TALKING ABOUT BLOOD TRANSFUSIONS
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What Is a Blood Transfusion?

A blood transfusion is a safe and common procedure. During a transfusion, a patient receives donated blood through an intravenous (IV) line, a thin flexible tube, into a vein. Some patients might need a blood transfusion because of a loss of blood from an injury or surgery. Talking About Blood Transfusions is written for those patients who need regular transfusions because their bodies can’t make enough healthy blood cells due to a chronic disease or illness.

What Is the Role of Blood Transfusion in Treatment for Chronic Disease?

Some treatments and diseases can decrease blood cell production to unsafe levels. Blood transfusions can help increase the number of blood cells in patients with chronic diseases. These include patients with bone marrow failure diseases, chronic kidney diseases, sickle cell disease, or thalassemia. Transfusions often improve a patient’s quality of life.

Bone Marrow Failure Diseases

In people with a bone marrow failure disease, the stem cells in the bone marrow don’t work properly. They might not turn into healthy blood cells, or they might destroy healthy blood cells. Bone marrow failure diseases include: myelodysplastic syndromes (MDS), aplastic anemia, and paroxysmal nocturnal hemoglobinuria (PNH).

Bone marrow failure diseases can lead to low numbers of healthy red blood cells, white blood cells, or platelets in the blood. Anemia (low red blood cell count) causes severe fatigue. Platelet shortages can cause bleeding and bruising. Low white blood cell counts can lead to a high risk of infections.

Sickle Cell Disease

When someone has sickle cell disease, his or her body makes red blood cells with an abnormal shape that looks like a crescent or sickle. These sickle cells contain abnormal hemoglobin, and they often block the flow of veins and arteries. This blockage can damage the kidneys, lungs, or brain, and it can cause periodic episodes of pain. The blockage can also lead to infections and increase the risk of stroke. Red blood cell transfusions can help deliver oxygen to the body, unblock blood vessels, and stop the premature destruction of red blood cells.

Thalassemia

Thalassemia is an inherited disorder in which the body doesn’t make enough hemoglobin. The healthy red blood cells don’t work properly or survive as long as healthy red blood cells. People with thalassemia have anemia, or low counts of healthy red blood cells.
Chronic Kidney Disease

Chronic kidney disease (CKD) is the permanent and partial loss of kidney function. Diseased or damaged kidneys don’t make enough of a hormone called erythropoietin. This hormone normally instructs the bone marrow to form red blood cells. When kidneys don’t make enough erythropoietin, the bone marrow makes fewer red blood cells. The result is anemia, a low red blood cell count.

Blood and Transfusion Basics

Your blood cells, formed in your bone marrow, carry oxygen and nutrients to your organs and tissues. Blood is made of different components. These include red blood cells, white blood cells, platelets, and plasma.

A transfusion usually involves only certain parts of blood. These might be the red blood cells, platelets, or plasma. Rarely is whole blood (red cells, plasma, platelets, and white cells) used for a transfusion.

Blood Types

Blood types are based on substances (antigens) in the blood cells. The blood used for any transfusion has to be compatible with the patient’s blood type. Otherwise, antibodies in the patient’s blood will attack the transfused blood. This can make the patient sick.

Every person has one of four groups of blood: A, B, AB, or O. These blood types are known as the ABO blood type. They indicate whether the patient has antigen A, antigen B, both antigen A and antigen B, or neither of these antigens.

Blood is also Rh-positive or Rh-negative. This means that the patient either has the Rh D antigen or doesn’t have it. The blood of someone with type A blood that is Rh-positive is referred to as type A-positive blood.

Blood type matching is particularly important for red blood cell transfusions. It is typically not critical for platelet or plasma transfusions. Most people who receive platelet or plasma transfusions that are of a different type should not have problems.
The transfusions that are safe for each ABO blood type are as follows:

<table>
<thead>
<tr>
<th>Type</th>
<th>Red Blood Cells</th>
<th>Safe for people with</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td>A or AB blood</td>
</tr>
<tr>
<td>AB</td>
<td></td>
<td>AB blood</td>
</tr>
<tr>
<td>B</td>
<td></td>
<td>B or AB blood</td>
</tr>
<tr>
<td>O</td>
<td></td>
<td>A, B, AB, or O blood</td>
</tr>
</tbody>
</table>

Safe transfusions by Rh status are as follows:

<table>
<thead>
<tr>
<th>Rh Status</th>
<th>Red Blood Cells</th>
<th>Safe for people with</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rh-positive</td>
<td></td>
<td>Rh-positive red blood cells</td>
</tr>
<tr>
<td>Rh-negative</td>
<td></td>
<td>Rh-negative or Rh-positive red blood cells</td>
</tr>
</tbody>
</table>
Types of Blood Transfusions

The parts of blood used in a transfusion depend on why the patient needs the transfusion.

