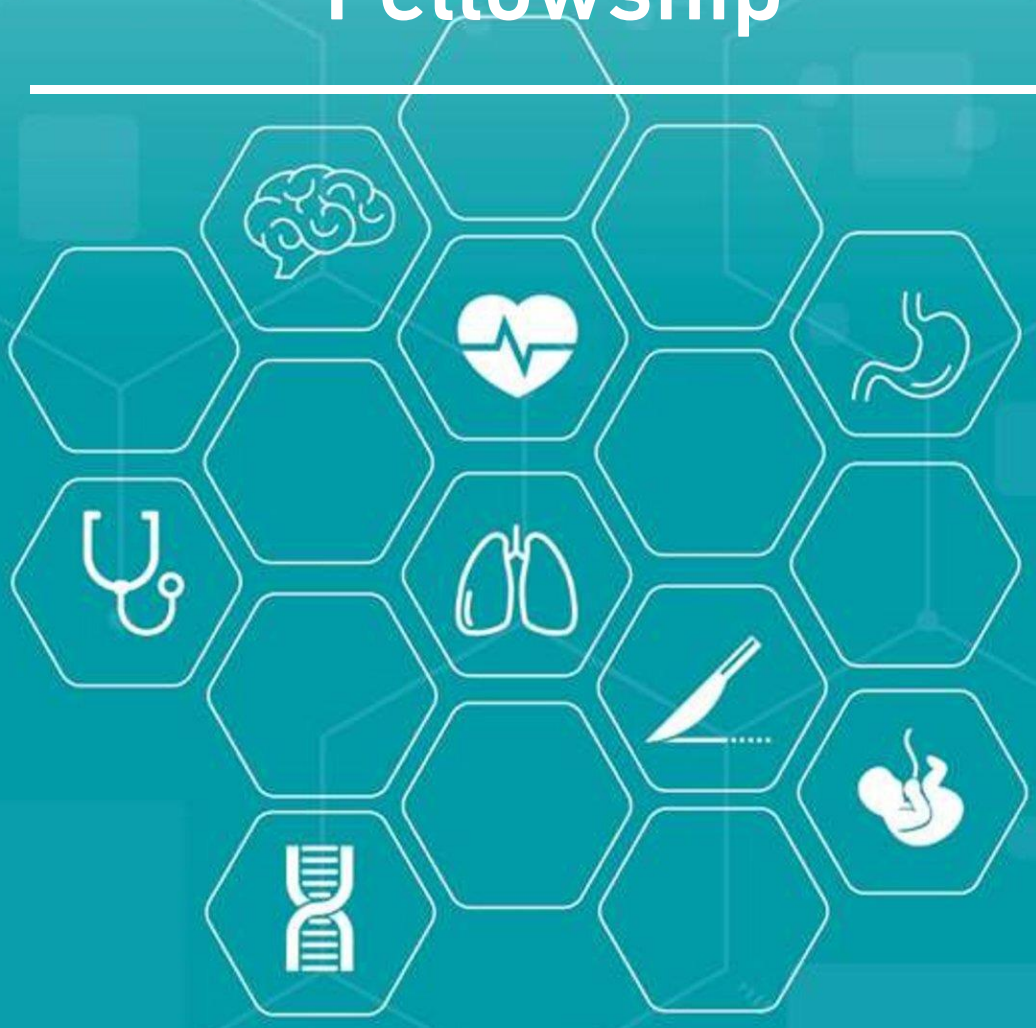
الهيئة السعودية للتخصصات الصحية
Saudi Commission for Health Specialties

Reconstructive Microvascular Surgery Fellowship



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بسم الله الرحمن الرحيم

PREFACE

- The primary goal of this document is to enrich the training experience of postgraduate trainees by outlining the learning objectives to become independent and competent future practitioners.
- This curriculum may contain sections outlining some training regulations; however, such regulations should be reviewed in 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 a discrepancy in regulation statements, the one stated in the most updated bylaws and executive policies should be applied.
- As this curriculum is subjected to periodic refinements, please refer to the electronic version posted online for the most updated edition at www.scfhs.org.sa.

