, have you had malaria? | | | |
| Y | 31. N | In the past month, have you taken any pills or medications? | | | |
| Y | 32. N | Have you ever been given growth hormone or received a dura mater (or brain covering) graft? | | | |
| Y | 33. N | Have you ever taken Etretinate (Tegison) or Acitretin (Soriatane)? | | | |
| Y | 34. N | Have you ever had cancer, a blood disease, or a bleeding problem? | | | |
| Y | 35. N | Have you ever had chest pain, heart disease, or lung disease? | | | |

(Use this section and reverse side of form to explain "Yes" answers above. With the exception of questions 22-24)

High Risk Oral Questions (30May2003) Asked By: _____ Donor: Temp: ____°F/°C (< 99.6°F/37.5°C) BP: ____/____ (≤ 180/100) Pulse: _____ (< 100 bpm) HCT/Hgb: _____ (> 38% or 12.5 g/dL)

31. Medications: _____

Malaria Prophylaxis: Daily____(Doxycycline) Weekly____(Mefloquin) N/A _____

Your blood will **NOT** be tested for viral diseases prior to transfusion due to the emergency, if you any reason you feel your blood may not be safe or you could answer yes to the high risk questions, please do not donate today. I have read/ had explained to me the high risk questions and am not in a high risk category, and feel my blood is safe to donate at this time.

I verify that I have answered the questions honestly, and feel my blood is safe to be transfused. _____

Donor's Signature

Phlebotomist:_____ Start Time:_____ Stop Time:_____ (Should be < 15 minutes)

Bag Manufacturer _____ Lot #:_____ Expiration date: _____ Segment Number: _____

The Modified DD Form 572 has been reviewed for completeness. If there are any risk factors that place the recipient at harm notify the ordering physician immediately for appropriate follow-up.

DD 572 (WB)
*Version: 13 August 2009*

12 August 2011

# Enclosure #1-QUESTIONNAIRE

## DIRECT ORAL QUESTIONS

**PREAMABLE**

I am required to ask you some questions. If you do not understand a question, please ask me to explain it before answering. The reason for asking these questions is to determine your suitability as a volunteer blood donor. Your answers to these questions will be kept strictly confidential, but may result in you being asked not to donate blood, either temporarily or permanently. Do not respond until I have asked you the entire group of questions, which at that time only give me one answer – Yes or No.

**GROUP A:**

1. Do you have AIDS or have you ever had a positive test for the AIDS virus (HIV)?
2. Have you ever taken illegal drugs with a needle, even one time (including steroids)?
3. Have you ever taken clotting factor concentrates for a bleeding disorder such as hemophilia?
4. At any time since 1977, have you taken money or drugs in exchange for sex?
5. ***Male donors only***. Have you had sex with another male, even one time since 1977?

**(A "Yes" answer to Group A is a PERMANENT DEFERRAL)**

**GROUP B:**

1. Were you born in, have you lived in, or traveled to any African country since 1977?

| IF Response is | THEN |
|---|---|
| **No** | Proceed to Group B, Question 3 |
| **YES** | Was it any of these countries: Cameroon, Benin, Central African Republic, Chad, Congo, Equatorial Guinea, Kenya, Gabon, Niger, Nigeria, Senegal, Togo or Zambia? |
| **If No** | Go to Group B, Question 3 |
| **If Yes – Travel Only** | Proceed to Group B Question 2 |
| **If Yes – Born or Lived in** | **Document when, DEFER INDEFINITELY** |

2. When you traveled to (name of country) did you receive a blood transfusion, or any other medical treatment with a product made from blood?

| IF Response is | THEN |
|---|---|
| **No** | Proceed to Group B, Question 3 |
| **YES** | **DEFER INDEFINITELY** |

3. Have you had sex with anyone who was born in, or has lived in any African Country since 1977?

| IF Response is | THEN |
|---|---|
| **No** | Proceed to Group C |
| **YES** | Was it any of these countries: Cameroon, Benin, Central African Republic, Chad, Congo, Equatorial Guinea, Kenya, Gabon, Niger, Nigeria, Senegal, Togo or Zambia? |
| **If NO to listed Countries** | Proceed to Group C |
| **YES to listed Countries** | **Document when, DEFER INDEFINITELY** |

