An Insight Toward Better of Blood Services; Bioethical Review

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Abstract. Health services are efforts organized alone or together in an organization to maintain and improve health, prevent and cure diseases and restore the health of individuals, families, groups or communities in order to realize optimal public health status. Blood services are health efforts that utilize human blood as a basic material for humanitarian purposes and not for commercial purposes. Blood is an important therapeutic product for human life, and its quality and safety must be guaranteed. The doctor's decision to give a transfusion is often assumed with the worst possibility that can occur, so it will require more time and effort to crossmatch. The purpose of this study is to analyze the effectiveness of blood ordering and transfusion administration by clinicians in elective surgery patient services. This research is normative with a qualitative approach. Qualitative research uses a statutory approach, a concept approach, and a case approach. Data collection techniques using literature reviews from primary and secondary data sources. The results showed that the maximum blood ordering schedule (MBOS) play a role in increasing the effectiveness of blood ordering and transfusing blood. Standard Operating Procedures (SOPs) for blood ordering and blood donor information systems need to be developed to improve the effectiveness of blood transfusion services at the Blood Transfusion Unit (UTD). Doctors who request blood for transfusion must be consistent with the existing SOP, be clear in writing the patient's indication on the transfusion request sheet, and give more consideration to the number of blood bags requested in accordance with the appropriate needs analysis.

Keywords: Effectiveness, MBOS, Ordering blood, Transfusion

1. Introduction

The Indonesian government guarantees every citizen to obtain health services. Article 28H of the 1945 Constitution of the Republic of Indonesia states that: "Every person has the right to live in physical and spiritual prosperity, to live and obtain a good and healthy environment and has the right to obtain health services".[1]

Health services are efforts organized alone or together in an organization to maintain and improve health, prevent and cure diseases and restore the health of individuals, families, groups or communities in order to realize an optimal degree of public health.

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Blood is a body fluid that is important for human life and circulates in the heart and blood vessels. Blood has two main components, namely the liquid part (55% plasma) and the corpuscular part (45% erythrocytes, leukocytes, and platelets). The blood transports oxygen and nutrients to all cells in the body and carries products of cellular metabolism. The total blood volume of an adult is estimated to be about 5-6 liters (7-8%) of a person's weight. Blood is a therapeutic product and must comply with the quality management system of the blood supply unit to ensure its quality and safety and to minimize the potential for bacterial or other microorganism contamination. Only donors who have been examined and meet the donor selection criteria set by the Blood Transfusion Unit (UTD) are allowed to donate blood.

Blood and blood components play a major role in the resuscitation and management of both elective and emergency surgical patients. Although this has its advantages, the supply of blood is currently limited due to the increasing demand and use of blood around the world. The use of high quality blood and blood components with minimal waste is an important goal in the blood use management system.[2]

A blood transfusion is the administration of whole blood or blood components such as red blood cells, plasma, or platelets through the intravenous route to meet the patient's need for blood according to the treatment program. Blood transfusions are universally needed to treat patients with severe anemia, patients with congenital blood disorders, patients who have suffered serious injuries, patients who are about to undergo operative surgery, and patients who have liver disease or other diseases that prevent the patient's body from producing blood or components. blood properly. In developing countries, blood transfusions are also needed to treat emergency deliveries and malnourished children, which can lead to severe anemia. Without enough blood, a person can experience health problems and even death. Therefore, blood transfusions given to patients who need them are needed to save lives. [3]

The death rate due to the unavailability of blood transfusion reserves in developing countries is relatively high. This is due to an imbalance in the ratio of blood availability to rational needs. In developing countries like Indonesia, the percentage of blood donations is lower than in developed countries, even though the level of need for blood in each country is relatively the same. Indonesia has a donor rate of six to ten people per 1,000 people. This is much smaller than a number of developed countries in Asia; for example, in Singapore, there were 24 people who donated blood per 1,000 population, and in Japan, there were 68 people who donated blood per 1,000 population.[4]

Blood transfusion is an important part of health services. Blood transfusions are often performed for both patients who require surgery and non-surgical patients. Giving transfusions to surgical patients can be done before, during, or after the operation. In non-surgical cases, it can be done at any time, depending on the indication. When blood transfusions are applied correctly, they can save the patient's life and improve the patient's health status.[1]

