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The Unit Cost of Leukocyte-Depleted Red Blood Cells Concentrates in Blood Transfusion Centre, Faculty of Medicine, Khon Kaen University, Thailand

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ABSTRACT

Background and objective: Leukocyte-depleted blood components are the best quality for multi transfusion in hemato-oncological patients. There are a number of cancer patients in the Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand and has been the center of threatening cancer of the north-eastern Thais and neighboring countries, such as Loa PDR, Cambodian. Therefore, leukocyte-depleted red blood cells (LDPRC) have to concern. The aim of this study is evaluate the unit cost of LDPRC.

Materials and methods: Three methods for LDPRC preparation in Blood Transfusion Centre, Faculty of Medicine, Khon Kaen University were compared by calculation from the cost of blood set, infectious screening, blood group testing and antibody screening.

Keywords: Leukocyte-depleted red blood cell (LDPRC), Human leukocyte antigen (HLA), Hemolytic transfusion reaction (HTR), Febrile non-hemolytic transfusion reaction (FNHTR), Leukocyte-poor packed red cells (LPRC)

BACKGROUND AND OBJECTIVE

The blood donated by one bag can be used for many patient by spin and separate various components. In addition to being useful in storage, it is also suitable for the treatment of many differently patients which is now generally accepted that the use of blood components transfusion is the best treatment for patients who lack only one part therefore, the blood is extracted into various parts. It is the right way to manage the use of blood that is appropriate for the patient's condition. White blood cells (white blood cells or Leukocyte) are cells that act in the body's immune system. To protect the body from germs foreign objects that accidentally enter the body due to the function of such white blood cells, it may be possible for patients to create antibodies that are specific to HLA antigen, or sometimes we see only as an adverse reaction from hemolytic transfusion reaction (HTR) in Thailand has created a national blood safety surveillance system (National Hemovigilance) to monitor the use of blood and blood components By being aware of the situation Unwanted from receiving blood and blood components to allow relevant personnel to understand the complications of blood and blood components (HTR) by having various agencies or hospitals involved, bringing data to analyze problems, frequency, severity of events, to find the cause and determine Measures to develop the use of blood and blood components In addition to providing adequate services, it also takes into account the more secure blood supply. And also to prevent the occurrence of Febrile non-hemolytic transfusion reaction (FNHTR) and Hemolytic transfusion reaction (HTR) and Transfusion-related acute lung injury (TRALI) is classified as an adverse complication from blood reception (adverse transfusion reactions which require surveillance Therefore, the components of the blood that have contaminated white blood cells are reduced to a minimum. Therefore is the best quality blood component for blood transfusions in many types that are given to blood and oncology patients with many cancer patients in Srinagarind

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Hospital Faculty of Medicine Khonkaen University Which is the center of cancer of the northeastern region of Thailand. In addition, when the Asian society is opened, it makes the patients both Thai and neighboring countries such as Lao People's Democratic Republic, Loas PDR, Cambodia Cambodian, Republic of the Union of Myanmar, The Union of Myanmar (Burma) and the Socialist Republic of Vietnam (Vietnam), etc. Therefore, the scope of services for patients, which is increasing Therefore, it is necessary to turn to regard safety as an important factor, in addition to the amount that is sufficient only. And the use of special red blood cells that eliminate white blood cells, whether it is Leukocyte-Depleted Red blood cells (LDPRC) and concentrated red blood cells with low leukocyte Leukocyte-Poor Packed Red Cells (LPRC), which is a component of the blood type that is the point of the doctor who is the most popular fever to choose. To be able to reduce the reaction from leukocyte-induced blood [1].

Therefore, the study therefore saw that the use of this type of blood that is more abundant although it is well known that it is very beneficial for the treatment of patients. But it is inevitable that problems will arise that is, the budget for storing and preparing such blood components. Because Thailand and Asian countries are not very rich countries. Therefore, the storage of such blood is not sufficient for treatment at this time; the study aims to study only the cost of preparing blood components that have many types of white blood cell (LDPRC) removal in the blood transfusion center, Faculty of Medicine. Khon Kaen University, Thailand for use in the treatment of patients in Srinagarind Hospital And nearby hospitals By evaluating LDPRC's cost per production unit to compare the advantages and disadvantages of choosing LDPRC for each method [2].

MATERIALS AND METHODS

Blood received from donations is a liquid component, blood cells and plasma. That consists of red blood cells (RBC), white blood cells (WBC) and platelet (platelet) when blended into different components including packed red cells (PRC) and platelet concentrated found that there are still a few white blood cells that are contaminated about 1-3 × 10^{10} cell/unit of PRC, which white blood cells that are contaminated is a major cause of many side effects in giving blood to patients, including Febrile Non-Hemolytic Transfusion Reaction (FNHTR) fever, alloimmunization on leukocyte antigen and HLA, immunomodulation reducing the number of leukocytes in the blood component will help reduce and prevent such side effects. According to the standards of the American Association of Blood Bank (AABB), which has been used as an international standard, has determined that the amount of white blood cells that are less than 1.2 × 10^{9} cell/unit will help reduce the Febrile Non-Hemolytic Transfusion Reaction: FNHTR can be obtained by using a blood type bag containing filters to separate the white blood cells before spinning which is the preparation of blood components called Leukocyte Depleted Packed Red Cells (LDPRC) using Leukocyte Filtration, which will filter out the white blood cells before they are used to spin the components. With the remaining white blood cell count less than 1.0 × 10^{6} cells per unit.

