الهيئة السعودية للتخصصات الصحية
Saudi Commission for Health Specialties

Hematology Fellowship

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PREFACE

The primary goal of this document is to outline the learning objectives for postgraduate trainees to enrich their training experience and help them become independent and competent future practitioners.

This curriculum contains sections outlining some regulations on training, but those regulations are also available as part of the "General Bylaws" and "Executive Policies" published by the Saudi Commission for Health Specialties (SCFHS), which can be accessed online through the official SCFHS website. In the event of any discrepancy in the content of the regulations, the provisions in the most updated bylaws and executive policies shall prevail.

As this curriculum is subject to periodic refinements, please refer to the electronic version posted online at www.scfhs.org.sa for the most updated edition.

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FOREWORD

The Fellowship Curriculum Development Team acknowledges the valuable contributions and feedback of the Scientific Committee members in the development of this program. We extend our special appreciation and gratitude to all the members who have been pivotal in the completion of this booklet, especially the Curriculum Group, the Curriculum Specialists, and the Scientific Committee. We would also like to acknowledge that the CanMEDS framework is a copyright of the Royal College of Physicians and Surgeons of Canada, and that the descriptions of many of the competencies have been borrowed from their resources.

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1 INTRODUCTION

Context of Practice

Hematology is a branch of internal medicine that focuses on the care of patients with benign and malignant disorders of the blood, bone marrow, and the lymphatic system, as well as disorders of hemostasis. According to the 2016 Saudi Cancer Registry report, lymphoma was the fourth most common cancer among adults, while leukemia ranked ninth (1). These numbers are increasing steadily in tandem with the growing Saudi population (2). While the exact burden of hematological malignancies in our region has not been studied extensively, it is well known worldwide that hematological malignancies have a huge impact on health care systems and require highly trained hematologists to deal with short- and long-term complications (3,4). Furthermore, the Kingdom of Saudi Arabia is known to have a high prevalence of sickle cell disease and β-thalassemia at around 2.6% and 0.07%, respectively, which is set to rise as a consequence of improved survival rates over the past decades with the advancement of supportive measures during childhood (5,6). Recent data have shown the magnitude of the economic burden of non-malignant hematological disorders and their impact on health care resources (7). Care of patients with chronic benign hematologic conditions, such as sickle cell disease, hemophilia, and congenital thrombophilia, has become more complex, with few hematologists available to administer care. Thus, there is a need to train physicians to care for patients with common benign hematologic disorders. The Adult Hematology Fellowship Program provides trainees with all the necessary skills for the acquisition of the Saudi Specialty Certificate in Adult Hematology, after which a trainee will be capable of handling all types of blood disorders with a good understanding of the related social, economic, and environmental aspects. The SCFHS-accredited Adult Hematology Fellowship Program started as a single national program in 2009 and involved rotations in different hospitals. Currently, the program is fully or partially accredited at

12 academic centers and institutions across the country, with a total of 47 trainees graduated in 2019.

The hematology fellowship is an intensive program of clinical and didactic education that focuses on the multidisciplinary care of hematology patients. It covers the care of patients with hematologic malignancies, such as leukemia, lymphoma, and myeloma, as well as immunodeficiency-related lymphoproliferative disorders. In addition, it includes the care of patients with acute and chronic benign (acquired and inherited) hematological disorders. The training will also cover the care of patients undergoing bone marrow transplantation and, to a lesser extent, other forms of cellular therapy and gene therapy such as chimeric antigen receptor T-cell therapy. Training will mostly be in outpatient and inpatient settings, while also including laboratory rotations that focus on hematopathology and microscopy skills. In addition, there is scope for research activities to meet SCFHS requirements that future physicians be skilled in research and the application of evidence-based medicine.

This curriculum defines the overall goals and objectives, learning content, and assessment process for adult hematology training leading to the award of the Saudi Specialty Certificate in Adult Hematology. The purpose of the hematology curriculum is to produce highly trained physicians with professional and hematology-specific competencies in the areas of knowledge, skills, and attitude that are needed to work as hematology experts.

Goals and Responsibilities of Curriculum Implementation

This curriculum ultimately seeks to guide trainees to become competent in their respective specialties. Accordingly, achieving this goal requires a significant amount of effort and coordination from all stakeholders involved in postgraduate training. As “adult learners,” trainees must be proactive, fully engaged in the process, and exhibit the following characteristics: a careful understanding of the learning objectives, self-directed learning, problem solving ability, an eagerness to apply learning by means of reflective practice

based on feedback and formative assessment, and self-awareness and willingness to ask for support when needed. The program director plays a vital role in ensuring the successful implementation of this curriculum. Moreover, training committee members, particularly the program administrator and chief fellow, have a significant impact on program implementation. Trainees should be called upon to share responsibility in curriculum implementation. The Saudi Commission for Health Specialties (SCFHS) applies the best models of training governance to achieve the highest quality of training. Additionally, academic affairs at the training centers and the regional supervisory training committee play a major role in training supervision and implementation. The Adult Hematology Scientific Committee will guarantee that the content of this curriculum is constantly updated to match the highest standards in postgraduate education.

What is new in this edition?

The major driver for changing the hematology curriculum was the SCFHS revision of the curricula and assessment standards and introduction of the CanMEDS framework by the Royal College of Physicians and Surgeons of Canada (8). The SCFHS mandates that all postgraduate curricula be based on advanced learning outcomes and incorporate competency-based education. We adopted the Hematology CanMEDS competency framework to the curriculum's overall competency-based goals and objectives, as well as specific objectives for each rotation. This will allow fellows to acquire the knowledge, skills, and attitude needed for effective patient-centered care. The core topics of the curriculum and some of the rotation objectives were adapted from the Curriculum for Training in Adult Benign Hematology produced by the American Society of Hematology (ASH) (9).

Delivering training to future hematologists is becoming more challenging, particularly due to an expanding curriculum, limited training time, and faculty shortages. Recent therapeutic advances in the management of hematological disorders have resulted in the need for more specialized hematology clinics to manage and coordinate the delivery of such therapeutic advances. This, however, will likely jeopardize precious training time as trainees would be

learning about rare conditions in very specialized clinics, an experience that is not likely to benefit them in the long term as most of these cases will end up in a tertiary referral center. Thus, the new rotation program in the updated curriculum provides more exposure to common hematological disorders by minimizing bone marrow transplantation (BMT) rotations and adding rotations for common important disorders in the hematology field, such as thrombosis and lymphoma. Due to proliferative clinical knowledge and guidelines in hematology, laboratory training has been reduced to 3 months and replaced with additional inpatient and outpatient rotations. In addition, dedicated research rotation has been added to facilitate in-depth research experience with more protected time.

Finally, training future hematologists is a privilege and honor. The success of training programs depends on the self-motivated engagement of trainers and trainees, assisted by close supervision and advance planning by all stakeholders. We hope that this updated hematology curriculum serves the purpose of cultivating future hematologists and filling the gaps in hematology training.

References

(1) SCR. Saudi Cancer Registry, Cancer Incidence Report 2016. National Health Information Center

(2) Bawazir A, Al-Zamel N, Amen A, Akiel MA, Alhawiti NM, Alshehri A. The burden of leukemia in the Kingdom of Saudi Arabia: 15 years period (1999–2013). BMC Cancer. Jul 17, 2019; 19(1):703.

(3) Liou SY, Stephens JM, Carpiuc KT, Feng W, Botteman MF, Hay JW. Economic burden of haematological adverse effects in cancer patients: a systematic review. Clin Drug Investig. 2007; 27(6):381–96.

(4) Burns R, Leal J, Sullivan R, Luengo-Fernandez R. Economic burden of malignant blood disorders across Europe: a population-based cost analysis. Lancet Haematol. Aug 2016; 3(8):e362–70.

(5) Jastaniah W. Epidemiology of sickle cell disease in Saudi Arabia. Ann Saudi Med. May–Jun 2011; 31(3):289–93.

(6) Memish ZA, Owaidah TM, Saeedi MY. Marked regional variations in the

prevalence of sickle cell disease and β-thalassemia in Saudi Arabia: findings from the premarital screening and genetic counseling program. J Epidemiol Glob Health. Dec 2011; 1(1):61–8.

(7) Luengo-Fernandez R, Burns R, Leal J. Economic burden of non-malignant blood disorders across Europe: a population-based cost study. Lancet Haematol. Aug 2016; 3(8):e371–8.

(8) Frank JR, Snell L, Sherbino J, editors. CanMEDS 2015 Physician Competency Framework. Ottawa: Royal College of Physicians and Surgeons of Canada; 2015.

(9) Abshire TC. Curriculum for Training in Adult Benign Hematology produced by the American Society of Hematology Committee on Training Programs.

2 ABBREVIATIONS USED IN THIS DOCUMENT

Abbreviation	Description
SCFHS	Saudi Commission for Health Specialties
BMT	Bone Marrow Transplantation
F1	First Year of Fellowship
F2	Second Year of Fellowship
GVHD	Graft Versus Host Disease
CAR	Chimeric Antigen Receptor
HLA	Human Leukocyte Antigen
FISH	Fluorescence In Situ Hybridization
PCR	Polymerase Chain Reaction
RBC	Red Blood Cell
HIT	Heparin-Induced Thrombocytopenia
VWF	Von Willebrand Factor
ITER	In-Training Evaluation Report
FITER	Final In-Training Evaluation Report
SOE	Structured Oral Examinations
ASH	American Society of Hematology

3 PROGRAM ENTRY REQUIREMENTS

3.1 Admission Criteria

1. Holder of Saudi Board Certificate in Internal Medicine or its equivalent as per SCFHS regulation
2. A letter from the sponsoring organization approving the candidate for full-time training for the entire period of the program
3. Passing an interview
4. Registration with the SCFHS for the subspecialty training program in Adult Hematology

3.2 Training Requirements

1. Training is a full-time commitment. Trainees shall be enrolled in continuous full-time training for the entire period of the program.
2. Training is to be conducted at institutions accredited by the SCFHS.
3. Training shall be comprehensive and include inpatient, ambulatory, and emergency management.
4. Trainees shall be actively involved in patient care with a gradual increase in responsibility.
5. Trainees shall abide by the training regulations and obligations set by the SCFHS.
6. During on-call duty, trainees are expected to reside in an area reachable by the paging system of the concerned hospital.

4 HEMATOLOGY TRAINING PROGRAM OBJECTIVES

4.1 Goals

A. To produce adult hematologists with adequate knowledge, skills, and attitude to cope efficiently with relevant health problems of patients with blood disorders
B. To train fellows to become self-disciplined and self-dependent learners, and to provide an educational environment that will promote the highest health care standards
C. To train fellows to perform research and to emphasize a research-oriented approach to new problems
D. To produce adult hematologists of internationally acceptable standards
E. To make trainees realize the importance of a team approach to medical problems

4.2 Hematology Competencies

The Adult Hematology Fellowship Program incorporates the CanMEDS Core Competencies into all aspects of the educational, clinical, and research curriculum and evaluation process (See Appendix A).

5 STRUCTURE OF TRAINING PROGRAM

The Adult Hematology Fellowship Program provides a structure within which fellows can develop clinical competence in the field of hematology. It is a two-year training program divided into clinical (inpatient and outpatient) rotations, laboratory-based training, and research activities. In addition, as part of the training experience, fellows will cover on-call night duties and weekend rounds. Fellows will also participate in patient care conferences and didactic lectures on a weekly basis. By the end of the training, fellows will acquire a significant amount of knowledge and skills and develop the attitude needed to be independent and competent hematologists.

5.1 Training Curriculum

5.1.1 Training Rotations

Table 5-1 Clinical and laboratory rotation

Rotation	First-year fellow	Second-year fellow
Consultative Hematology	2 months	3 months
Inpatient Hematology	3 months	2 months
Bone Marrow Transplantation (BMT)		2 months
Hematopathology	1 month	1 month
Laboratory Medicine (Blood Bank and Coagulation Laboratory)[1]	1 month	
Thrombosis	1 month	
Pediatric Hematology	1 month	
Lymphoma		1 month
Palliative care and radiation oncology[2]		1 month
Research	1 month	
Elective rotation	1 month	1 month
Leave	4 weeks	4 weeks

1 The rotation schedule is divided equally between blood bank and coagulation laboratory.

2 The rotation schedule is divided equally between palliative care and radiation oncology.

The purpose of the first fellowship year is to introduce fellows to laboratory and clinical hematology. They will rotate in the hematology laboratory in the first year of their fellowship in order to be able to read and familiarize themselves with the interpretation of peripheral and bone marrow smears early in their training. During the clinical hematology rotations, they will be in immediate contact with patients and learn how to deal with the problems associated with patient care on a one-to-one basis in conjunction with the senior fellow/assistant supervised by the attending hematologist. This is to allow first-hand exposure to blood disorders and introduce fellows to the special care and needs of patients to help them gain experience in tackling various problems associated with these patients.

Year 3 (Optional)

Fellows interested in extending their training for one more year in research or in certain areas of interest in clinical hematology may do so after obtaining approval from the reference employer in accordance with the SCFHS regulations.

5.1.2 Continuity Clinic

Continuity clinics are an important aspect of the training curriculum and outpatient care exposure. Fellows will undertake longitudinal follow-up of

patients with hematologic malignancies as well as those with non-malignant hematologic disorders. Fellows are expected to have one half-day continuity clinic designed as per the local institutional training committee; this clinic can be replaced by the BMT clinic during the BMT rotation. Fellows will take one extra half-day clinic during non-clinical rotations, including elective rotation. There must be at least one faculty member present in outpatient clinics for the supervision of fellows during the outpatient sessions.

The following are the objectives of the continuity clinic:

1. Develop growing responsibility for the direct management of patients in the outpatient setting, such as writing chemotherapy orders in a supervised environment and working with nursing staff and clinical coordinators to arrange diagnostic tests and imaging studies needed in follow-up.
2. Enroll both malignant and benign hematology patients for whom fellows can provide care under the supervision of a consultant.
3. Learn how to manage certain chronic hematologic disorders (e.g., hemophilia and hemoglobinopathies)
4. Communicate effectively with patients and families to create and sustain professional and therapeutic relationships with people from a broad range of socioeconomic and cultural backgrounds
5. Effectively present the status of continuity clinic patients and review of chart documentation to the supervising consultant.
6. Continually demonstrate accountability to all patients and the health care team

5.1.3 Research Activities

Fellows will be required to participate in specific research projects that might have an impact on the quality of their future practice. They will be involved in designing research protocols, writing clinical protocols, obtaining regulatory approval for the study, performing data collection and analysis, and coordinating their research project. They should learn how to write abstracts for presentations at local, national, and international scientific meetings, and acquire the skills to draft manuscripts under the guidance of hematology staff

for submission and presentation to national and international journals. Fellows will be invited to participate on a regular basis in academic activities within the section and department. Individualized clinical research projects tailored to a fellow's interests and career path with a specified mentor will be undertaken within the first few months of the first year of the fellowship program (ideally, a letter of intent should be submitted to the Research Committee within the first 4–6 months of the fellowship). Fellows are expected to meet with their mentors every month to provide an update on the progress of their research. The Fellowship Program should establish the Research Committee comprising independent investigators who may periodically monitor and guide fellows in the attainment of their research goals. Fellows should submit a progress report to the Research Committee every 6 months.

