RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER

SYLLABUS OF COMPETITIVE EXAMINATION FOR THE POST OF ASSISTANT PROFESSOR (Super Speciality) Clinical Hematology
MEDICAL EDUCATION DEPARTMENT

Unit I. Basic Foundation in Clinical Hematology:

1. Introduction to clinical hematology- approach to diagnosis
2. Evidence based medicine
3. Clinical trials, clinical epidemiology, research methodology.
4. Basics of biostatistics- Kaplan meir survival curve, OS, PFS etc.
5. Critical review of medical literature
6. Breaking bad news, communication with patients and family,
7. Genetics basics
8. Principles of genetic counselling.
9. Principles of palliation
10. Basics of blood tests- pre analytic variables, errors and care needed for different tests like prior blood transfusions before HPLC or chromosomal fragility testing.

Unit II. Practical questions to assess competence in the following clinical skills:

1. Bone marrow aspiration and biopsy.
2. Preparation and interpretation of films of blood and marrow.
3. Administration of chemotherapy, extravasation, compatibility etc.
4. Apheresis technique.
5. Isovolemic Phlebotomy and exchange transfusion.
6. Insertion, management and care of indwelling catheter.
7. Lumbar puncture with chemotherapy.
8. Diagnosis and prompt management of seriously sick patients.
9. Protocol based therapies in management of various hematological disorders.
10. Hematopoietic stem cell transplant indications, mobilization and collection and enumeration of stem cells.

Unit III Basic Hematology –:

1. Basic CBC, and red blood cell indices,
2. Peripheral smear, variations in disease.
3. Basic concepts of hematopoiesis.
4. Bone marrow structure and morphology examination.
5. Red blood cells: Structure and function.
6. Laboratory approach to diagnosis of anemia.
7. Overview of normal hemostatic mechanism.
8. Laboratory approach to diagnosis of bleeding disorders.
9. Clinical evaluation and management of inherited bleeding disorders.
10. Immunology principles of innate and adaptive immunity and transplant Immunology.

Unit IV Laboratory methods in hematology: -

1. Principles of automated cell counter and interpretation of results.
2. Hemoglobin electrophoresis.
3. HPLC use in hematology.
4. Special stains and cytochemistry.
5. Flow cytometry and its applications in leukemias.
6. Flow cytometry and its applications in other hematology conditions
7. Imaging-Understanding different imaging techniques, advantages and disadvantages- CT/MRI Xray, US, Doppler. Role of imaging in diagnosis and monitoring for different Hematology conditions.
8. Principles of Nuclear Medicine: and applications of PET scan and in hematology & hemato-oncology conditions.
9. Basics of molecular tests, karyotyping, FISH, PCR, NGS, Sanger sequencing and whole exome sequencing. Indications and applications.
10. Basic principles of radiotherapy

Unit V. Disorders of Erythrocytes and Hemoglobinopathies: -

1. Iron metabolism and iron deficiency anemia. IRIDA- disorders of iron metabolism
2. Red cell membrane defect: e.g. hereditary spherocytosis etc.
3. Red cell enzymopathies.
4. Megaloblastic anemias.
5. Presentation of Thalassemias: Interpretation of HPLC, CBC, red blood cell indices in patients with thalassemia trait or disease. Interpretation of HPLC, electrophoresis, sickling test, Point of care tests for sickle cell diagnosis
6. Regular blood transfusion management principles in patients with chronic anemias
7. Iron overload and its monitoring techniques. Iron chelation medicines, pharmacology, side effects,
8. Molecular genetics and prenatal testing for thalassemia and sickle cell disease prevention. Management of hemoglobinopathy center. Clinical aspects and community screening
9. Sickle cell disease, presentation -monitoring for complications- understanding of tests and interpretation Hydroxyurea, vaccinations and prevention of infection, Indications for transfusions in sickle cell patients
10. Indications for Hematopoietic stem cell transplant (HSCT) in patients with thalassemia disease. Newer therapies- SMAD2/3 inhibitors, gene therapy for thalassemia. Indications for Hematopoietic stem cell transplant HSCT) for sickle cell, newer therapies including HSCT, gene therapy, gene editing. Other Abnormal hemoglobinopathies and compound heterozygote states, unstable hemoglobin, meth-hemoglobinemia.

