Residency Program
Doctor of Medicine (MD)
Curriculum (Phase-B)

Hematology

Bangabandhu Sheikh Mujib Medical University
Dhaka, Bangladesh
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### Residency Program

#### 1. Introduction:

1.1. Overview of the Specialty.

The specialty of Hematology developed as a subspecialization of Physicians who are predominantly concerned with the care of patients with Hematological disorders. It is a branch of Internal Medicine concerned with prevention, investigations, therapy and research into disease involving the Hematological disorders. Care of patients with hematological disorders embraces a wide range of clinical activities and Hematologists need a broad view of the Hematological needs of individual patients and the communities in which they live including an understanding of any prevailing healthcare inequalities. This requires knowledge of not only the diagnostic and therapeutic modalities available, but also appreciation of the importance of epidemiology and potential for prevention of Hematological disease.

Although Hematology is generally stereotyped and highly practical skill based medical specialty, with invasive and Laboratory skills as high-profile components of the workload, competence in other areas of practice such as clinical, pharmacology, special hematological laboratory works and Bone Marrow Transplantation are equally important. There is also a mandate to train physicians to assume care of patients with common hematological disorders such as thalassaemia and other hemolytic anaemia, hemophilia and other congenital and acquired bleeding disorders, diagnosis of common haemato-oncological patients.

Hematologists generally work as hospital based specialists and need to integrate their work with not only community based primary care colleagues but also other hospital based physicians. e.g. Medicine specialists, Neuro Medicine specialists, Physical Medicine specialists, Hepatologists, Diabetologists or Nephrologists, Nuclear Medicine, as well as
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working closely with Orthopedic and general Surgeons and Anaesthesiologists and with all other sub speciality of faculty of basic science and faculty of medicine.

1.2. Program overview:
Residents will undertake a three years intensive Phase-B training after completion of Phase A training in order to achieve the levels of knowledge, skills and expertise required for clinical practice in the field of Hematology. It is a competency based program emphasizing on meaningful integration and contextualization.

The two years Phase A training Program is designed to introduce and develop the broad range of core knowledge, skills, attitudes and behaviors required to become a competent physician. The knowledge and skills acquired during Phase A training are further focused and refined during phase B training, which is a 3 year specially specific training in Hematology. The teaching, learning and assessment of the curriculum is facilitated by the provision of comprehensive, educationally oriented supervision and support, which is provided to all trainees across both the phases of the Program.

2. Goals and objectives:

2.1. Goals
1. To prepare haematologist who would be able to meet and respond to the changing healthcare needs and expectation of the society.
2. To develop haematologist who posses knowledge, skills and attitudes that will ensure that they are competent to practice Haematological disorders, safely and effectively.
3. To ensure that they have appropriate foundation for lifelong learning and further training in their specialty.

4. To help them develop to be critical thinkers and problem solvers when managing heath problems in the community they serve.

2.2. Learning Objectives:
Residents of this training Program will be equipped to function effectively with in the current and emerging professional, medical and societal contexts. At the completion of the training Program in hematology, as defined by this curriculum, it is expected that a new hematologist will have developed the clinical skills and have acquired theoretical knowledge for competent hematologist practice.

The educational and training process aims to develop hematologist who:

- Can address all aspects of the healthcare needs of patients and their families
- Maintain the highest standards appropriate in their professional field
- Are aware of current thinking about ethical and legal issues
- Are able to act as safe independent practitioners whilst recognizing the limitation of their own expertise and are able to recognize their obligation to seek assistance of colleagues where appropriate.
- Are aware of the procedures and able to take appropriate action, when things go wrong, both in their own practice and in that of others.
- Will be honest and objective when assessing the performance of those they have supervised and trained.
- Can take advantage of information technology to enhance all aspects of patient care.
- Can develop management plans for the "Whole patient" and maintain knowledge in other areas of medicine which impinge on the specialty of Hematology.
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- Understand that more effective communication between them and their patients can lead to more effective treatment and care.

- Apply appropriate knowledge and skill in the diagnosis and management of patients.

