Research study

TRANSFUSION ERRORS and THEIR PREVENTION

Commission Revolution General Hospital Hodeida
Center for Blood Transfusion and research

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INTRODUCTION

Both blood components and fractionated products are biologic material and, in the case of components containing blood cells, are living human tissues. They are prescription medicines intended for use by medical practitioners and midwives in the treatment of patients.

Blood transfusion therapy has had a central role in the advances and practice of modern medicine. As in other areas of clinical medicine, prescribers need to consider both the benefits and risks of blood transfusion. Professional judgement based on clinical evaluation determines selection of blood components and fractionated products, dosage, rate of administration and sometimes other decisions in situations not covered in this general introduction to blood transfusion practice.

The presence of contaminants such as immunogenic cellular and protein elements, viable donor cells and infectious agents in blood cannot be totally avoided and indeed may cause undesirable side effects in some recipients. The information in this handbook cannot therefore be considered or interpreted as an expressed or implied warranty of the safety or fitness of the described blood components or fractionated products when used for their intended purpose.

Clinical staff
in hospital units where blood is transfused are responsible for:

• providing appropriate and properly identified recipient blood samples to the transfusion laboratory for compatibility testing;
• verifying that the blood component issued for transfusion is compatible with the recipient's blood group;
• infusing the blood component at the specified time and rate, through a suitable administration set, with careful monitoring for any adverse effects; and
• maintaining a record of each transfusion on the recipient's medical record, and reporting any adverse reactions to the recipient's physician and the transfusion laboratory

The Recipient's physician
who orders the blood component or product is responsible for:

• carefully assessing the clinical need for each order;
• providing information to each recipient on transfusion benefits, risks and alternatives so that the recipient can provide informed consent, and recording this consent in the recipient's medical record;
• instructing staff responsible for performing the transfusions about the urgency, quantity and rate of administration;
• ensuring that all significant, unexpected reactions are promptly reported and investigated; and
• promptly contacting and arranging for testing, either personally or through the family physician, of any recipients identified by the hospital transfusion laboratory as being at possible risk from a previous transfusion (*e.g.* CBS lookback program), then reporting on the recipient's status and test results to CBS and public health authorities if required to do so

PROCEDURES

1. PATIENT INFORMATION

Except in emergencies, the risks, benefits and alternatives to blood transfusion should be discussed with the patient and documented in their medical records. The provision of a blood transfusion information leaflet for patients is recommended4 and an example of one such leaflet currently in use in Ireland is provided in Appendix

2. PRESCRIPTION

The patient's hospital medical records should contain the indication for the blood transfusion and the number of units required.5 All blood and blood components for transfusion should be prescribed by a medical practitioner, preferably on a unit by unit basis.6 Specialist advice may be needed on the need for cytomegalovirus (CMV) seronegative or gamma irradiated components. Individuals responsible for the prescription and request of blood components must be familiar with the special needs of their patients. These special requirements should form part of the prescription and should be flagged on the clinical and laboratory records.7-14 Any medication to be given in conjunction with the transfusion must be prescribed on the drug chart. No other infusions, solutions or drugs should be added to any blood component as they may result in haemolysis or clotting.

3. POSITIVE PATIENT IDENTIFICATION

Hospital policy should address the training of staff in the identification of the patient. This procedure should include asking the patient to state his/her full name and date of birth e.g. patient should be asked "what is your name" not "are you Mr/Mrs Murphy?" The information given by the patient must be identical to that on the patient's identity band (ID band).16 ID bands should preferably be printed: hand-written bands can be difficult to read, contain varying information and may be subject to overwriting. In the event of removal of ID bands e.g. to access the radial artery, it is the responsibility of the person who removes the ID band to ensure it is reapplied.4 A standard procedure should exist for positively identifying the patient and any blood or blood components being transfused during transfer between clinical areas.

3.1 In-patients

A secure patient identification procedure should be in place in all hospitals and the ID band should be worn at all times. All patients should be allocated a unique identification number on admission to hospital, which should remain unchanged for the duration of hospitalisation and should be used in subsequent hospital admissions.15 This ID band should record the patient's full name, date of birth and a unique identification number.

3.2 Day patients/Out patients

Patient ID bands should be positioned before the pre-transfusion sampling procedure and worn until the transfusion is completed. Where the pre-transfusion sample is taken and the patient is readmitted at a later date for transfusion, policies should be in place for reapplying the original, or a new ID band, before the transfusion is commenced.

