

TRANSFUSION POLICIES IN ANEMIA

Blood transfusion and alternatives in elderly, malignancy and chronic disease

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Introduction

Blood transfusion is an essential part of modern medicine and health care, however it should be prescribed only to treat conditions associated with significant morbidity or mortality that cannot be prevented or managed by other means [1].

Both blood transfusion service and clinical users should share efforts to establish and implement policies and strategies aiming at reducing the need for transfusion, minimize unnecessary transfusions and ensure a safe, rational and appropriate use of blood and blood components. Blood should not be transfused unless it has been obtained from appropriately selected donors, has been tested for transfusion transmissible infections and tested for compatibility between donor's red cells and patient's plasma [1].

Anemia of chronic disease is the second prevalent anemia after anemia caused by iron deficiency, occurs in patients with acute or chronic activation [3].

Definition

Anemia is defined as a hemoglobin concentration in blood that is below the expected value, when age, gender, pregnancy and certain environmental factors, such as altitude, are taken into consideration [1].

However anemia in general results as a consequence of one or more of the following generic causes:-

- Increased loss of red blood cells.
- Decreased production of red blood cells.
- Increased destruction of red blood cells.
- Increased demand of red blood cells.
- Increased production of abnormal red blood cells.

When anemia develops it leads to various physiologic changes, the most important of which is the compensatory response which aims at preserving the oxygen supply to the tissues. When anemia is severe enough that the patient is de-compensated, it is very important that red cells transfusion is considered to increase the oxygen carrying capacity needed for the tissues. De-compensation might happen in case of significant cardiovascular disease, fever or infections which increase the demand for oxygen.

General common features associated with anemia related to elderly, malignancy, and chronic disease

The rate at which anemia develops determines the severity of the symptoms and accordingly the consequences. Subsequently anemia can be classified as:-

- Mild
- Moderate
- Severe

Moderate anemia may cause no symptoms; nevertheless it reduces the patient's reserves to adjust to any event such as infection.

Severe anemia is an important factor in reducing the patient's tissue supply to critical levels. In this situation, urgent treatment is required and the need for transfusion should be assessed. Severe anemia is usually a sign of an advanced underlying disease.

The clinical picture of anemia in the above mentioned three conditions are due to either anemia itself or the underlying cause. However chronic anemia in these situations may have some symptoms which will increase greatly if the patient develops sudden hemolysis, bleeding or during other physiological conditions such as pregnancy or labor.

Anemia has been associated with relatively poor prognosis among patients with various conditions, including cancer, chronic kidney disease and congestive heart failure [3].

Symptoms such as fatigue and shortness of breath are subjective, but are still useful in determining the need for red cell transfusion in patients with chronic anemia [4].

Anemia of chronic disease is not itself usually a cause of symptoms. The anemia is mild and well tolerated unless it is superimposed on other threatening conditions. The importance of recognizing anemia of chronic disease is in identifying its underlying cause [5].

Special considerations when transfusing an elderly, malignancy and chronic disease

Blood transfusion in general should be prescribed, administered and monitored very carefully by a competent medical person. This is due to the fact that it carries potential risks and hazards. The patient may have several causes of anemia, such as malnutrition deficiency, infection, malignancy or hemoglobinopathy. There are few considerations which should be considered in the transfusion management of the following three conditions:-

- **Elderly:** the rate of red cell transfusion must be slower than in younger age patients. Elderly patients are subjected to heart failure due to blood volume overload if the rate of transfusion is fast. Diuretics should be considered in the appropriate dose when transfusion is inevitable. Moderate anemia warrants correction in patients older than 65 years old, especially those with additional risk factors [such as coronary artery disease, pulmonary disease, or chronic kidney disease] or combination of these factors [3].
- **Malignancy:** usually patients with malignant disorders who need red cell transfusion are likely to need other blood components as well such as platelet concentrates. Due to the frequency of this therapy, one should consider at the beginning of transfusion protocol several issues as leukodepletion, irradiation and erythropoietic agents.
- **Chronic disease:** same considerations of malignancy are applied in cases of anemia due to chronic disease. In patients with renal failure who are receiving dialysis and in patients with cancer who are undergoing chemotherapy, correction of anemia up to levels of 12 g/dl is associated with an improvement of quality of life [3].

Red cells transfusion

In cases such as elderly, malignancy and chronic diseases, red cell concentrate is the component of choice, as whole blood carries the risk of volume overload. Red cells are prepared by centrifugation and separation from whole blood. It should be stored at 4°C and has to be administered within 60 minutes of issuance from controlled storage temperature. Red cell concentrate should be administered through standard [170 micron] giving set.

One red cell concentrate unit should increase the hemoglobin level in an adult by 1 g/dl.

Red cell concentrate [packed red cells, or plasma reduced red cells] is the simplest red cell component. This component can further be leukodepleted using leukocyte filters, irradiated by gamma irradiation, washed by normal saline to remove the plasma proteins or suspended in additive nutritive solution to extend its shelf life and reduce its hematocrite. It is advisable to leukodeplete all red cell concentrate units used for patients who are anticipated to receive multiple transfusions. This is to avoid all the untoward consequences of leukocytes. Immune-compromised patients such as malignancy under chemotherapy should receive irradiated cellular components to avoid the possibility of developing GVHD.