- Establish a differential diagnosis for patients presenting with medical problems by the appropriate use of the clinical history, examination and investigations.

- Are competent to perform the core investigations and procedures required in their specialties.

- Develop clinical practice which is based on and analysis of relevant clinical trials and to have an understanding of their research methodologies.

- Are able to apply the knowledge of biological and behavioral sciences in clinical practice.

- Are able to identify and take responsibility for their own educational needs and the attainment of these needs.

- Have developed the skills of and effective teacher.

3. Admission Requirements for Phase B Training:

A. Residents who has successfully completed Phase A training and passed Phase A Final Examination are eligible for enrolment in the Phase B Program.

B. Candidates with FCPS/MD in Internal Medicine can be enrolled directly into Phase- B of the residency Program.

4. Content (Syllabus) outline: detail in section 11

The training is designed to develop both the generic and specialty specific attributes necessary to practice independently as a consultant Hematologists. The aim is to train individuals to provide the highest standard of service to patients with hematological disorders. This includes the development of positive attitudes towards lifelong learning and the ability to adopt to future technological advances and the changing expectations of society. In-depth specialty specific educational and training Program in this phase will make the resident competent and prepare them for the specialty qualification. It will provide educational Program covering the specialty of Hematology and its subspecialties, Biostatistics, Research Methodology and Medical Education along with rotation specific clinical training.

4.1. Educational Program: (May be organized into academic modules)

4.1.1. Applied basic medical science

- Applied basic medical science related to hematology.

4.1.2. Hematology syllabus

- The syllabus include the cardinal manifestations, definition, epidemiology, etiopathogenesis, genetics, clinical presentation, complications, differential diagnosis, investigations, treatment and prevention and prognosis of all haematological diseases. In addition the trainee should be well versed with all common and important pediatric haematological disease; it will also cover the recent advances that have occurred in the field of hematology.

4.1.3 Basic courses on: (to be satisfactory completed)

- Research Methodology
- Medical education
4.2. Phase B training rotation: (Annexure I)
Hematology specialty training comprises rotations in:

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<th>Specialty</th>
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<tr>
<td>Hematology inpatients</td>
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<td>Hematology Outpatients</td>
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<td>Hematology lab. And inpatients</td>
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<td>Transfusion Medicine</td>
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<td>Pediatric hematology</td>
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<td>Medical Oncology</td>
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<td>Critical care (ICU, pain clinic)</td>
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<td>Eligibility assessment and Phase B Final Exam</td>
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5. Teaching and learning Methods:
The bulk of learning occurs as a result of clinical experiences (experiential learning, on the job learning) and self directed study. The degree of self directed learning will increase as trainees became moral experienced. Teaching and learning occurs using several methods that range from formal didactic lectures to planned clinical experiences aspects covered will include knowledge, skills and practices relevant to the discipline in order to achieve specific learning outcomes and competencies. The theoretical part of the curriculum presents the current body of knowledge necessary for practice. This can be imparted using lectures, grand teaching rounds, clinicopathological meetings, morbidity/mortality review meetings, literature reviews and presentations, journal clubs, self directed learning, conferences and seminars.

6. Record of Training:
The evidence requires to confirm progress through training includes:

- Details of the training rotations, the training plan agreed with weekly timetables and duty rosters; and numbers of practical procedures and outcomes

- Confirmations of attendance at events in the educational Program, at departmental and inter-departmental meeting and other educational events.
- Confirmation (certificates) of attendance at subject-based/skills-training/instructional courses
- A properly completed logbook with entries capable of testifying to the training objectives which have been attained and the standard of performance achieved.
- CME activity
- Supervisor’s reports on Observed performance (in the workplace): of duties, practical procedures of presentations made and teaching activities, of advising and working with others, of standards of case notes, correspondence and communication with others.

6.1. Logbook:
Residents are requested to maintain a Logbook in which entries of academic Professional work done during the period of training should be made on a daily basis and signed by the supervisor. Completed and duty certified logbook will form a part of the application for appearing in Phase B Final Examination.