3.3 Patients unable to identify themselves

This includes patients who are undergoing general anaesthesia, unconscious or confused patients, young children or patients whose first language is not English. To ensure continuing accurate positive identification, we recommend that these patients should have two ID bands applied e.g. wrist and ankle bands

4. PRE-TRANSFUSION SAMPLING

Hospital policy should address the training needs of staff who undertake pre-transfusion sampling and provide detailed instructions on venepuncture and on the identification of patient and sample.5 Correct blood sampling techniques are Guidelines for the Administration of Blood and Blood Components 8 Guidelines for the Administration of Blood and Blood Components 9 vital to avoid haemodiluted samples being processed which may lead to incorrect clinical management/inappropriate transfusion.12-14 The pre-transfusion blood sample must be taken by trained individuals e.g. phlebotomists, nurses or doctors. Instruction on pre-transfusion sampling should form part of induction programmes. A record of this instruction should be maintained. Personnel responsible for taking samples for blood grouping and cross-matching must strictly follow hospital procedures at all times to avoid errors in patient sampling and patient identification. The person taking the sample must sign the sample tube confirming the patient's identity.

5. THE REQUEST FOR BLOOD

Each request for blood must be documented on a laboratory request form and submitted to the laboratory with the blood sample for compatibility testing. The hospital transfusion laboratory should have a policy for documenting telephone requests. The identity of the person making the request and the person receiving it should both be recorded. The following information should be provided: patient's surname, first name, unique identification number, date of birth, location, the number and type of blood components required (including any special requirements), the reason for the request and the time and date the blood components are required.

5.1 The request form The request form must contain the following minimum information:

• Surname and first name.
• Unique identification number.
• Date of birth.
• Gender. The request form should also contain:
• Blood component required.
• Number of units required.
• Date, time and the location where required.
• Indications for request.
• Patient diagnosis.
• Any special requirements e.g. CMV seronegative, gamma irradiated.
• Previous transfusions, obstetric history, red cell antibodies or any adverse reactions.
• Name and signature of requesting person. For the unconscious / unidentified patient, the minimum information necessary on the request form is a unique identification number and gender of the patient.

5.2 The sample tube The sample tube must contain the following minimum information:

• Surname and first name.
• Unique identification number.
• Date of birth.
• Signature of person drawing the sample (the signature is required to confirm that they have verified the patient's identity).
• Date and time sample was drawn. Sample tubes should be hand-written and labelled immediately after sampling at the patient's side. Electronically generated bar-coded labels are being developed and are under evaluation. For the present, until the automated systems are available, identification procedures must be strictly adhered to at the bedside to reduce sample errors. The use of addressograph labels or the pre-labelling of blood sample tubes is specifically prohibited.

5.3 Inadequately/incorrectly labelled samples

Hospital policy addressing inadequately/incorrectly labelled samples, should be agreed by both the Hospital Transfusion Committee and the Risk Management Department. Hospital transfusion laboratory staff are acting correctly in refusing to accept a request for compatibility testing when either the request form or the sample is inadequately labelled.

5.4 Emergency requests

Each institution must have a fast tracking procedure for dealing with emergency requests. This should be in keeping with protocols for dealing with massive haemorrhage and with the hospital's major emergency plan:- See "A Guideline for the Use of Blood and Blood Components in the Management of Massive Haemorrhage". Wherever possible the senior doctor managing the clinical situation should state the degree of urgency of the transfusion requirement so that the laboratory can decide what blood should be selected. When several patients require transfusion, one person on the Accident and Emergency team should be delegated to communicate with the hospital transfusion laboratory. This avoids confusion with duplicate orders and incorrect information.

5.5 Major emergency plan

Hospitals should have a major emergency plan in place to cover major accidents/incidents, which should include transfusion provision.

5.6 Telephone requests

Telephone requests should be documented by the laboratory and in the patient's medical records by the requesting doctor. The following minimum information must be given and confirmed: (i) Surname. (ii) First name. (iii) Hospital/accident and emergency number/trauma number. (iv) Location. (v) Number/volume and type of component. (vi) Reason for request. (vii) Date and time required.

6. PRE-TRANSFUSION TESTING

Each hospital transfusion laboratory should follow standard operating procedures (SOPs). All laboratories crossmatching blood should participate in external quality control. The hospital transfusion laboratory should verify the patient's ABO and Rhesus D (Rh D) group against previous records for the patient; any discrepancies should be resolved before blood components are issued. Where there is an urgent requirement for transfusion, group O Rh D negative blood should be issued until the discrepancy is resolved. Hospital transfusion laboratory practices should comply with the guidelines for blood bank computing.

6.1 Patients with special requirements

The transfusion laboratory should have a record of patients' special requirements eg CMV seronegative or gamma irradiation, and these components should be selected. Patients with significant red cell antibodies should be issued with antigen negative blood. Consideration should be given to issuing antibody cards to all patients with clinically significant red cell antibodies. When the care of patients with haematological or other disorders requiring transfusion support is shared, there is a risk that not all pertinent transfusion history will be available to both sites. In the absence of networked Guidelines for the Administration of Blood and Blood Components 10 pathology information systems, it is essential that local procedures are devised for adequate communication between laboratories as well as clinical teams.