Blood transfusion has been a common procedure used to treat anemia for the past century and is one of the most frequently performed medical therapies in the

world. However, transfusion cannot be considered safe and risk-free for patients, especially the pediatric population. Allogeneic blood transfusions have the potential for the greatest risk of medical intervention. Transfusion has a direct or deterministic hazard with a post-transfusion damage mechanism that can be clearly traced to the transfused blood in a cause-and-effect manner, so it is called a 1:1 hazard and is documented in an alert program. Transfusion has the hazard of being liable for indirect or probabilistic harm identified as related to transfusion through epidemiological studies, and transfusion in these circumstances is a risk factor for an adverse outcome and is not a specifically defined disease state.[5]

The need for adequate blood transfusions for surgical procedures led to the development of the Maximum Surgical Blood Order Schedule (MSBOS), which lists surgical procedures with the recommended number of units of blood. Adopting MSBOS can reduce unnecessary bleeding, minimize wastage due to expiration, and reduce blood bank workload by providing guidance with simple methods, such as implementing the type and screen (T&S) method for procedures with low MSBOS. MSBOS can also indicate the number of blood units that are routinely cross-matched for any given surgery, eliminate unnecessary preoperative testing, increase costs, reduce the number of cross-matched blood units, and assist blood bank management. One concern with early-stage MSBOS is that the recommendations are often out of date. Advances in surgical equipment, changes in transfusion criteria, modification or introduction of new surgical procedures, and preferences for non-invasive surgery influence the utilization of surgical blood, which should be reflected in the current MSBOS.[6] [7]

The specific location of the MSBS must also consider the availability of blood bank resources and staffing levels, which may affect the clinician's ability to quickly obtain blood products without pre-existing cross-matching. The MSBOS should be generated based on an audit of hospital blood use, and it has been noted that electronic anesthesia information management systems can facilitate the collection of large amounts of data. Conducting large-scale audits can be challenging because data from electronic systems and prospective databases is often not available.[8]

The decision to transfuse is often based on subjective judgment, where the request for a blood unit is always assumed to be the worst that can occur, so that it will take more time and effort to be used in cross-matching. The purpose of this study was to determine the effectiveness of ordering blood and administering transfusions in elective surgery services.

2. Problems

What is the effectiveness of blood ordering and transfusion delivery by clinicians in elective surgery patient care?

3. Method

This research is normative with a qualitative approach. Data collection techniques using literature reviews from primary and secondary data sources

4. Discussion

The effectiveness of MBOS in blood ordering and transfusion delivery in elective surgery is presented in Table 1.

Table 1. *Effectiveness of MBOS in several research studies*

No.	Author	Sample (patients)	C/T Ratio	Results
1.	Kurniawan, 2017[9]	100	2.89	Gynecological elective surgery patients who met the MSBOS criteria were 80 out of 100 people who were examined with CT 2.89 at Soetomo General Hospital, Surabaya.
2.	Kasraian *et al.*, 2019[10]	23	1.6	There was a decrease in the average use of blood and C/T after the implementation of MSBOS (13.2%, 42.9%) in 23 hospitals in Shiraz, Iran.
3.	Naomi et al.,2021[11]	210	1.55	Overall, the CTR value is 1.55 and is said to be efficient in the use of blood at KH Hospital. Daud Arif Kuala Tungkal, West Tanjung Jabung Regency, Jambi. MBOS has been successfully applied to several elective surgeries. SC surgery is the least efficient in the use of blood because the CTR is 2.6
4.	Rini *et al.*, 2023[12]	21	2	ORIF plating symphysis-type operations have C/T 2 and are effective for MSBOS
5.	Murugesan *et al.,* 2019[13]	3675	1.1-2.4	MSBOS is effective in patients with obstetric-specific diagnostic surgery compared to cesarean section and delivery patients
6.	Singh *et al.*, 2021[14]	252	1.89±0.97	MSBOS is effective in elective surgery patients for 4 months, from January to April 2019, with a C/T ranging from 1.20 to 4.59. MSBOS is not effective in thoracotomy surgery patients.
7.	Sharifi *et al.,* 2019[15]	17.696	1.3	MSBOS is effective in the performance of the antibody screening test in Tehran Children's Medical Center Hospital, Iran from 2006-2017 so that it can save economy and reduce blood preparation time, especially in emergency situations.
8.	Fenelon *et al.*, 2018[16]	1467	1.97 (2012) – 1.81(2015)	The updated MSBOS resulted in a 46% reduction of cross-matched blood and savings of €54,375 per annum.

