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Principles of blood transfusion service audit

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Summary

Blood transfusion is still an important procedure in modern medical practice despite efforts to avoid it. This is due to its association with infections especially HIV. It is therefore necessary to have proper quality control of its production, storage and usage [1]. A way of controlling usage is to do regular clinical audit. To effect this, there has to be an agreed standard for appropriate use of blood. The aim of this paper is to briefly highlight the importance of audit, audit procedures and tools i.e. required records, development of audit criteria and audit parameters. Every hospital / blood transfusion center is expected to develop a system of audit that is appropriate to its needs. The suggestions are mainly based on the experience at the Lagos University Teaching Hospital and the Lagos State Blood Transfusion Service.

Keywords: *Audit criteria, audit parameters, transfusion standard*

Résumé

La transfusion sanguine demeure une procédure importante dans la pratique de la médecine moderne, bien que l'associe infections telles que le VIH. Il est nécessaire d'avoir un système de contrôle de la qualité, la protection et l'usage par un audit clinique régulier. Utilisant le protocole standard pour l'usage approprié du sang, ce papier illustre l'importance des critères et des paramètres d'audit et ses outils. En effet, chaque hôpital ou centre de transfusion sanguine doit développer un système d'audit sanguin approprié et standard. Des suggestions sont fondées sur les expériences des pratiques régulières à un centre universitaire hospitalier de l'Université de Lagos et du Service de transfusion sanguine de l'état de Lagos.

Introduction

Medical audit is the systematic, critical analysis of the quality of medical care, including the procedures used for diagnosis and treatment, the use of resource, the outcome and the change in the quality of life of the patients with the sole aim of continually improving medical care [2]. Medical audit should not replace reviews that are comparative appraisal of existing methods and practice with the aim of setting standards and approving the best of practice.

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Audit is to establish whether the approved standards are adhered to. Ideally an independent team should carry out the audit so that there is a fair and impartial analysis.

Aim of medical audit

Medical audit can be said to be an independent review that:

- Verifies the proper processing (keeping and maintenance) of medical records.
- Ensures that performance of procedures is in accordance with existing and accepted standards.
- Identifies deviation from standards
- Verifies the stated safety, efficacy and outcome of the procedures.
- Makes recommendations that can be used by the institution to improve the practice and by the regulatory authority for accreditation purpose.

Audit report should be presented to a body that has authority to implement recommendations and carry out corrective measures that are not necessarily punitive.

Where there is a national or regional blood transfusion service, the hospital based transfusion committee initiates the audit and selects the auditors. The audit team presents its report and makes recommendations to the Regional or State Blood Transfusion Committee for deliberations and comments. The Regional Blood Transfusion Committee sends its report to the National Blood Transfusion Service and the accreditation body [2]. These reports are useful:

- For the improvement of transfusion practice and to ensure compliance with existing standard.
- For accreditations purpose.
- To review the national policy on blood transfusion when necessary
- To disburse available funds to blood transfusions centers.
- To direct and assist in research and development.

Blood Transfusion Committee:

The hospital authority or the State Blood Transfusion Service sets up this committee in accordance with the rules and regulations of each institution to:

- Monitor blood transfusion practice
- Review blood transfusion policy periodically.
- Set hospital standards for blood transfusion.
- Recommend training and continuing education for laboratory personnel, medical and nursing staff.

Membership of the committee should include representatives from all the departments that use blood and blood products. Representatives from the department of nurs-

ing, health records, and administration are also desirable [4]. The director of the blood transfusion service is expected to be a permanent member of the committee without necessarily being the chairperson. The guidelines from some National Blood Transfusion Services, recommends that the committee meets every two months and submit annual audit report to the Regional Blood Transfusion Service and the hospital authority. However the frequency of meetings may be decided by each service.

Audit standard or guidelines

The audit standards are agreed modalities of practice based on scientific and medical finding by a team of professionals involved in blood transfusion. Audit is done with reference to an agreed standard of practice. From this standard, audit criteria are prepared such that non-medical personnel may successfully perform the audit.