7. ISSUING OF BLOOD

Computer generated self-adhesive compatibility labels are recommended. Efforts to standardise these labels nationally should continue for consistency between hospitals and to minimise checking errors. The hospital transfusion laboratory should also provide a blood compatibility report form with the blood component issued. The compatibility label on each unit should show:

• Surname and first name of patient.
• Date of birth.
• Unique identification number.
• Gender.
• ABO group and Rh D group of the patient.
• ABO group and Rh D group of the unit.
• Donation number.
• Expiry date of unit.
• Time when blood is required.
• Location of patient. The compatibility report form should contain the following information:
• Surname and first name of the patient.
• Date of birth. • Unique identification number.
• Gender.
• ABO group and Rh D group of the patient.
• ABO group and Rh D group of the unit.
• Donation number.
• Expiry date of unit.
• If not recorded elsewhere, eg prescription sheet, space for signature of persons checking and administering the unit.
• Time when blood is required.
• Location of patient. The ABO group, Rh D group and unit number must be identical on the Irish Blood Transfusion Service Label, Hospital Compatibility Report Form and the Compatibility Label on the blood pack. Occasionally the ABO group and Rh D group issued for a patient may be of a different group15, usually due to a shortage of a particular group. In these circumstances, the hospital transfusion laboratory should inform the patient's doctor and include the information on the compatibility report form.

8. STORAGE OF BLOOD COMPONENTS

• Red blood cells and whole blood should only be stored in a designated controlled blood refrigerator.
• Plasma is stored frozen and thawed in the laboratory immediately before use.
• Platelets are stored at room temperature on a controlled agitator to avoid clumping, and should never be stored in a refrigerator.
• The time of removal of all components from the controlled storage should be logged – ideally electronically, or failing that, manually. Guidelines for the Administration of Blood and Blood Components
• Once a unit of blood has been removed from controlled storage the transfusion should be commenced immediately on delivery to the clinical area. If the transfusion cannot be initiated promptly, the blood should be returned to the hospital transfusion laboratory for storage, unless the transfusion to the intended recipient can be completed within 4 hours. Blood should be returned to the hospital transfusion laboratory for documented disposal if out of controlled storage for more than 30 minutes.
• The transfusion of plasma and platelets should be commenced as soon as possible following issue from the laboratory and must not be stored outside the laboratory.
• The use of validated blood transport containers is recommended.

9. COLLECTION OF BLOOD OR COMPONENTS FROM THE HOSPITAL TRANSFUSION LABORATORY

Written requests for the release and collection of blood components are recommended and should contain the patient's full name, date of birth, unique identification number and location of patient. If a telephone request is given to a porter or other member of staff to collect blood,

the person must be given the above patient identification details so that he/she can write them down and bring them to the storage area when removing the blood component. The removal of a blood component from storage must be recorded manually or electronically. This area is identified as a critical area for human error. 7-11 Hospital policy should dictate who is trained and certified to collect the blood component. The person requesting the collection of the blood component must ensure the patient has a patent intravenous cannula before the blood component is removed from storage.

10. PRE-TRANSFUSION IDENTIFICATION

Hospital blood administration policy should include detailed instruction on the procedure for pre-transfusion identification of both the intended recipient and the blood component to be transfused. This procedure must be performed by two persons and both must sign the prescription sheet or the compatibility report form.4 Persons authorised to perform pretransfusion identification include: a registered nurse, doctor or perfusionist. Before starting the transfusion, the following checks are essential at the patient's bedside or wherever the patient is to be transfused

If there are any discrepancies, the unit must not be transfused. The hospital transfusion laboratory should be informed immediately. Generally it will be necessary to return the unit and compatibility form to the laboratory.

10.1 Inspection of unit prior to administration

• Check that the pack is in date and shows no sign of leakage, unusual colour or haemolysis
• Check that the platelet packs do not show clumping or appear unusually cloudy, as this may be a sign of bacterial contamination.
• If a defect is suspected, contact the hospital transfusion laboratory for advice
• If in doubt, do not transfuse.

11. ADMINISTRATION OF BLOOD COMPONENTS

11.1 Optimal timing of transfusion

• Elective transfusions and transfusion for transfusion-dependent anaemia should normally be carried out during the day.

11.2 Infusion rates

• In the non-haemorrhaging patient, rates depend on the clinical context, age and cardiac status. Except in the massive transfusion setting, transfusion rates for blood should not exceed 2-4 mls/kg/hr. 20
• From starting the infusion (puncturing the blood pack with the infusion set) to completion, infusion of the pack should take a maximum of 4 hours.
• Each unit of solvent detergent (SD) plasma should be transfused to the uncompromised adult over 30-60 minutes. Patients should be examined clinically for evidence of volume overload.12-13
• A single adult dose of apheresis platelets contains an average of 230-300mls and pooled platelets contain an average of 320-340mls. Each dose of platelets should be transfused over a period of 30-60 minutes.