7. Research:
Development of research competencies forms an important part of the residency Program curriculum as they are an essential set of skills for effective clinical practice undertaking research helps to develop critical thinking and the ability to review medical literature. Every Resident shall carry out work on and assigned research project under the guidance of a recognized supervisor, the project shall be written and submitted in the from of a Thesis/Research Report.
8. Assessment:
The assessment for certification of the MD degree of the University is comprehensive, integrated and phase-centered attempting to identify attributes expected of specialists for independent practice and lifelong learning and covers cognitive, psychomotor and affective domains. It keeps strict reference to the components, the contents, the competencies and the criteria laid down in the curriculum. Assessment includes both Formative Assessment and Summative (Phase final) Examinations.

8.1. Formative Assessment:
Formative assessment will be conducted throughout the training phases. It will be carried out for tracking the progress of residents, providing feedback, and preparing them for final assessment (Phase completion exams).

There will be Continuous (day-to-day) and Periodic type of formative assessment.

- **Continuous (day-to-day)** formative assessment in classroom and workplace settings provides guide to a resident’s learning and a faculty’s teaching / learning strategies to ensure formative lesson / training outcomes.

- **Periodic formative assessment** is quasi-formal and is directed to assessing the outcome of a block placement or academic module completion. It is held at the end of Block Placement and Academic Module Completion. The contents of such examinations include Block Units of the Training Curriculum and Academic Module Units of the Academic Curriculum.

8.1.1. End of Block Assessment (EBA):
End of Block Assessment (EBA) is a periodic formative assessment and is undertaken after completion of each training block, assessing knowledge, skills and attitude of the residents. Components of EBA are written examination, structured clinical Assessment (SCA), medical record review, and logbook assessment. Unsatisfactory block training must be satisfactorily completed to be eligible for phase final examination.

8.1.2. Formative assessment for Academic modules for Biostatistics and Research Methodology and Medical Education to be done in the first nine months of Phase B training. Residents getting unsatisfactory grade must achieve satisfactory grade by appearing the re-evaluation examination to be eligible for the Phase B Final Examination.

8.2. Summative Examination:
Assessment will be done in two broad compartments.

a) **Compartment A**: Consist of 3 (three) components.
   1. Written Examination (Consisting of 2 papers).
   2. Clinical Examination (One long and four short cases).
   3. SCA and Oral (10 stations SCA, Oral one board consisting of 2 examiners).

   Every Resident must pass all the 3 components of compartment-A separately. Candidates will be declared failed if he/she fails in one or more component(s) of the examination. He/she then have to appear all the 3 components in the next Phase B Final Examination.

b) **Compartment B**: Thesis and Thesis defense.
8.2.1. Written Examination:
Two Papers: Contents of written papers listed in Annexure II

**Question type and marks:**
- Two Papers (Paper I and Paper II); 100 marks each; Time 3 hrs for each paper. Pass marks-60% of total of 2 papers.
- Each paper will consist of Two Groups:
  - **Group A:**
    - 10 short questions (5 marks each)
    - These will assess the knowledge of different level and its application
  - **Group B:**
    - 5 scenario based problem solving questions (10 marks for each).
    - The questions should focus to assess the capability of handling clinical problem independently and comprehensively as a specialist.
    - Suggested format:
      - A scenario followed by question(s).
      - Questions may include diagnosis, differential diagnosis, investigation plan, treatment, follow up and patient education.

8.2.2. Clinical Examination: Long case and Short case:
- There will be one long case and four short cases.

**i) Long case: Marks-100**
- Directly observed
- Two examiners for each examinee.
- History taking and examination by the examinee – 30 min.
- Discussion on the case 20 min.(presentation 6 min, crossing 6x2 min and decision 2 min).

**ii) Short cases : Marks-100**
- Four in number
- Time 20-30 min. (Time will be equally divided for each short case)
- Crossing should be done with proper weightage on different segment of clinical skills.

