MD TRANSFUSION MEDICINE AND IMMUNO HAEMATOLOGY

SYLLABUS

Topic I: History of Transfusion Medicine (0.5%)

1.0: Identify and relate the important features of the history of transfusion medicine
1.1: Outline the scientific benchmarks in the evolution of transfusion medicine
1.2: Explain how specific innovations affected transfusion medicine practice
1.3: Describe recent trends in the practice of transfusion medicine

Topic II: Scientific Basis of Transfusion (14%)

2.0: Describe the biochemical properties and characteristics of the major surface antigens of the formed elements of the blood
2.1: List the clinically significant antigen systems and associated phenotypes
2.2: Compare the expression of these antigen systems on red cells and other cells in blood
2.3: Describe the biochemical properties of the ABO antigens
2.4: Describe the biochemical properties of the Rh and MNS blood group systems

3.0: Genetics of the major surface antigens of the formed elements of the blood
3.1: Describe the principles of antigen inheritance
3.2: Identify the genotypes that produce the common phenotypes in the ABO and Rh systems
3.3: Order and phenotypes of the ABO and Rh blood groups by frequency of occurrence in the major ethnic groups.

4.0 The role of the HLA (major histocompatibility complex (MHC) system in transfusion, transplantation and associated diseases
4.1: Describe the nomenclature used for the HLA (MHC) system
4.2: Describe the inheritance of HLA antigens
4.3: Compare the biochemical properties of Class I and II antigens
4.4: Describe the distribution of the HLA antigens on blood cells and other tissues
4.5: Explain the role of MHC in cellular immunology
4.6: Describe the microlymphocytotoxicity assay, comparing its use for HLA typing and crossmatching.
4.7: Describe the principles of the mixed lymphocyte culture test
4.8: Identify clinical situations in which the mixed lymphocyte test is used for donor selection
4.9: Identify significant HLA disease associations

5.0: Analyze the clinical and pathological consequence of antibodies to red cells
5.1: Distinguish the naturally occurring antibodies from those requiring prior immunization
5.2: List the blood group systems in which antibodies are naturally occurring and the most important ones in which unexpected (irregular) antibodies occur
5.3: Compare transfusion and pregnancy as immunizing events
5.4: Describe the techniques for detection of antibodies / complements on red cell membrane
5.5: Interpret the results of tests for detection of red cell antibodies
5.6: Outline the mechanisms of red cell destruction
5.7: Describe the importance of complement activation and antibody mediated red cell destruction

6.0: Relate the kinetics and function of the cellular elements of blood to normal and disease states
6.1: Describe the process of cell production of red cells, neutrophils, lymphocytes and platelets
6.2: State the lifespan of blood cells in normal and disease states
6.3: Describe neutrophil functions in defense against bacterial infection
6.4: Describe the role of the platelet in hemostasis
6.5: Describe the function of lymphocyte subpopulations in normal and disease states
6.6: Outline the pathophysiology and clinical features of disorders caused by abnormalities of cell function or number.

7.0 Relate the structure and function of haemoglobin to normal and disease states
7.1: Describe the role of haemoglobin in oxygen transport
7.2: Draw the haemoglobin molecule indicating the oxygen-binding sites
7.3: Describe how abnormalities in haemoglobin may affect the ability to transport oxygen
7.4: Outline the Steps I haemoglobin degradation
7.5: State the amount of iron normally present in the blood and narrow storage compartment.

8.0 Apply the principles of basic mechanism of blood coagulation to the diagnosis and treatment of coagulation disorder.
8.1: Describe the interaction of soluble coagulation factors with platelets
8.2: List the steps in the fibrinolytic pathway
8.3: Identify the abnormalities of coagulation in common hemostatic disorders
8.4: Describe the role of fibrinolysis in normal and abnormal hemostasis
8.5: Describe the interactions among the coagulation, complement, kalli krein, and immunologic systems.
8.6: Describe the principles of the common screening tests for abnormalities in haemostasis.
8.7: Interpret the results of coagulation tests in specific clinical situations.
8.8: Integrate clinical information with result of coagulations tests to establish a diagnosis and treatment plan.