5.1.4 On-Call Duties

Fellows will be assigned to on-call night and weekend duties to provide them with more opportunities to gain clinical experience and enable them to take greater responsibility for patient care. Fellows are expected to take around five on-calls (including a weekend call) per month at the hospital in which they rotate. On-calls will be at-home calls, in addition to the weekend hospital round.

5.1.5 Other Training Activities and Clinical Responsibilities

Fellows will, on a daily basis, be engaged in holding educational discussions, reviewing treatment protocols, critically analyzing the literature, and synthesizing information. They will regularly attend scheduled semi-didactic sessions in which basic disciplines such as laboratory medicine, pathology, blood banking, radiology, molecular genetics, immunology, biostatistics, and others are discussed. Fellows are expected to attend regular clinical sessions and ward rounds to actively discuss the management of both outpatient and inpatient issues. Fellows will assist in the supervision of medical residents and students during their rotations in hematology.

5.1.6 Mentorship

Mentorship is a critical component of training. Each trainee shall be assigned a career mentor at the beginning of training, and they may make a request to change mentors during the progression of training.

5.1.7. Leaves

Regulations governing leaves are as per SCFHS policy, and the local training committee suggests the leave schedule for each fellow. However, fellows have a grace period of two months (November–December, the preceding year) to request leaves on specific dates. A request for any unplanned long leaves (e.g., emergency or maternity) have to be made to the program director, and the matter needs to be discussed with the members of the local training committee to enable them to organize the rotation schedule. Fellows can have 4 weeks leave per year and a maximum of 10 days for Eid. Educational leave is also allowed.

Educational leave is permitted for the purposes of attending/making poster or oral presentations at any local or overseas hematology conference such as the following:

1. American Society of Hematology (ASH) Annual Meeting
2. International Society on Thrombosis and Hemostasis Congress
3. European Society for Blood and Marrow Transplantation Conference
4. American Society for Transplantation and Cellular Therapy Conference
5. European Hematology Association Annual Meeting
6. Hemophilic Congress
7. Lugano Lymphoma Conference

5.2 Goals and Objectives of Core Rotations

5.2.1 Consultative Hematology

Fellow Level:	Duration:
F1	2 Months

F2 3 Months

General Description:

Consultative hematology rotation provides fellows with a vital educational experience covering a variety of medical and surgical patients. It gives fellows a broad experience in both benign and malignant hematologic disorders. Cases expected to be the subject of consultation include undiagnosed cytopenias, hemoglobinopathies, hemorrhagic and thrombophilic states, transfusion-related issues, anemias, platelet-related disorders, hematologic manifestations of infections, such as human immunodeficiency virus, and perioperative management of patients with a variety of blood disorders, including sickle cell anemia, coagulopathies, and thrombocytopenia. Fellows are expected to contribute to the teaching of residents through rotations with them. Fellows will participate in bone marrow biopsies and aspiration, plasmapheresis, leukoreduction, and transfusion medicine support. They are also expected to review and interpret peripheral blood smears, coagulation testing, and bone marrow aspiration and biopsy.

Core Competencies:

Physician Role	Objectives
Medical expert	1. Demonstrate effective, appropriate, and timely consultation with another health professional for optimal patient care 2. Obtain hematology-specific history from the patient and family members 3. Perform a complete hematology-specific physical examination 4. Formulate an appropriate differential diagnosis related to a suspected hematologic disorder 5. Utilize available diagnostic tools related to hematology in a cost-effective way 6. Develop and provide the rationale for a management plan for patients with hematologic disorders 7. Understand the hospital management and provide appropriate consultation for patients with bleeding disorders, thrombosis, anemia, and platelet and white blood cell disorders 8. Provide appropriate diagnostic evaluation and management of the complications of sickle cell disease such as vaso-occlusive crisis, acute chest syndrome, priapism, and stroke, and handle perioperative management

Physician Role	Objectives
	9. Recognize the indications for and the risks of the following therapies in the inpatient setting and develop an appropriate management plan for their common complications: a. Blood product transfusion b. Exchange transfusion therapy c. Factor replacement therapy d. Anti-coagulation therapy e. Therapeutic plasma exchange f. Leukapheresis procedure 10. Recognize the indications and manage the complications of the following procedures: a. Bone marrow aspiration and biopsy b. Intrathecal chemotherapy 11. Develop the skills needed to interpret peripheral blood smears, bone marrow aspirations and biopsies, as well as basic and advanced tests of thrombosis and hemostasis 12. Recognize the impact of benign blood disorders on the management of other medical and surgical conditions 13. Recognize the impact of pregnancy on blood disorders and vice-versa 14. Distinguish between patients who need treatment in the inpatient unit and those who can be managed in the outpatient setting 15. Recognize and manage acutely ill patients and make appropriate transfers to the intensive care unit 16. Demonstrate knowledge of the following conditions: a. Bone marrow failure syndromes b. Iron disorders and anemia of inflammation c. Megaloblastic anemia d. Storage disorders e. Immunodeficiency disorders f. Red cell membrane defects g. Hemoglobinopathies h. Microangiopathic hemolytic anemia i. Erythrocytosis, porphyria, and hemochromatosis j. Disorders of platelets k. Acquired and congenital hemostatic defects l. Thrombophilia and thrombosis m. Neutrophil disorders

Physician Role	Objectives
Communicator	1. Communicate effectively and in an appropriate and professional manner with patients and families to create and sustain an ethical therapeutic relationship 2. Obtain informed consent for the performance of procedures 3. Communicate effectively with other members of the consult service and members of the referring service 4. Demonstrate safe handover of care, using both verbal and written communication, during patient transition to a different health care professional, setting, or stage of care. 5. Maintain timely comprehensive medical records
Collaborator	1. Establish and maintain positive professional relationships with other members of the consult service and members of the referring service 2. Work with other members of the consult service and members of the referring service to address and negotiate overlapping and shared responsibilities 3. Engage in respectful and shared decision-making with other members of the consult service and members of the referring service 4. Work with others to implement strategies to promote understanding, manage differences, and prevent and resolve conflicts in a manner that supports a collaborative culture 5. Work with others to determine when care should be transferred to another health care professional
Manager	1. Demonstrate leadership skills to enhance consult service dynamics 2. Effectively conduct triage consultation and prioritize cases based on the nature of consultation 3. Employ information technology to improve the quality of patient care and optimize patient safety 4. Analyze patient safety incidents to enhance the patient care system 5. Apply evidence and management guidelines related to clinical and laboratory hematology to achieve cost-effective care
Healthcare advocate	1. Identify opportunities for advocacy, health promotion, and disease prevention for individuals with blood disorders, including promotion of thromboprophylaxis and blood product safety 2. Recognize the psycho-social implications and the impact of blood disorders, especially sickle cell disease, thalassemia, and hemophilia, on patients and their families, and work effectively with other health care professionals and social workers to address their needs

Physician Role	Objectives
Scholar	1. Present new cases to consult service members with a detailed literature review of the management plan and utilize feedback from this experience to improve future presentations 2. Engage in the education of patients, families, medical students, and other health professionals 3. Identify gaps in knowledge and opportunities for improvement 4. Demonstrate understanding of principles of critical appraisal through effective utilization of educational and evidence-based resources to seek answers to scientific and clinical questions
Professional	1. Exhibit appropriate professional behaviors and relationships in all aspects of practice, demonstrating honesty, integrity, humility, commitment, compassion, respect, altruism, and respect for diversity and confidentiality 2. Demonstrate a commitment to excellence and ongoing professional development by being prepared for patient care rounds, demonstrating punctuality, dressing in appropriate attire, and contributing in rounds, teaching activities, and didactic lectures 3. Demonstrate advocacy for patients and their families

5.2.2 Inpatient Hematology

Fellow Level:	Duration:
F1	3 Months
F2	2 Months

General Description:

During this rotation, fellows will further expand their competence in internal medicine and hematology. They will gain experience in the implementation of efficient diagnostic evaluation and rational expansion of differential diagnoses with correct interpretation of laboratory and diagnostic imaging tests performed on patients with blood diseases. They will acquire hands-on experience and knowledge in the clinical manifestations, diagnostic modalities, and management of acute leukemia and other hematologic malignancies, bone marrow failure syndromes, and other complicated hematological disorders. Fellows will be responsible for their assigned patients and present their patients during the weekday round to the hematology consultant covering the service. Fellows on this rotation will be

responsible for all procedures related to the diagnosis and treatment of these patients, such as chemotherapy prescription and monitoring, bone marrow biopsies, and intrathecal chemotherapies. Fellows will engage in clinical teaching and participate in decision making with other hematology team members covering the service, including residents and students.

Core Competencies:

Physician Role	Objectives
Medical expert	1. Demonstrate effective, appropriate, and timely patient care, including the following: a. Evaluation and staging of patients with hematological malignancies and determination of treatment plans b. Administration of intensive chemotherapy and recognition and management of its complications c. Management of complications such as nausea and vomiting, bleeding, febrile neutropenia, tumor lysis, acute neurological complications, mucositis, and pain d. Nutritional management e. Use of growth factor and blood product transfusion support f. Care of terminally ill patients g. Care of patients with complicated benign hematological disorders 2. Recognize the indications for and the risks of the following therapies and develop appropriate management plans for their common complications: a. Central venous line insertion b. Radiation therapy c. Transfusion therapy d. Exchange transfusion therapy e. Factor replacement therapy f. Anti-coagulation therapy g. Therapeutic plasma exchange h. Leukapheresis procedure 3. Provide appropriate diagnostic evaluation and management of the complications of sickle cell disease such as vaso-occlusive crisis, acute chest syndrome, priapism, and stroke, and handle perioperative management 4. Recognize the indications and manage the complications of the following procedures: a. Bone marrow aspiration and biopsy b. Intrathecal chemotherapy

.Physician Role	Objectives
	5. Develop the skills needed to interpret peripheral blood smears, bone marrow aspirations and biopsies, as well as basic and advanced tests of thrombosis and hemostasis 6. Recognize and manage acutely ill patients and make appropriate transfers to the intensive care unit 7. Demonstrate knowledge of the following conditions: a. Acute and chronic leukemias, including myeloid or lymphoid leukemia, and myelodysplastic syndrome b. Lymphomas including B and T cell lymphoma, plasma cell disorders, Hodgkin's Disease c. Histiocytosis disorders d. Hematologic emergencies e. Palliative care
Communicator	1. Communicate effectively and in an appropriate and professional manner with patients and families to create and sustain an ethical therapeutic relationship 2. Lead the discussion with the patient and family regarding a newly diagnosed hematological malignancy 3. Effectively initiate end-of-life discussions with patients with advanced and incurable hematological malignancies 4. Obtain informed consent for the performance of procedures 5. Communicate effectively with and be part of the multidisciplinary care team that includes nurses, pharmacists, nutritionists, and social workers, and also interact with other supportive services in the management of hematologic disorders 6. Maintain timely and comprehensive medical records 7. Demonstrate safe handover of care, using both verbal and written communication, during patient transition to a different health care professional, setting, or stage of care

Physician Role	Objectives
Collaborator	1. Establish and maintain positive professional relationships with other members of the inpatient service and multidisciplinary care team including nurses, pharmacists, nutritionists, and social workers 2. Work with other members of the inpatient service to address and negotiate overlapping and shared responsibilities 3. Work effectively with other team members to arrange homecare and follow-up for patients set to be discharged 4. Engage in respectful and shared decision-making with other members of the inpatient service 5. Work with others to implement strategies to promote understanding, manage differences, and prevent and resolve conflicts in a manner that supports a collaborative culture
Manager	1. Demonstrate leadership skills to enhance inpatient care dynamics 2. Effectively lead the inpatient team round and prioritize cases based on the nature of the condition 3. Employ information technology to improve the quality of patient care and optimize patient safety 4. Analyze patient safety incidents to enhance the patient care system 5. Apply evidence and management guidelines related to malignant hematology to achieve cost-effective care
Healthcare advocate	1. Identify opportunities for advocacy, health promotion, and disease prevention for individuals with blood disorders, including promotion of thromboprophylaxis and blood product safety 2. Recognize the psycho-social implications and the impact of hematological malignancies and other blood disorders, especially sickle cell disease, on patients and their families, and work effectively with other health care professionals and social workers to address their needs

.Physician Role	Objectives
Scholar	1. Present new cases to the multidisciplinary tumor board with a detailed literature review of latest evidence to support the management plan and utilize feedback from this experience to improve future presentations 2. Engage in the education of patients, families, medical students, and other health professionals on a daily basis during the inpatient round 3. Identify gaps in knowledge and opportunities for improvement 4. Demonstrate understanding of principles of critical appraisal through effective utilization of educational and evidence-based resources to seek answers to scientific and clinical questions 5. Utilize the websites of hematology societies and other hematological malignancies research groups to stay up to date on management guidelines and pertinent information regarding clinical trials
Professional	1. Exhibit appropriate professional behaviors and relationships in all aspects of practice, demonstrating honesty, integrity, humility, commitment, compassion, respect, altruism, and respect for diversity and confidentiality 2. Demonstrate a commitment to excellence and ongoing professional development by being prepared for patient care rounds, demonstrating punctuality, dressing in appropriate attire, and contributing in rounds, teaching activities, and didactic lectures 3. Demonstrate advocacy for patients and their families

5.2.3 Bone Marrow Transplantation

Fellow Level:	Duration:
F2	2 Months

General Description:

Fellows will be exposed to the unique experience of taking care of patients with hematologic malignancies and other disorders requiring high-dose chemotherapy and stem cell rescue or allogeneic bone marrow transplant from a sibling, matched unrelated donor, or mismatched donor. Diseases seen during this rotation include acute leukemia, chronic leukemia, non-Hodgkin's lymphoma, Hodgkin's disease, myelodysplastic syndrome, myeloproliferative disorders, multiple myeloma, bone marrow failure conditions, sickle cell disease, and rare autoimmune disorders. Fellows may also participate in one half-day schedule in outpatient BMT clinics. They will be part of a multidisciplinary team to help manage these patients. Fellows will be responsible for their assigned patients, alongside a faculty member dedicated to the bone marrow transplant service, and will help in all procedures related to the diagnosis and treatment of these patients, such as prescription and administration of conditioning regimen, assisting in bone marrow biopsies and intrathecal chemotherapies, and arranging skin or gastrointestinal biopsies. They will understand the indications for BMT and associated complications, such as graft versus host disease (GVHD). Fellows will engage in clinical teaching and participate in decision making with other BMT team members covering the service, including residents and students.