**iii) Pass marks: 60% of total of Long and Short Cases**

8.2.3. Structured Clinical Assessment (SCA): Marks-100
- 10 stations : 5 min each

8.2.4. Oral Examination: Marks-100
- One board consisting of 2 examiners.
- 20 minutes (9+9+2).

8.2.5. Pass marks in SCA and Oral: 60% of total (SCA and Oral.)

8.3. Thesis Evaluation:
- Marks: Thesis writing-200; Defense-100: Marks for acceptane-60% of total.
- To be evaluated by 3 (three) evaluators:- 2 subject specialists and one academician preferably involve in research and teaching research methodology.
- Among the subject specialists one should be external.
- Evaluators should be in the rank of Professor/Associate Professor.
- Supervisor will attend the defense as an observer and may interact only when requested by the evaluators.
- Thesis must be submitted to the controller of Exam not later than 27 months of enrolment in Phase-B.
- Thesis must be sent to the evaluators 2 (Two) weeks prior to assessment date.
- Evaluation will cover Thesis writing and its defense.
- For thesis writing evaluator will mark on its structure, content, flow, scientific value, cohesion, etc.
- For defense – Candidate is expected to defend, justify and relate the work and its findings.
- Assessment must be completed in next 3 months.
- Outcome of the assessment shall be in 4 categories – "Accepted", "Accepted with minor correction", "Accepted with major correction" and "Not Accepted".

8.3.1. Description of terms:
- **Accepted**: Assessors will sign the document and resident will bound it and submit to the Controller of Examinations by 10 days of the examination.
- **Accepted with minor correction**: Minor correction shall include small inclusion/exclusion of section; identified missing references, correction of references and typographical and language problem. This should be corrected and submitted within 2 weeks.
- **Accepted with major correction**: Task is completed as per protocol with acceptable method but some re-analysis of result and corresponding discussion are to be modified.
- To be corrected, confirmed by Supervisor and submit within 3 (Three) weeks.
- **Not Accepted**: When work is not done as per protocol or method was faulty or requires further inclusion or confirmation of study.

- To complete the suggested deficiencies and reappear in defense examination during its next Phase Final Examination.
- Candidate has to submit his/her thesis and sit for examination and pay usual examination fees for the examination.

8.3.2. Residents must submit and appear Thesis defense at notified date and time. However non-acceptance of the Thesis does not bar the resident in appearing the written, clinical and oral exam.

8.4. Qualifying for MD/MS Degree:
On passing both the compartments, the candidate will be conferred the degree of MD/MS in the respective discipline. If any candidate fails in one compartment he/she will appear in that compartment only in the subsequent Phase-B exam.

9. Supervision and training Monitoring:
Training should incorporate the principle of gradually increasing responsibility, and provide each trainee with a sufficient scope; volume and variety of experience in a range of setting that include inpatients, outpatients, emergency and intensive care. All elements of work in training rotation must be supervised with the level of supervision varying depending on the experience of the trainee and the clinical exposure. Outpatient and referral supervision must routinely include the opportunity to personally discuss all cases. As training progresses the trainee should have the opportunity for increasing autonomy, consistent with safe and effective care for the patient. Trainees will at all times have a named Supervisor, responsible for overseeing their education.
Supervisors are responsible for supervision of learning throughout the program to ensure patient and/or laboratory safety, service delivery as well as the progress of the resident with learning and performance. They set the lesson plans based on the curriculum, undertake appraisal, review progress against the curriculum, give feedback on both formative and summative assessments as well as sign the logbook and portfolio. The residents are made aware of their limitations and are encouraged to seek advice and receive help at all times.

The course coordinator of each department coordinates all training and academic activities of the Program in collaboration with the Course Manager. The course Director of each faculty directs guides and manages curricular activities under his/her jurisdiction and is the person to be reported to for all events and performances of the residents and the supervisors.

10. Curriculum Implementation, Review and updating:
Both Supervisors and residents are expected to have a good knowledge of the curriculum and should use it as a guide for their training Program.