12. BLOOD ADMINISTRATION SETS/EQUIPMENT

12.1 Administration sets

• Cannula size depends on vein size and rate of infusion required.
• For whole blood, red cells, platelets, plasma and cryoprecipitate, an infusion set containing an integral filter (170-200 microns) must be used. This is a standard clot screen filter. Bedside white cell filters are no longer required as all blood components are now leucodepleted pre-storage by the IBTS.

• Blood administration sets should normally be changed after a maximum of 6 hours.17 In the massive transfusion setting the blood administration set may be changed at the discretion of the nurse or doctor administering the blood i.e. if they become blocked or have been used to transfuse multiple units.

• For efficient use, blood administration sets should be primed with the blood component, fully wetting the filter. 16 Multiple blood components administered sequentially through the same set should be ABO compatible. After a red cell component or plasma transfusion, a new blood administration set should be used to transfuse platelets. Blood component administration sets should not be used for subsequent infusions post transfusion as the intravenous fluid may be incompatible with blood in the line.

• Transfusion can take place through one lumen of a multi-lumen central catheter while the other lumen or lumina are in use. No other infusion solutions or drugs should be added to any blood component as they may result in haemolysis or clotting.`Q`1 Guidelines for the Administration of Blood and Blood Components Blood warmers Routine warming of blood is not indicated. Patients who will benefit from warmed blood include adults and children receiving massive transfusion,18 infants requiring exchange transfusion and patients with clinically significant high-titre cold agglutinins active in vitro at 37°C.15 Blood warmers must be subject to regular servicing and used in accordance with the manufacturer's instructions ((Red blood cells and plasma exposed to temperatures over 40°C may cause severe transfusion reactions. Blood components must NOT be warmed by improvisations such as putting the pack))

into hot water, in a microwave, or on a radiator, as uncontrolled heating can damage the contents of the pack. Handling and disposal of blood packs Hospital policy should cover the use of gloves, trays, bags, accidental spills/damage and disposal. Unless the patient has an acute transfusion reaction, used blood packs should be disposed of after the transfusion in an appropriate designated container i.e. a rigid spill proof bin with yellow lid. If more than 100mls remains in the pack, disposal should be in a spill proof container in accordance with local hospital policy.

13. MONITORING

13.1 In-patients Severe reactions

are most likely to occur within the first 15 minutes/50mls of each unit and patients should be closely observed during this period.

Temperature, pulse, respirations and blood pressure should be measured and recorded before the transfusion commences and when the transfusion of each unit is completed. Temperature and pulse should be measured 15 minutes after the start of each individual unit.21 Additional observations are discretionary and the patient should be monitored as his/her condition warrants, or if there are signs of a transfusion reaction. The patient who is elderly, or who has compromised cardio-respiratory function requires additional monitoring. Patients with chronic anaemia are usually normovolaemic or hypervolaemic and may have signs of cardiac failure before any fluid is infused. If such a patient must be transfused, each unit should be given slowly with a diuretic (e.g. frusemide 20mg) and the patient closely observed. Restricting transfusion to one unit of red blood cells in each 12 hour period should reduce the risk of left ventricular failure (LVF).

13.2 Unconscious patients

These patients require continuous observation and monitoring. A transfusion reaction should be considered in the event of any deterioration in the patient's condition during or immediately following a transfusion.

13.3 Day patients Day patients

discharged from hospital following a blood transfusion should be issued with an information card indicating the symptoms and signs of transfusion reactions and given advice on when to contact the hospital (See Appendix 2).

14. Adverse events Patients

should be observed closely during the initial 15 mins/50mls of a transfusion.16,21,23 Any symptoms, which may indicate a transfusion reaction including distress, pain at or near the transfusion site, loin pain, backache, fever, or dyspnoea, must be investigated as they could indicate a serious reaction. The transfusion must be stopped and the cause of the symptoms investigated immediately. Serious or life-threatening acute reactions are very rare. However, new Guidelines for the Administration of Blood and Blood Components 14 symptoms or signs that arise during a transfusion must be taken seriously, as they may be the first warning of a serious reaction. It is important to realise that signs and symptoms are not necessarily specific to a given type of reaction (See Appendix 3). The commonest problem associated with transfusion is a rise in temperature. This can be a result of the transfusion itself or the underlying illness and can occur at any time during the transfusion. Each patient should be assessed individually, but in general a temperature rise of 1.5°C above normal should result in the cessation of the transfusion and investigation of a possible transfusion reaction. In the case of simple, urticarial-type reactions with no other symptoms or signs, the patient can be given antihistamines and the transfusion may be continued at a slower rate. (See Appendix 3).

14.1 Acute transfusion reactions

Acute transfusion reactions can be associated with significant morbidity and rarely with mortality (See Appendix 4). Prompt recognition and management is essential. All suspected transfusion reactions should be reported immediately to the hospital transfusion laboratory. Immediate reporting is particularly important if an incorrect unit of blood has been transfused in case blood packs have been transposed and another patient is put at risk.15 Protocols should be in place to detect, investigate, and where possible prevent adverse reactions.16 Adverse reactions should be reported to the hospital transfusion laboratory and TSO.