4.1. Blood and Blood Ministries

Blood service is a health effort that utilizes human blood as a basic ingredient for commercial purposes. Blood is obtained from voluntary blood donors who meet the criteria for donor selection and must be subject to laboratory examination before use, while blood transfusion services are health service efforts that include planning, mobilizing, and preserving blood donors, supplying blood, distributing blood, and medical procedures for giving blood to patients with the aim of curing disease and restoring health.[17]

Transfusion therapy is used primarily to treat two conditions, namely inadequate oxygen-carrying capacity due to anemia or blood loss and insufficient protein or platelet coagulation to provide adequate homeostasis. Each patient requires an individual plan during the administration of transfusion therapy that reflects changing clinical conditions, anticipation of blood loss, capacity for compensatory mechanisms, and laboratory results. Patients who do not require transfusion despite anemia or thrombocytopenia may do so because their clinical condition is stable and there is little or no risk of adverse events. Generally, this condition mostly affects patients with iron deficiency anemia with minor symptoms.[18]

According to the American Society of Hematology, "blood transfusion" is the transfer of blood, components, or blood products from a donor to a recipient. The goals of blood transfusions include increasing circulating blood volume after surgery, trauma, or bleeding, increasing the number of red blood cells and maintaining hemoglobin levels in clients who suffer from severe anemia, and providing selected cellular components as replacement therapy (e.g., factors Plasma clotting to help control bleeding in patients with hemophilia).[11]

Organizing blood donors and blood management is carried out by the Blood Transfusion Unit in accordance with Law Number 36 of 2009, Article 87, concerning health.[17] The Blood Transfusion Unit (BTU) is a health service that organizes blood donation, blood supply, and blood distribution.[1] Law Number 36 of 2009, Article 88, explains that blood transfusion services include planning, blood distribution, mobilization of blood donors, and the provision and medical action of giving blood to patients with the aim of healing disease and restoring health.[17] Government Regulation Number 7 of 2011 explains that the central government and regional governments are responsible for (1) regulating, fostering, and supervising blood services; (2) providing blood services that are safe, easily accessible, and as needed; (3) encouraging research and development of blood service activities; and (4) funding blood service activities.[19]

The hospital blood bank is obliged to store blood that has been screened by UTD PMI and cross-match each blood bag ordered for transfusion preparation. Cross-match is a blood test between the patient and the donor that needs to be done before carrying out a blood transfusion to determine the compatibility of the blood between the donor and the recipient. Not all the blood that is cross-matched will be transfused to the patient. This indicates an inappropriate distribution of blood products, wastage

of blood, inaccessibility of blood for emergency patients, increased costs, and an increased workload for staff. more time and effort spent on cross-matching.[1] [20]

To increase efficiency in the large number of blood requests, the hospital implements various quality indicators for the utilization of blood that have been studied, for example, the management of ordering blood and administering transfusions at operations. The Maximum Surgical Blood Ordering Schedule (MSBOS) for surgery is designed based on reports from each hospital regarding the amount of blood used during various types of surgical operations, providing specific guidelines for each blood bank to record the number of units of blood requested routinely. Based on this pattern, requests for adaptation tests will be limited to a number of surgical procedures that carry a high risk of transfusion. Requests for blood in surgery are tailored to the needs of individual surgeons, thereby reducing the number of compatibility tests, the use of whole blood products in most cases, and the effective use of blood inventories.[21]

The C/T ratio (crossmatch to transfusion ratio) describes the ratio between cross-tested blood and transfused blood. When giving blood, you must pay attention to the patient's condition, then match the blood through the patient's name, blood label, blood type, and check the color of the blood (clots occur or not), homogeneity (mixed or not).[22] MSBOS can assist patient blood management efforts and lead to efficiency and safety for patients and hospitals. Implementation of MSBOS, which included information on specific red blood cell transfusion procedures, resulted in a 38% reduction in preoperative blood orders and reduced annual costs. In addition, the implementation of MSBOS experienced a significant decrease in the average number of RBC cross-match units and the amount of blood transfused to surgical patients per month, while the C/T ratio of the whole tissue tended to decrease after the implementation of MSBOS.[23]

MSBOS aims to reduce the number of units of blood that are wasted and not transfused during surgical procedures, thereby reducing the consumption of blood bank resources and time. MSBOS still recommends that for patients with possible blood transfusions, the number of cross-matched units should be twice the median requirement for that surgical procedure, with a C/T ratio of 2:1.[24]