Preparation of LDPRC in the Blood Transfusion Center, Faculty of Medicine Khon Kaen University uses 3 methods **(Figure 1)**:

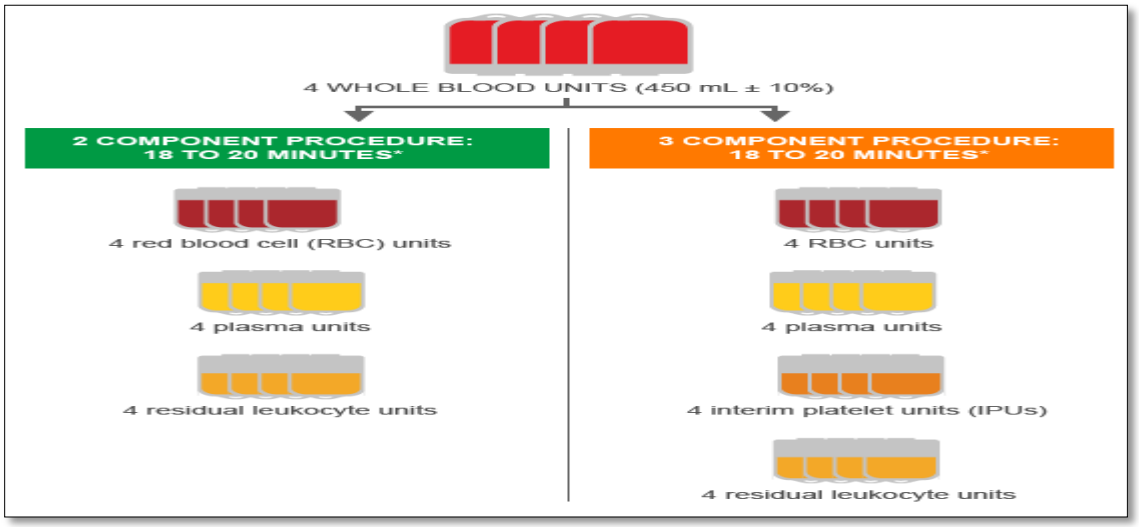

Figure 1. Blood transfusion system.

- Reveos system: Automation can improve operations and deliver impressive benefits to your blood center. The Reveos system is an easy-to-use platform that automates and integrates the manual steps of whole blood processing: from start to finish, whole blood to platelet concentrates. Plus, you can process four units of whole

blood in a single run. With the touch of a button, you can easily meet the challenges faced by component labs around the world.

The Reveos device, along with the RSM and the integrated processing set, enables consistent separation of blood into quality components. An integrated sealer seals all products at the end of the run.

1. Up to four units of whole blood are loaded into the device.
2. The rotor begins to spin, and the whole blood is separated into its components.
3. Plasma, platelets and leukocytes are expressed into their respective product bags and each bag is sealed.
4. After the procedure, run data is transferred to the RSM.
5. Products are unloaded for storage or additional processing.

- Pre storage filtered blood is the selection of special blood bags containing leukocyte filtration by using a blood-type filter bag. To separate the white blood cells before spinning, which is the preparation of blood components called Leukocyte Depleted Packed Red Cells (LDPRC) using Leukocyte Filtration, which will filter out the white blood cells before they are used to spin the components. With the remaining white blood cell count less than 1.0×10^6 cells per unit.
- Post storage filtered blood is the removal of white blood cells after the normal spin. They filtered white blood cells from Packed Red Blood Cells (PRC) or Leukocyte Poor Red Blood Cells (LPRC) by bringing blood bags that have been donated and disassembled and then packed with red blood cells. Packed Red Blood Cells (PRC) is very much filtered by filtration set at the preparation room.

Assemble the blood to filter out the contaminated white blood before applying to the patient.

The study calculated the cost of blood tests, screening, blood tests and antibody screening.

TRANSCRIPT

Cost of Reveos system, pre-storage method and method of storage after storage are 1,200, 1,346 and 1,682 baht, respectively. Blood bag values 2,461, 1,552 and 379 baht, respectively, over the past 3 years, method of collecting data after storage. The data is 313 sets (recorded). Therefore, Reveos and data storage systems are therefore cheaper than 150,866 and 105,168 baht **(Table 1)**.

Table 1. Cost analysis of Reveos system, pre-storage and method post-storage methods.

	Reveos system	Pre-storage method	Post-storage method
Volume	1,200	1,346	1,682
Cost	2,461	1,552	379
Filter set	0	0	1,200
N=313	157,200	485,776	2,137,027

CONCLUSION

The data show the benefits of hematologic oncology patients using the blood components that the white blood cells lose. The new Reveos technology system is suitable and reduces the budget for preparing LDPRC. We can make decisions and set policies for the provision of LDPRC in hospitals to reduce the loss of limited budget. And will also be useful for hospitals with similar budget problems that can be applied to all hospitals [3].

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