Unit VI- Other chronic anemias:

1. Immune hemolytic anemias - AIHA, Evan's
2. DCT/ICT principles and interpretation.
3. Work up for hemolytic anemia
4. Hemolytic disease of newborn

5. Drug related hemolysis
6. Allo-immunization
7. Congenital dys-erythropoietic anemia (CDA)
8. Pure red cell aplasia- inherited and acquired
9. Sideroblastic anemia
10. Anemia of chronic disease

Unit VII Pancytopenia:

1. Aplastic anemia- presentation and diagnosis.
2. Therapeutic options for acquired aplastic anemia, e.g. Triple therapy, HSCT, management of relapse.
3. Pancytopenia due to drugs, severe sepsis, infections, auto-immune or other conditions.
4. Inherited bone marrow failure syndromes (IBMFS) manifestations.
5. Diagnosis in pediatric and adult patients.
6. Standard of care management and newer therapy options.
7. Risk assessment for solid and hemato-oncologic progression.
8. Understanding of tests and molecular techniques for diagnosis.
9. Hematopoietic stem cell transplant (HSCT) in such patients, special considerations
10. Gene therapy in IBMFS and genetic counselling.

Unit VIII Malignancy Basics:

1. Cell Cycle and Carcinogenesis. Principles of chemotherapy.
2. Management of toxicity, overdose or prevention of toxicity.
3. Understanding Common protocols and need for protocol-based therapy. Understanding need for modification of protocols due to baseline co-morbidity or complications.
4. Understanding drug interactions when using chemotherapy and anti-infective and other agents.
5. Management of emergencies hematology-oncology- hyper calcemia, hyperkalemia, paraparesis, acute tumor lysis syndrome, superior vena cava syndrome, acute paraparesis etc.
6. Assessment of fitness of patient for chemotherapy.
7. Knowledge of staging and risk stratification tools.
8. Supportive care and infection control. Vaccinations and prophylactic agents to reduce infections. Surveillance for infections, choice of antibiotics, anti-biotic resistance patterns, newer tests for bacterial infections. Fungal infections, diagnosis, Pre-emptive therapy for fungal infections.
9. Monitoring therapeutic drug levels of methotrexate, cyclosporin, voriconazole.
10. Monoclonal antibodies, immunology, small molecules and their uses in Hematology.

Unit IX. Hematopoietic stem cell transplant (HSCT)/Bone marrow transplantation:

1. Indications for allogeneic Hematopoietic stem cell transplant in malignant and non-malignant disorders. Indications for autologous transplantation.
2. HLA typing principles, techniques.
3. Donor selection in matched sibling, matched unrelated and haplo- transplant.

4. Conditioning regimens for myelo-ablative, RIC, etc.
5. Acute and chronic complications- assessment and management.
6. GVHD causes, assessment and therapy for both acute and chronic GVHD.
7. Risk for infections, prophylaxis, early identification and management of infections
8. Immune reconstitution and post-transplant vaccination, viral infections etc.
9. Veno-occlusive disease of liver (VOD) and other complications
10. Evaluation of patient post-transplant for relapse, role of maintenance therapy and relapse identification and options.

Unit X. Disorders of WBC-benign /clonal:

1. Quantitative defect of neutrophils- neutropenia and neutrophilia.
2. Causes of lymphocytosis, eosinophilia, hyper-eosinophilic syndrome and monocytosis
3. Functional defects and Immune deficiency- primary e.g. Chediak Higashi, Wiskott-Aldrich CVID etc.
4. Secondary immune-deficiency diagnosis assessment principles of prophylaxis and treatment
5. Mastocytosis
6. T and B cell lymphoproliferative disorders
7. Langerhans cell histiocytosis
8. Hemophagocytic lympho histiocytosis (HLH)- primary and secondary
9. Disorders of spleen
10. Immune cytopenias, causes of lymphadenopathy- including Kikuchi Fujimoto etc.

Unit XI. Disorders of WBC - malignant – diagnosis, management and newer treatments:

1. Introduction to acute leukemias. Immunophenotyping of acute leukemias. Mutation & Cytogenetics of acute leukemias. Measurable residual disease in acute leukemia-monitoring and therapeutic decisions. Risk stratification of acute and chronic leukemias.
2. Acute lymphoblastic leukemia in children. Acute lymphoblastic leukemia in adults.
3. Acute myeloid leukemia including in Down's syndrome. Acute promyelocytic leukemia.
4. Chronic myeloid leukemia, JMML.
5. Chronic lymphocytic leukemia and CLPD
6. Approach to patient with Lymphadenopathy +/- splenomegaly.
7. Hodgkins Lymphoma.
8. Non- hodgkins lymphomas – precursor lymphoid, mature B, Mature T/NK
9. Rare leukemias – chronic neutrophilic leukemia, erythroleukemias, basophilic leukemia, basic concepts. Therapy in elderly or frail or patients ineligible for conventional therapy
10. Second line therapy, Role of newer agents immunotherapy – monoclonal antibodies, etc in management in leukemias and lymphomas.