Such standards should include:

- Definition of blood product and transfusion method.
- Indications for the use of blood products with explanations.
- The modality and frequency of administration.
- Expected outcome of transfusion
- Set targets for the turn around time, outdate, storage rate.
- Efficient use of material and procedures in the blood bank
- The provision and sourcing of safe blood and its proper storage and processing.
- Appropriate quality control in the blood bank and transfusion practice.
- Effective disposal of infected blood and expired blood.

National guidelines or standards on appropriate use of blood and blood products where they exist, can be used to design:

- The audit criteria for the appropriate use of blood in each hospital.
- The appropriate inventory control in the blood bank
- The minimum record to be created, the method of storage and the minimum storage period.
- The standard operative procedures and the flow chart of events in the various department of the blood bank.
- The quality control measures and the methods of reporting.
- The appropriate source of blood for transfusion based on the social circumstances in the catchments area of the hospital.

Audit criteria

These are predetermined measurable elements based on the approved standards of blood transfusion that are agreed upon. These measurable elements are employed to

assess whether the practice conforms to the agreed standards. The audit criteria should be simple so that a non-medical staff can understand and use it to audit transfusion practice. An audit criterion contains: [5]

- Audit element i.e. Indications for the transfusion of blood product or the modality of transfusion.
- Exceptions: clinical conditions wherein transfusions may take place without fulfilling the elements.
- Instructions: where the parameters given in the elements can be found.

Any transfusion order that does not conform to these criteria will be scrutinized and referred to the blood transfusion committee.

The maximum surgical blood order schedule

This is a document that serves as audit criteria for scheduled surgeries done in the hospital. The maximum blood order schedule is a document prepared in consultation with the surgical team and the anaesthetists. It is based on the past usage of blood in the operating room and the immediate post operation.

With regards to surgical blood usage in scheduled surgeries, there are 3 categories.

A. *No order*: Surgeries for which blood transfusion is not normally needed are listed in this category. Orders for such transfusions are referred to the blood bank physician. Examples are: herniorrhaphy, eye operations, appendectomy, tubal ligation, etc.

B. *Type and screen*: Operations that require blood transfusion only occasionally. These can be identified by listing operations whose cross match transfusion ratio is greater than 2 i.e. in most cases blood is cross matched without being transfused. The patient's blood is sent to the blood bank two days before surgery so that typing and screening for atypical antibody can be done. If no antibody is found, the serum is stored. An abbreviated cross match is done if blood is needed at surgery. Examples are: laparotomy, primary caesarean section, etc

C. *Cross match and keep*: Surgical procedures that always require blood transfusion (Cross match / Transfusion Ratio <2.). The average units of blood to be pre cross matched based on previous practice must be stated in the list. Examples are : repeat Caesarean section (1 unit), hysterectomy (2 units), myomectomy (2 units), prostatectomy (3 units), hemicolecotomy (2 units), thyroidectomy (1unit) etc

Some of these surgeries may benefit from autologous blood transfusion: i.e. Myomectomy, hysterectomy, mastectomy, thyroidectomy, schedule plastic surgeries, scheduled orthopaedic surgeries. A protocol for autologous blood transfusion should be developed.

Table 1: Audit criteria for transfusion : whole blood and red cells.

Indications	Exceptions	Instructions
Whole blood: Blood loss: ->30% of blood volume (1.5l) -PCV<28% and loss continues	Fresh whole blood may be given where blood product cannot be prepared to supply platelets and coagulations factors -Low blood pressure, low pulse volume and pulse rate >100/minute.	-Patients case note Theatre records:-Anesthetists records - At blood loss <30-25% of blood volume i.e. 1.5 l of blood in adults the loss can be replaced with crystalloid and colloids
Red cell. Anaemia: -PCV<21% in adult -PCV<36% in neonates -PCV<17% in chronic anaemia -PCV<15% in immune haemolysis	History of: Coronary heart disease Cerebrovascular accident Chronic obstructive airways disease Evidence of anaemic heart Failure	Check: Patients case notes Laboratory records over 1-2days