14.2 Management and reporting of adverse events/errors

Failure to adhere to policies and procedures should be dealt with by the local TSO in association with the local Hospital Transfusion Committee. Serious adverse events/errors should be reported to the NHO. Article 15 of the Directive 2002/98/EC of the European Parliament and of the Council of 27 January 2003, which will come into effect in 2005, requires mandatory reporting of ‘serious adverse events (accidents and errors) relating to the collection, testing, processing, storage and distribution of blood and blood components which may have an influence on their quality and safety, as well as any serious adverse reactions observed during or after transfusion which may be attributed to the quality and the safety of blood and blood components’.

14.3 Near miss incidents Near miss incidents are defined as “Any error, which if undetected, could result in the determination of a wrong blood group, or issue, collection, or administration of an incorrect, inappropriate or unsuitable component but which was recognised before the transfusion took place.”11 Near miss incidents should be reported to the local TSO. Hospitals should have a system of recording, evaluating and learning from near miss events as these are more frequent than real errors, but often have the same root causes.7-11 Local audit and education should be used to close the loop on near miss incidents to prevent recurrence.

15. DOCUMENTATION AND TRACEABILITY

15.1 General points A medical practitioner

must record the prescription of blood and blood components. Each hospital must have a system in place to ensure full traceability through maintaining patient and laboratory transfusion records. These records must be stored safely and be available for future look-back and audit exercises. Procedures and policies for each part of the record keeping system must be established and documented. Records may be held in a manual, computerised, or microfilm format or a combination thereof. Records must be protected from inadvertent or unauthorised destruction or modification. Procedures for tracing of blood components in any future look-back should be included in hospital transfusion laboratory SOPs.16 Guidelines for the Administration of Blood and Blood Components

15.2 Traceability of blood components The Council of Europe defines traceability as “the ability to identify the actual recipients, of every component released and, conversely, the ability to identify all blood donors involved in the transfusion of a given patient. Retrospective analysis has shown that traceability is not achieved by the simple knowledge of the patient to whom the blood component was initially distributed. Active return of information from the clinical area to the blood transfusion service after the transfusion act is necessary to provide complete and reliable information about the fate of a given blood component. Traceability documents may include information on the existence of immediate adverse reaction”. Article of the EC Blood Directive 2002/98/EC mandates full traceability of all blood components. Data needed for full traceability in accordance with this article must be retained for at least 30 years. Donation numbers for blood and blood components (whole blood, red cells, platelets, cryoprecipitate and cryo-poor plasma) and batch numbers for pooled blood products (Octaplas and Uniplas, clotting factor concentrates, albumin, antiD, intravenous immunoglobulin), must be specifically recorded on the transfusion record sheet and filed in the patients medical record and in the hospital transfusion laboratory or pharmacy. Recording practices such as the use of peelable labels containing batch numbers are encouraged to reduce the possibility of transcription error. Standardisation of documentation throughout the country is recommended, as is the maximum use of computerised and electronic data.

16. DEVELOPMENTS IN INFORMATION TECHNOLOGY

Computer systems should be used in the transfusion process as they reduce the risk of transfusion error and facilitate full traceability and audit. These systems are used in hospital transfusion laboratories, but as sampling and administration have been identified as problem areas in the transfusion chain, extension of the use of such systems to the clinical area to ensure correct patient identification at sampling and administration is recommended.

Use of computerised request forms should be adopted. There is evidence that stimulating awareness of, and compliance with, best practice by computer generated reminders at the point of care is effective. Computerised request programmes with preestablished algorithms can guide the clinician to comply with accepted guidelines and ask for additional clinical reasons when overriding the guidelines. They also provide an effective means of online documentation.

Computerisation is known to reduce human error in the many steps involved in the administration of blood. We recommend that hospital authorities should evaluate the use of computerised systems for the whole transfusion process from pre-transfusion patient sampling through to the administration of the transfusion of blood to the recipient. This will be essential for full traceability.

17. THE TRANSFUSION COMMITTEE

The hospital executive or health board has the responsibility to establish the hospital transfusion committee. The committee should be supported and resourced by hospital management which should also be represented.

The membership of a hospital transfusion committee should be multidisciplinary representing the main users of blood and should include a consultant haematologist, transfusion scientist and TSO in a hospital or region. The committee should meet regularly and adopt a preventative/corrective approach to transfusion problems. Adverse events and near misses should be examined. The committee should review and audit the use of blood and blood components and make recommendations on appropriate use. The committee's recommendations should be conveyed to the hospital executive in regular reports. Guidelines for the Administration of Blood and Blood Components 16

18. EDUCATION AND TRAINING PROGRAMME

The TSO, or another identifiable member of staff, should be responsible for ensuring that all staff involved in the transfusion process receive adequate education and training relevant to their role within that process. This programme should be documented and subject to regular review.