Core Competencies:

Physician Role	Objectives
Medical expert	1. Demonstrate knowledge and gain experience in the following areas: a. Assessment of proper indications for bone marrow transplantation b. Evaluation prior to initiating a bone marrow transplantation c. Principles of administration and types of conditioning regimen d. Management of complications of bone marrow transplantation such as nausea and vomiting, febrile neutropenia, tumor lysis, acute neurological complications, mucositis, and pain e. Opportunistic infection prophylaxis, pre-emptive therapy, and anti-microbial therapy f. Nutrition support, both enteral and parenteral g. Use of growth factor and blood component transfusion support post BMT h. Use of immunosuppressive therapy for GVHD prophylaxis i. Assessment and management of GVHD 2. Recognize the indications for and the risks of the following therapies/procedures and develop appropriate management plans for their common complications: a. Central venous line insertion b. High dose chemotherapy c. Radiation therapy d. Stem cell infusion e. Bone marrow harvest f. Transfusion therapy 3. Demonstrate the ability to produce a detailed and appropriate report on the history and physical examination of complex post-BMT cases, while supporting diagnostic studies 4. Understand when to consult other services in post-bone marrow transplant setting, such as dermatology, infectious diseases, gastroenterology, and hepatology 5. Recognize and manage acutely ill patients and make appropriate transfers to the intensive care unit 6. Demonstrate knowledge of the indications of chimeric antigen receptor (CAR) T cell therapy and associated complications 7. Demonstrate knowledge of basic immunology of BMT and basic mechanism of GHVD and graft versus leukemia 8. Describe the Human Leukocyte Antigen (HLA) system 9. Demonstrate knowledge of the following complications post BMT and their treatment: a. Viral and fungal infections b. Pulmonary complications including hemorrhage c. Hepatic veno-occlusive disease

Physician Role	Objectives
	d. Acute and chronic graft vs. host disease e. Graft failure f. Mucositis g. Renal complication h. Hemorrhagic cystitis i. Multi-system organ failure
Communicator	1. Communicate effectively and in an appropriate and professional manner with patients and families to create and sustain an ethical therapeutic relationship 2. Lead the discussion with a patient who is a potential candidate for BMT and their family regarding the expected effects and complications 3. Effectively initiate end-of-life discussions with patients with advanced and incurable hematological malignancies that have relapsed post BMT 4. Obtain informed consent for the performance of procedures related to BMT 5. Communicate effectively with and be part of the multidisciplinary care team that includes nurses, pharmacists, nutritionists, and social workers, and also interact with other supportive services in the management of BMT patients 6. Maintain comprehensive, timely, and legible medical records with clear documentation for the grading and management of post-BMT complications, as well as engraftment data and discharge plan 7. Demonstrate safe handover of care, using both verbal and written communication, during patient transition to a different health care professional, setting, or stage of care.
Collaborator	1. Establish and maintain positive professional relationships with other members of the BMT service and multidisciplinary care team including nurses, pharmacists, nutritionists, and social workers 2. Work with other members of the BMT service to address and negotiate overlapping and shared responsibilities 3. Work effectively with other team members to arrange homecare and follow-up for patients set to be discharged 4. Engage in respectful and shared decision-making with other members of the BMT service 5. Work with others to implement strategies to promote understanding, manage differences, and prevent and resolve conflicts in a manner that supports a collaborative culture

Physician Role	Objectives
Manager	1. Demonstrate leadership skills to enhance BMT care dynamics 2. Effectively lead the BMT team round and prioritize cases based on the nature of the condition 3. Employ information technology to improve the quality of patient care and optimize patient safety 4. Analyze patient safety incidents to enhance the patient care system 5. Apply evidence and management guidelines related to BMT to achieve cost-effective care
Healthcare advocate	1. Identify opportunities for advocacy, health promotion, and disease prevention for individuals who are set to undergo or have already undergone BMT, including promotion of vaccination and blood product safety 2. Recognize the psycho-social implications and the impact of BMT-related complications, especially chronic GVHD, on patients and their families, and work effectively with other health care professionals and social workers to address their needs
Scholar	1. Present new cases to the multidisciplinary tumor board and BMT patient care meeting with a detailed literature review of latest evidence to support the management plan and utilize feedback from this experience to improve future presentations 2. Engage in the education of patients, families, medical students, and other health professionals on a daily basis during the inpatient round 3. Identify gaps in knowledge and opportunities for improvement 4. Demonstrate understanding of principles of critical appraisal through effective utilization of educational and evidence-based resources to seek answers to scientific and clinical questions 5. Utilize the websites of BMT societies and other BMT network research groups to stay up to date on management guidelines and pertinent information regarding clinical trials
Professional	1. Exhibit appropriate professional behaviors and relationships in all aspects of practice, demonstrating honesty, integrity, humility, commitment, compassion, respect, altruism, and respect for diversity and confidentiality 2. Demonstrate a commitment to excellence and ongoing professional development by being prepared for patient care rounds, demonstrating punctuality, dressing in appropriate attire, and contributing in rounds, teaching activities, and didactic lectures 3. Demonstrate advocacy for patients and their families

5.2.4 Hematopathology

Fellow Level:	Duration:
F1	1 Month
F2	1 Month

General Description:

This is a laboratory-based rotation focused on the laboratory aspects of the diagnosis of hematologic disorders, especially hematologic malignancies. During this rotation, fellows will acquire diagnostic skills in the interpretation of peripheral blood smear and bone marrow aspiration/biopsy, as well as other essential diagnostic tests, including flow cytometry and molecular and genetic testing. In addition, they will also be exposed to other diagnostic tools for various hematological malignancies, including lymph node histopathology, cerebrospinal fluid cytology, protein electrophoresis, and immunofixation. This rotation will also cover special laboratory tests for hemoglobin disorders and hemolytic anemia, such as hemoglobin electrophoresis and osmotic fragility test. By the end of this rotation, the fellow will be able to describe microscopic findings, formulate differential diagnoses, and select appropriate diagnostic tools.

Core Competencies:

Physician Role	Objectives
Medical expert	1. Demonstrate working knowledge of the following hematology-specific testing: a. Automated complete blood count with differential and reticulocyte count b. Hematopathology tissue assessment techniques including standard morphological evaluation and immunostaining c. Flow cytometry d. Cytogenetics including fluorescence in situ hybridization (FISH) e. Molecular testing techniques including polymerase chain reaction (PCR) f. Serum and urine electrophoresis and immunofixation g. Hemoglobin electrophoresis h. Osmotic fragility test

Physician Role	Objectives
	i. Red blood cell (RBC) enzyme assays j. Blood smear preparation k. Techniques for microscopic identification of RBC parasites l. High pressure liquid chromatography 2. Utilize available diagnostic tools related to hematology in a cost-effective way 3. Develop the skills needed to interpret peripheral blood smears and bone marrow aspirations and biopsies 4. Demonstrate expanding knowledge of lymph node and splenic pathology
Communicator	1. Communicate effectively with laboratory members and the referring service 2. Demonstrate safe documentation of laboratory findings
Collaborator	1. Establish and maintain positive professional relationships with other members of the laboratory 2. Work with other members of the laboratory service to address and negotiate overlapping and shared responsibilities 3. Engage in respectful and shared decision-making with other members of the laboratory 4. Implement strategies to promote understanding, manage differences, and resolve conflicts in a manner that supports a collaborative culture
Manager	1. Demonstrate leadership skills 2. Participate in identifying system errors in the laboratory setting to enhance the system 3. Apply evidence and management guidelines related to clinical and laboratory hematology to achieve cost-effective care
Healthcare advocate	1. Identify opportunities for advocacy, health promotion, and disease prevention for individuals with blood disorders, including promotion of testing cost awareness 2. Recognize the psycho-social implications and the impact, including risk-benefit analysis, of certain testing for hereditary blood disorders on the patient and family, and work effectively with other health care professionals and social workers to address their needs

Physician Role	Objectives
Scholar	1. Present new cases during the hematopathology conference with a detailed literature review and utilize feedback from this experience to improve future presentations 2. Engage in the education of the laboratory personnel, medical students, and other health professionals 3. Identify gaps in knowledge and opportunities for improvement 4. Demonstrate understanding of principles of critical appraisal through effective utilization of educational and evidence-based resources to seek answers to scientific and laboratory questions
Professional	1. Exhibit appropriate professional behaviors and relationships in all aspects of practice, demonstrating honesty, integrity, humility, commitment, compassion, respect, altruism, and respect for diversity and confidentiality 2. Demonstrate a commitment to excellence and ongoing professional development by demonstrating punctuality, dressing in appropriate attire, and contributing in rounds, teaching activities, and didactic lectures

5.2.5 Laboratory Medicine (Blood Bank and Coagulation Laboratory)

Fellow Level: Duration:

F1 1 Month

General Description:

This is a laboratory-based rotation focused on the laboratory aspects of transfusion medicine and the diagnosis of hemostasis disorders. During this rotation, fellows will spend two weeks in the blood bank and another two weeks in the coagulation laboratory. During the blood bank rotation, fellows will be exposed to donor services, donor sample processing, blood component preparation, cross-matching issues, and investigation of immunohematologic problems. Fellows will gain experience in the principles and practice of transfusion medicine, including blood product utilization and conservation, as well as laboratory management and quality assurance. In addition, they will also gain experience in the principles and practice of apheresis procedures. During the coagulation laboratory rotation, fellows will acquire knowledge and

skills in the interpretation of coagulation, platelet disorders, and thrombophilia testing.

Core Competencies:

Physician Role	Objectives
Medical expert	1. Demonstrate working knowledge of the following clinical laboratory techniques: a. Blood banking techniques of cross-matching, antibody screening, direct antiglobulin test, and indirect Coombs test b. Apheresis, plasmapheresis, plateletpheresis, leukopheresis c. Therapeutic phlebotomy d. Exchange transfusion e. Prothrombin time and activated partial thromboplastin time f. Fibrinogen and D-dimer assays g. Coagulation factor and inhibitor assays h. Bleeding time i. Lupus anticoagulant j. Platelet function studies k. Heparin-induced thrombocytopenia (HIT) assays l. Protein C, S, and antithrombin assays m. von Willebrand factor (VWF) assays n. Anticoagulation monitoring assays 2. Utilize available diagnostic tools related to hematology in a cost-effective way 3. Demonstrate working knowledge on how to collect, evaluate, and prepare blood products for administration to patients 4. Describe indications of blood product preparation for specific clinical situations, including irradiation, washing, and filtering techniques 5. Describe indications and potential risks of transfusion of blood products, including red blood cells, platelets, granulocytes, fresh frozen plasma, and cryoprecipitate 6. Describe the red blood cell and platelet antigen systems 7. Evaluate and manage all forms of transfusion reactions 8. Resolve complex RBC antibody and platelet transfusion problems
Communicator	1. Communicate effectively with laboratory members and the referring service 2. Demonstrate safe documentation of laboratory findings

Physician Role	Objectives
Collaborator	1. Establish and maintain positive professional relationships with other members of the laboratory 2. Work with other members of the laboratory service to address and negotiate overlapping and shared responsibilities 3. Engage in respectful and shared decision-making with other members of the laboratory 4. Implement strategies to promote understanding, manage differences, and resolve conflicts in a manner that supports a collaborative culture
Manager	1. Demonstrate leadership skills 2. Participate in identifying system errors in the laboratory setting to enhance the system 3. Apply evidence and management guidelines related to clinical and laboratory hematology to achieve cost-effective care
Healthcare advocate	1. Identify opportunities for advocacy and promotion of blood product donation and blood product safety 2. Recognize the psycho-social implications and the impact, including risk-benefit analysis, of certain testing for hereditary blood disorders on the patient and family, and work effectively with other health care professionals and social workers to address their needs
Scholar	1. Discuss complex transfusion cases with the transfusion medicine director and utilize feedback from this experience to improve future presentations 2. Engage in the education of the laboratory personnel, medical students, and other health professionals 3. Identify gaps in knowledge and opportunities for improvement 4. Effectively utilize educational and evidence-based resources to seek answers to scientific and laboratory questions
Professional	1. Exhibit appropriate professional behaviors and relationships in all aspects of practice, demonstrating honesty, integrity, humility, commitment, compassion, respect, altruism, and respect for diversity and confidentiality 2. Demonstrate a commitment to excellence and ongoing professional development by demonstrating punctuality, dressing in appropriate attire, and contributing in rounds, teaching activities, and didactic lectures

5.2.6 Thrombosis

Fellow Level: Duration:

F1 1 Month

General Description:

This rotation is primarily an outpatient experience that focuses exclusively on thromboembolic disorders. Fellows will learn how to test for thrombophilia, manage thromboembolic disorders, and manage issues related to anticoagulation therapy.

Core Competencies:

Physician Role	Objectives
Medical expert	1. Demonstrate timely and appropriate patient care 2. Perform diagnostic evaluation of new patients with suspected thrombotic disorder 3. Formulate an appropriate differential diagnosis related to suspected thrombotic disorder 4. Demonstrate outpatient management and perform appropriate consultation for patients with thromboembolic disorders 5. Demonstrate working knowledge of the appropriate indications and use of anticoagulants, the monitoring of anticoagulation therapy, and the management of their complications 6. Develop the skills needed to interpret tests of thrombosis and hemostasis 7. Describe the thromboprophylaxis strategies in medical and surgical populations 8. Recognize the impact of thromboembolic disorders on the management of other medical and surgical conditions 9. Recognize the impact of pregnancy on thromboembolic disorders and vice versa 10. Describe the indications and limitations of genetic testing to assess risk factors for thrombosis 11. Demonstrate knowledge of congenital and acquired thrombophilia conditions
Communicator	1. Communicate effectively and in an appropriate and professional manner with patients and families to create and sustain an ethical therapeutic relationship 2. Communicate effectively with other members of the thrombosis clinic

	3. Be able to effectively communicate the status of the patients seen in the clinic to referring physicians 4. Maintain timely and comprehensive medical records
Collaborator	1. Establish and maintain positive professional relationships with other members of the thrombosis clinic and the referring physicians 2. Work with other members of the thrombosis clinic and the referring physicians to address and negotiate overlapping and shared responsibilities 3. Engage in respectful and shared decision-making with other members of the thrombosis clinic and the referring physicians 4. Work with others to implement strategies to promote understanding, manage differences, and prevent and resolve conflicts in a manner that supports a collaborative culture 5. Work with others to determine when care should be transferred to another health care professional
Manager	1. Demonstrate leadership skills to enhance thrombosis clinic dynamics 2. Employ information technology to improve the quality of patient care and optimize patient safety 3. Analyze patient safety incidents to enhance the patient care system 4. Apply evidence and management guidelines related to clinical and laboratory thrombophilia to achieve cost-effective care
Healthcare advocate	1. Identify opportunities for advocacy, health promotion, and disease prevention for individuals with blood disorders, including promotion of thromboprophylaxis and blood product safety 2. Demonstrate practical experience in pre-test and post-test counseling for patients with inherited thrombophilia and their families 3. Recognize the psycho-social implications and the impact of thromboembolic disorders, including inherited thrombophilia, on patients and their families, and work effectively with other health care professionals and social workers to address their needs

Scholar	1. Present new cases to the members of the thrombosis clinic with a detailed literature review of the management plan and utilize feedback from this experience to improve future presentations 2. Engage in the education of patients, families, medical students, and other health professionals 3. Identify gaps in knowledge and opportunities for improvement 4. Demonstrate understanding of principles of critical appraisal through effective utilization of educational and evidence-based resources to seek answers to scientific and clinical questions
Professional	1. Exhibit appropriate professional behaviors and relationships in all aspects of practice, demonstrating honesty, integrity, humility, commitment, compassion, respect, altruism, and respect for diversity and confidentiality 2. Demonstrate a commitment to excellence and ongoing professional development by being prepared for the clinic, demonstrating punctuality, dressing in appropriate attire, and contributing in rounds, teaching activities, and didactic lectures 3. Demonstrate advocacy for patients and their families

5.2.7 Pediatric Hematology

Fellow Level: F1

Duration: 1 Month

General Description:

This rotation, primarily an outpatient rotation, provides more training in blood disorders, but focuses on the unique presentation and management approach to the pediatric hematology population. More emphasis will be placed on the pediatric multidisciplinary approach to hereditary hematological disorders such as hemoglobinopathies, coagulation disorders, and bone marrow failure syndromes.