Table 2: Audit criteria for plasma, cryoprecipitate: platelets

Plasma -Burn > 25% Fresh frozen plasma: -Bleeding in liver failure -Prothrombin Time Ratio >1.5 in the presence of haemorrhage or imminent invasive oricEDURE. -Prothrombin Time Ratio >4.5 for patient on warfarin with or without bleeding. -Multiple coagulation factor deficiency. -Protein C,S and antithrombin deficiency	-Evidence of disseminated Intravascular Coagulation Thrombotic thrombocytopenic purpura -Hemolytic ureamic syndrome.	
<i>Cryoprecipitate:</i> -Bleeding in hemophiliacs, -Fibrinogen of fibronectin and von Willebrand's disease	Post surgery and post trauma with massive transfusion.	Patient's case note
<i>Platelets Concentrate:</i> -Platelet count <10X10 ⁹ /L and no bleeding -Platelet count <20X10 ⁹ /L with bleeding -Platelet count <50X10 ⁹ /L in preparation for invasive procedure	In neonate, count <20X10 ⁹ /L. In the presence of sepsis or abnormal platelet functions	Patient's case note and laboratory results registers.

Audit modalities of blood transfusion practice [5]

There are 3 methods of audit procedure:

1. *A retrospective audit:* This is a review after the blood product has been transfused. The tools are the audit criteria, the patients case note, the haemovigilance form and the laboratory records. Transfusions done are selected randomly or with bias for a particular situation. The indication, units cross matched, units transfused and effectiveness of the transfusion are compared to the guidelines. Transfusion that does not conform to the Hospital's guideline is selected for consideration by the Blood Transfusion Committee. The hospital unit involved is made to

explain the situation and corrective measures are taken. However, in the practice, this may look like a fault-finding exercise that may not be sustainable for the same reason. Where it is used alone, it does not achieve much when a rapid change in practice is desirable.

2. *Concurrent audit:* This is a review done within twenty-four hours of blood transfusion while the patient is still hospitalized. This is very effective in monitoring clinical transfusion practice especially if this is monitored closely by the hematologist. The modalities can be designed by each service e.g. All orders that do not meet the transfusion criteria are referred to the hematologist with-

out disturbing the flow of work. The hematologist then consults the patient and the attending physician for a possible change in management approach.

3. *Prospective audit:* This may be implemented where there is a good communication system to ensure smooth flow of work. All requests from the clinicians are checked against the audit criteria by the laboratory scientist on duty and any incomplete from is clarified. All requests that fail the audit criteria are referred to the hematologist who investigates and makes modifications. The concurrent and prospective audits are possible where there are blood bank physicians and they are desirable where certain rapid changes in practice are indicated.

Audit parameters

Audit parameters in blood transfusion service audit could be of two types [2,3]

A. The blood bank audit: this is to assess the workload, the effective use of material and the quality and inventory controls of the blood bank. Some of the parameters that are useful for this purpose are:

1. The number of units / percentage transfused in the form of whole blood, packed cells, fresh frozen plasma, etc.
2. The percentage of the different category of blood donors recruited. i.e. Voluntary donors, family replacement and autologous blood transfusion donations. The number/percentage of self-deferrals, percentage of temporary and permanent deferrals
3. The number of emergency cross match and full cross match done.
4. The cross match / transfusion ratio.
5. Inventory control parameters: the outdate rate, the shortage rate, surgical cancellation rate, number of donor blood collected, percentage positive for hepatitis and HIV. Balance sheet of blood units collected, blood transfused, blood units discarded, Units returned un-transfused to the banks, blood bank reserve time.
6. Material usage parameters: number of blood bags supplied, percentage successfully used for blood collection, percentage discarded due to leakages, small volume, the presence of clots in the blood units.
7. The number of blood units grouped / cross matched per 10mls of reagents (anti sera), Blood bank response and the turn around time.

