

A Review on Regulations and Legislations for blood and blood products in India

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Abstract:

A blood product is any therapeutic substance derived from human blood, including whole blood and other blood components for transfusion and plasma-derived medicinal product. It is found that the mortality rate, complications in pregnant women and children are high due to unavailability of blood when needed, hence a well organised blood transfusion centre and service is mandatory which requires manpower, infrastructure and equipment's to ensure the blood and blood products quality, safety and efficacy. The CDSCO covers the human blood under the definition of "drug" of the Drug and Cosmetic Act under section 3(b). The National Blood Policy was published by the Indian government to provide safe, adequate quantity of blood and blood products. The Schedule F provides requirements for accommodation, technical staff and equipment for the blood bank operations.

Key Words: Blood products, Regulations, Requirements, National Policy, India,

INTRODUCTION

Nowadays there is a rise in need for blood and blood products, especially in case of accidents, surgeries, research etc [1]. They are made available from blood banks, which include collection of blood, processing, testing, separation and storage [2]. A blood product is any therapeutic substance derived from human blood, including whole blood and other blood components for transfusion and plasma-derived medicinal product [3]. The major components of blood are plasma, red blood cells, white blood cells and platelets [4]. It is found that the mortality rate, complications in pregnant women and children are high due to unavailability of blood when needed, hence a well organised blood transfusion centre and service is mandatory which requires manpower, infrastructure and equipment's to ensure the blood and blood products quality, safety and efficacy [5]. The WHO advocates the blood system whether they are in compliance with the standards. The "Assessment Criteria for National Blood Regulatory System" was developed by the WHO Blood Regulators Network [6]. The regulatory system involved in the transfusion, quality system and GMP of the blood and blood products is called "good preparation practice" (GPP) which supports in the implementation [7]. To assure the quality and safety the blood banks should comply with the GPP requirements which are given below in table-1.

Table-1 Good preparation practice requirements

1	organization and personnel (including training)
2	maintenance of facilities/premises
3	equipment qualification, calibration and maintenance

4	quality control programme for products, supplies and services
5	donor selection, blood collection, testing, processing, storage and distribution, and record-keeping
6	SOPs containing step-by-step instructions for all activities undertaken during product preparation, as well as specifications for the resulting blood components
7	process validation
8	change control
9	corrective and preventive measures
10	quality monitoring
11	management of risks, documentation, nonconformities, audits and contracts

Regulated blood system implementation plan

1. System design and development

- Development of Legal framework
- Adoption of Blood standards
- Review/approve the organisation and infrastructure
- Interaction among stakeholders

2. Implementation and Validation

- Regulatory function establishment
- Capacity building and training
- Interaction among key players
- Implementation of blood standards

3. Performance and enforcement

- Compliance achievement
 - Performing the full regulatory function
 - Maintenance of the blood standards
- Increasing the availability and ensuring supply

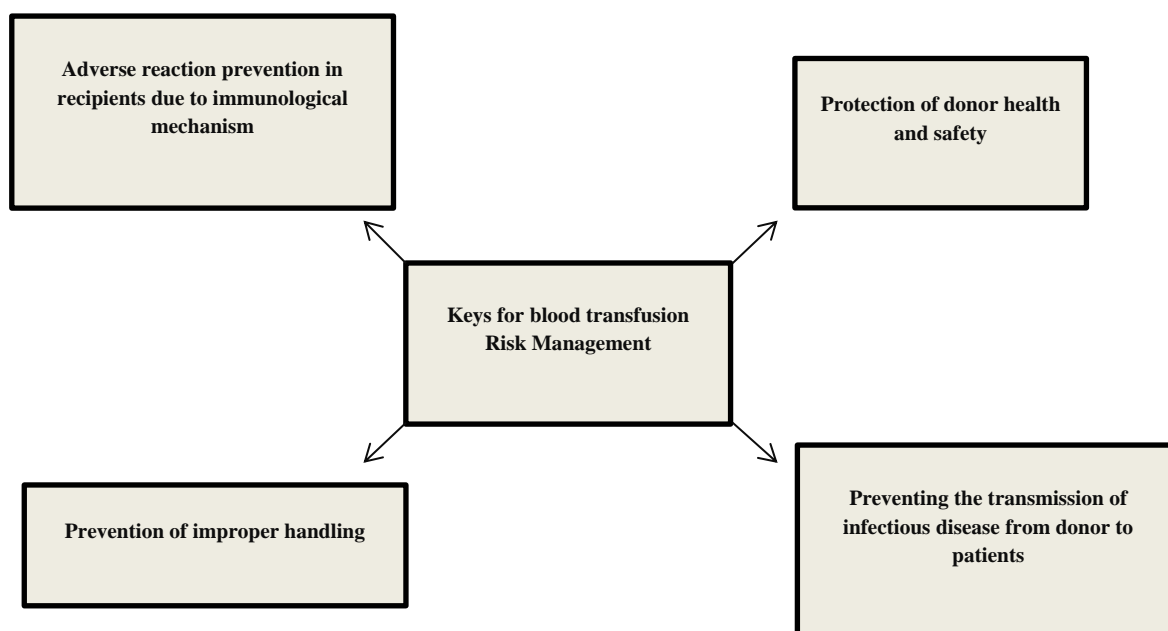


Figure 1 : Keys for blood transfusion risk management

I. Requirements for the manufacture of blood products

A. General requirements

1. Location and surrounding, buildings and water supply
2. Disposal of waste and infectious materials
3. Health, clothing and sanitation of personnel
4. Ancillary area