19. HOSPITAL-BASED HAEMOVIGILANCE

Haemovigilance should be under the direction of the consultant haematologist and is the responsibility of all persons involved in the transfusion process. Haemovigilance should include:

- Promoting the appropriate use of blood and blood components/products.
- Provision and organisation of education and training relevant to staff involved in the transfusion process.
- Co-ordination, collection and reporting to the NHO of serious adverse reactions/events relating to blood transfusion.
- The tracing and recall of blood and blood components as requested by the IBTS.
- Participation in an active hospital transfusion committee.
- Review and audit of all aspects of the transfusion process.

20. THE NATIONAL HAEMOVIGILANCE OFFICE

The NHO receives and follows-up confidential reports from hospitals and medical practitioners of serious adverse events/reactions to blood components following transfusion. Feedback is provided as appropriate. The reports are analysed, the findings are then disseminated and published in the form of an Annual Report, which makes recommendations for future practice. The NHO recognises the progress that has already been made in the area of administration of blood and blood components. This programme has been co-ordinated through the efforts of local TSO and their teams.

Description

The procedures employed during the process of blood transfusion in accordance with the process of blood transfusion in the United States Standards . And according to the World Health Organization standards for safety and the safety of blood transfusions and clinical uses for blood transfusion

when those procedures for a blood transfusion in the Revolution Hospital in Hodeida body as a model for hospitals in the province for a blood transfusion in Hodeidah to the largest number of patients in the blood transfusion process

In study on those procedures in blood transfusion of the doctors levels as follows :

1. cognitive errors: this level in the lack of knowledge of some doctors, especially pediatricians when a blood transfusion to a patient from lack of knowledge of blood components of red cells and plasma and sheets Wi-pathological cases transported him from blood components and a report that he did not convey the full blood in cases kids art of patients anima sickle cell and thalassemia and other.

2. dosage errors: This level of errors in not knowing the doctors determine the required amount of a component of blood components in accordance with the proper dose of each component and crumbs doctors surgery

3. nursing errors: this level of lack of knowledge of nursing correct procedures in blood transfusion and proper handling of the various components of the blood and transported to the patient in terms of the degree of blood bladders heat only red cells or whole blood that must be transferred to a patient process
Complications that may occur during the blood transfusion and Kiffa deal Maha other
No data logged when you get any complications in the blood to move a file or in multiples own paper by the Blood Bank

4. blood administration errors and blood components: this level in the lack of knowledge of general physicians of blood administration in how to deal with regular medical conditions or bleeding or major operations of the report of any of the components of blood, which is given to the patient and the appropriate for the arrival of the patient's state of stability and demise danger

Indications

Error tracking systems

. Serious Hazards of Transfusion (SHOT) in UK
- Tracking incorrect blood component transfused (IBCT) since 1996
. Transfusion Error Surveillance System (TESS) in Canada
- Tracking all transfusion errors at pilot hospital sites since 2005

1-Neonates and children (first day – 10 year)

A- Method:-

To study the pathological situations that need a blood transfusion in children and Neonates in the number of 443 state of the blood transfusion

including table the transfer of the following:-

Type component	Number	Transfusion Reactions
whole blood	386 unit	13 state
Red blood cells	52 unit	0 state
other blood component	5 unit	0 state
TOTAL	443 unit	13 state

The blood transfusion reactions and complications in state in which the number of whole blood quoted 13 state got her reactions and complications of blood transfusion state either transferred red cells did not get her any interactions

Table shows the reaction of blood transfusion the Actual :-

Transfusion Reactions

Type of Reaction	Etiology	Clinical Presentation
Febrile Non-Hemolytic Transfusion Reaction	Recipient antibodies, reactive to antigens expressed on cells in the component, usually white blood cells	• Fever usually occurs during or up to four hours post-transfusion. • May be associated with chills, rigors, nausea, vomiting and hypotension • Fever is not always present (i.e. chills, nausea, etc., alone).
Urticaria , Other Minor Allergic Reactions	Unclear, but relates to factors in the plasma portion of the component.	• One urticarial lesion to widespread urticarial lesions. • May be associated with pruritis, erythema, flushing, or mild upper respiratory symptoms (cough, wheezing), nausea, vomiting, abdominal ,cramps, or diarrhea

Circulatory overload,	• Whole Blood creates more of a risk than Red Blood Cells because the transfused plasma adds volume without increasing oxygen-carrying capacity. • Patients with chronic anemia have increased blood volumes and are at increased risk for circulatory overload	resulting in pulmonary edema,
Iron overload	a long-term complication of repeated red cell transfusions. Each transfusion contributes approximately 250 mg of iron. Patients requiring multiple transfusions for aplastic anemia, thalassemias, or hemoglobinopathies are at far greater risk than patients transfused for hemorrhagic indications, because blood loss is an effective means of iron excretion. Patients with predictably chronic transfusion requirements should be considered for treatment with iron chelating agents	

Results Classification of in the doctors levels size by blood components Utilization

Order blood component	Percentage for Utilization %	Percentage for Order blood blood components errors by doctor %
Order blood component errors whole blood	**87 %**	**87 %**
Order blood component Right other blood component	**1.3 %**	
Order blood component Right RBC	**11.7 %**	
TOTAL	**100 %**	

B- Results

3.36% 13 state Of transfused with whole blood in children and Neonates patients received a blood transfusion complications The number of cases of blood transfusion 386 unit of blood transfusion was a full blood transfusion .