Core Competencies:

Physician Role	Objectives
Medical expert	1. Obtain pediatric hematology-specific history, including psychosocial issues, from the patient and family members 2. Perform a complete pediatric hematology-specific physical examination 3. Formulate appropriate differential diagnosis related to suspected pediatric hematologic disorder

Physician Role	Objectives
	4. Demonstrate practical knowledge of the change in peripheral blood counts of the pediatric population 5. Develop and provide the rationale for a management plan for patients with pediatric hematologic disorders 6. Provide appropriate diagnostic evaluation and management of pediatric hereditary blood disorders and immunological disorders with hematological complications
Communicator	1. Communicate effectively and in an appropriate and professional manner with patients and families to create and sustain an ethical therapeutic relationship 2. Communicate effectively with other members of the pediatric hematology service 3. Demonstrate safe handover of care, using both verbal and written communication, during patient transition to a different health care professional, setting, or stage of care 4. Maintain timely and comprehensive medical records
Collaborator	1. Establish and maintain positive professional relationships with other members of the pediatric hematology service 2. Work with other members of the pediatric hematology service to address and negotiate overlapping and shared responsibilities 3. Engage in respectful and shared decision-making with other members of the pediatric hematology service 4. Work with others to implement strategies to promote understanding, manage differences, and resolve conflicts in a manner that supports a collaborative culture
Manager	1. Demonstrate leadership skills 2. Employ information technology to improve the quality of patient care and optimize patient safety 3. Apply evidence and management guidelines related to clinical pediatric hematology to achieve cost-effective care
Healthcare advocate	1. Identify opportunities for patient and family advocacy, health promotion, and disease prevention, including promotion of vaccination and blood product safety 2. Recognize the psycho-social implications and the impact of blood disorders, especially sickle cell disease and inherited coagulation disorders, on patients and their families, and work effectively with other health care professionals and social workers to address their needs

Physician Role	Objectives
Scholar	1. Present new cases to the pediatric hematology team with a detailed literature review of the management plan and utilize feedback from this experience to improve future presentations 2. Engage in the education of patients, families, medical students, and other health professionals 3. Identify gaps in knowledge and opportunities for improvement 4. Demonstrate understanding of principles of critical appraisal through effective utilization of educational and evidence-based resources to seek answers to scientific and clinical questions
Professional	1. Exhibit appropriate professional behaviors and relationships in all aspects of practice, demonstrating honesty, integrity, humility, commitment, compassion, respect, altruism, and respect for diversity and confidentiality 2. Demonstrate a commitment to excellence and ongoing professional development by being prepared for the clinic, demonstrating punctuality, dressing in appropriate attire, and contributing in rounds, teaching activities, and didactic lectures 3. Demonstrate advocacy for patients and their families

5.2.8 Lymphoma

Fellow Level: Duration:

F2 1 Month

General Description:

As part of this outpatient rotation, fellows will be involved in the care of patients with lymphoma. Fellows will participate in clinics under the direct supervision of lymphoma faculty. Fellows will attend lymphoma tumor board meetings and coordinate lymphoma cases for presentation and discussion. Patients are evaluated at all stages of disease, with the management plan covering diagnosis, staging, treatment, follow-up, and complications. The fellows' education is optimized as they see new patients and establish a treatment plan, while also being exposed to patients undergoing active treatment or experiencing complications of their disease. Fellows are expected to be involved in routine cancer surveillance and cancer survivorship.

Core Competencies:

Physician Role	Objectives
Medical expert	1. Demonstrate appropriate and timely patient care, including the following: a. Evaluation and staging of patients with lymphoma and determination of treatment plans b. Administration of chemotherapy and recognition and management of its complications in an outpatient setting 2. Demonstrate knowledge of the epidemiology, natural history of disease course, genetics, risk factors, staging systems, and classification of various types of lymphomas 3. Demonstrate working knowledge of the role of imaging studies (e.g., positron emission tomography scan and others), molecular diagnostics, and cytogenetics in making diagnostic and prognostic predictions in patients with lymphoma 4. Demonstrate practical competency in the management of various types of lymphomas 5. Describe the role of chemotherapy, immunotherapy, targeted therapy, and radioimmunotherapy agents in the treatment of lymphomas 6. Describe the role of radiation therapy, surgery, and stem cell transplantation in the treatment and management of lymphomas 7. Demonstrate practical competency in the evaluation and management of patients with relapsed or refractory lymphomas
Communicator	1. Communicate effectively and in an appropriate and professional manner with patients and families to create and sustain an ethical therapeutic relationship. 2. Lead a discussion with a patient and family regarding a newly diagnosed lymphoma 3. Effectively initiate end-of-life care discussions with patients with advanced and incurable lymphoma 4. Obtain informed consent for the performance of procedures 5. Communicate effectively with and be part of the multidisciplinary care team that includes nurses, pharmacists, nutritionists, and social workers, and also handle other supportive services in the management of lymphoma 6. Maintain timely and comprehensive medical records

Physician Role	Objectives
Collaborator	1. Establish and maintain positive professional relationships with other members of the lymphoma clinic and multidisciplinary care team including nurses, pharmacists, nutritionists, and social workers 2. Work with other members of the lymphoma clinic to address and negotiate overlapping and shared responsibilities 3. Engage in respectful and shared decision-making with other members of the lymphoma clinic 4. Work with others to implement strategies to promote understanding, manage differences, and resolve conflicts in a manner that supports a collaborative culture
Manager	1. Demonstrate leadership skills to enhance lymphoma clinic dynamics 2. Employ information technology to improve the quality of patient care and optimize patient safety 3. Analyze patient safety incidents to enhance the patient care system 4. Apply evidence and management guidelines related to lymphoma to achieve cost-effective care
Healthcare advocate	1. Identify opportunities for advocacy, health promotion, and disease prevention for individuals with lymphoma, including promotion of thromboprophylaxis, vaccination, and blood product safety 2. Recognize the psycho-social implications and the impact of lymphoma and other blood disorders on patients and their families, and work effectively with other health care professionals and social workers to address their needs
Scholar	1. Present new cases to the multidisciplinary lymphoma board with a detailed literature review of latest evidence to support the management plan and utilize feedback from this experience to improve future presentations 2. Engage in the education of patients, families, medical students, and other health professionals during the clinic service 3. Identify gaps in knowledge and opportunities for improvement 4. Demonstrate understanding of principles of critical appraisal through effective utilization of educational and evidence-based resources to seek answers to scientific and clinical questions 5. Utilize the websites of hematology societies and other lymphoma research groups to stay up to date on management guidelines and pertinent information regarding clinical trials

Physician Role	Objectives
Professional	1. Exhibit appropriate professional behaviors and relationships in all aspects of practice, demonstrating honesty, integrity, humility, commitment, compassion, respect, altruism, and respect for diversity and confidentiality 2. Demonstrate a commitment to excellence and ongoing professional development by being prepared for the clinic, demonstrating punctuality, dressing in appropriate attire, and contributing in rounds, teaching activities, and didactic lectures 3. Demonstrate advocacy for patients and their families

5.2.9 Palliative Care and Radiation Oncology

Fellow Level: Duration:

F2 1 Month

General Description:

This rotation will be divided equally between palliative care and radiation oncology; fellows can start the rotation with either one of them. Palliative care rotation consists of inpatient and outpatient clinical experience. In addition, fellows will attend regular palliative patient care rounds and academic activities. Fellows will gain experience in communication, end-of-life care, prognosis, and symptom management related to palliative care. Radiation oncology rotation is primarily an outpatient experience; fellows will gain experience by attending radiation oncology clinics and observing patients undergoing radiation therapy procedures. Fellows will learn about the role of hematologists in organizing treatment with radiation oncologists.

Core Competencies:

Physician Role	Objectives
Medical expert	1. Demonstrate practical competency in discussing and delivering end-of-life care, which includes skills and competency in communicating with patients and their families, taking into account their cultural, ethnic, and religious biases 2. Describe the indications for hospitalization and outpatient care for patients with terminal hematological malignancies 3. Effectively utilize palliative chemotherapy and surgical and radiation modalities 4. Demonstrate practical competency in the management of end-of-life symptoms 5. Demonstrate a working knowledge of and practical competency in managing pain in patients with hematologic disorders 6. Describe the basic principles of radiation biology 7. Describe the approaches for administering radiation therapy, including the different radiation fields, source types, and dosing 8. Demonstrate practical competency in the role of radiation in hematological malignancies, including curative and palliative intent 9. Demonstrate knowledge of and practical competency in recognizing and managing short-term toxicities and the potential long-term consequences of radiation therapy (e.g., secondary malignancies, coronary artery disease) 10. Recognize the interactions of radiation therapy with medications, including chemotherapy and other antineoplastic agents
Communicator	1. Communicate effectively and in an appropriate and professional manner with patients and families to create and sustain an ethical therapeutic relationship 2. Lead the discussion with patients and families regarding initiation of end-of-life care for patients with advanced and incurable cancer 3. Lead the discussion with patients and families regarding initiation of radiotherapy in patients with hematological malignancies 4. Communicate effectively with and be part of the multidisciplinary care team that includes nurses, pharmacists, nutritionists, and social workers, and also handle other supportive services in the management of palliative care or radiation oncology patients 5. Maintain timely and comprehensive medical records

Physician Role	Objectives
Collaborator	1. Establish and maintain positive professional relationships with other members of the palliative care team and multidisciplinary care team including nurses, pharmacists, nutritionists, and social workers 2. Engage in respectful and shared decision-making with other members of the palliative care and radiation oncology teams 3. Work with others to implement strategies to promote understanding, manage differences, and resolve conflicts in a manner that supports a collaborative culture
Manager	1. Demonstrate leadership skills to enhance palliative care and radiation oncology clinic dynamics 2. Employ information technology to improve the quality of patient care and optimize patient safety 3. Analyze patient safety incidents to enhance the patient care system 4. Apply evidence and management guidelines related to palliative care and radiation oncology to achieve cost-effective care
Healthcare advocate	1. Identify opportunities for advocacy, health promotion, and disease prevention 2. Recognize the psycho-social implications and the impact of incurable hematological malignancies and radiotherapy on patients and their families, and work effectively with other health care professionals and social workers to address their needs
Scholar	1. Present new cases to the multidisciplinary tumor board with a detailed literature review of latest evidence to support the management plan and utilize feedback from this experience to improve future presentations 2. Engage in the education of patients, families, medical students, and other health professionals during the clinic service 3. Identify gaps in knowledge and opportunities for improvement 4. Demonstrate understanding of principles of critical appraisal through effective utilization of educational and evidence-based resources to seek answers to scientific and clinical questions

Physician Role	Objectives
Professional	1. Exhibit appropriate professional behaviors and relationships in all aspects of practice, demonstrating honesty, integrity, humility, commitment, compassion, respect, altruism, and respect for diversity and confidentiality 2. Demonstrate a commitment to excellence and ongoing professional development by being prepared for the clinic, demonstrating punctuality, dressing in appropriate attire, and contributing in rounds, teaching activities, and didactic lectures 3. Demonstrate empathy toward the family in planning goals of palliative care and radiotherapy, including relevant psychological issues and spiritual dimensions 4. Demonstrate advocacy for patients and their families

5.2.10 Research

Fellow Level: Duration:

F1 1 Month

General Description:

Fellows must keep in mind that a one-month rotation is not enough to conduct a research project. The aim of this rotation is to ensure protected time for ongoing research projects that can be utilized for writing proposals, designing protocols, performing data collection and analysis, and writing the manuscript. This rotation can also be utilized to enroll in research workshops or online research activities. The rotation content is negotiable between fellows and their mentors and should be planned prior to the beginning of the rotation to maximize rotation time productivity. Fellows are expected to meet more frequently with their mentors during the month and provide a progress report to the program director by the end of the rotation.

Core Competencies:

Physician Role	Objectives
Medical expert	1. Demonstrate a working knowledge of the purpose and function of the Institutional Review Board and other regulatory bodies that oversee the conduct of clinical investigations 2. Demonstrate a working knowledge of biostatistics that will allow the trainee to interpret the published literature 3. Demonstrate a working knowledge of the purposes, goals and characteristics of different retrospective and prospective study designs and phases (e.g., Phase I, II, III) of clinical trials 4. Demonstrate a basic knowledge of proper clinical trial design, including identification of target populations, statistical power, proper statistical tools, and ethical concerns 5. Demonstrate a working knowledge of the purpose, content, and design of informed consent documents, and show the ability to obtain informed consent 6. Demonstrate an understanding of the ethics related to conducting clinical trials, including issues of industry sponsorship and conflict of interest 7. Demonstrate the ability to manage a patient on a clinical trial, including evaluating patient eligibility for participation in a specific clinical trial; obtaining informed consent; following the study calendar as directed in the protocol; and assessing and reporting responses and adverse events appropriately 8. Demonstrate the ability to seek out the existence of available clinical trials at their institution and elsewhere in the course of caring for their patients 9. Demonstrate a general working knowledge of where funding resources for research studies can be found

Physician Role	Objectives
Communicator	1. Communicate effectively and in an appropriate and professional manner with patients and families to create and sustain an ethical therapeutic relationship 2. Lead the discussion with patients and their families regarding a clinical trial 3. Obtain informed consent for clinical research 4. Communicate effectively with and be part of the multidisciplinary research team that includes research coordinators, nurses, pharmacists, nutritionists, and social workers, and also handle other supportive services 5. Maintain timely and comprehensive medical records 6. Disseminate the knowledge gained from the research project to other members of the medical team and health care community to advance the field of science
Collaborator	1. Establish and maintain positive professional relationships with other members of the research team and the multidisciplinary care team including research coordinators, nurses, pharmacists, nutritionists, and social workers 2. Work with other members of the research team to address and negotiate overlapping and shared responsibilities 3. Engage in respectful and shared decision-making with other members of the research team 4. Work with others to implement strategies to promote understanding, manage differences, and prevent and resolve conflicts in a manner that supports a collaborative culture
Manager	1. Demonstrate leadership skills to enhance the research team dynamics 2. Effectively conduct regular meetings with mentors and research coordinators 3. Employ information technology to improve the quality of research and optimize research outcomes 4. Utilize available research resources in a cost-effective way
Healthcare advocate	1. Identify opportunities for advocacy, health promotion, and disease prevention for individuals, including promotion to participate in clinical research 2. Recognize the importance of clinical research to improve the health of individuals and the community

Physician Role	Objectives
Scholar	1. Present new proposals to the multidisciplinary research meeting with a detailed literature review of latest evidence to support the research plan being proposed and utilize feedback from this experience to improve future presentations 2. Engage in the education of patients, families, medical students, and other members of the research team 3. Identify gaps in knowledge and opportunities for improvement 4. Utilize didactic workshops and online activities to learn about research conduct and ethics 5. Demonstrate understanding of principles of critical appraisal through effective utilization of research and evidence-based resources to seek answers to scientific and clinical questions 6. Utilize the websites of hematology societies and other hematology research groups to stay up to date on management guidelines and pertinent information regarding clinical trials
Professional	1. Understand the role of researcher while keeping the patient's best interest as the primary goal, and perform these duties in a professional manner 2. Demonstrate ethical practices in accordance with institutional review board guidelines and Good Clinical Practice 3. Demonstrate personal responsibility in achieving research timeline objectives 4. Demonstrate the ability to maintain protected health information and other personal data consistent with institutional policies and law 5. Describe the principles of patient autonomy, beneficence, and justice as it relates to patient involvement in clinical research 6. Disclose potential financial conflicts of interest when presenting research results 7. Demonstrate advocacy for patients and their families

5.2.11 Elective

Fellow Level:	Duration:
F1	1 Month
F2	1 Month

General Description:

The aim of this rotation is to expand fellows' experience in their area of interest. Ideally, this is a sub-specialized outpatient experience under the supervision of an expert faculty member in the field. There are many areas in which fellows can choose to take their elective rotation, such as lymphoma, BMT, myeloma, thrombosis, hemoglobinopathy, or any other clinic of interest that is approved by the local institutional training committee. Fellows can also use elective rotation as protected time to conduct their ongoing research, if approved by the training committee.