9.0: Relate the principles of the hemodynamics of circulation to the diagnosis and treatment of hypervolemia and hypovolemia.
9.1: State the normal values for blood volume
9.2: Identify the physiologic mechanisms for control of blood volume.
9.3: Describe the compensatory mechanism for abnormalities in blood volume
9.4: Describe the symptoms and signs associated with abnormalities in blood volume.
9.5: Integrate the clinical and laboratory data to establish the diagnosis of hypervolemia and hypovolemia

Topic III: Management of blood donation and preparation of blood components (6%)

10.0: Determine the acceptability of individuals for blood donation through appropriate consultations with donor personnel.
10.1: Identify the donor's risks in blood donation.
10.2: Identify potential risks to the recipient.

11.0: Construct a plant to care for blood donors
11.1: Delineate the complications of blood donation.

11.2: Describe the presentation and management of complications of blood donation

12.0: Analyze significant issues in donor recruitment
12.1: Explain the concepts of community responsibility and individual responsibility
12.2: Compare paid and volunteer blood donation systems
12.3: Define directed donation and autologus donations.
12.4: Describe the impact of these types of donation on the safety and adequacy of the blood supply

13.0: Outline the procedures for donor blood processing
13.1: Name the tests required for donor blood processing.
13.2: Describe the potential patient complications if errors occur in donor blood processing.
13.3: Evaluate the effectiveness of pretransfusion hepatitis, syphilis, and HIV testing.

14.0: Describe the preparation and composition of blood components
14.1: Outline the basic steps in component production.
14.2: List the functional composition of each component

15.0: Describe the preparation and production of blood derivatives
15.1: Distinguish between a blood component and a blood derivative
15.2: List the blood derivatives that are prepared commercially.
15.3: Describe the composition of each blood derivative

16.0: Describe the changes in blood component
16.1: State the expiration period for each component
16.2: Describe the changes in each component with storage
16.3: Identify adverse effects of transfusion that may result from storage- induced change in blood components.
16.4: Compare the potential risks and benefits of transfusing blood products stored for varying lengths of time

Topic: IV Pretransfusion testing (4%)

17.0: Explain the basic procedures used for blood compatibility testing:
17.1: Define the basic terms associated with tests for blood compatibility
17.2: Explain the principles of red cell compatibility
17.3: Describe the methods for determining compatibility of donor blood with the recipient.
17.4: Explain what 'Compatibility crossmatch' means
17.5: Distinguish testing procedures for red cell and red cell free components.
17.6: Describe and explain the criteria for selection of an appropriate donor unit.
17.7: Distinguish between emergency and elective selection of blood

18.0 Apply immunologic principles of blood cell compatibility to clinical situations
18.1: Identify the clinical situations associated with formation of antibodies to blood cell antigens.
18.3: Correlate the results of laboratory tests within vivo reactions.

Type V: Transfusion of blood components (47%)

General aspects of transfusion

19.0: Describe the major indications for the following blood components and derivatives.
19.1: Whole blood
19.2 Red cells (including additive solutions)
19.3: White cell poor red cell products (such as washed red cells, previously frozen deglycerolized red cells, and filtered red cells).
19.4: Platelets (concentrates or apheresis product)
19.5: Granulocytes (concentrates or apheresis product)
19.6: Single- donor plasma (eg. Fresh-frozen plasma or plasma frozen after 24 hours)
19.7: Cryoprecipitate
19.8: Coagulation factor concentrates (eg. Factor VIII, prothrombin complex, or anti inhibitor coagulant complex)
19.9: Colloid solutions (albumin and plasma protein fraction)
19.11 Autologous blood (pre surgical deposit or intraoperative and traumatic salvage)
19.12 Vaccines (eg. Hepatitis B vaccine)

20.0. Construct an appropriate plan for administering blood products (19, 1-19, 12) that considers dosage, infusion equipment, and rate of administration. B. Cardiopulmonary bypass

21.0: Diagnose and develop a plan for treatment of symptomatic coagulatin abnormalities develop in following cardiopulmonary bypass (CPB).
21.1: List the laboratory tests that should be ordered to evaluate a patient bleeding after CPB.
21.2: List the laboratory tests that should be ordered to evaluate a patient bleeding after CPB.
21.3: Synthesize the clinical and laboratory information to establish the cause of bleeding.
21.4: Select the proper blood component (or other medication) to treat the bleeding diathesis.