Since Hematology has historically been rapidly changing specially the need for review and up-dating of curriculum is evident. The Curriculum is specifically designed to guide an educational process and will continue to be the subject of active redrafting, to reflect changes in both Hematology and educational theory and practice. Residents and Supervisors are encouraged to discuss the curriculum and to feedback on content and issue regarding implementation at Residency course Director. Review will be time tabled to occur annually for any minor changes to the curriculum. The Curriculum will be reviewed with input from the various subspecialties of hematology.

11. Detail Content of Learning (The Syllabus):
The educational process in Hematological disorder aims to provide basic knowledge, intellectual, clinical and transferable skills to produce competent specialists in hematology. These specialists will be capable of providing specialized care of the highest order to patients with hematological disorders in the community as well as clinical tertiary centers. They will recognize the health needs of the community and carry out professional obligations ethically and keeping their standards by engaging in continuing medical education. The Program also aims to introduce the candidate to the basics of scientific medical research.

Block-1
- Collection and handling of blood
- Biohazard precautions
- Standardized procedure
- Venous Blood
- Capillary Blood

Blood film preparation
Differences between capillary and venous blood, Serum & plasma
Anticoagulants
Effects of storage on the blood count
Effects of storage on blood cell morphology
Basic hematological techniques
Haemoglobinometry
Haemiglobincyanide method
Oxyhaemoglobin method
Packed cell volume or haematocrit
Microhaematocrit method
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Preparation and staining methods for blood and bone marrow films/smears
- Preparation of blood films on slides
  Manual method
  Automated methods
Labeling blood films
Fixing blood films
Bone marrow smears

Staining blood and bone marrow films/smears.
Preparation of solutions of Romanowsky dyes

Staining methods
May-Grünwald-Giemsa stain
Standardized Romanowsky stain
Automated staining
Rapid staining method

Separation and concentration of blood cells
Preparation buffy coat
Clinical importance of buffy coat

Parasites detectable in blood, bone marrow, or splenic aspirates
Examination of blood films for parasites
Making thick films
Staining thick films
Staining thin/thick films for parasites
Leishman’s stain

Malaria
Leishmaniasis
Diagnosis of leishmaniasis in the hematology laboratory

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Blood cell morphology in health and diseases
Examination of blood films
Red cell morphology
  - Anisocytosis and poikilocytosis
  - Microcytes
  - Basophilic Stippling
Inadequate haemoglobin formation
Hypochromasia
Anisochromasia and dimorphic red cell population
Hyperchromasia
Spherocytosis
Irregularly contracted red cells
Elliptocytosis and ovalocytosis

Spiculated cells and red cell fragmentation
Schistocytes
Keratocytes
Acanthocytes
Echinocytes

Miscellaneous erythrocyte abnormalities
Leptocytes
Target cells
Stomatocytes
Sickle cells
Erythrocyte inclusions
Pappenheimer bodies
Rouleaux and autoagglutination

Changes associated with a compensatory increase in erythropoiesis
Polychromasia
Erythroblasts
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Morphology of Leucocytes
Polymorphonuclear leucocytes
Granules
Vacuoles
Bacteria
Do¨hle bodies
Nuclei
Hypersegmentation
Pelger-Hu¨et cells
Eosinophils
Basophils
Monocytes
Lymphocytes
Platelet morphology
Identification of artifact

Investigation of abnormal hemoglobin's and thalassaemia

Erythrocyte cytochemistry
-Siderocytes and sideroblasts
-Haemoglobin derivatives

Leucocyte cytochemistry
Myeloperoxidase
Sudan black B
Neutrophil alkaline phosphatase
PAS
Acid phosphatase reaction
Esterases
Naphthol AS-D chloroacetate esterase

Immunophenotyping
Methods for the study of immunological markers
Preparation of the specimens and cell separation

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Detection of membrane antigens
Detection of surface immunoglobulin
Detection of intracellular antigens
Quantification of antigens
Immunocytochemistry
Immunoperoxidase
Immunological markers in acute leukaemia
Immunological markers in chronic lymphoproliferative disorders
Immunological markers for the detection of minimal residual disease