B The Clinical Audit: This is to assess the appropriate use of blood and the effects of blood transfusion:

1. Hospital transfusion rate i.e. Number of units transfused per hospital bed per year.
2. The percentage transfused per user department and per indication.
3. Cross match/ transfusion ratio per department, per surgery and per indication.

4. Transfusion failure rate i.e. Percentage of transfusion that did not meet the expected result.
5. Positive look back rate i.e. Percentage of infections likely to be due to blood transfusion in the hospital in one year.
6. Percentage of non-compliance with audit criteria
7. Blood transfusion reaction rate

Records required for blood transfusion service audit:

To ensure adequate audit of blood transfusion practice and blood banking in a transfusion center, the following records should be made available to the auditors:

Request register

The purpose is to identify the mode of requests and the percentage honored. The register should show the following:

Date and time the request was made, the patient's name, hospital number, ward, units requested for, when blood is required, indication, history of previous transfusions, blood group and whether the request was honored.

Cross match performance register

This is to identify the blood bank workload, test procedures and emergency requests. The register should show the following: date and time of cross matching, patient's name, hospital number, pathology number, blood group of the patient and that of the donor, the result of the compatibility done at various conditions e.g. saline at room temperature and at 37°C, in the presence of albumin and / or enzyme treatment at 37°C, Coomb's test, controls, comments and signature.

Issuing out register

This is to identify the units sent for transfusion, location of transfusion, units returned un-transfused and the turn-around time of the blood bank. This register should contain the following: date and time of blood collection, patient's identity, ward, blood unit number, amount paid, if returned un-transfused, expiring date, blood product given and the officer's signature.

Blood bank ledger/brain box

This can be used to trace the units of blood collected. The register should contain the following data: blood unit number, date collected, expiring date, blood group, antibody screen, result of Transfusion Transmissible Infections screening, component prepared from it i.e. packed red cells, platelet concentrate, fresh frozen plasma, frozen plasma, cryoprecipitate, date transfused for each component, hospital number of patient, reaction, look back; expiring date, date discarded.

Donor register

This is to facilitate donor follow up. The register should include the following information:

Date and place of donation, donor's name, donor category, sex, age, occupation, donor's address and telephone number, blood group, genotype, blood unit number, deferral, look back and in case of replacement donation, the patient's identity may be needed.

Blood group performance register

This should represent content of the standard operative procedure of the blood bank for blood grouping. It therefore should have the date, the blood unit number, cell and serum grouping results, screening for atypical antibody, D variant tests, and evidence of haemolysins, final group, comment and signature.

Bank inventory control register

This register should represent a balance sheet of the stock of blood at any given time. The shortage, outdate and surgical cancellation rates should be easily deduced from this register. The following are useful data to include: Month, day, date, units collected, units screened, units positive to Transfusion Transmissible Infection Screen, units expired, total for discard, units for transfusion, units released to the blood bank, units returned on daily basis, total transfused, shortages based on blood group, surgical cancellation based on blood group.

Blood bank quality control register

The documentation of quality control measures of blood for transfusion should be encouraged. Some of useful data are: average weight of blood units collected sampling 1 in 10 units, swab culture of venesection site sampling 1 in 20 donors, PCV of expired blood sampling 1 in 4 units, plasma hemoglobin estimation of expired blood sampling 1 in 4 units, culture of expired blood sampling 1 in 10.

Register for the investigation of blood transfusion reaction

This is to reflect the number of blood transfusion reactions in the practice and the possible cause. Data to note are: date of reporting, patient's name, donor blood number, date of collection, expiring date, weight of the bag, physical condition of the blood unit, result of patient's and donor's blood group, result of cross match done, Coomb's tests done on patient's red cells, blood culture result done on donor unit, presence of hemoglobinuria or jaundice, presenting symptoms and indication for blood transfusion and outcome of the transfusion reaction.

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