Red Blood Cell Transfusions
Red cells carry oxygen from the lungs, on a substance called hemoglobin, to every part of the body. Hemoglobin is a protein that contains iron. Red blood cells also carry carbon dioxide out of the organs and tissues and back to the lungs. Your lungs remove these waste products when you breathe out. Red blood cells are involved in more blood transfusions than any other part of the blood.

Platelet Transfusions
Platelets are blood cell fragments that help stop bleeding. When your blood has too few platelets, known as thrombocytopenia, mild to serious bleeding can occur. Platelet transfusions are given to control active bleeding whether due to thrombocytopenia and/or platelet dysfunction.

Plasma Transfusions
Patients may receive a transfusion of plasma when they have active bleeding. Blood cells float in plasma, the yellow part of blood. Plasma contains factors that form clots that help stop the bleeding when blood vessels are broken. Plasma also carries nutrients to tissues throughout the body.

Granulocyte Transfusions
Granulocytes are a type of white blood cell a body needs to fight bacterial and fungal infections. Some patients may have serious, life-threatening infections that do not respond to appropriate antibiotics, and they may have low levels of granulocytes. This may be due to their disease or treatment for their disease. These patients may require transfusions of granulocytes to help fight their infections.

“Usually the next day, I am able to go back to work and get to my normal routine. Definitely after two days, I feel like I have more energy.”

—29-year-old patient
What to Expect Before, During, and After a Blood Transfusion

Before a Blood Transfusion
Tests to find out the patient’s blood type (A, B, AB, or O) are done before a transfusion. There are also tests to see if the patient is Rh-positive or Rh-negative.

During a Blood Transfusion
People usually get blood transfusions in a hospital. RBC transfusions usually take up to 4 hours. Sometimes transfusions are done in doctors’ offices, outpatient clinics, or even the patient’s home.

During and after a blood transfusion, a doctor or nurse will watch carefully to see how you are responding to the transfusion. You will be reminded about signs or symptoms to watch out for, and to report back to your doctor, once you go home. These might include:

- Back pain
- Chills
- Dark or red urine
- Fever
- Headache
- Hives, skin rash, or itching
- Nausea
- Shortness of breath
- Trouble breathing

After a Blood Transfusion

After the transfusion, the nurse checks the patient’s vital signs and takes the IV line out. The spot where the needle entered the vein is covered with a bandage. The patient might feel some soreness or have some bruising in the area where the IV line was inserted. He or she might need blood tests to show how the body is responding to the transfusion.

Transfusion Tips from Patients:
- I take a blanket with me because it is cold in the hospital.
- I take a book or a crossword book. I also bring my phone and charger.
- I listen to calming music.
- If you have questions, ask!

“The first one for me was so emotional, I cried a lot. I didn’t know it would take hours. Nothing was explained to me.”
— 67-year-old patient
Blood Transfusion Safety and Risks

Negative side effects of blood transfusion therapy are uncommon. Blood banks, hospitals, and health care providers take many precautions to minimize risks before each blood transfusion.

Blood banks test each unit of blood to find out its ABO type and Rh status. In the United States, after a hospital laboratory receives a blood unit from the blood bank, the laboratory tests the unit again.

"Know that it takes a long time to cross match your blood with the donated blood. Expect to wait. Our blood banks are the best in the world. They do much testing on the blood to insure your safety."
— 54-year-old patient

This testing helps make sure that when a blood transfusion is given, the blood is compatible with the patient’s blood system. This testing also helps make sure that the donated blood won’t transfer an infection to the patient.

Infections

In the past, infections were the biggest risk of blood transfusions. But because of today’s screening and prevention procedures, infections from blood transfusions are very rare. Blood banks and laboratories test donated units of blood for factors that can cause infections. Blood banks also routinely ask potential donors if they have infections, any risk factors for most infections, or any symptoms of infection. The chance of getting an infection from a blood transfusion in the United States is very low. This testing has made the U.S. blood supply extremely safe.

Chronic Iron Overload

Red blood cells contain iron. Having enough iron in your body is important. Iron plays a role in making your muscles, nerves, and immune system work well. After the body uses up the iron that it needs, it can’t get rid of any extra iron that it doesn’t need. A high level of iron in the blood is known as chronic iron overload. Chronic iron overload can happen in people who have many red blood cell transfusions.