6 TEACHING AND LEARNING

The teaching process in this postgraduate fellowship training program is based mainly on the principles of adult learning. Trainees recognize the importance of playing active roles in the content and process of their own learning. The adult learning concept is incorporated into each component of the training program so that fellows are responsible for fulfilling their personal learning requirements.

6.1 Teaching Methods

Multiple learning methods are implemented to ensure proper delivery of the curriculum. Learning methods are integrated within the training structure in addition to didactic sessions. Formal training time includes the following three formal teaching activities:

6.1.1 Program-Specific Learning Activities

The program-specific activities are specifically designed and intended for trainee education during their training period. It is mandatory for trainees to attend these activities, and non-compliance can subject them to disciplinary actions. Attendance and participation in these activities are linked to the continuous assessment tools under Structured Academic Activities (see section 7.2 on Formative Assessment). Program administration should support these activities by providing protected time for trainees to attend these activities and allowing them to participate in such activities.

6.1.1.1 Formal Learning Activities

a) **Academic activity:** Every week, at least 2–3 hours of formal training time should be reserved, with the hours allocated on one day or spread over the weekdays. The formal teaching time is planned in advance with an assigned tutor, time slots, and venue. The activity deals mainly with core specialty topics (see section 6.2), some of which are selected by fellows based on their needs. The core specialty topics will ensure that important clinical

problems related to hematology are well taught. It is recommended that the lectures be conducted in an interactive, case-based, discussion format. Local training committees should work to ensure the planning and implementation of academic activities, as indicated in the curriculum. Trainees should be actively involved in the development and delivery of the topics under faculty supervision; their involvement might be in the form of delivery, content development, research, etc. The supervisor's educator should make sure that the discussion for each topic is stratified into three categories of the learning domain: knowledge, skill, and attitude (see section 6.2 and Appendix B for the list of core topics and procedure list).

b) **Journal club:** This activity involves an in-depth and critical review of a recently published article. This should be conducted quarterly during each academic year. The focus is on evaluating and understanding the statistical methods used for the study, biases, limitations, and generalizability for incorporation into clinical practice.

6.1.1.2 Practice-based Learning

Multidisciplinary Tumor Board conference: During this weekly activity, clinical problems are discussed with clinicians in other disciplines. Participation of fellows in multidisciplinary tumor board meetings is consistent with the development of skills related to communication, leadership, collaboration, and medical knowledge.

An example of the academic activity table is shown in Appendix C.

6.1.2 Universal Topics

Universal topics are educational modules developed by the SCFHS that are intended for all specialties. Priority will be given to topics that satisfy the following conditions:

- Are of high value
- Are interdisciplinary and integrated
- Require expertise that might be beyond the scope of the local clinical training sites

Universal topics are available as e-learning modules to which each trainee is given personalized access. Each universal topic will have a self-assessment at the end of the module. As indicated in the "executive policies of continuous assessment and annual promotion," universal topics are mandatory components of the criteria for the annual promotion of trainees from their current level of training to the subsequent level. Universal topics will be distributed over the entire training period. Fellows who complete the required universal topics during their residency training can provide proof of completion from their personalized access to the online modules.

The following table shows the required universal topics and the year of completion (see Appendix D for more details on universal topics).

Table 6-1 Universal topics and year of completion

Training Year	Modules		Title	
	Number	Name	Number	Name
F1	Module-1	Introduction	Topic-1	Safe drug prescribing
			Topic-5	Blood transfusion
	Module-2	Cancer	Topic-6	Principles of management of cancer
			Topic-7	Side effects of chemotherapy and radiation therapy
			Topic-8	Oncologic emergencies
F2	Module-2	Cancer	Topic-9	Cancer prevention
			Topic-10	Surveillance and follow-up of cancer patients
	Module-7	Ethics and Healthcare	Topic-35	Ethical issues: treatment refusal; patient autonomy
			Topic-36	Role of doctors in death and dying

6.1.3 General Learning Opportunities

The formal training time should be supplemented by other learning activities such as the following:

6.1.3.1 Work-based Learning

a) Daily-round-based learning

b) On-call-based learning

c) Clinic-based learning

d) Workshops and courses

Training exposure during bedside, clinic, laboratory, procedural, and other work-related activities represent excellent targets for learning. Trainees are expected to build their capacity based on self-directed learning. Each trainee needs to maintain a logbook documenting the procedures observed, performed under supervision, and performed independently.

6.1.3.2 Practice-based Learning

a) **Morbidity and mortality meeting:** This conference offers trainees an opportunity to discuss patient cases where there have been adverse effects due to errors or complications. The goal of this resource is to refocus on morbidity and mortality and transform it into a platform for teaching patient safety principles and emphasizing error reduction strategies.

b) **Grand round:** Fellows are encouraged to attend and participate in divisional and departmental conferences. This activity provides an opportunity to engage with experts in their discussion on interesting cases and review of recent updates in medicine.

c) **Joint specialty meeting:** This involves participation in meetings such as hematopathology conferences.

6.1.3.3 Self-directed Learning

a) Regularly reading journals and attending e-learning workshops

b) Watching educational videos related to procedural skills

c) Carrying out research-related activities

d) Attending national and international meetings: Trainees should have the opportunity to attend relevant conferences and meetings, such as the ASH Annual Meeting and European Hematology Association Annual Meeting, as these events often offer excellent educational opportunities.

6.2 Core Hematology Topics

Basic Principles
Basic laboratory concepts This should include the basic concepts of DNA, RNA, and proteins and their general role in normal cellular processes, as well as the basic concepts of cell cycle regulation and apoptosis. The goal is to understand the standard techniques to evaluate cellular processes such as PCR, colony forming unit assays, and other cellular assays.
Normal Hematopoiesis This should include the developmental processes of all hematopoietic cell lineages. The goal is to understand cell surface protein changes that occur in the normal development and differentiation of hematopoietic cells; hemoglobin synthesis, structure, and function; and the genetics and basic mechanisms of hemoglobin gene expression.
Normal Hemostasis This should include the basic mechanisms and components of normal hemostasis and thrombosis.
Pharmacology related to hematology The goal is to understand the mechanism of action, metabolism, route of administration, appropriate indications and dosages, drug-drug interactions, and long-term consequences and toxicities of chemotherapy, immunotherapy, growth factors, small molecule inhibitors, and biologic agents used to treat hematologic disorders. It should also include the use of different classes of anticoagulants and various factor replacement products and antifibrinolytic agents.
Transfusion Medicine This should include the basic concepts of red blood cell and platelet antigen systems and indications of specific blood products transfusion and the potential risks/reactions associated with the administration of various blood products. It should also include the use of various apheresis procedures.
Pregnancy and Hematology This should cover hematologic changes that are associated with pregnancy and the impact of hematologic disorders and its management on pregnancy.

Basic Principles
Ethics in Hematology This should cover the ethical issues that patients and their families face in terms of treatment options and treatment outcomes such as end-of-life care. It should also cover ethical issues related to hereditary disorders, ethical issues in dealing with pharmaceutical and other health care industry companies and their representatives, and the ethical conduct of clinical trials.

Benign Hematology Topics
Anemia due to nutritional deficiencies: This should include anemia due to iron, vitamin B12, and folate deficiencies.
Anemia of chronic disease
Red cell aplasia
Thalassemia
Sickle cell anemia
Autoimmune hemolytic anemia
Metabolic enzyme deficiency hemolytic anemia: This includes deficiencies of glucose-6-phosphate-dehydrogenase and pyruvate kinase, among others.
Paroxysmal nocturnal hemoglobinuria (PNH)
RBC membrane disorders
Microangiopathic hemolytic anemia: This should include thrombotic thrombocytopenic purpura, hemolytic uremic syndrome, and disseminated intravascular coagulation.
Hemochromatosis
Granulocyte Dysfunction Disorders: This should include enzyme deficiencies, enzyme storage disorders, Chediak-Higashi syndrome, chronic granulomatous disease, and leukocyte adhesion deficiency.

Benign Hematology Topics
Lymphopenia and Lymphocyte Dysfunction Syndromes: This includes common variable immunodeficiency, severe combined immunodeficiency, adenosine deaminase deficiency, Wiskott-Aldrich syndrome, ataxia-telangiectasia, DiGeorge anomaly, selective immunoglobulin deficiencies, Omenn syndrome, and reticular dysgenesis.
Hereditary Platelet Disorders: These include von Willebrand's disease, Bernard-Soulier syndrome (glycoprotein Ib-IX deficiency or defect), platelet collagen receptor deficiency, Glanzmann thrombasthenia (glycoprotein IIb-IIIa deficiency), gray platelet syndrome (α-granule deficiency, α-storage pool disease), and dense granule deficiency (δ-storage pool disease).
Acquired Platelet Function Disorders
Immune Thrombocytopenic Purpura
Heparin-Induced Thrombocytopenia
Bone Marrow Failure
Bleeding Disorders: This should include von Willebrand's disease, hemophilia A and B, and other inherited factor deficiencies. It also includes acquired factor deficiencies.
Thrombophilia and thrombosis

Malignant Hematology Topics
1. Cancer Biology: This should include the mechanisms of tumor cell growth and mechanisms of tumorigenesis and tumor immunology.
2. Chronic Myelogenous Leukemia
3. Polycythemia Rubra Vera
4. Chronic Idiopathic Myelofibrosis
5. Essential Thrombocythemia
6. Acute Myeloid Leukemia
7. Myelodysplastic Syndrome
8. B/T-Lymphoblastic Leukemia/Lymphoma
9. Lymphoplasmacytic Lymphoma (Waldenström's Macroglobulinemia)
10. Chronic Lymphocytic Leukemia

Malignant Hematology Topics
11. Hairy Cell Leukemia 12. B-cell Lymphomas: Splenic marginal zone lymphoma including mucosa-associated lymphoid tissue lymphoma, nodal marginal zone B-cell lymphoma, follicular lymphoma, mantle cell lymphoma, diffuse large B-cell lymphoma, mediastinal (thymic) large B-cell lymphoma, intravascular large B-cell lymphoma, primary effusion lymphoma, Burkitt's lymphoma/leukemia, angiocentric lymphoma, and anaplastic large cell lymphoma 13. Primary central nervous system lymphomas 14. Plasma Cell Disorders (Multiple Myeloma) 15. Amyloidosis 16. Castleman's Disease 17. Post-transplantation Lymphoproliferative Disorders 18. Adult T-cell Leukemia/Lymphoma 19. Mycosis Fungoides, Sézary Syndrome, and Cutaneous T-cell Lymphoma 20. T-cell Large Granular Lymphocytic Leukemia 21. T-cell Lymphomas: Peripheral T-cell lymphoma, angio-immunoblastic T-cell lymphoma, precursor T-lymphoblastic leukemia/lymphoma, nasal T/NK-cell lymphoma, intestinal T-cell lymphoma, and anaplastic large cell lymphoma 22. Hodgkin's Disease 23. Histiocytic and Dendritic Cell Neoplasms 24. Mastocytosis
Malignant hematologic emergencies, such as the following: 1. Febrile Neutropenia 2. Tumor Lysis Syndrome 3. Hyperleukocytosis 4. Superior Vena Cava Syndrome 5. Spinal Cord Compression 6. Paraneoplastic Disorders

Bone Marrow Transplantation (BMT)
1. Biologic and immunologic basis of BMT, including HLA system 2. The indication and role of autologous, allogeneic, and tandem BMT in the management of hematologic diseases 3. The preparative regimens used in anticipation of autologous and allogeneic BMT 4. The method of collecting and handling bone marrow and peripheral stem cells for transplantation 5. The need for infection prophylactic and supportive care measures in the management of patients undergoing BMT 6. Recognition of the presentation, diagnosis, and management of post-transplant complications, including marrow engraftment failure, acute and chronic graft-versus-host disease, opportunistic infections, and veno-occlusive disease

7 ASSESSMENT AND EVALUATION

7.1 Purpose of Assessment

1. Assess trainees' actual performance in the workplace
2. Provide trainees with immediate feedback, help them measure their own performance, and identify areas for development
3. Drive learning and enhance the training process by clarifying what is required of trainees and motivating them to ensure that they receive suitable training and experience
4. Provide robust summative evidence that trainees are meeting the curriculum standards during the training program
5. Ensure that trainees are acquiring competencies within the domains of good medical practice
6. Ensure that trainees possess the essential underlying knowledge, skills, and attitude required for their specialty
7. Identify trainees who should be advised to consider a career change

7.2 Formative Assessment

7.2.1 General Principles

As adult learners, trainees should strive for feedback throughout their journey of competency from "novice" to "mastery" levels. Formative assessment (also referred to as continuous assessment) is a component of assessment that is distributed throughout the academic year, aiming primarily at providing trainees with effective feedback.

Trainees should assign at least 1 hour every two weeks to meet with their mentors in order to review performance reports (e.g., In-Training Evaluation Report (ITER), e-portfolio). Input from the overall formative assessment tools

will be utilized at the end of the year to determine whether individual trainees can be promoted from the current to the subsequent training level. Trainees should play an active role in seeking feedback during training, while trainers are expected to provide timely formative assessment. The SCFHS will provide an e-portfolio system to enhance communication and analysis of data arising from the formative assessment. Trainers and trainees are directed to follow the recommendations of the scientific council regarding the updated forms, frequency, distribution, and deadlines related to the implementation of evaluation forms.

7.2.2 Formative Assessment Tools

Table 7-1 Formative Assessment Tools:

Learning Domain	Formative Assessment Tools	Important details (e.g., frequency, specifications related to the tool)
Knowledge	Annual Written Progress Test	This written exam is conducted as per SCFHS regulation at the end of the first year.
	Structured Academic Activities	Attendance and participation are recorded on a weekly basis as described in section 5.1.1
Skills	Logbook	The logbook maintains a record of procedures performed. The logbook should be filled as an electronic record through One45 (see Appendix E) Each fellow is required to perform a minimum of 10 intrathecal chemotherapy procedures and 15 bone marrow aspirations and biopsies for each academic year
	Research Activities	By the end of the training, the fellow should conduct the following activities to be able to get the corresponding score: • Provide proof for a published manuscript or a manuscript submitted for publication in a peer-reviewed journal, or abstract presentation at a national or international meeting during the duration of training (Score 40–50%) • Write a research proposal, publish a case report, or conduct data collection/analysis (Score 10–20%). • Provide a research progress report every 6 months to the local research committee (Score 50%) • None of the above (Clear fail) Sum of the total score from all activities will be used for final evaluation Evaluation must be approved by the local research committee
Attitude	ITER: In-Training Evaluation Report	Evaluation form to be filled monthly for each rotation by the faculty through One45 (see Appendix F)

The evaluation of each component will be based on the following equation:

Percentage	< 50%	50–59.4%	60–69.4%	>70%
Description	Clear fail	Borderline fail	Borderline pass	Clear pass

To achieve unconditional promotion, the candidate must score a minimum of "borderline pass" in all five components.