I. CONTRIBUTORS

Curriculum Development Committee:
• Dr. Nedhal Abdullah Alqumber • Dr. Bassam Alawirdhi • Dr. Fahad Aljindan • Dr. Fatema Alsubhi • Dr. Feras M. Alshomer
Reviewed and approved by Scientific Committee Members:
• Dr. Nedhal Abdullah alqumber • Dr. Bassam Alawirdhi • Dr. Fahad Aljindan • Dr. Fatema Alsubhi • Dr. Feras M. Alshomer
Curriculum Review Committee Members:
• Dr. Mai Alajaji, Msc. MedEd, PhD • Dr. Nouf Alrumaihi MBBS, Msc. MedEd., PMP
Approved by the Head of Curricula Review Committee:
• Dr. Ali AlYahya, MBBS, Msc. MedEd. FRCSC, FACS

II. COPYRIGHT STATEMENTS

Correspondence: Saudi Commission for Health Specialties

P.O. Box: 94656 Postal Code: 11614

Contact Center: 920019393

E-mail: Curricula@scfhs.org.sa;

Website: www.scfhs.org.sa

III. FOREWORD

The Fellowship and Training Program of the Reconstructive and Microsurgery Fellowship curriculum development team acknowledges the valuable contributions and feedback from the scientific committee members in the development of this program. We extend special appreciation and gratitude to all of the members who have been pivotal in the completion of this booklet, especially the Curriculum Group, the Curriculum Specialists, and the Scientific Council. We also wish to acknowledge that the CanMEDS framework is a copyright of the Royal College of Physicians and Surgeons of Canada, and many of the descriptions' competencies have been acquired from their resources.

The Fellowship curriculum development team would like to express their sincere gratitude to the late Dr. Nedhal Alqumber for his valuable contribution in the development of the Fellowship curriculum and several initiatives related to the enhancement of the training process. His enthusiasm and motivation will never be forgotten. May his soul rest in peace.

IV. TABLE OF CONTENTS

V. INTRODUCTION

1. Context of Practice

Reconstruction and microsurgery are surgical subspecialties that deal with various congenital or acquired problems. These problems can be traumatic or neoplastic in origin, may affect any part of the body, and require a microsurgical procedure performed with the aim of advanced delicate, micro-instruments, micro sutures, and operating microscopes.

The main goal of this specialty is to restore lost function and aesthetic appearance. In this context, the microsurgeon is involved in a range of conditions, from simple digital nerve repair to complex functional free muscle transfer.

Plastic surgery as a specialty has a close relationship with the reconstructive and microsurgery specialties. Since the days of its early investigation to the current wide adoption of the many techniques, plastic surgery specialists are required to have high exposure and the necessary skills to deal with a variety of cases. Scientific publications in the field of reconstructive surgery and microsurgery also have a deep root in plastic surgery. A study that investigated such achievement from 1990 to 2015 showed an incremental peak in published articles related to reconstructive and microsurgery specialties. 1

Analyzing the different variables and clinical conditions that the reconstructive microsurgeon can deal with will lead to the discussion of differences in disease incidence and its implication that the reconstructive surgeon can be part of the multidisciplinary team

involved in the management plan. For example, the incidence of cancer in Saudi Arabia accounts for approximately 800 new cases per million population per year; this is compared to other contourites, such as the United States (approximately 4000) and Kuwait (approximately 400). 2 Reconstructive microsurgeons are also heavily involved in trauma cases. A true example of this a burden is shown by the World Health Organization (WHO) findings that in 2015, the estimated number of road traffic fatalities in Saudi Arabia was 27.4 per 100,000 population, as compared to other countries like the US and Australia, with fatality rates between 2.9 and 10.6 per 100,000 people. 3

When analyzing the different international trends related to Fellowship training programs across nations, it was estimated that there are 42 reconstructive and microsurgery Fellowship training programs in the US, which serve approximately 328 million people. In Australia, there are eight training programs per 23 million people; in Canada, there are ten training programs serving approximately 38 million people; and in the UK, there are six training programs serving approximately 66 million people. 1

Taken together, it is clear that global and specific national demands for such specialties are increasing, especially with a population count of 34.27 million Saudi citizens, which is estimated to reach approximately 40 million by 2026. 4

The scope of microsurgery is broad, and its practice requires a delicate set of skills that are essential to treat and manage different pathologies. The microsurgeon's microsurgery skills might be applied to different areas of the body, such as the head and neck, trunk, breast, hand, foot, and extremities. It also considers functional and cosmetic aspects. This is usually delivered as a multidisciplinary team, which may include orthopedic surgeons, onco-surgeons,

radiation oncologists, medical oncologists, radiologists, pediatric surgeons, rheumatologists, anesthetists, and physiotherapists. Surgical intervention, if delivered in a timely fashion, with complex reconstruction taking place at an appropriate time, has the best outcome. This is true for major traumatic injuries, patients with cancer (including head and neck cancer, breast cancer, skin cancer, and patients with musculoskeletal sarcoma), and patients with peripheral nerve injury.

2. Goal and Responsibility of Curriculum Implementation

The reconstructive and microsurgical Fellowship training program is committed to a process that provides the fundamental concepts, principles, knowledge, and advanced surgical skills in reconstructive microsurgery that prepare the Fellow to be a professional and safe surgeon in this challenging specialty. Fellows will be exposed to the entire spectrum of patient ages from pediatric to elderly patients, a high volume of operative procedures, and academic, teaching, and research activities.