4.2. Blood Services in a Bioethical Review

Efficient use of blood and blood components remains a challenge for healthcare workers involved in transfusion therapy. Over-ordering can be a problem when preoperative blood orders exceed the average or even double the actual consumption. Blood transfusion services are very important in clinical laboratories because they have three components, namely those related to blood product collection, those devoted to blood bank preparation, allocation, and diagnosis, as well as clinical constituents and repair. The constitutional services of blood banks are therapeutic rather than diagnostic and thus differ from other pathology subspecialties. Impulsively excessive ordering of blood can overburden the physical and human budgets of the healthcare system, thereby increasing patient care expenditures. There is a need for a multidisciplinary approach to managing the use of blood products to reduce complexity and avoid minimal waste of resources.[25]

The management of blood transfusions is in accordance with the theory of utilitarianism, which holds that the purpose of law is to provide as much benefit as possible. In this case, expediency is defined as happiness, so the judgment of whether a law is good or bad or fair depends on whether the law can give happiness to humans or not. Every preparation of legal products (statutory regulations) should always pay attention to the purpose of the law, namely to provide as much happiness as possible for the community.[26] Utilitarianism is often known as a cost-benefit analysis. Utilitarianism is commonly used to determine the most efficient use of resources so that it can determine the best value of these resources and individuals can get benefits and happiness[27].

The law must provide benefits to all humans, such as bringing good and avoiding bad. Good is synonymous with pleasure, and bad is synonymous with suffering, as a substitute for fair and unfair, moral and immoral, good and evil. The law always gives freedom to every individual, but the opportunity for freedom must be limited so that there is no mistreatment of others.[28] The purpose of the law based on the theory of utilitarianism, which is oriented towards individual happiness or benefit, has been achieved and implemented in the law.[29]

In medical ethics, beneficence is the principle that requires doctors to provide the best possible positive benefits, such as good health, and to prevent and eliminate conditions that are detrimental to patients. The principle of non-maleficence explains the obligation not to harm others, so it is closely related to the maxim of non-cere. The ancient Hippocratic Oath binds a doctor to act "on behalf of my patients and abstain from that which is harmful or naughty." The primacy of patient well-being is the foundation of medical ethics, and the certainty of these values forms the basis of most professional codes. Physicians are responsible for acting in the best interests of their patients, regardless of personal motives, and patients must have confidence in their ability to do so.[30]

Blood services should be carried out with respect for maintaining the security and safety of blood as a human organ, donors as donors, and patients as recipients of blood through transfusion. The Hippocratic Oath made a major contribution to upholding the medical profession as a respectable profession in society. In the Hippocratic Oath, there is an obligation towards patients, namely not to take actions that harm patients, which is also stated in the 1945 Constitution of the Republic of Indonesia. Article 28H paragraph (1) of the Second Amendment states that every person has the right to live in physical and spiritual prosperity, to have a place to live, to have a good and healthy environment, and to obtain health services. The relationship between patients and doctors is often impersonal because certain medical procedures need to be carried out by a team of specialist doctors, and in health services in hospitals, it is necessary to use sophisticated technology to support services to the public.[31]

4.3. Efforts to improve the effectiveness of blood services at BTU

The availability of blood in health facilities is strongly influenced by the participation of the community in donating blood and the availability of infrastructure facilities that can ensure the availability of sufficient, safe, and quality blood. The impact of the

unavailability of blood can be fatal for patients who need it. Therefore, blood inventory control is very important to control the optimal amount of inventory in order to minimize the occurrence of inventory shortages or excess supplies of blood components. According to the Regulation of the Minister of Health of the Republic of Indonesia No. 91 of 2015 The managerial standard for each PMI UTD must have a donor recruitment plan, one of which is the calculation of the safe supply of blood and blood components whose periods are made according to the conditions needed by the hospital.[1]

A blood donor information system also needs to be developed to increase the efficiency and effectiveness of blood transfusion services in the Blood Transfusion Service Unit (UPTD). The use of information technology in the medical world has great potential to improve efficiency and quality of service. Information technology in the blood transfusion unit facilitates access for the public and health workers to health information. This is in accordance with the opinion of Osby et al., who argued that developing a blood transfusion information system is the right solution to improve accuracy and set quality service standards in a blood transfusion unit.[32]

5. Conclusion

The maximum blood ordering schedule (MBOS) act as one of the tools to improve the effectiveness of blood ordering and transfusion. There is a need for a standard operational procedure (SOP) for ordering blood and a blood donor information system to improve the efficiency of blood transfusion services in each blood transfusion unit. Clinicians who request blood for transfusion should be consistent with the existing SOP, be clear in writing the patient's indication on the transfusion request sheet, and give more consideration to the number of blood bags requested in accordance with the appropriate needs analysis.

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