The program director can still recommend the promotion of candidates even if the above condition is not met in some situations:

- If the candidate has scored "borderline fail" in one or two components at maximum, and these scores do not belong to the same area of assessment (for example, both borderline failures are not in the area of "skills").
- The candidate has passed all the other components and scored a minimum of "clear pass" in at least two components.

7. 3 Summative Assessment

7.3.1 General Principles

Summative assessment is a component of assessment that primarily aims at making informed decisions on trainee competency. Unlike formative assessment, summative assessment does not aim to provide constructive feedback. For further details on this section, please refer to the general bylaws and executive policy of assessment (available online: www.scfhs.org). In order to be eligible to appear for the final exams, trainees will be granted a "Certification of Training Completion" upon successful completion of all training rotations.

7.3.2 Final In-Training Evaluation Report (FITER)

In addition to the supervising committee's approval of the completion of clinical requirements (fellow's logbook), FITER is also prepared by the program director for each fellow at the end of their final year of training. This report shall be the basis for obtaining the Certification of Training Completion and qualifying for the final specialty exams.

7.3.3 Certification of Training Completion

To be eligible to appear for the final specialty examinations, each trainee is required to obtain a "Certification of Training Completion." Based on the training bylaws and executive policy (please refer to www.scfhs.org), trainees will be granted a "Certification of Training Completion" once the following criteria are fulfilled:

a) Successful completion of all training rotations
b) Completion of training requirements (e.g., logbook, research) as outlined in FITER, which is approved by the scientific council/committee of specialty
c) Clearance from SCFHS training affairs, which ensures compliance with tuition payments and completion of universal topics

The "Certification of Training Completion" will be issued and approved by the supervisory committee or an equivalent authority according to SCFHS policies.

7.3.4 Final Specialty Examinations

The final specialty examination is the summative assessment component that grants trainees the specialty certification. It has two elements:

a) Final written exam: In order to be eligible for this exam, trainees are required to have a "Certification of Training Completion."
b) Final clinical exam (Structured Oral Examinations [SOE]): Trainees will be required to pass the final written exam in order to be eligible to appear for the final clinical exam.

Table 7-2 Final Specialty Examinations

Learning Domain	Summative Assessment Tools	Passing Score
Knowledge	Final Written Examination	At least borderline pass
Skills	Structured Oral Examinations (SOE)	At least borderline pass
Attitude	FITER	Successfully pass FITER

Blueprints of the final written and clinical exams are shown in the following tables:

Table 07-2 Blueprint of the final written exam

Sections	Proportion	Medical science	Diagnosis	Management	Investigations
Anemia	15%	4	4	3	4
Bleeding and thrombosis, including platelet disorders	15%	3	3	5	4
Leukocyte disorders	3%	0	1	1	1
Bone Marrow Failure Disorders	5%	2	1	1	1
Acute leukemia. and MDS	13%	2	2	5	4
Transfusion Medicine	5%	2	1	1	1
Lymphomas and CLL	15%	3	3	5	4
Myeloproliferative neoplasms	7%	1	1	3	2
Plasma cell disorders	6%	0	1	3	2
Stem Cell Transplantation	5%	1	1	3	0
Supportive Care	5%	0	1	4	0
Research, ethics, and pharmacology	6%	3	0	3	0
Total	100%				

Table 07-3 Blueprint of the final clinical exam

		DIMENSIONS OF CARE				
		Health Promotion & Illness Prevention	Acute	Chronic	Psychological Aspects	Total Station(s)
DOMAINS FOR INTEGRATED CLINICAL ENCOUNTER	Patient Care	1	4	2		7
	Patient Safety & Procedural Skills		1			1
	Communication & Interpersonal Skills			1	1	2
	Professional Behaviors					0
	Total Stations	1	5	3	1	10

*Main blueprint framework adapted from the Medical Council of Canada Blueprint Project

For further details on the final exams, please refer to the general bylaws and executive policy of assessment (available online: www.scfhs.org).

7.4 Certification

After passing the final examination conducted through the SCFHS, the fellow will be awarded the "Saudi Specialty Certificate in Adult Hematology."

8 SUGGESTED LEARNING RESOURCES

Textbooks

Hematology: Basic Principles and Practice, 7th Edition. By Hoffman

Williams Hematology, 10th Edition, by Kenneth Kaushansky

WHO Classification of Tumours of Haematopoietic and Lymphoid Tissues, Revised Edition 2017

Online resources

Up to Date

ASH Self-Assessment Program

ASH Image Bank

ASH Clinical Practice Guidelines

Hematology: ASH Education Program Book

American Society of Clinical Oncology Guidelines

American Society of Hematology

International Society on Thrombosis and Hemostasis

The European Society for Blood and Marrow Transplantation

American Society for Transplantation and Cellular Therapy

European Hematology Association

National Comprehensive Cancer Network Guidelines

Journals

American Journal of Hematology

Biology of Blood and Marrow Transplantation

Blood

Blood Cancer

Blood Review

Bone Marrow Transplantation

British Journal of Hematology

Hemophilia

Journal of Clinical Oncology

Journal of Thrombosis and Hemostasis

Lancet Hematology

Lancet Oncology

Leukemia

Leukemia & Lymphoma

New England Journal of Medicine

The Lancet

Transfusion Journal

9 PROGRAM AND COURSE EVALUATION

The SCFHS applies variable measures to evaluate the implementation of this curriculum. The training outcomes of this program will undergo the quality assurance framework endorsed by the SCFHS Central Training Committee. Trainees' assessment (both formative and summative) results will be analyzed and mapped to curriculum content. Other indicators that will be incorporated are as follows:

- Report of the annual trainee satisfaction survey
- Reports of trainees' evaluation of faculty members
- Reports of trainees' evaluation of rotations
- Reports from the annual survey of program directors
- Data available from program accreditations
- Reports from direct field communications with trainees and trainers

Goal-based Evaluation: The achievement of the intended milestones will be evaluated at the end of each stage to assess the progress of curriculum delivery, and any deficiency will be addressed in the following stage utilizing the time devoted for trainee-selected topics and professional sessions.

In addition to subject-matter opinion and best practices from benchmarked international programs, the SCFHS will apply a robust method to ensure that this curriculum utilizes all available data at the time of revision of this curriculum in the future.

10 POLICIES AND PROCEDURES

This curriculum represents the means and materials that outline the learning objectives with which trainees and trainers will interact for the purpose of achieving the identified educational outcomes. The Saudi Commission for Health Specialties (SCFHS) has a full set of "General Bylaws" and "Executive Policies" (published on the official SCFHS website) that regulate all training-related processes. The general bylaws on training, assessment, and accreditation as well as executive policies on admission, registration, continuous assessment and promotion, examination, trainees' representation and support, duty hours, and leaves are examples of regulations that need to be implemented. Under this curriculum, trainees, trainers, and supervisors must comply with the most updated bylaws and policies, which can be accessed online (via the official SCFHS website).

11 APPENDICES

11.1 Appendix-A

Hematology General Competencies: At the completion of training, a fellow will function effectively in the following roles and have acquired the corresponding competencies:

Medical Expert:

As Medical Experts, hematologists integrate all the CanMEDS Roles, applying medical knowledge, clinical skills, and professional attitudes in their provision of patient-centered care. Medical Expert is the central physician Role in the CanMEDS framework.

Key and Enabling Competencies:

1. **Function effectively as consultants, integrating all the CanMEDS Roles to provide optimal, ethical, and patient-centered medical care**
   - 1.1. Perform a consultation, including the presentation of well-documented assessments and recommendations in oral, written, and/or electronic form, in response to a request from another health care professional
   - 1.2. Demonstrate effective use of all CanMEDS competencies relevant to hematology
     - 1.2.1. Apply lifelong learning skills of the Scholar Role to implement a personal program to remain up to date and enhance areas of professional competence
     - 1.2.2. Contribute to the enhancement of quality care and patient safety in their practice, integrating the available best evidence and best practices
   - 1.3. Identify and appropriately respond to relevant ethical issues arising in hematological patient care
   - 1.4. Demonstrate the ability to prioritize professional duties when faced with multiple patients and problems
   - 1.5. Demonstrate compassionate and patient-centered care
   - 1.6. Recognize and respond to the ethical dimensions in medical decision-making
   - 1.7. Demonstrate medical expertise in situations other than patient care
2. **Establish and maintain clinical knowledge, skills, and behaviors appropriate to their practice**

2.1. Apply knowledge of the clinical, socio-behavioral, and fundamental biomedical sciences relevant to benign and malignant hematological disorders

2.1.1. Describe normal and disordered hematopoiesis, including changes related to age from the fetus to the elderly

2.1.2. Demonstrate an understanding of genetics and cytogenetics pertaining to hematology

2.1.3. Describe the mechanisms of oncogenesis

2.1.4. Describe the principles of cancer epidemiology, staging, and prognostic factors

2.1.5. Describe the mechanisms of action of chemotherapeutic agents, targeted agents, and radiation

2.1.6. Describe the principles of molecular testing including polymerase chain reaction (PCR)

2.1.7. Describe normal and disordered immune function

2.1.8. Describe the normal and disordered pathways of hemostasis

2.1.9. Describe the normal and disordered red cell structure and function

2.1.10. Describe the red blood cell and platelet antigen systems and the principles of transfusion medicine

2.1.11. Describe iron metabolism

2.1.12. Describe the Human Leucocyte Antigen (HLA) system

2.1.13. Demonstrate basic knowledge of lymph node and splenic pathology

2.1.14. Demonstrate an awareness of the common hematological disorders occurring in childhood

2.1.15. Demonstrate knowledge of physiologic changes and hematological disorders occurring in pregnancy and during the post-partum period

2.1.16. Describe the principles of laboratory testing, including automated blood cell counters, flow cytometry, and coagulation assays

2.2. Interpret blood films, bone marrow aspiration, and biopsies

3. Perform a complete and appropriate assessment of patients

3.1. Identify and effectively explore issues to be addressed in a patient encounter, including the patient's context and preferences

3.2. Elicit a history that is relevant, clear, concise, and accurate to context and preferences for the purposes of diagnosis, management, health promotion, and disease prevention

3.3. Perform a focused physical examination that is relevant and accurate for the purposes of diagnosis, management, health promotion, and disease prevention

3.4. Diagnose patients appropriately using currently accepted diagnostic criteria

3.5. Evaluate diseases appropriately using currently accepted staging systems and prognostic indices

3.6. Select medically appropriate investigative methods in a resource-effective and ethical manner

3.7. Demonstrate effective clinical problem solving and judgment to address patient problems, including interpreting available data and integrating information to generate differential diagnoses and management plans

4. Use preventive and therapeutic interventions effectively

4.1. Implement an effective management plan in collaboration with the patient and their family

4.2. Demonstrate effective, appropriate, and timely application of preventive and therapeutic interventions relevant to the hematological practice, including the following:

4.2.1. Vaccination and/or immunization

4.2.2. Transfusion

4.2.3. Chemotherapy

4.2.4. Antibody therapy and other targeted therapy

4.2.5. Radiation

4.2.6. Immunosuppressive agents

4.2.7. Anticoagulants, thrombolytic agents, and hemostatic agents

4.2.8. Stem cell transplantation, including patient assessment, donor selection, stem cell collection and infusion, and management of complications including graft-versus-host disease and infections

4.2.9. Apheresis

4.2.10. Supportive care including antiemetics, growth factors, antibiotics, and analgesics

4.3. Obtain appropriate informed consent for therapies, including transfusion and chemotherapy

4.4. Manage late complications of therapy, including recognition of the challenges faced by cancer survivors

4.5. Ensure patients receive appropriate end-of-life care

4.6. Manage the following in a timely, logical, ethical, and efficient manner:

4.6.1. Qualitative and quantitative disorders of

- 4.6.1.1. Red blood cells
- 4.6.1.2. Neutrophils
- 4.6.1.3. Eosinophils, basophils, and monocytes
- 4.6.1.4. Lymphocytes

4.6.2. Monoclonal gammopathy

4.6.3. Lymphadenopathy

4.6.4. Splenomegaly and splenic dysfunction

4.6.5. Quantitative and qualitative disorders of platelets

4.6.6. Bleeding disorders (congenital and acquired)

4.6.7. Thrombotic disorders (congenital and acquired)

4.6.8. Complications of central venous catheters

4.6.9. Disorders of iron metabolism including iron overload

4.6.10. Allo-immune and autoimmune cytopenias

4.6.11. Transfusion reactions

4.6.12. Patients with known or suspected hematological malignancies including the following:

- 4.6.12.1. Lymphoproliferative disorders
- 4.6.12.2. Leukemia
- 4.6.12.3. Plasma cell dyscrasias
- 4.6.12.4. Other hematological malignancies

4.6.13. Patients with known or suspected stem cell disorders including the following:

- 4.6.13.1. Myeloproliferative neoplasia disorder
- 4.6.13.2. Aplastic anemia
- 4.6.13.3. Myelodysplasia

4.6.14. Hematological emergencies

5. Demonstrate proficient and appropriate use of procedural skills, both diagnostic and therapeutic

5.1. Demonstrate effective, appropriate, and timely performance of diagnostic procedures relevant to hematology, including the following:

- 5.1.1. Bone marrow aspiration and biopsy
- 5.1.2. Lumbar puncture
- 5.1.3. Proficiency in hematologic microscopy

5.2. Demonstrate effective, appropriate, and timely performance of therapeutic procedures relevant to their practice

- 5.2.1. Administration of intrathecal chemotherapy

5.2.2. Supervision of therapeutic phlebotomy

5.2.3. Supervision of transfusion and infusion of concentrates

5.2.4. Supervision of chemotherapy

5.3. Obtain appropriate informed consent for all procedures

5.4. Describe and discuss potential adverse effects

5.5. Ensure adequate follow-up is arranged for procedures performed

6. Seek appropriate consultation from other health professionals by recognizing the limits of their personal expertise

6.1. Demonstrate insight into their own limits of expertise

6.2. Demonstrate effective, appropriate, and timely consultation of another health professional as needed for optimal patient care

6.3. Arrange appropriate follow-up care services for patients and their families/caregivers

Communicator

As Communicators, hematologists effectively facilitate the doctor-patient relationship and the dynamic exchanges that occur before, during, and after the medical encounter.