C. Emergency medicine (massive transfusion haemorrhagic shock, burns)

22.0: Construct the appropriate orders for compatibility testing in massive transfusin.
22.1: Define massive transfusion.
22.2: Identify the correct use of 'type- specific' blood
22.3: Identify the correct use of O-negative or O-positive blood in patients with unknown ABO type.

23.0: Explain the rationale for the use of various components in massive transfusion.
23.1: Describe the coagulation and metabolic abnormalities
23.2: Order coagulation and metabolic abnormalities in the terms of clinical importance.
23.3: Define the indications for platelet transfusion.
23.4: Compare the indications for whole-blood versus packed cells.
23.5: Define the indications for fresh-frozen plasma.
23.6: Evaluate the risks and benefits of blood salvage techniques during massive transfusion.

24.0 Describe fluid losses associated with burns.
24.1 Describe operative and non operative mechanisms of fluid and protein loss in burn patients.

D. General surgical support

25.0: Construct appropriate preoperative orders for blood.
25.1: Recall the factor used to evaluate haemostatic safety preoperatively
25.2: Identify appropriate orders for blood and blood components for elective surgical procedure, including the use of type and screen
25.3: Describe the use of the maximum surgical blood order schedule in preparing preoperative blood orders.

26.0: Evaluate preoperative transfusion needs.
26.1: Describe the methods of predicting estimated blood loss
26.2: Describe the treatment for hypovolemia
26.3: Correlate for clinical symptoms and measurements of blood loss to determine if transfusion is needed.

27.0: Recognize the cause of blood wastage.
27.1: Define the time limits for nonrefrigerated blood
27.2: Define the desirable cross match: transfusion ratio.

E. Haematology and Oncology

28.0: Outline the diagnosis and management of hemostatic defects including thrombocytopenia.
28.1: Describe the clinical features of coagulopathies.
28.2: Describe the use of blood components and derivatives in the treatment of coagulopathies and thrombocytopenia
28.3: Describe the mechanism of action of heparin and coumadin anticoagulants.
28.4: Identify the special management problems present in patients receiving anticoagulants.

29.0: Plan appropriate blood support for patient with neoplastic disease.
29.1: Identify the special hematologic problems in patients with specific forms of neoplasia.
29.2: Describe the appropriate use of blood components in the treatment of neoplastic disease

30.0: Choose the appropriate blood support in the treatment of anemia.
30.1: Identify the special transfusion problems in patients with chronic hypoproliferative anemia.
30.2: Identify the special transfusion problems in patients with haemolytic anaemia.
30.3: Identify the clinical indications and contraindications for red cell transfusion.

31. Outline a plan for the diagnosis and transfusion support of thrombocytopenias caused by accelerated platelet destruction.
31.1 Distinguish between different types of accelerated platelet destruction

32.0 Plan blood support for bone marrow transplantation.
32.1: List the blood products used to support bone marrow transplant patients
32.2: Illustrate the use of blood products in the pretransplant and post transplant periods in patients with leukaemia and aplastic anaemia.

F. Neonatology and paediatrics

33.0 Describe the pathophysiology of haemolytic disease of the new born (HDN)
33.1: Diagram Rh and ABO incompatibility.
33.2: Describe the clinical effects of haemolytic disease in the foetus and new born.