Compatibility of red blood cells with the intended recipient must be verified by suitable pre-transfusion testing [2]. Cross-matching [compatibility testing] is done between the donor's red cells and patient's serum for every unit for transfusion. It is recommended to transfuse fully ABO, Rh and K compatible red cells. Red cell antibody screening should be performed in every transfusion; this is to avoid any hemolytic reaction which in these conditions might lead to very serious consequences.

The medical person who gives the transfusion to a patient is responsible for the control of identity and other safety measures. Verification of identity shall be carried out either by asking the patient to tell his/her name or other identification details on a wrist band which has been attached to the patient according to well-specified rules [2].

Close monitoring of patients during transfusion is essential in order to manage any adverse effects in due time. The dose and frequency of red cell transfusion has to be appropriate to the patient's age, weight, and clinical condition.

Because of the risk of damage to the blood components, no medical products or infusion solutions may be added to blood units [2].

Alternatives to red cell concentrate transfusion

Transfusion is usually not needed for chronic anemia, and the unnecessary transfusions in these situations

may lead to unavoidable complications. Simple preventive measures and the use of oral iron replacement can greatly reduce the prevalence of iron deficiency anemia and reduce the need for blood transfusion [1].

Erythropoietic agents for patients with anemia of chronic disease are currently approved for use by patients with cancer who are undergoing chemotherapy, patients with chronic kidney disease, and patients with HIV infection who are undergoing myelosuppressive therapy [3].

Transfusion guidelines

The philosophy of the appropriate clinical use of blood [ACUB] is a rational move to be adopted by clinicians. In order to achieve this practice, health care providers and systems should implement effective and sustainable health programs and services. This leads to the control and standardization of the blood transfusion practice.

Establishing national guidelines for blood transfusion protocols is a very important tool for proper management of all conditions that need blood transfusion or alternatives, including anemias. Government support is very useful in this policy.

National guidelines should elaborate issues such as information on different blood components, blood ordering policies, compatibility, handling, monitoring and management of adverse effects to blood. Many countries have considered this and produced their national guidelines. WHO has issued a group of publications regarding the use of blood components which are very reasonable and can be applied in many health systems.

Management

One should always bear in mind that blood transfusion is an adjuvant therapy, and it is always accompanied by other types of treatment measures. These other treatment measures have to be taken into consideration while ordering, administering and monitoring blood transfusion. It is very rational that every patient is managed individually and golden rules to be avoided.

Blood transfusion management in the above mentioned cases depends on various factors such as age, underlying illness, duration & rate at which anemia developed and the degree of compensation. Red cell transfusion is considered only when anemia is severe enough to cause reduced oxygen supply to tissues leading to de-compensated situation. The aim of red cell transfusion in this case is to supply the patient with sufficient hemoglobin to improve the hypoxia and not to increase the lab hemoglobin level.

In order that blood transfusion becomes effective, it is very important to treat the underlying cause of anemia whenever it is possible. The need for transfusion can often be avoided by either preventing or early diagnosis or treatment of anemia and conditions that lead to anemia, or correction of anemia and the replacement of depleted iron stores by prescribing oral iron in the relevant dose and frequency.

Transfusion are particularly helpful in the context of either severe anemia [< 8.0 g/dl] or life threatening anemia [< 6.5 g/dl] particularly when the condition is aggravated by complications that involve bleeding [3].

Clinicians who are managing anemia in the above mentioned situations should have good knowledge about red cell components specially indications, risks, storage and benefits. They should as well inform their patients about the potential hazards and benefits of red cell transfusion and alternative if relevant.

Recommendations

- Red cell transfusion should be considered only when anemia has caused inadequate oxygen supply to the needs of the patient. Otherwise patients should be managed early enough to avoid this situation.
- Treatment of the underlying cause of anemia usually prevents further decrease of oxygen carrying capacity, hence making management easier and avoids blood transfusion that carries potential hazards.
- National training programs should be in place which aims at standardizing the practice of blood transfusion among all clinicians.
- Decisions to transfuse blood should always be based on careful assessment of clinical and laboratory indicators that transfusion is necessary to save life or prevent significant morbidity [1].
- Do not transfuse more than necessary, in other words do not restore laboratory hemoglobin level. It should be raised to relieve clinical condition.

Conclusions

Transfusion can be a life saving intervention, however like all other treatments; it may result in acute or delayed complications and carries the risk of transfusion transmissible infections [1].

There are no reliable parameters to guide the need for red cell transfusion. The decision to transfuse red cell is a complex one and depends on factors such as the cause of the anemia, its severity and chronicity, the patient's ability to compensate for anemia, the likelihood of further blood loss and the need to provide some reserve before the onset of tissue hypoxia [4].

Clinical experience of blood prescribers is crucial to the management of anemia as there is no reliable trigger or golden rule to be followed.

References

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