The curriculum allows the Fellow to be involved in all of the cases that the faculty perform, so he/she will get the opportunity to be exposed and learn a variety of methods and operative techniques in the management of general, traumatic, peripheral nerve, and oncoplastic reconstructive procedures.

Fellows are treated as colleagues, encouraged to develop excellence in patient care, are part of the decision-making process in the management of all patients, and are held accountable for their personal professional development. Fellows are also encouraged to expand the ever-broadening horizons of cutting-edge technology.

The goals of the Reconstructive & Microsurgery Fellowship are as follows:

- Prepare surgeons for a role in reconstructive and microsurgery as a clinical and academic surgeon by focusing on different theoretical and clinical activities in the following areas:
  - Anatomy of the entire body, with an emphasis on head and neck, trunk, breast, hand, foot, extremities, vascular system, nerve plexus, and peripheral nerves
  - Muscle, nerve, and joints physiology
  - Blood perfusion pattern and bone healing and metabolism
  - Detailed operative skills, including basic and advanced microsurgical techniques
  - Dedicated lab training course in microsurgery on laboratory animals
  - Rehabilitation and post-operative care
- Grant Fellows will acquire an in-depth comprehensive up-to-date knowledge and advanced surgical skills in the field of reconstructive microsurgery, and develop an understanding of all surgical and medical management of the general, traumatic, oncoplastic, lymphedema, and peripheral nerve cases that require microsurgical procedures.
- Grant Fellows will learn to be competent, safe, compassionate, and professional surgeons in practice, and to perform the practice of reconstructive surgery in an ethical manner. Additionally, Fellows will develop skills for continuing this field.
- To optimally prepare surgeons-in-training, it will be ensured that the Fellow can confidently manage all pathological, congenital, acquired, or traumatic conditions afflicting any part of the body (i.e., head and neck, trunk, breast, extremities, lymphatic, and peripheral nerve disorders).

- The Fellows will be motivated and inspired to give back to the community and specialty through active participation in different scientific research and other teaching roles.

VI. ABBREVIATIONS USED IN THIS DOCUMENT

Try to limit the use of abbreviations to the recognized ones, for example:

Abbreviation	Description
SCFHS	Saudi Commission for Health Specialties
F(1)	(First) year of Fellowship
F(2)	(Second) year of Fellowship
PT	Progress test
OSCE	Objective structured clinical examination
OSPE	Objective structured practical examination
Mini-CEX	Mini-Clinical Experience report
DOPS	Direct Observation of Procedural Skills report
CBD	Case-Based Discussion report
CBE	Competency-based education
ITER	In-training evaluation report
COT	Consultation observation tool
CBE	Competency-based education
MBBS	Bachelor of Medicine and Surgery

Abbreviation	Description
LVA	Lymphaticovenous anastomosis
VLNT	Vascularized lymph node transfer
ALT	Anterolateral thigh
PAP	Profunda artery perforator
RFF	Radial forearm
SCIP	Superficial circumflex iliac artery perforator
DIEP	Deep inferior epigastric perforators
TRAM	Transverse rectus abdominis
TBL	Team-based learning
OR	Operating theater
OPD	Outpatient department
CPD	Continuous professional development
M&M	Morbidity and mortality

VII. PROGRAM ENTRY REQUIREMENTS

- Applications for the microsurgery Fellowship will be accepted from the 1st January each year, for the Fellowship beginning on the 1st of October of the same academic year.
- Please submit the following information and documents:
    - Completed Fellowship application
    - Curriculum vitae
    - Plastic Surgery Board certificate
    - MBBS and internship certificate
    - Medical school transcript
    - Personal statement
    - Three letters of recommendation, including one from the training program director
    - Academic activity (speaker certificate, research publication)
    - Malpractice insurance
    - Three recent photographs
    - Professional registration in the SCFHS
- The Fellow must submit a completed Fellowship Application form to SCHS.
- Applicants will be interviewed by a committee for the selection purpose of future Fellows.

VIII. LEARNING AND COMPETENCIES

1. Introduction to Learning Outcomes and Competency-Based Education

Training should be guided by well-defined "learning objectives" that are driven by targeted "learning outcomes" of a particular program to serve specific specialty needs. Learning outcomes are supposed to reflect the professional "competencies" and tasks that are aimed to be "entrusted" by trainees upon graduation. This will ensure that graduates meet the expected demands of the healthcare system and patient care in relation to their particular specialty. Competency-based education (CBE) is an approach of "adult-learning" that is based on achieving pre-defined, fine-grained, and well-paced learning objectives, which are driven from complex professional competencies.