34.0: Outline the diagnosis and management of HDN
34.1: Describe the methods of prenatal diagnosis (e.g. maternal history, maternal antibody titre, maternal and paternal phenotypes, and amniocentesis).
34.2: Define the indications, including the rationale, for each form of therapy for HDN (early delivery, plasmapheresis of mother, intrauterine transfusion, phototherapy and exchange transfusion).
34.3: Identify two common antibodies that cause HDN that require exchange transfusion.
34.4: Describe the selection of blood for exchange transfusion
34.5: Describe the kinetics of exchange
34.6: List the possible complications of exchange transfusion

35.0: Describe the role of Rh immunoprophylaxis (antepartum and postpartum) in the prevention of HDN
35.1: Define Rh immunoprophylaxis
35.2: Identify the indications for its use, including dosage, timing and route of administration.

36.0: Compare compatibility testing for neonatal and paediatric/ adults transfusion.
36.1: Identify the appropriate blood samples for neonatal testing
36.2: Describe the appropriate compatibility tests for the neonate.
36.3: Identify the appropriate blood types (ABO, Rh etc) for component separation.
36.4: Compare the procedure used to select blood for neonate and adult patients.
37.0: Distinguish the posttransfusion risk that may be specific in the neonatal patient.
37.1: Identify situations in which the neonate is at risk for graft- versus host disease(GVHD)
37.2: Identify situations in which the neonate is at risk for postransfusion cytomegalovirus (CMV) infection.

38.0: Describe the pathophysiology of neonatal alloimmune trombocutopenia and neutropenia.
39.0: Formulate the treatment for neonatal alloimmune thrombocytopenia and neutropenia.
39.1: Choose the appropriate component therapy.
39.2: Predict the response to therapy.

G. Nephrology

40.0: Illustrate the use and limitations of blood component therapy in renal disease.
40.1: Describe the use of blood components in end-stage renal disease.
40.2: Describe the use of blood components in renal transplantation.

Topic 17 adverse effects of blood transfusion (147)

41.0: Develop a plan for dealing with adverse immunologic effects of blood transfusion.
41.1: Describe intravascular “immediate” haemolytic transfusion reaction (i.e, their etiology, pathogenesis, pathologic sequelae and clinical outcome).

41.2: Describe delayed anamnestic transfusion reactions (i.e, their etiology, pathogenesis, and clinical significance).
41.3: Compare clinical syndromes occurring with the intravascular and extravascular destruction of red cells.
41.4: Describe the steps to prevent haemolytic transfusion reactions.
41.5: Outline the steps to be taken by physicians, floor nurse, and laboratory staff in response to suspected haemolytic transfusion reactions.
41.6: List the laboratory tests done for suspected haemolytic reactions.
41.7: Describe the test result that would be expected in immediate and delayed haemolytic reactions.
41.8: Distinguish immunologic from non immunologic causes of haemolysis
41.9: Describe febrile reactions.
41.10: Distinguish the cause of febrile reactions considering clinical and laboratory information.
41.11: Outline the steps to prevent and treat febrile reactions
41.12: Describe allergic and anaphylactic transfusion reaction.
41.13: Outline the steps to prevent and treat allergic and anaphylactic transfusion reaction.
41.14: Describe the clinical significance of immunization to platelet and white cell antigens.
41.15: Outline the steps to prevent alloimmunization to platelet and white cell antigens.
41.16: Formulate a scheme to manage clinical problems resulting from immunization to platelet and white cell antigens.

42.0: Develop a plan to prevent or manage the adverse metabolic effect of transfusion.
42.1: Describe the pathogenesis of adverse metabolic effect of transfusion(e.g, acidosis, hypocalcemia, hyperkalemia, hypothermia)
42.2: Recognize the clinical steps and symptoms associated each of these.
42.3: Outline a plan to prevent or manage the adverse metabolic effects of transfusion.

43.0: Analyze the adverse pulmonary complications of transfusion
43.1: Describe current knowledge about the role of micro aggregates.
43.2: Compare the roles of hypervolemia and low oncotic pressure in producing pulmonary complications.
43.3: Describe the role of white cell antibodies in producing noncardiac pulmonary oedema.