The body’s organs (including the heart, liver, and pancreas) store the extra iron from blood transfusions. If the iron continues to build up, it may eventually damage the organs that store it, especially the heart and liver. Chronic iron overload may also increase the risk of infection. Chronic iron overload can reduce the success of hematopoietic stem cell transplantation (HSCT) in those patients who might benefit from a transplant.

The symptoms of chronic iron overload can include:
- Pain in abdomen
- Tiredness or fatigue
- Weight loss
- Pain or aches in the joints
- Weakness

Doctors can check the amount of iron in a patient’s body. If you are diagnosed with chronic iron overload, speak with your doctor about treatment options.
Other Risks

Allergic Reactions
Some people have allergic reactions to blood transfusions. The symptoms of an allergic reaction can include itching and hives, wheezing, and shortness of breath. Some patients might be given an antihistamine or steroid before the transfusion to help prevent an allergic reaction.

Fever
Some people suddenly get a fever or chills during a blood transfusion or within a few hours after a transfusion. A fever is often a sign that the patient’s body is reacting to white blood cells, plasma, or platelets in the donated blood. Doctors can usually treat transfusion-related fever with medicines, such as aspirin or acetaminophen, which reduce fever.

Lung Injury (also known as transfusion-related acute lung injury, or TRALI)
In rare cases, blood transfusions can damage a person’s lungs. Although any type of transfusion can cause lung injury, this response is most common after a transfusion of blood components containing plasma, such as fresh frozen plasma, or platelets. Patients with a transfusion-related lung injury are treated, and most get better within two or three days.

Acute Immune Hemolytic Reaction
When the blood type of the blood component that is transfused into a patient doesn’t match the patient’s blood type, antibodies already present in the patient’s blood can attack the donated red blood cells. This is known as an acute immune hemolytic reaction. These reactions are very rare, but serious. The symptoms of acute immune hemolytic reaction include fever, chills, dizziness, pain in the lower back or sides, dark urine, and breathing problems. The doctor gives the patient treatment for heart and lung symptoms and to increase urine flow.

Delayed Hemolytic Reaction
A delayed hemolytic reaction is also caused by antibodies that are later made in the patient’s blood. Some patients have a fever and/or jaundice (yellow skin) and pass dark urine. In rare cases, this reaction can damage the kidneys. People with delayed immune hemolytic reaction don’t usually need any treatment, but will need special blood tests before they can have more blood transfusions.

Transfusion-Associated Graft-Versus-Host Disease (GVHD)
In rare cases, patients develop graft-versus-host disease (GVHD) after a transfusion of a blood product. In GVHD, the transfused white blood cells attack the patient’s tissues. Patients who have a very weak immune system because of a disease or chemotherapy treatment are most likely to develop GVHD. GVHD can also happen in people whose transfused blood was donated by a relative or someone with similar, but not exactly the same type of tissue as the patient. The symptoms occur after the transfusion and can include fever, rashes, liver problems, and diarrhea. These symptoms typically start within the first six weeks after a transfusion. Blood banks can prevent GVHD by treating donated blood with radiation so that the white blood cells can’t cause GVHD.
Donating Blood

Family and friends often ask what they can do to help when you are diagnosed with an illness or disease. Donating blood to a blood bank is one way they can ensure there is an adequate supply of blood in your community. Safe blood saves lives and improves health. There is a constant need for regular blood supply because blood can be stored for only a limited time before use. Regular blood donations by a sufficient number of healthy people is needed to ensure that safe blood will be available whenever and wherever it is needed. Find out more at your hospital or local blood bank.

Additional Resources:

For more information about blood transfusions, visit:

- The Aplastic Anemia & MDS International Foundation
  www.AAMDS.org/Transfusions

- The National Heart, Lung, and Blood Institute of the National Institutes of Health
  www.nhlbi.nih.gov

- The American Red Cross: History of Blood Transfusion
  www.redcrossblood.org/learn-about-blood/history-blood-transfusion

This Talking About Blood Transfusions booklet offers general information about the benefits and risks of transfusions for bone marrow failure diseases, sickle cell, thalassemia, and chronic kidney disease patients. Although the information in this booklet has undergone a thorough, independent medical review to insure its accuracy, this information is not intended to be a substitute for the advice of your doctor. You should always seek medical advice from a qualified physician.
The Aplastic Anemia & MDS International Foundation is an independent nonprofit organization. Our mission is to support patients, families, and caregivers coping with:

- Aplastic anemia
- Myelodysplastic syndromes (MDS)
- Paroxysmal nocturnal hemoglobinuria (PNH)
- Related bone marrow failure diseases

For more information, call us at (800) 747-2820, or visit us online at www.AAMDS.org.

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