0 % There is not a single state when blood transfusion red blood cells got her blood transfusion complications of the total number of cases, 52 unit blood transfusion RBC

87 % Order blood report errors The arrest of a number of blood report requested by the doctors at the request of one of the blood components are heading for the amount of the dose or that the component is not suitable for a pathological condition suspended for blood transfusion and review doctors in the piece and modify a report demand for blood transfusion.

C- Actions taken and prevention

1-The preparation of a book on clinical blood transfusion guidelines for doctors And distribution of the book on the practice of doctors to be the policy when blood transfusion

2- Action workshop for doctors on the clinical use of blood transfusion and its components

3- Making Blood Bank observer Ali blood transfusion and its clinical use process

4- The introduction of a substance in the decisions of the Faculty of Medicine of the clinical practice of blood transfusion taught in Medicine and the Division of Nursing and Clinical Pharmacology .

5- Doctors commitment to the management of the global blood transfusion and the Association of British doctors and policy Aruban and American blood transfusion

2- adult and Operations:-

A- Method:-

To study the pathological situations that need a blood transfusion in adult and Operations in the number of 3000 state of the blood transfusion

including table the transfer of the following:-

Type component	Number	Transfusion Reactions
whole blood	1145	unknown
Red blood cells	194	unknown
FFP	158	unknown
platelet	122	unknown
Cryoprecipitate	0	unknown
TOTAL	1619 unit	

The number of interactions and complications of blood transfusion for the1619 unit of blood transfusion is unknown because:-

1. The lack of information in the medical files for blood transfusion.

2. Non-nursing documentation of those situations that happened to her complications of blood transfusion during or after transport. That is why we do not get any of the patients who happened to them complications of blood transfusion numbers.

And this would apply to me Error tracking systems and clinical use blood transfusion guidelines .

Table shows the reaction of blood transfusion the blood components The possible:
Transfusion Reactions

Type of Reaction	Etiology	Clinical Presentation
Febrile Non-Hemolytic Transfusion Reaction	Recipient antibodies, reactive to antigens expressed on cells in the component, usually white blood cells	• Fever usually occurs during or up to four hours post-transfusion. • May be associated with chills, rigors, nausea, vomiting and hypotension • Fever is not always present (i.e. chills, nausea, etc., alone).
Urticaria , Other Minor Allergic Reactions	Unclear, but relates to factors in the plasma portion of the component.	• One urticarial lesion to widespread urticarial lesions. • May be associated with pruritis, erythema, flushing, or mild upper respiratory symptoms (cough, wheezing), nausea, vomiting,

		abdominal ,cramps, or diarrhea
Circulatory overload,	• Whole Blood creates more of a risk than Red Blood Cells because the transfused plasma adds volume without increasing oxygen-carrying capacity. • Patients with chronic anemia have increased blood volumes and are at increased risk for circulatory overload	resulting in pulmonary edema,
Bacterial Contamination of platelet	1. Skin commensals from the donor (each venipuncture may result in a small skin plug that is retained in the donation bag) 2. Unrecognized bacteremia in the donor 3. Contamination from the environment or from handling the product	• Clinical features of transfusion associated sepsis may include: • Rigors, fever, tachycardia, hypotension, nausea and vomiting, dyspnea, disseminated intravascular coagulation • It is usually possible to culture the offending organism from both the patient and the transfused product. • There may be no immediate clinical signs of bacterial infection after transfusion of bacterially contaminated platelets, if the bacterial load is small
Transfusion-Related Acute Lung Injury ((TRALI	1. Antibody-mediated: Passive transfer of Human Leukocyte Antigen (HLA) or granulocyte antibodies from donor to blood product recipient; or, less commonly, HLA or granulocyte antibodies in the recipient (antibodies detected in donor or recipient in 80% of cases) ❖ Antibodies are most common in multiparous female donors as a consequence of prior pregnancies 2. Neutrophil priming hypothesis: Biologic response modifiers such as biologically active lipids in	• Dyspnea, hypoxemia, fever and hypotension. • Chest X-ray reveals interstitial and alveolar infiltrates (pulmonary edema), without elevated pulmonary pressures. • Usually occurs with transfusion of RBCs, platelets and plasma, but rarely with other blood products (including cryoprecipitate and Intravenous Immunoglobulin (IVIG)). • Almost always within the first 1-2 hours after the start of transfusion but can be delayed for up to 6 hours. • Usually resolves in 24-72 hours 72% of reported cases required mechanical ventilation and death occurs in 5-10% of patients experiencing a TRALI reaction. ❖TRALI is currently thought to be the most common cause of transfusion-associated fatalities. • Milder forms of TRALI are thought to exist and may present as transient hypoxia. • Acute transient leukopenia may be observed after a TRALI reaction. **Chest X-ray of a patient before and during an episode of transfusion-related acute lung injury (TRALI)**