44.0: Respond to clinical situations in which transfusion- induced iron overload occurs.
44.1: Outline the steps to prevent iron over load
44.2: Describe the treatment of iron over load

45.0: Develop a plan for the diagnosis and treatment of infectious complications that can result from transfusion.
45.1: List the infectious complications that can result from transfusion (bacterial, hepatitis B, A, non-A, non-B, HIV, CMV, malaria).
45.2: Describe the cause and clinical presentation of each complication.
45.3: Outline a plan to prevent these adverse sequelae from occurring.
45.4: Describe the treatment of each identified complication.
45.5: Describe what the physician, nurse, transfusion service, and blood centre staff should do when a case occurs.

46.0: Develop a plan to prevent or manage post transfusion GVHD
46.1: Describe the cause of transfusion induced GVHD

46.2: List conditions that make transfusion recipients susceptible to GVHD.
46.3: Identify transfusion recipients who are at risk for post transfusion GVHD.
46.4: Describe the clinical course of post transfusion GVHD.
46.5: Describe the methods to manage the disease.

Topic VII: Autoimmunity (4%)

47.0: Characterize haemolytic anaemia
47.1: Differentiate between haemolytic and non haemolytic anemia.
47.2: Differentiate between immune and nonimmune haemolytic anemia.
47.3: Examine autoimmune haemolytic anaemia according to immunologic and clinical criteria.

48.0: Propose a plan to diagnose and treat warm reactive autoimmune haemolytic anaemia (AIHA).
48.1: Describe the pathogenesis of warm reactive AIHA
48.2: Delineate the clinical and laboratory features of warm- reactive AIHA
48.3: Describe the appropriate therapy for patients with warm- reactive AIHA
48.4: Identify factors to be considered when transfusion therapy is necessary.

49.0: Describe the appropriate treatment of or response to cold-reactive autoimmune haemolytic anaemia (AIHA).
49.1: Describe the pathogenesis of cold-reactive AIHA
49.2: Outline the clinical and laboratory features of cold-reactive AIHA
49.3: Describe the process or recognizing and diagnosing cold-reactive AIHA
49.4: Identify the different syndromes produced by cold-reactive AIHA
49.5: Identify and distinguish between different types of cold-reactive AIHA

50.0: Present a scheme for the diagnosis and treatment of drug induced immune haemolytic anaemia.
50.1: Describe the differential diagnosis of drug- induced immune haemolytic anaemia.
50.2: Identify and distinguish between different mechanisms of drug- induced immune injury.
50.3: Describe the appropriate treatment for patients with drug- induced haemolytic anaemia.

51.1: Differentiate between immune and non immune thrombocytopenia.
51.2: Outline the pathophsiology and clinical features of idiopathic thrombocytopenic purpura (TTP, also known as autoimmune thrombocytopenic purpura, ATP).
51.3: Distinguish drug-induced thrombocytopenia form ITP
51.4: Describe the appropriate management o ITP, including the role of transfusion therapy.
51.5: Construct a plan to diagnose and treat neutropenia.

52.1: Differentiate between immune and nonimmune neutropenia
52.2: Outline the clinical and laboratory features of immune neutropenia.
52.3: Describe the role of drugs in the induction of immune and nonimmune neutropenias.
52.4: Describe the appropriate management in the care of patients with neutropenia.

Topic VIII: Transfusion (6%)

53.0: Explain the role of transplantation in patients with end-stage organ failure
53.1: List the important developments in organ transplantation

53.2: Identify the organs and issues currently being transplanted.
53.3: Contrast the factors involved in living organ versus tissue transplantation.
53.4: Identify the problems limiting transplantation.