Key and Enabling Competencies:

1. Develop rapport, trust, and ethical therapeutic relationships with patients and their families

1.1. Recognize that being a good communicator is a core clinical skill for physicians, and that effective physician-patient communication can foster patient satisfaction, physician satisfaction, adherence, and improved clinical outcomes

1.2. Establish positive relationships with patients and their families that are characterized by understanding, trust, respect, honesty, and empathy

1.3. Respect patient confidentiality, privacy, and autonomy

1.4. Listen effectively

1.5. Be aware of and responsive to nonverbal cues

1.6. Facilitate a structured clinical encounter effectively

1.7. Communicate effectively with patients and their families about end-of-life issues, including transition from treatment with curative intent to palliative/supportive therapy and withdrawal of therapy such as transfusions and/or chemotherapy

2. Accurately elicit and synthesize relevant information and perspectives of patients, their families, colleagues, and other professionals

2.1. Gather information about a disease and about a patient's beliefs, concerns, expectations, and illness experience, including acceptance of blood products

2.2. Seek out and synthesize relevant information from other sources, such as a patient's family, caregivers, and other professionals, while respecting individual privacy and confidentiality

3. **Convey relevant information and explanations accurately to patients and families, colleagues, and other professionals**

3.1. Deliver information to patients and families, colleagues, and other professionals in a humane manner and in such a way that it is understandable and encourages discussion and participation in decision-making

4. **Develop a common understanding on issues, problems, and plans with patients, families, and other professionals to develop a shared plan of care**

4.1. Identify and explore problems to be addressed from a patient encounter effectively, including the patient's context, responses, concerns, and preferences

4.2. Respect diversity and differences, including but not limited to the impact of gender, religion, and cultural beliefs on decision-making

4.3. Encourage discussion, questions, and interaction in the encounter

4.4. Engage patients, families, and relevant health professionals in shared decision-making to develop a plan of care

4.5. Address challenging communication issues effectively, including but not limited to obtaining informed consent, delivering bad news, and addressing anger, confusion, and misunderstanding

5. **Convey effective oral and written information about a medical encounter**

5.1. Maintain clear, accurate, and appropriate records (written or electronic) of clinical encounters and plans

5.2. Present oral reports of clinical encounters and plans

6. **Present medical information to the public or media about a medical issue**

Collaborator

As Collaborators, hematologists effectively work within a health care team to achieve optimal patient care.

Key and Enabling Competencies:

1. **Participate effectively and appropriately in an interprofessional health care team**

1.1. Describe the hematologist's roles and responsibilities to other professionals

1.2. Describe the roles and responsibilities of other professionals within the hematology team, including laboratory technologists and physicians, nurses, social workers, and pharmacists

1.3. Recognize and respect the diverse roles, responsibilities, and competencies of other professionals in relation to their own

1.4. Work with others to assess, plan, provide, and integrate care for individuals and groups of patients

1.5. Work with others to assess, plan, provide, and review other tasks, such as research problems, educational work, program review, or administrative responsibilities

1.6. Participate effectively in interprofessional teams in the laboratory as well as ambulatory and inpatient settings

1.7. Establish interdependent relationships with other professionals for the provision of quality care

1.8. Describe the principles of team dynamics

1.9. Respect team ethics, including confidentiality, resource allocation, and professionalism

1.10. Demonstrate leadership as appropriate in a health care team

2. **Work with other health professionals effectively to prevent, negotiate, and resolve interprofessional conflict**

2.1. Demonstrate a respectful attitude toward other colleagues and members of an interprofessional team

2.2. Work with other professionals to prevent conflicts

2.3. Respect differences and the scope of practice of other professions

2.4. Reflect on their own differences, misunderstandings, and limitations that may contribute to interprofessional tension

2.5. Reflect on interprofessional team function

2.6. Employ collaborative negotiation to resolve conflicts and address misunderstandings

Manager

As Managers, hematologists are integral participants in health care organizations, organizing sustainable practices, making decisions about allocating resources, and contributing to the effectiveness of the health care system.

Key and Enabling Competencies:

1. **Participate in activities that contribute to the effectiveness of their health care organizations and systems**
   - 1.1. Work collaboratively with others in their organizations
   - 1.2. Participate in systemic quality process evaluation and improvement, including patient safety initiatives in clinical care and the laboratory
   - 1.3. Describe the structure and function of the health care system as it relates to hematology practice, including cancer care systems and Ministry of Health frameworks
   - 1.4. Describe principles of health care financing, including physician remuneration, budgeting, and organizational funding
2. **Manage their practice and career effectively**
   - 2.1. Set priorities and manage time to balance patient care, practice requirements, outside activities, and personal life
   - 2.2. Manage a practice including finances and human resources
   - 2.3. Implement processes to ensure personal practice improvement
   - 2.4. Employ information technology appropriately for patient care
3. **Allocate finite health care resources appropriately**
   - 3.1. Demonstrate an understanding of the importance of fair allocation of health care resources and balancing effectiveness, efficiency, and access with optimal patient care, particularly with respect to high-cost therapies, laboratory investigations, and blood products
   - 3.2. Apply evidence and management processes at a systems level for cost-appropriate care for individual hematology patients
4. **Serve in administration and leadership roles, as appropriate**
   - 4.1. Chair or participate effectively in committees and meetings
   - 4.2. Lead or implement change in health care
   - 4.3. Plan relevant elements of health care delivery, such as work schedules

Health Advocate

As Health Advocates, hematologists use their expertise and influence responsibly to advance the health and well-being of individual patients, communities, and populations.

Key and Enabling Competencies:

1. **Respond to individual patient health needs and issues as part of patient care**
   - 1.1. Identify the health needs of an individual patient and take a patient-centered approach to investigations and management

1.2. Identify opportunities for advocacy, health promotion, and disease prevention for individuals under their care, including access to drugs and blood products

2. Respond to the health needs of the communities that they serve

2.1. Describe the practice communities that they serve

2.2. Identify opportunities for advocacy, health promotion, and disease prevention in the communities that they serve, and respond appropriately

2.3. Demonstrate an appreciation of the possibility of competing interests between the communities served and other populations

3. Identify the determinants of health for the populations that they serve

3.1. Identify the determinants of health of the population they serve, including barriers to access to care and resources, especially financial barriers

3.2. Identify vulnerable or marginalized populations within those served and respond appropriately

4. Promote the health of individual patients, communities, and populations

4.1. Describe an approach to implementing changes in health determinants in the populations they serve

4.2. Describe how public policy impacts the health of the populations served

4.2.1. Promote preventative strategies, including thromboprophylaxis and vaccination programs

4.2.2. Promote blood safety

4.3. Identify points of influence in the health care system and its structure

4.4. Describe the ethical and professional issues inherent in health advocacy, including altruism, social justice, autonomy, integrity, and idealism

4.5. Demonstrate an appreciation of the possibility of conflicts that are inherent in their role as a health advocate for a patient or community with that of manager or gatekeeper

4.6. Describe the role of the medical profession in collectively advocating for health and patient safety

Scholar

As Scholars, hematologists demonstrate a lifelong commitment to reflective learning, as well as the creation, dissemination, application, and translation of medical knowledge.

Key and Enabling Competencies:

1. Maintain and enhance professional activities through ongoing learning

1.1. Describe the principles of maintenance of competence

- 1.2. Describe the principles of and strategies for implementing a personal knowledge management system
- 1.3. Recognize and reflect on learning issues in practice
- 1.4. Conduct personal practice audits
- 1.5. Pose an appropriate learning question
- 1.6. Access and interpret the relevant evidence
- 1.7. Integrate new learning into practice
- 1.8. Evaluate the impact of any change in practice
- 1.9. Document the learning process

2. **Critically evaluate medical information and its sources, and apply this appropriately to practice decisions**
   - 2.1. Describe the principles of critical appraisal
   - 2.2. Critically appraise retrieved evidence in order to address a clinical question
   - 2.3. Integrate critical appraisal conclusions into clinical care

3. **Facilitate the learning of patients, families, students, residents, other health professionals, the public, and others, as appropriate**
   - 3.1. Describe principles of learning relevant to medical education
   - 3.2. Identify collaboratively the learning needs and desired learning outcomes of others
   - 3.3. Select effective teaching strategies and content to facilitate others' learning
   - 3.4. Deliver effective lectures or presentations
   - 3.5. Assess and reflect on teaching encounters
   - 3.6. Provide effective feedback
   - 3.7. Describe the principles of ethics with respect to teaching

4. **Contribute to the development, dissemination, and translation of new knowledge and practices**
   - 4.1. Describe the principles of research and scholarly inquiry
   - 4.2. Describe the principles of research ethics
   - 4.3. Pose a scholarly question
   - 4.4. Conduct a systematic search for evidence
   - 4.5. Select and apply appropriate methods to address the question
   - 4.6. Participate in a scholarly research, quality assurance, or educational project relevant to hematology, demonstrating primary responsibility for the following elements of the project:
     - 4.6.1. Development of the hypothesis, which must include a comprehensive literature review

4.6.2. Development of the protocol for the scholarly project

4.6.3. Preparation of a grant application if applicable

4.6.4. Development of the research ethics proposal if applicable

4.6.5. Interpretation, synthesis, and presentation of the results

Professional

As Professionals, hematologists are committed to the health and well-being of individuals and society through ethical practice, profession-led regulation, and high personal standards of behavior.

Key and Enabling Competencies:

1. **Demonstrate a commitment to their patients, profession, and society through ethical practice**
   - 1.1. Exhibit appropriate professional behaviors in practice, including honesty, integrity, commitment, compassion, respect, and altruism
   - 1.2. Demonstrate the ability to meet deadlines and be punctual
   - 1.3. Demonstrate a commitment to delivering the highest quality care and maintenance of competence
   - 1.4. Recognize and appropriately respond to ethical issues encountered in practice and/or research, including but not limited to disclosure of errors and interactions with pharmaceutical and other health care industries
   - 1.5. Identify, declare, and manage perceived, potential, or actual conflicts of interest, including interactions with pharmaceutical and other health care industries
   - 1.6. Recognize the principles and limits of patient privacy and confidentiality, as defined by professional practice standards and the law
   - 1.7. Maintain appropriate boundaries with patients
2. **Demonstrate a commitment to their patients, profession, and society through participation in profession-led regulation**
   - 2.1. Demonstrate knowledge and an understanding of professional, legal, and ethical codes of practice
   - 2.2. Fulfill the regulatory and legal obligations required of current practice
   - 2.3. Demonstrate accountability to professional regulatory bodies
   - 2.4. Recognize and respond appropriately to others' unprofessional behaviors in practice
   - 2.5. Participate in peer review

3. Demonstrate a commitment to physician health and sustainable practice 3.1. Balance personal and professional priorities to ensure personal health and a sustainable practice 3.2. Recognize the impact of caring for a dying patient 3.3. Strive to heighten personal and professional awareness and insight 3.4. Recognize other professionals in need and respond appropriately

11.2 Appendix-B

Top Conditions and Procedures in the Hematology Specialty	
Top Hematological Malignancies among Saudi Adults in 2016	
Disease	Frequency
Non-Hodgkin's Lymphoma	6.3%
Hodgkin's Lymphoma	3.4%
Leukemia	3.3%
Top Procedures/Surgeries Performed by the Hematology Specialty	
Bone marrow aspiration and biopsy	
Intrathecal chemotherapy	
Bone marrow harvest	

11.3 Appendix-C

The following table lists example topics that illustrate the half-day activities spread over the course of one year (or cycle of teaching if more than one year is required to cover all the topics).

Academic week	Date	Time	Sessions	Presenters
1	Jan-5	13:00–14:00	Program welcome session	Program director
		14:00–15:00	Case-based study	A
		15:00–16:00	Approach to thrombocytopenia in hospitalized patient	B
	Jan-6	15:00–16:00	Multidisciplinary lymphoma board conference	
2	Jan-12	13:00–14:00	Initial management of acute leukemia	C
		14:00–15:00	Case-based study	D
		15:00–16:00	Bleeding Disorders	E
	Jan-13	15:00–16:00	Multidisciplinary lymphoma board conference	
3	Jan- 19	13:00–14:00	VTE	F
		14:00–15:00	Case-based study	B
		15:00–16:00	Management of chemotherapy-induced nausea and vomiting	C
	Jan-20	15:00–16:00	Multidisciplinary lymphoma board conference	
4	Jan- 26	13:00–14:00	Journal club	K
		14:00–15:00	Case-based study	B
		15:00–16:00	Approach to anemia	A
	Jan-27	15:00–16:00	Multidisciplinary lymphoma board conference	

11.4 Appendix-D

Universal Topics

Intent:

These are high-value, interdisciplinary topics of outmost importance to the trainee. The primary reason for delivering the topics is to ensure that every trainee receives high-quality teaching and develops essential core knowledge. These topics are common to all specialties. The topics included here meet one or more of the following criteria:

- Impactful: topics that are common or forceful
- Interdisciplinary: topics that are difficult to teach in a single discipline
- Orphan: topics that are poorly represented in the undergraduate curriculum
- Practical: topics that trainees will encounter in hospital practice

Development and Delivery:

Core topics for the PG curriculum will be developed and delivered by the SCFHS through an e-learning platform. A set of preliminary learning outcomes will be developed for each topic. Content experts, in collaboration with the central team, may modify the learning outcomes.

These topics will be didactic in nature, with a focus on the practical aspects of care. These topics will be more content-heavy than the workshops and other face-to-face interactive sessions that will be part of the program.

The suggested duration of each topic is an hour and a half.

Assessment: The topics will be delivered in a modular fashion. At the end of each learning unit, there will be an online formative assessment. After completion of all topics, there will be a combined summative assessment in the form of context-rich MCQs. All trainees must attain minimum competency in the summative assessment. Alternatively, these topics can be assessed in a summative manner, along with a specialty examination.

Some ideas include case studies, high-quality images, worked examples on prescription of drugs for disease states, and internet resources.