Complications of Massive Transfusion	• Number of units transfused • Rapidity of transfusion • Patient factors	**1. Dilutional coagulopathy** • 50% of massively transfused patients develop an International Normalized Ratio (INR) >2.0 and about 33% have thrombocytopenia with a platelet count < 50 x 10_9/L. • Number of RBCs transfused does not accurately predict the need for a platelet and frozen plasma (FP) transfusion; frequent laboratory measurements are required to guide transfusion decisions. • Although formula replacement of blood components is not recommended, it may be required when coagulation tests are not rapidly available.[65] • Use laboratory monitoring where possible to guide the use of blood components. **2. Hypothermia** • Rapid infusion of cold blood can result in cardiac arrhythmias. • Prevention is critical – if massive transfusion is likely, use an approved and properly maintained blood warmer. • Mortality after massive transfusion is inversely related to core temperature (data from 1987):[66] < 34ºC – 40% < 33ºC – 69% < 32ºC – 100% • Risk of clinically important hypothermia is significantly increased by infusion of 5 or more units of blood.[66] • Consequences of hypothermia: • Platelet dysfunction • Decreased coagulation factor activity • Reduced clearance of citrate • Decreased cardiac output • Hypotension • Arrhythmias (especially if cold blood is transfused rapidly through a central line) **3. Hypocalcemia/Hypomagnesemia/Citrate toxicity** • Citrate is the anticoagulant used in blood components. • It is usually rapidly metabolized by the liver. • A normothermic adult not in shock can tolerate upwards of 20 units per hour without calcium supplementation • With massive transfusion, the capacity of the liver to degrade citrate may be overwhelmed. • Citrate binds ionic calcium and magnesium, causing functional hypocalcemia, hypomagnesemia, and also

		metabolic alkalosis (from bicarbonate, a metabolite of citrate). • Clinical symptoms include: hypotension, narrow pulse pressure, elevated pulmonary artery pressure, tetany, paresthesia and arrhythmias. • If hypocalcemia develops OR patient develops signs or symptoms of hypocalcemia then administer: 1 gram (1 ampoule) of calcium chloride IV at maximum rate of 100 mg/minute **4. Metabolic acidosis** • Rare; from acid pH of blood products. • Usually, metabolic alkalosis is due to bicarbonate production from citrate metabolism. • May be an indicator of lactic acidosis in patients and tissue hypoperfusion. **5. Hyperkalemia** • Release of potassium from stored RBCs increases with storage time and after irradiation. • Potassium concentration in a Saline-adenine-glucose-mannitol (SAGM)-RBC unit is approximated by the number of days of storage (110 ml of supernatant/unit). • For example, a 42-day old RBC has a potassium concentration of approximately 45 mmol/L • Order blood work q1h (*e.g.* complete blood count (CBC), INR, Partial thromboplastin time (PTT), fibrinogen, calcium, arterial blood gas, potassium)

Results Classification of in the doctors levels size by blood component Utilization

Order blood component	**Percentage for Utilization**	**Percentage for Order blood blood components errors by doctor %**
Order blood component errors whole blood	**70.7 %**	**88 %**
Order blood component error platelet	**7.5 %**	
Order blood component error FFP	**9.8 %**	
Order blood component error Cryoprecipitat	**0.0 %**	
Order blood component Right	**12 %**	
TOTAL	**100 %**	

B- **Results**

unknown state Of transfused with blood component in adult and Operations patients received a blood transfusion complications The number of state of blood transfusion 1619 unit of blood transfusion was a full blood transfusion .

unknown There is not a single state when blood transfusion blood component got her blood transfusion complications of the total number of unit, 1619 unit blood transfusion

88 % state Order blood report errors The arrest of a number of blood report requested by the doctors at the request of one of the blood components are heading for the amount of the dose or that the component is not suitable for a pathological condition suspended for blood transfusion and review doctors in the piece and modify a report demand for blood transfusion.

C- Actions taken and prevention :-

1-The preparation of a book on clinical blood transfusion guidelines for doctors And distribution of the book on the practice of doctors to be the policy when blood transfusion

2- Action workshop for doctors on the clinical use of blood transfusion and its components

3- Making Blood Bank observer Ali blood transfusion and its clinical use process

4- The introduction of a substance in the decisions of the Faculty of Medicine of the clinical practice of blood transfusion taught in Medicine and the Division of Nursing and Clinical Pharmacology .

5- Doctors commitment to the management of the global blood transfusion and the Association of British doctors and policy Aruban and American blood transfusion