54.0: Explain the role of antigen matching and or compatibility in selecting organs or tissues for transplantation.
54.1: List organs and tissues for which ABO compatibility is considered essential.
54.2: Describe the role of the major histocompatibility complex (HLA) in graft survival.
54.3: Describe the role of minor histocompatibility antigens in grafts survival

55.0: Distinguish between appropriate and inappropriate transfusion practices in patients undergoing transplantation.
55.1: Contrast the effect of pretransplant transfusion on graft survival in renal and bone marrow transplantation.
55.2: Evaluate the proposed immunologic mechanisms for the effect of pretransplant transfusion on graft survival in renal and bone marrow transplantation.
55.3: Identify the adverse effects associated with transfusion of immunocompromised recipients.
55.4: Describe the appropriate transfusion support for blood group incompatible bone marrow transplantation.

Topic IX: Therapeutic apheresis and phlebotomy

56.0: Illustrate the basic principles of therapeutic apheresis and phlebotomy
56.1: Define the terminology associated with apheresis and phlebotomy procedures (eg, therapeutic apheresis, plasma exchange, phlebotomy and plateletpheresis)
56.2: Describe the mechanisms of each of these procedures.
56.3: State the rationale for using each procedure

57.0: Describe the disorders for which phlebotomy and plasma exchange are indicated.
57.1: List the disorders for which phlebotomy and plasma exchange are considered.
57.2: Distinguish appropriate from inappropriate uses of phlebotomy and plasma exchange therapeutic procedures.

Topic X: Blood substitutes (17)

58.0: Evaluate the volume expanders available for clinical use:
58.1: List the volume expanders available for clinical use (crystalloids, natural colloids, synthetic colloids)
58.2: Describe the biochemical and physiologic characteristic of volume expanders.
58.3: Describe the clinical presentation of the adverse effects associated with volume expanders.

59.0: Evaluate the usefulness of synthetic oxygen carrying compounds under investigation
59.1: List the synthetic oxygen carrying compounds under investigation (perfluorcarbons, and haemoglobin solutions)
59.2: Describe the results of clinical evaluations of synthetic oxygen-carrying compounds.

Topic XI: Medicolegal consideration (0.5%)

60.0: Demonstrate the principles of forensic serologic testing
60.1: Describe the resolving power of different genetic systems in paternity or other forensic testing.
60.2: Distinguish exclusion from nonexclusion in paternity testing.
60.3: Explain the limits of paternity testing.

61.0: Describe the management of transfusion therapy in individuals with religious objections to transfusion.
61.1: Examine religious objections to transfusion
61.2: Identify the religious groups which interdict transfusion.
61.3: Identify those situations in which intraoperative blood salvage would be acceptable.
61.4: Identify the legal avenues for obtaining permission to administer transfusions that are medically indicated but religiously interdicted.
61.5: Examine the ethics of seeking legal avenues for obtaining permission to administer transfusions that are medically indicated but religiously interdicted.

62.0: Explain the ethical and legal considerations pertaining to donation of bone marrow by unrelated donors and recipient.
62.1: Explain the role of informed consent
62.2: Describe the procedure for obtaining informed consent.
62.3: Explain the role and importance of confidentiality.
62.4: Describe the procedures to assure confidentiality.

Topic XII: Organisation and function of regional blood service and hospital transfusion service (0.5%)

63.0: Describe the interactions between regional blood centres and hospital based blood services.
63.1: Describe the organization and function of blood centres, including issues of quality assurance donor confidentiality and obligations to donors.
63.2: Describe the organization and function of hospital transfusion services, including issues of appropriateness of transfusion and informed consent.
63.3: Compare the function of regional and hospital blood service.

(3 years posting)

1st year

1 to 6 months. Department of Transfusion Medicine

(Dissertation protocol should be ready by the end of 6 months)

7th Months: Clinical Pathology & Haematology (Pathology)
8th Month: Microbiology
9th Month: Clinical Pathology & Haematology (Pathology)
10-12 Months: Department of Transfusion Medicine

2nd year

1st Month: Cancer Ward (Radiotherapy)
2nd Month: Paediatrics (Leukemea Ward & Neonatology)
3 to 3.5 months (15 days) : Labour Room
3.5 to 4th month (15 days) : Speciality(Nephrology,Thorasic surgery,Urology)
4th Month: Anaesthesia (Operation Theatre)
5th Month: Haematology (Medicine)
6th Month: Haematology & Clinical Pathology (Pathology)
7th to 12 Months: Department of Transfusion Medicine