Module 1: Introduction

1. Safe drug prescribing
2. Hospital-acquired infections
3. Sepsis; systematic inflammatory response syndrome (SIRS); disseminated intravascular coagulation (DIC)
4. Antibiotic stewardship
5. Blood transfusion

Safe Drug Prescribing: At the end of the learning unit, you should be able to do the following:

a) Recognize the importance of safe drug prescribing in health care
b) Describe various adverse drug reactions with examples of commonly prescribed drugs that can cause such reactions
c) Apply principles of drug-drug interactions, drug-disease interactions, and drug-food interactions in common situations
d) Apply principles of prescribing drugs in special situations such as renal failure and liver failure
e) Apply principles of prescribing drugs in elderly and pediatric patients, and in pregnancy and lactation
f) Promote evidence-based, cost-effective prescribing
g) Discuss ethical and legal framework governing safe drug prescribing in Saudi Arabia

Hospital-Acquired Infections (HAI): At the end of the learning unit, you should be able to do the following:

a) Discuss the epidemiology of HAI with special reference to HAI in Saudi Arabia
b) Recognize HAI as one of the major emerging threats in health care
c) Identify the common sources and settings of HAI

d) Describe the risk factors of common HAIs such as ventilator-associated pneumonia, Methicillin-resistant Staphylococcus aureus (MRSA), central line-associated bloodstream infection (CLABSI), and Vancomycin-resistant Enterococcus (VRE)
e) Identify the role of health care workers in the prevention of HAI
f) Determine appropriate pharmacological (e.g., selected antibiotic) and non-pharmacological (e.g., removal of indwelling catheter) measures in the treatment of HAI
g) Propose a plan to prevent HAI in the workplace

Sepsis, SIRS, and DIC: At the end of the learning unit, you should be able to do the following:

a) Explain the pathogenesis of sepsis, SIRS, and DIVC
b) Identify patient-related and non-patient-related predisposing factors of sepsis, SIRS, and DIVC
c) Recognize a patient at risk of developing sepsis, SIRS, and DIVC
d) Describe the complications of sepsis, SIRS, and DIVC
e) Apply the principles of management of patients with sepsis, SIRS, and DIVC
f) Describe the prognosis of sepsis, SIRS, and DIVC

Antibiotic Stewardship: At the end of the learning unit, you should be able to do the following:

a) Recognize antibiotic resistance as one of the most pressing public health threats globally
b) Describe the mechanism of antibiotic resistance
c) Determine the appropriate and inappropriate use of antibiotics
d) Develop a plan for safe and proper antibiotic usage plan including right indications, duration, types of antibiotics, and discontinuation
e) Appraise local guidelines in the prevention of antibiotic resistance

Blood Transfusion: At the end of the learning unit, you should be able to do the following:

a) Review the different components of blood products available for transfusion
b) Recognize the indications and contraindications of blood product transfusion
c) Discuss the benefits, risks, and alternatives to transfusion
d) Undertake consent for specific blood product transfusion
e) Perform steps necessary for safe transfusion
f) Develop an understanding of special precautions and procedures necessary during massive transfusions
g) Recognize transfusion-associated reactions and provide immediate management

Module 2: Cancer

6. Principles of management of cancer
7. Side effects of chemotherapy and radiation therapy
8. Oncologic emergencies
9. Cancer prevention
10. Surveillance and follow-up of cancer patients

Principles of Management of Cancer: At the end of the learning unit, you should be able to do the following:

a) Discuss the basic principles of staging and grading of cancers
b) Enumerate the basic principles (e.g., indications, mechanisms, types) of
    a. Cancer surgery
    b. Chemotherapy
    c. Radiotherapy
    d. Immunotherapy
    e. Hormone therapy

Side Effects of Chemotherapy and Radiation Therapy: At the end of the learning unit, you should be able to do the following:

c) Describe important side effects (e.g., frequent or life- or organ-threatening) of common chemotherapy drugs

d) Explain principles of monitoring of side effects in a patient undergoing chemotherapy
e) Describe available measures (pharmacological and non-pharmacological) to ameliorate the side effects of commonly prescribed chemotherapy drugs
f) Describe important (e.g., common and life-threatening) side effects of radiation therapy
g) Describe available measures (pharmacological and non-pharmacological) to ameliorate the side effects of radiotherapy

Oncologic Emergencies: At the end of the learning unit, you should be able to do the following:

a) Enumerate important oncologic emergencies encountered in both hospital and ambulatory settings
b) Discuss the pathogenesis of important oncologic emergencies
c) Recognize oncologic emergencies
d) Institute immediate measures when treating a patient with oncologic emergencies
e) Counsel patients in an anticipatory manner to recognize and prevent oncologic emergencies

Cancer Prevention: At the end of the learning unit, you should be able to do the following:

a) Conclude that many major cancers are preventable
b) Identify smoking prevention and life-style modifications as major preventable measures
c) Recognize cancers that are preventable
d) Discuss the major cancer prevention strategies at the individual as well as national level
e) Counsel patients and families in a proactive manner regarding cancer prevention, including the importance of screening

Surveillance and Follow-Up of Cancer Patients: At the end of the learning unit, you should be able to do the following:

a) Describe the principles of surveillance and follow-up of patients with cancers
b) Enumerate the surveillance and follow-up plan for common forms of cancer
c) Describe the role of primary care physicians, family physicians, and similar others in the surveillance and follow-up of cancer patients
d) Liaise with oncologists to provide surveillance and follow-up for patients with cancer

Module 3: Diabetes and Metabolic Disorders

11. Recognition and management of diabetic emergencies
12. Management of diabetic complications
13. Comorbidities of obesity
14. Abnormal ECG

Recognition and Management of Diabetic Emergencies: At the end of the learning unit, you should be able to do the following:

a) Describe the pathogenesis of common diabetic emergencies including their complications
b) Identify risk factors and groups of patients vulnerable to such emergencies
c) Recognize a patient presenting with diabetic emergencies
d) Institute immediate management
e) Refer the patient to appropriate next level of care
f) Counsel patient and families to prevent such emergencies

Management of Diabetic Complications: At the end of the learning unit, you should be able to do the following:

a) Describe the pathogenesis of important complications of Type 2 diabetes mellitus
b) Screen patients for such complications
c) Provide preventive measures for such complications
d) Treat such complications
e) Counsel patients and families with special emphasis on prevention

Comorbidities of Obesity: At the end of the learning unit, you should be able to do the following:

a) Screen patients for the presence of common and important comorbidities of obesity
b) Manage obesity-related comorbidities
c) Provide dietary and life-style advice for prevention and management of obesity

Abnormal ECG: At the end of the learning unit, you should be able to do the following:

a) Recognize common and important ECG abnormalities
b) Institute immediate management, if necessary

Module 4: Medical and Surgical Emergencies

15. Management of acute chest pain
16. Management of acute breathlessness
17. Management of altered sensorium
18. Management of hypotension and hypertension
19. Management of upper GI bleeding
20. Management of lower GI bleeding

For all the above, the following learning outcomes apply.

At the end of the learning unit, you should be able to do the following:

a) Triage and categorize patients
b) Identify patients who need prompt medical and surgical attention
c) Generate preliminary diagnoses based on history and physical examination
d) Order and interpret urgent investigations
e) Provide appropriate and immediate management to patients
f) Refer the patients to next level of care, if needed

Module 5: Acute Care

21. Pre-operative assessment

22. Post-operative care
23. Acute pain management
24. Chronic pain management
25. Management of hydration in hospitalized patients
26. Management of acid-base and electrolyte imbalances

Pre-Operative Assessment: At the end of the learning unit, you should be able to do the following:

a) Describe the basic principles of pre-operative assessment
b) Perform pre-operative assessment in uncomplicated patients with special emphasis on
    a. General health assessment
    b. Cardiorespiratory assessment
    c. Medications and medical device assessment
    d. Drug allergy
    e. Pain relief needs
c) Categorize patients according to risks

Post-Operative Care: At the end of the learning unit, you should be able to do the following:

a) Devise a post-operative care plan including monitoring of vitals, pain management, fluid management, medications, and laboratory investigations
b) Hand over patients properly to appropriate facilities
c) Describe the process of post-operative recovery in a patient
d) Identify common post-operative complications
e) Monitor patients for possible post-operative complications
f) Institute immediate management for post-operative complications

Acute Pain Management: At the end of the learning unit, you should be able to do the following:

a) Review the physiological basis of pain perception

b) Proactively identify patients who might be in acute pain
c) Assess a patient with acute pain
d) Apply various pharmacological and non-pharmacological modalities available for acute pain management
e) Provide adequate pain relief for uncomplicated patients with acute pain
f) Identify and refer patients with acute pain who can benefit from specialized pain services

Chronic Pain Management: At the end of the learning unit, you should be able to do the following:

a) Review the bio-psychosocial and physiological basis of chronic pain perception
b) Discuss various pharmacological and non-pharmacological options available for chronic pain management
c) Provide adequate pain relief for uncomplicated patients with chronic pain
d) Identify and refer patients with chronic pain who can benefit from specialized pain services

Management of Hydration in Hospitalized Patients: At the end of the learning unit, you should be able to do the following:

a) Review the physiological basis of water balance in the body
b) Assess a patient for his/her hydration status
c) Recognize a patient with over and under hydration
d) Order fluid therapy (oral as well as intravenous) for a hospitalized patient
e) Monitor fluid status and response to therapy through history, physical examination, and selected laboratory investigations

Management of Acid-Base and Electrolyte Imbalances: At the end of the learning unit, you should be able to do the following:

a) Review the physiological basis of electrolyte and acid-base balance in the body
b) Identify diseases and conditions that are likely to cause or be associated with acid-base and electrolyte imbalances

c) Correct electrolyte and acid-base imbalances

d) Perform careful calculations, checks, and other safety measures while correcting acid-base and electrolyte imbalances

e) Monitor response to therapy through history, physical examination, and selected laboratory investigations

Module 6: Frail Elderly

27. Assessment of the frail elderly
28. Mini-mental state examination
29. Prescribing drugs in the elderly
30. Care of the elderly

Assessment of the Frail Elderly: At the end of the learning unit, you should be able to do the following:

a) Enumerate the differences and similarities between comprehensive assessment of the elderly and assessment of other patients

b) Perform comprehensive assessment, in conjunction with other members of the health care team, of frail elderly patients with special emphasis on social factors, functional status, quality of life, diet and nutrition, and medication history

c) Develop a problem list based on the assessment of the elderly

Mini-Mental State Examination (MSE): At the end of the learning unit, you should be able to do the following:

a) Review the appropriate uses, advantages, and potential pitfalls of mini-MSE

b) Identify patients suitable for mini-MSE

c) Screen patients for cognitive impairment through mini-MSE

Prescribing Drugs in the Elderly: At the end of the learning unit, you should be able to do the following:

a) Discuss the principles of prescribing in the elderly

b) Recognize polypharmacy, prescribing cascade, inappropriate dosages, inappropriate drugs, and deliberate drug exclusion as major causes of morbidity in the elderly

c) Describe physiological and functional declines in the elderly that contribute to increased drug-related adverse events

d) Discuss drug-drug interactions and drug-disease interactions among the elderly

e) Be familiar with Beers Criteria

f) Develop rational prescribing habit for the elderly

g) Counsel elderly patients and family on safe medication usage

Care of the Elderly: At the end of the learning unit, you should be able to do the following:

a) Describe the factors that need to be considered while planning care for the elderly

b) Recognize the needs and well-being of caregivers

c) Identify the local and community resources available in the care of the elderly

d) Develop, with inputs from other health care professionals, individualized care plans for elderly patients

Module 7: Ethics and Healthcare

31. Occupational hazards of health care workers (HCW)
32. Evidence-based approach to smoking cessation
33. Patient advocacy
34. Ethical issues: transplantation/organ harvesting; withdrawal of care
35. Ethical issues: treatment refusal; patient autonomy
36. Role of doctors in death and dying

Occupational Hazards of Health Care Workers (HCW): At the end of the learning unit, you should be able to do the following:

a) Recognize common sources and risk factors of occupational hazards among HCW
b) Describe common occupational hazards in the workplace
c) Develop familiarity with legal and regulatory frameworks governing occupational hazards among HCW
d) Develop a proactive attitude to promote workplace safety
e) Protect yourself and colleagues against potential occupational hazards in the workplace

Evidence-based Approach to Smoking Cessation: At the end of the learning unit, you should be able to do the following:

a) Describe the epidemiology of smoking and tobacco use in Saudi Arabia
b) Review the effects of smoking on the smoker and family members
c) Effectively use pharmacologic and non-pharmacologic measures to treat tobacco use and dependence
d) Effectively use pharmacologic and non-pharmacologic measures to treat tobacco use and dependence among special population groups such as pregnant women, adolescents, and patients with psychiatric disorders

Patient Advocacy: At the end of the learning unit, you should be able to do the following:

a) Define patient advocacy

b) Recognize patient advocacy as a core value governing medical practice
c) Describe the role of patient advocates in the care of patients
d) Develop a positive attitude toward patient advocacy
e) Be a patient advocate in conflicting situations
f) Be familiar with local and national patient advocacy groups

Ethical issues: transplantation/organ harvesting; withdrawal of care: At the end of the learning unit, you should be able to do the following:

a) Apply key ethical and religious principles governing organ transplantation and withdrawal of care
b) Be familiar with the legal and regulatory guidelines governing organ transplantation and withdrawal of care
c) Counsel patients and families in the light of applicable ethical and religious principles
d) Guide patients and families in making an informed decision

Ethical issues: treatment refusal; patient autonomy: At the end of the learning unit, you should be able to do the following:

a) Predict situations where a patient or family is likely to decline prescribed treatment
b) Describe the concept of "rational adult" in the context of patient autonomy and treatment refusal
c) Analyze key ethical, moral, and regulatory dilemmas in treatment refusal
d) Recognize the importance of patient autonomy in the decision-making process
e) Counsel patients and families declining medical treatment in the light of the best interests of patients

Role of Doctors in Death and Dying: At the end of the learning unit, you should be able to do the following:

a) Recognize the important role a doctor can play during the dying process
b) Provide emotional as well as physical care to a dying patient and family
c) Provide appropriate pain management in a dying patient

d) Identify suitable patients and refer them to palliative care services

11.5 Appendix-E

Logbook Form	
Date:	
Center/Region:	
Supervisor:	
Medical Record Number:	
Age:	
Sex:	
Procedure/ Encounters:	
Trainee Comments:	
Supervisor feedback	
Did you supervise the following procedure(s)?	
Supervisor Comments:	

11. 6 Appendix-F

ITER - IN-TRAINING EVALUATION REPORT (M.F.HemaA)

	n/a	Clear Fail (1)	Borderline (2)	Clear Pass (3)	Exceed Expectations (4)
*A. MEDICAL EXPERT: History & Physical Examination: 1. Comprehensive, accurate & concise with all relevant details	○	○	○	○	○
*Diagnostic Tests: 2. Used in a cost-effective manner & understands limitations & predictive value.	○	○	○	○	○
*Clinical Decision: 3. Able to formulate appropriate differential diagnosis.	○	○	○	○	○
*4. Able to analyze, integrate, and formulate effective management strategies.	○	○	○	○	○
*Medical Knowledge: 5. Broad Clinical & Basic knowledge of a wide variet of medical problems and develops a plan of secondary prevention.	○	○	○	○	○
*Emergency Management: 6. Able to identify and respond appropriately to urgent cases	○	○	○	○	○
*Evidence-based Practice/Critical Appraisal Skills: 7. Aware of the role of evidence in clinical decision-making.	○	○	○	○	○
*8. Able to apply relevant information in problem-solving.	○	○	○	○	○
*9. Demonstrates knowledge of medications used, mechanisms of action, clinically relevant pharmacokinetics, indications, contraindications, and adverse effects.	○	○	○	○	○
*Procedural Skills: 10.. Perform diagnostic & therapeutic procedures, undestands indications, limitations & complications.	○	○	○	○	○
*B. COMMUNICATOR 11. Communicates effectively with patients, their families, and HCPs.	○	○	○	○	○
*12. Able to maintain clear, accurate & appropriate records.	○	○	○	○	○
*13. Written orders and progress notes are well organized & legible.	○	○	○	○	○
*14. Discharge summaries are concise & completed promptly.	○	○	○	○	○
*C. COLLABORATOR: 15. Works effectively in a team environment with attending, juniors & nursing staff.	○	○	○	○	○
*D. MANAGER : 16. Serves in administration and leadership roles as appropriate.	○	○	○	○	○
*17. Appropriate & efficient use of health care resources.	○	○	○	○	○
*E. SCHOLAR : 18. Attends and contributes to rounds, seminars, and other learning events.	○	○	○	○	○
*19. Accepts and acts on constructive feedback.	○	○	○	○	○
*20. Contributes to the education of patients, junior residents, house staff, and students.	○	○	○	○	○
*21. Contributes in scientific research.	○	○	○	○	○
*F. HEALTH ADVOCATE : 22. Able to identify the psychosocial, economic, environmental & biological factors which influence the health of patients and society.	○	○	○	○	○
*23. Offers advocacy on behalf of patients at practice and general population levels.	○	○	○	○	○
*G. PROFESSIONAL : 24. Delivers the highest quality of care with integrity & compassion. Recognizes limitations and seeks advice and consultations when necessary.	○	○	○	○	○
*25. Reflects the highest standards of excellence in clinical care and ethical conduct.	○	○	○	○	○

*Comments (areas of strengths/areas for improvement)