Unit XII Plasma cell dyscrasias:

1. Interpretation of imaging and electrophoresis reports
2. Understanding of disease process Diagnosis, staging and therapy for - multiple myeloma, plasmacytoma, MGUS, POEMS, plasma cell leukemia, etc.
3. Waldenstrom's macroglobulinemia and Amyloidosis

4. Autologous BMT for Multiple myeloma and amyloidosis

Unit XIII- Myeloproliferative / myelodysplastic syndrome:

1. Diagnosis risk assessment and management including newer JAK2, disease modifying therapy. Indications for transplant
2. Polycythemia vera (PV)
3. Essential thrombocytosis (ET)
4. Myelofibrosis (MF)
5. Myelo-dysplastic syndrome (MDS)

Unit XIV Complement disorders:

Diagnosis management and monitoring-

1. Paroxysmal nocturnal hemoglobinuria (PNH)
2. Thrombotic thrombocytopenic purpura (TTP), atypical HUS
3. Antiphospholipid Syndrome
4. Cryo-globulinemia
5. Cold agglutinin disease, C1 inhibitor (hereditary or acquired)

Unit XV Disorders of Hemostasis/ bleeding:

1. Laboratory diagnosis of platelet function defects.
2. Overview of megakaryopoiesis. Quantitative platelet disorders. Qualitative platelet disorders.
3. Immune thrombocytopenia (ITP).
4. Hemophilia

    a) Understanding inheritance and indications and methodology for prenatal diagnosis.
    b) Laboratory diagnosis of bleeding disorders.
    c) Management of bleeding- understanding of therapy options, indications and monitoring of care
    d) Special management issues with surgery and trauma.
    e) Management of patients with inhibitors
    f) New non- factor therapy
    g) Management of a haemophilia care center

5. Von Willebrand's disease
6. Rare bleeding disorders-
    a. Dysfibrinogemias,
    b. Rare factor deficiencies FXIII, FX deficiency etc.
    c. Platelet Function Defects
    d. Inherited thrombophilias
    e. hereditary hemorrhagic telangiectasia etc.
7. Acquired hemophilia
8. Women with bleeding disorders- management

9. Point of care tests of hemostasis, Application of flow cytometry/ molecular tests/ NGS for diagnosis
10. Fibrinolysis and defects of fibrinolytic pathway. Disseminated intravascular coagulation.

Unit XVI. Thrombosis:

1. Pathophysiology of thrombosis. Thrombophilic states- congenital and acquired
2. Laboratory testing of prothrombotic state – lacuna and caveats.
3. Thrombosis in adults: therapy with DOACs, vitamin K antagonists, monitoring, complications and Management issues in special conditions e.g. thrombocytopenia, pregnancy etc.
4. APLA/ Lupus anticoagulant
    1. Lab diagnosis.
    2. Clinical presentation and management.
5. TTP/HUS/ Congenital deficiency of ADAMTS13.
6. Thrombosis in newborn and children. Thrombosis and anti-coagulation in pregnancy. Liver disease or renal failure and the hemostatic system. Thrombo-inflammation.

Unit XVII. Transfusion medicine:

1. Blood component preparation and storage. Understanding of the clinical indications for the proper use of specific blood components
2. Quality assurance in transfusion medicine. Assessment for Transfusion transmitted infections
3. Diagnosis and management of transfusion associated complications- TRALI, TACO, delayed hemolytic reaction etc.
4. Concepts and indication of leucodepletion and irradiation of blood components. With knowledge on the performance of the same.
5. Apheresis – platelet collection. Platelet transfusion indications in different disease and for surgery and procedures

Unit XVIII Consultative Hematology/ Hematological manifestation disease.

1. Critical care ICU
2. Obstetrics and Gynecology- management of women in pregnancy with – known hematologic conditions like ITP, sickle cell disease, vWD, chronic myeloid leukemia, aplastic anemia, thalassemia major, PNH, rare bleeding disorders etc.
3. Hematologic manifestation of other diseases. Hematological manifestation of HIV, COVID 19. Hematological consults in geriatric medicine, Consultation in rheumatologic patients - APS/ HLH/ MAS/ CAPS. Hematological manifestations in solid tumors and thrombosis in cancer
4. Surgery / surgical specialties/ trauma –
    a) Blood and component therapy
    b) Massive transfusions.
    c) Blood safety program.
    d) Thrombocytopenia, bleeding peri-operatively
    e) Monitoring of fibrinogen, point of care testing for thrombosis/ bleeding risk

f) Thrombosis risk assessment, prophylaxis and management

5. New concepts basic aspects and molecular aspects of Hematology and innovations in HSCT, CAR-T cells, bi-specifics, etc. Recent Advances in Hematology, new diagnostic tools or advances in imaging in Hematology.

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Pattern of Question Papers:

1. **Objective Type Paper**
2. **Maximum Marks: 150**
3. **Number of Questions: 150**
4. **Duration of Paper: 2.30 Hours**
5. **All Questions carry equal marks**
6. **There will be Negative Marking**

   (**For every wrong answer one-third of the marks prescribed for that Particular question shall be deducted.)**

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