3rd Year

Department of Transfusion Medicine Only
(At the end of 2 years and 6 months ------- Thesis should be completed
Teaching shedule for pg students
8 am to 9 am: bleeding room
9.30 am to 10.30 am: topic presentation
11am to 1 pm: bleeding room, component seperation & screening
2pm to 4 pm: special investigations, component seperation & screening

Evaluation

THEORY examination: 4 papers

1. Applied aspects of basic science
2. Immunohaematology, immunogenetics and applied serology.
3. Blood centre operation, donor organisation, blood preservation and technology of components.
4. Recent advances in transfusion technology and haemotherapy practice.

Practical examination
Long case – 1 - 100 marks
Short Case- 2 - 2x50= 100marks
Spotters -10No - 10x10=100 marks
Viva - 100marks
Total Marks – 400

Dissertation

The subjects for dissertation shall be allocated within six months of admission and after completion of the project the dissertation shall be submitted six months before the final examination.

Books Author

1. AABB Technical manual Edition 14- Editor in chief Richard H Walker
2. Scientific bases of Transfusion Medicine Anderson & Ness
3. Blood transfusion in clinical Medicine Mollison

4. New Frontiers in Blood Banking (American Association of Blood Banks)
5. Infection complications of Blood Transfusion Tabor
6. Platelets in Biology and Pathology J.L.Jordon
7. Albumin in structure, function and use Rosenoer, Oratx
8. Standards for blood banks and transfusion service 15th Edition (AABB)
9. Donor Room policies and procedure (AABB)
10. Glycoproteins of blood cells and plasma Jamieson & Creen walt
11. Quality assurance in blood banking and its clinical impact
12. Problem solving in immuno haematology IRAA Shrlman
13. Case studies in transfusion Medicine Lynn K. Hoffstadier, Philip, J Dechristopher, James J Perkins
14. Haemotherapy of the infant and premature (AABB)
15. An introduction of blood serology Kathlein E.Boorman
16. Blood storage and preservation (AABB)
17. Fundamentals of a pheresis programme (AABB)
18. Input output donor recruitment feed back (AABB)
19. Practical blood transfusion Daughlass W. Huestis, Joseph r Bove
20. Considerations in the selection of transfusion –A Technical Workshop (AABB)
21. Clinical and practical aspects of the use of frozen blood(AABB)
22. A. Manual of hemotherapy Hasold.B Anstal. Poul M. Urie
23. Haemostasis for blood bank a technical workshop (AABB)
24. Understanding technology to be Blood bank (AABB)
25. Progression transduction Medicine (Vol. I) John D. Casi
26. Special serological techniques useful in problem solving(AABB)
27. Blood donor characteristics and types of blood donation (DHEW publication)
28. Plasmapheresi sin immunology and oncology JN Bayer, H.Borberg
29. Standards for blood banks and transfusion service (AABB)
30. Hemotherapy in tromma and surgery (AABB)
31. Trouble- shooting the cross match a teclinical workshop (AABB)
32. Surgical hamotherapy JA Collins, Stanford C slif
33. Hepatitis and blood transfusion Girish N. Vyas
34. Clinics in Haematology William Bayer WB sounding company, London
35. Blood group serology Kathlees E. Booman
36. Current conception tranfintherapy (AABB)
37. Recent advances in haematology immunology and blood transfusion S.R.Hollam I.Hernot G.First
38. Safety in transfusion practices Herbert F.Polesky Richard H Willan
39. Blood transfusion – A conceptional approach John G. Kelton Mancy M.Heddle
40. Hand book series in clinical lab service Section D – Vol II&III
41. Advance in blood grouping Vol III, Alexander S. Wiener

LIST OF JOURNALS

1. Vox Sanguinis
2. Transfusion
3. Transfusion medicine review
4. Transfusion Medicine
5. Transfusion Science
6. Journal of clinical apheresis