**(A "Yes" answer to Group B may be an Indefinite Deferral)**

**GROUP C:**

1. Have you had sex in the last 12 months, even once, with anyone who has AIDS or has had a positive test for the AIDS virus?
2. Have you had sex in the last 12 months, even once, with anyone who has ever taken illegal drugs with a needle (including steroids)?
3. Have you had sex in the last 12 months, even once, with anyone who has taken clotting factor concentrates for a bleeding disorder such as hemophilia?
4. At any time in the last 12 months have you given money or drugs to someone to have sex with you?
5. At any time in the last 12 months, have you had sex with someone who has taken money or drugs in exchange for sex?
6. In the past 12 months, have you had a positive test for syphilis?
7. In the last 12 months have you had syphilis or gonorrhea or have you been treated for syphilis or gonorrhea?
8. In the last 12 months, have you received blood or blood products?
9. In the last 12 months, have you been incarcerated in a correctional institution (including jail or prison) for more than 72 consecutive hours?
10. In the last 12 months, have you taken (snorted) cocaine through your nose?
11. ***Female donors only***. In the past 12 months, have you had sex with a man who had sex with another man, even one time sine 1977?

**(A "Yes" answer to Group C is a TEMPORARY DEFERRAL for 12 months following the event)**

**GROUP D:**

1. Have you at any time since 1980 injected Bovine (Beef) Insulin?

**(A "Yes" answer to Group D is an INDEFINITE DEFERRAL)**

Direct Oral Questions January 10, 2010
Army Blood Program Policy Letter 2010-01-02

12 August 2011

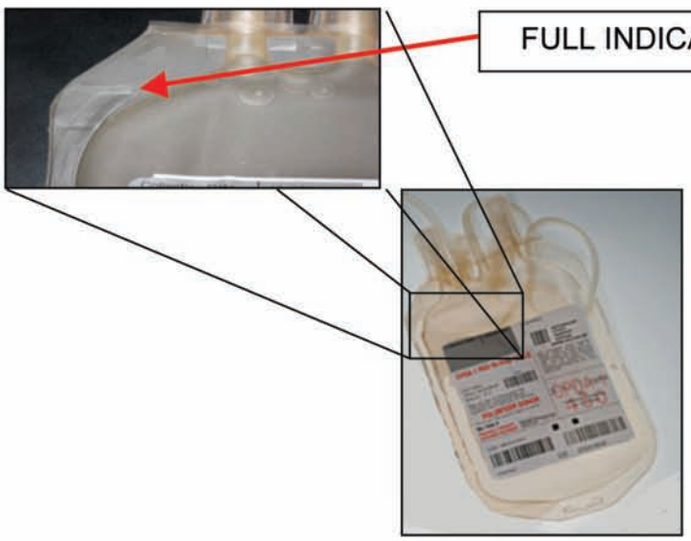
# Enclosure #2-SUGGESTED PACKING LIST

## SUGGESTED MINIMUM EQUIPMENT FOR BLOOD COLLECTION AND ADMINISTRATION

| Item Description | National Stock Number (NSN) |
|---|---|
| BLOOD COLLECTING AND DISPENSING BAG, CPD | 6515-01-523-5964 |

OR

| | |
|---|---|
| COLLECTION BAG, TERUMO® | 6515-01-480-2307 |




NITRILE GLOVES, OD

Medium: 6515-01-521-7501

Large: 6515-01-521-7505

X-Large: 6515-01-521-7508

12 August 2011

PAD, ISOPROPYL ALCOHOL IMPREGNATED 6510-00-786-3736


PAD,POVIDONE-IODINE IMPREGNATED 6510-01-010-0307


TOURNIQUET, NONPNEUMATIC (CONSTRICTING BAND) 6515-01-146-7794

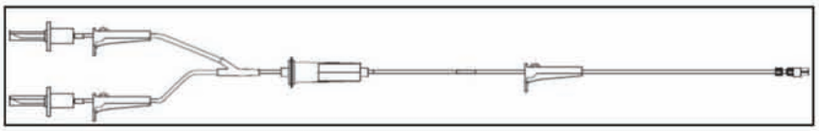

SPONGE SURGICAL, STERILE, 2X2 INCH 6510-01-530-9413


12 August 2011

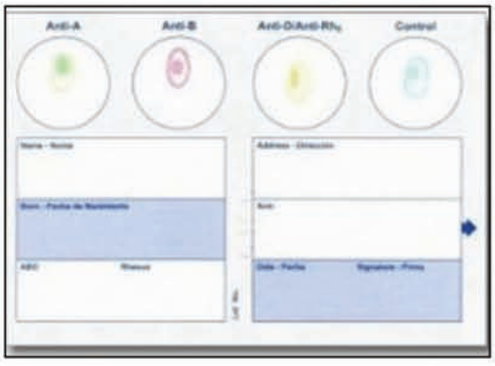
ADHESIVE TAPE, SURGICAL 6510-01-497-5161