Block-2
Investigation of haemostasis
Principles of laboratory analysis
Preanalytical variables including sample collection
Calibration and quality control
Performance of coagulation tests
Prothrombin time
Activated partial thromboplastin time
Measurement of fibrinogen
-Correction tests using the thrombin time
Investigation of a bleeding disorder resulting from a coagulation factor deficiency or defect
General principles of parallel line bioassays of coagulation factors
Investigation of a patient with a circulating anticoagulant (inhibitor)
Circulating inhibitor (anticoagulant) screen based on the APTT
Quantitative measurement of factor VIII:C inhibitors
Investigation of a patient suspected of afibrinogenaemia, hypofibrinogenaemia, or dysfibrinogenaemia
Fibrinogen estimation (dry clot weight)
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Investigation of the vascular disorders of haemostasis
Bleeding time
Standardised template method
Investigation of suspected von Willebrand's disease
Investigation of a suspected disorder of platelet function, inherent or acquired
Laboratory investigation of platelets and platelet function
Platelet aggregation
Detection of fibrinogen/fibrin degradation products using a latex agglutination method
Screening tests for fibrin monomers
Detection of crosslinked fibrin D-dimers latex agglutination method
Haemoglobin & protein electrophoresis.
Immunofixation /Immunodisplacement
Cytogenetic
Osmotic fragility test
Ham's test
Sickling test
Clot retraction
Reticulocyte count
Urine iron stain
Bone marrow iron stain
CSF study.

Block-3

A. Applied Basic Medical Sciences: (Scientific Basis of Hematology).
I. Basic Principles in Hematology.
- Apply clinical skills to diagnose and update management of Hematological disorders.
II. Basic and advanced Life Support
1. Perform and supervise the resuscitation of hypovolemic shock, hyper leucostasis, electrolyte imbalance.

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B. Presentations and Manifestations of Hematological Disease
1. Approach to a patients presenting with splenomegaly.
2. Approach to a patients presenting with lymphadenopathy.
3. Evaluation of patients with unexplained anemia.
4. Assess and treat patients with high hemoglobin, WBC and Platelet.
5. Assess and treat patients with bicytopenia.
6. Assess and treat patients with easy bruising.
7. Assess and treat patients with raised ESR, serum or urine paraproteinaemia.
8. Assess and treat patients with spinal cord compression.

Block-4

Diagnosis and treatment of patients with:
1. Hemoglobin disorders (hemoglobinopathies, thalassemia syndromes)
2. Iron overload.
4. Sickle cell diseases.
5. Acquired hemolytic anaemias.
6. Paroxysmal nocturnal haemoglobinuria.
7. Aplastic anaemia (Inherited and acquired )

Block-5

A). Diagnosis and treatment of patients with:
1. Acute myeloid leukaemia.
2. Acute lymphoid leukaemia
3. Chronic myeloid leukaemia
4. Chronic lymphocytic leukaemia.
5. Myelodysplastic syndrome.
6. Patients with myeloma.
7. Lymphoma.
8. Myeloproliferative disorders.

B).
1. Assess and treat patients with bleeding disorders (Inherited and acquired)
2. Assess and treat patients with coagulation disorders (Inherited and acquired)
3. Assess and treat patients with venous thrombosis.
4. Assess and treat patients with platelet disorders.

Block-6
Haematological changes and management in systemic disease
1. Assessment and treatment of hematological disorders with rheumatologic disease.
2. Assess and treat patients with hematological disorder with renal disease.
3. Assess and treat patients with hematological disorder in liver disease.
4. Assess and treat patients with hematological disorder in endocrine disorders.
5. Assess and treat patients with infections in hematological diseases.

7. Assess and treat hematological disease in patients who are pregnant or planning to be pregnant.
8. Assess and manage hematological disorders in geriatric patients
10. Assess and treat patients with risk factors for thromboembolism.
11. Assess and treat patients with DIC.
12. Uses of anticoagulants and follow-up in different conditions.
# Residency Program

## Hematology

### Annexure 1:
**Clinical Training Rotations:**

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27
### Annexure 2:
**Contents of Written Papers**

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*February, 2014*