The manufacturing area should be provided with proper enclosed area, free of dust with HEPA Filter system, which should be periodically checked for performance periodically. The interior surface should be smooth and free from cracks. The microbial counts should be carried out and recorded during the manufacturing operation. Sinks and drains should be excluded from the aseptic areas. Satisfactory temperature should be maintained to avoid contamination. The maintenance of the premises is an important factor to ensure that the repair operation does not cause any hazard to the quality of the products. Refreshment rooms should be separate from other areas.

B. Collection and storage of plasma fractionation

Collection: The cold chain process is involved during the plasma collection and should not be warmed than -20°C. Collected plasma are quarantined until the Hepatitis B and C virus antibody and HIV I and II are performed, only if the sample is found to be negative it's taken for fractionation.

Storage area: Sufficient space and capacity is required for the storage of various categories of materials, ensuring clean, dry and good storage conditions. Receiving and dispatch bays should be kept protected. Products that are rejected, recalled or returned shall be segregated. Ancillary materials like ethanol, water,

salts and polyethylene glycol should be provided with adequate facility.

C. Personnel

Full time technical staffs is required for the active supervision and direction during the manufacturing with one year experience in the blood product manufacturing/ plasma fractionation possessing post-graduate degree in medicine, science and pharmacy (microbiology/ pathology/ bacteriology/ immunology/ biochemistry).

D. Production control

The production area and the viral inactivation room shall be centrally air-conditioned fitted with HEPA filters, filling and sealing should be done under aseptic condition.

E. Viral inactivation process

If the licensee has adopted viral inactivation and validation process, submission to be done to the licensing authority and central licence approving authority for approval.

F. Quality control

Separate facilities shall be provided for Haematological, Bio-chemical, Physico-chemical, Microbiological, Pyrogens, Instrumental and safety testing.

G. Testing of blood products

All the products should conform to the India Pharmacopoeia if some standards are not specified they shall conform to the United States Pharmacopoeia or the British Pharmacopoeia.

H. Storage of finished products

The finished products should be stored within 5 - 8°C, the assigned shelf-life by the licensee should be submitted to the licensing authority for the approval.

I. Labelling

The labelling shall be done as specified in the Indian, British or United States Pharmacopoeia and the results of the Hepatitis B surface antigen and HIV I and II tests results should be mentioned.

J. Records

As per the Schedule U records should be maintained and should also comply with the Schedule M (Paragraph 9 Part I) and other requirements as directed by the central licensing authority.

K. Master formula record**II. Requirements for manufacture of blood products from bulk finished products**

The blood products such as Albumin, Plasma protein fraction, immunoglobulin and coagulation factor concentrates are manufactured through the manufacturing activities of filling and sealing the blood products from bulk powder or solution or both, the requirements are same as for the blood products.

The Forms that are involved for the blood and blood products

Form 26-G	Rule 122-H	Certificate of renewal of license to operate a blood bank for processing of whole human blood and/ or for preparation for sale or distribution of its components
Form 26-I	Rule 122-I	Certificate of renewal of license for manufacture of blood products
Form 27-C	Rule 122-F	Application for grant/ renewal of license for the operation of a blood bank for processing of whole blood and/ or preparation of blood components
Form 27-E	Rule 122-F	Application for grant/ renewal of license to manufacture blood products for sale or distribution
Form 28-C	Rule 122-G	Licence to operate a blood bank for collection, storage and processing of whole human blood and/ or its components for sale or distribution
Form 28-E	Rule 122-G	Licence to manufacture and store blood products for sale or distribution

III. Requirements for the functioning and operation of a blood bank and / or for preparation of blood products

- 100 squares metres for its operation
- 50 squares metres for the preparation of blood products

Rooms for blood collection, registration of donors, blood components preparation, laboratory for blood group serology, laboratory for blood transmissible disease like Hepatitis, Syphilis, Malaria, HIV, sterilization-cum-washing, refreshment-cum-restroom, store-cum-records.

Personnel: Every blood bank should have a full time technical staff from the following categories, Medical officer, blood bank technicians, registered nurses, technical supervisor.

Maintenance: The premises should be maintained in a clean and proper manner, private and through examination, collection of blood from the donors with minimum risk, provision for (storage, quarantine, handling, disposal of products), storage of finished products before issue or distribution.

Equipment's: The equipment's should be maintained in a clean and proper manner that is used for the collection, processing, testing, storage and sale/ distribution. The equipment's used are: Temperature recorder, refrigerated centrifuge, haematocrit centrifuge, general centrifuge, automated blood typing, haemoglobin meter, refractometer or urinometer, blood container weighing device, water bath, Rh view box, autoclave, serologic rotators, laboratory thermometers, electronic thermometers and blood agitators.