NYLON CORD PIA-C-5040/MIL-C-5040, TYPE III, 11 INCH 4020-00-246-0688

BLOOD RECIPIENT SET, INDIRECT TRANSFUSION 6515-01-128-1407



BLOOD TYPING CARD (ELDONCARD®)
6550-01-511-9294



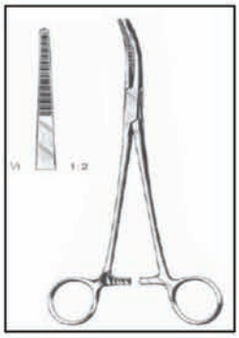


## ADDITIONAL EQUIPMENT FOR COLLECTION AND ADMINISTRATION OF BLOOD AND BLOOD COMPONENTS

| Item Description | National Stock Number (NSN) |
|---|---|

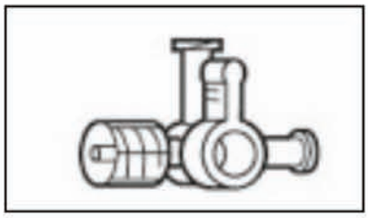
12 August 2011

FORCEPS, HEMOSTATIC 6515-01-459-3970

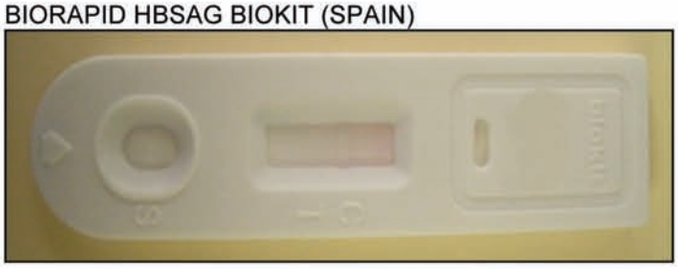


UNDERPAD, BLUE (CHUX) 6530-01-027-0179

STOPCOCK, IV THERAPY, 3 WAY 6515-00-864-8864



BIORAPID HBSAG BIOKIT (SPAIN) 6550-08-133-2246



BIORAPID HCV BIOKIT (SPAIN) 6550-08-133-2247

12 August 2011

HIV 1/2 RA ORAQUICK

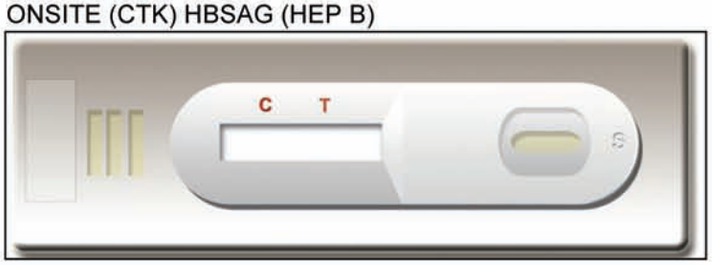
6550-01-526-7424

ORAQUIK HCV

6550-01-589-9845

ONSITE (CTK) HBSAG (HEP B)

6550-01-472-6534




MALARIA RAPID DIAGNOSTIC DEVICE (MRDD) 6550-01-554-8536

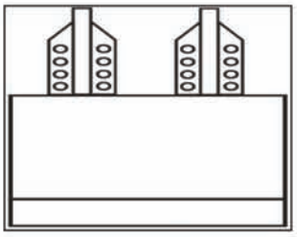

12 August 2011

TEST KIT, SYPHILIS DETECTION 6550-01-511-0291


PLASMA OVERWRAP BAGS 6515-01-511-3624

THAWING SYSTEM, PLASMA (4 UNIT) 6640-01-510-3136





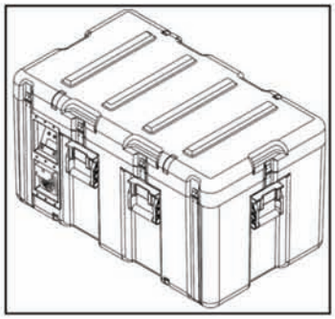
Golden Hour Container

| | |
|---|---|
| Woodland Marine Pixel | 6530-01-505-5308 |
| Desert Pattern | 6530-01-505-5306 |
| Woodland Army | 6530-01-505-5301 |
| Thermal Chamber, Replacement Part | 6530-01-505-5311 |

12 August 2011

BLOOD PRODUCT REFRIGERATOR/FREEZER 4110-01-506-0895





CENTRIFUGE, LABORATORY, HAND OPERATED 6640-00-926-6913

ADAPTER, DRILL, HAND OPERATED CENTRIFUGE LOCAL MANUFACTURE


12 August 2011