Supplies and Reagents

Good Manufacturing Practices (GMPs)/ Standard Operating Procedures: The written SOPs are available to the personnel's in the concerned areas and also includes the steps to be followed in the collecting, processing, compatibility testing, storage and sale or distribution of blood or blood products.

Criteria for blood donation

Blood donation	Once in three months
Age group	18 to 65
Weight	Not less than 65 kilograms
Temperature & pulse	Normal
Haemoglobin	Not less than 12.5 grams
Systolic & Diastolic blood pressure	Within Normal limits without medication

The donor should be free from acute respiratory disease, skin diseases, skin punctures, scars. Blood donors should not suffer from cancer, heart disease, abnormal bleeding, unexplained weight loss, insulin controlled diabetes, hepatitis, liver disease, tuberculosis, asthma etc.

General equipment's and instruments**Special Reagents****Testing of whole blood**

Records: The records are maintained for the blood donors, master records for the blood and its components, issue register, records of components supplied, records of ACD/CPD/CPD-A/SAGM bags, register for diagnostic kits and reagents used, transfusion adverse reaction records, records of purchase.

Labels

- | |
|---|
| (a) Name of the product (in prominent place and bold) |
| (b) Name and Address of the blood bank |
| (c) Licence number |
| (d) Serial number |
| (e) Date of blood dawn and date of expiry as prescribed under schedule P to these rules |
| (f) Coloured label for different blood groups |
| O - Blue |
| A - Yellow |
| B - Pink |
| AB - White |
| (g) The results of the test |
| (h) The Rh group |
| (i) Total volume of blood, the preparation of blood, nature and percentage of anti-coagulant. |
| (j) Continuous temperature (2°C - 6°C) |
| (k) Disposable transfusion sets with filter shall be used in administration equipment |
| (l) Appropriate cross matched blood without a typical antibody in recipient shall be used |
| (m) If any visible evidence of deteriorations like haemolysis, clotting or discoloration is present the contents of the bag shall not be mentioned. |
| (n) Appropriate donor classification like "Voluntary Donor" or "Replacement Donor" |

Blood Donation Camps: The blood donation camps are organised by the regional blood transfusion centres, red cross society, government blood banks etc. The requirements for blood donation camp includes premises, personnel, continuous and uninterrupted electricity supply, adequate lighting, hand-wash facility, refreshment facility, proper disposal of wastes, BP apparatus, Stethoscope, blood bags, donor questionnaire, plastic waste basket, needles and destroyer etc ^[9].

National Blood Policy in India

It is very important to have a well organised Blood transfusion Service (BTS), which plans in a proper way so that infections caused during blood transfusion can be eliminated. For ensuring the quality, safety and efficacy of blood and blood products adequate infrastructure, trained personnel and equipment is mandatory.

Mission: The main of the policy is to ensure easy access and adequate blood supply, safe procurement of blood in well-equipped premises and free from transfusion transmitted infections.

Objectives: To make available adequate resources, blood transfusion services, latest technologies, awareness programs, manpower, encourage the appropriate clinical use etc ^[10].

CONCLUSION

Blood is an important component of life which saves the life of a person. There must be stringent regulation for the blood and blood components and must be followed strictly by the blood banks and manufacturers during the collection, processing, testing, storage and transfusion. In India, the Drug and Cosmetic Act 1940 and Rules 1945 has set a clear rules for the blood bank, transfusion, manufacture and also the requirements are mentioned in detail.

REFERENCE

- <https://newslanded.com/2020/05/31/covid-19-causes-surge-in-the-need-for-blood-and-blood-products/#:~:text=While%20there%20is%20a%20rise%20in%20blood%20and,cancer%20patients%2C%20and%20even%20helps%20for%20research%20purposes.>
- https://www.medicinenet.com/blood_bank/definition.htm
- https://www.who.int/health-topics/blood-products#tab=tab_1
- <https://www.thoughtco.com/blood-373480>
- World Health Organisation: Recruiting, Educating and Retaining [Internet]. Safe Blood Donors Geneva, Switzerland: World Health Organization; 2010 [cited 2018 Mar 10]. Available from: http://www.who.int/hrh/migration/code/WHO_global_code_of_practice_EN.pdf.
- Jay S.Epstein. Best practices in regulation of blood and blood products. Elsevier Ltd. 2012. 40(3): 200-204. Available from URL: <https://www.sciencedirect.com/science/article/abs/pii/S1045105611001886?via%3Dihub>
- https://www.who.int/bloodproducts/brn/ManBloodEM_GL_WHO_TRS_1004_web_Annex_3.pdf?ua=1
- http://www.cfdamp.nic.in/pdf/guidelines_for_blood_bank.pdf
- Vijay Malik. Law relating to Drugs and Cosmetics, 25th Edition 2016. Pg No: 375-397.
- https://www.nhp.gov.in/national-blood-policy-2003_pg