Professional competencies related to healthcare are usually complex and contain a mixture of multiple learning domains (knowledge, skills, and attitude). CBE is expected to change the traditional way of postgraduate education. For instance, the time of training, though a precious resource, should not be viewed as a proxy for competence (e.g., the time of rotation in certain hospital areas is not the primary marker of competence achievement). Furthermore, CBE emphasizes the critical role of informed judgment of learners' competency progress, which is based on a staged and formative assessment that is driven by multiple workplace-based observations. Several CBE

models have been developed for postgraduate education in healthcare (e.g., CanMEDs by the Royal College of Physicians and Surgeon of Canada (RCPSC), the CBME-Competency model by the Accreditation Council for Graduate Medical Education (ACGME), tomorrow's doctor in the UK, and multiple others). The following are concepts that enhance the implementation of CBE in this curriculum:

- **Medical Expert:** As medical experts, physicians integrate all of the CanMEDS roles, applying medical knowledge, clinical skills, and professional values in their provision of high-quality and safe patient-centered care. A medical expert is the central physician in the CanMEDS framework and defines the physician's clinical scope of practice.
- **Communicator:** Physicians form relationships with patients and their families, which facilitate the gathering and sharing of essential information for effective health care.
- **Collaborator:** Physicians work effectively with other healthcare professionals to provide safe, high-quality, patient-centered care.
- **Leader:** Physicians engage with others to contribute to a vision of a high-quality healthcare system and take responsibility for the delivery of excellent patient care through their activities as clinicians, administrators, scholars, and teachers.
- **Health Advocate:** Physicians contribute their expertise and influence as they work with communities or patient populations to improve their health. Physicians work with those they serve to determine and understand their needs, speak on behalf of others when required, and support the mobilization of resources to effect change.
- **Scholar:** Physicians demonstrate a lifelong commitment to excellence in practice through continuous learning and by

teaching others, evaluating evidence, and contributing to scholarships.

- **Professional:** Physicians are committed to the health and well-being of individual patients and society through ethical practice, high personal standards of behavior, accountability to the profession and society, physician-led regulation, and maintenance of personal health.
- **Competency:** Competency is a cognitive construct that assesses the potential to perform efficiently in a given situation based on the standard of the profession. Professional roles (e.g., experts, advocates, communicators, leaders, scholars, collaborators, and professionals) are used to define competency to make it mendable for learning and assessment.
- **Milestones:** Milestones are stages of the developmental journey throughout the competency continuum. Trainees, throughout their learning journey from junior and throughout senior levels, will be assisted in transforming from being (novice/supervised) to (master/unsupervised) practitioners. This should not undermine the role of supervisory/regulatory bodies in the malpractice of independent practitioners. Milestones are expected to enhance the learning process by pacing training/assessment to match the developmental level of trainees (junior vs. senior).
- **Learning-Domains:** Whenever possible, efforts should be directed to annotate the learning outcomes with the corresponding domain (K: Knowledge, S: Skills, and A: Attitude). More than one annotation is possible for a given learning outcome.
- **Content-area Categorization:** It is advisable to categorize learning outcomes in broad content areas related to the practice of profession. For example, diagnostic versus therapeutic, simple versus complex, and urgent versus chronic.

Trainees are expected to progress from the novice to the mastery level in a certain set of professional competencies. SCFHS endorsed CanMEDs to articulate professional competencies. This curriculum applies the principles of competency-based medical education. CanMEDs represents a globally accepted framework that outlines competency roles. The CanMEDs 2015 Framework was adopted in this curriculum (Frank JR, Snell L, Sherbino J, Editors. CanMEDS 2015 Physician Competency Framework. Ottawa: Royal College of Physicians and Surgeons of Canada, 2015).

2. Program Durations

The length of the advanced hands-on reconstructive and microsurgery Fellowship programs is 2 clinical years with research opportunities.

3. Program Rotations

1.1 Training Sittings

- Clinical training of the designated Fellows will be performed in different centers that which are either participating solely in offering the Fellowship training program, or in a group of different hospitals as a joint program with a high volume of reconstructive and microsurgical procedures in Saudi Arabia.
- Fellows may also render and attend services at different appointed hospitals, either locally or internationally, to ensure that they have performed the maximum number of complex advance reconstructive cases (microsurgery, peripheral nerve, etc.).
- The Fellow will also be assigned a full-time consultant plastic and reconstructive surgeon, and will get the opportunity to attend all

the reconstructive microsurgery cases that the surgeon performs to learn and improve their knowledge, skills, and experience.

1.2 Rotation and Competency Role Mapping

This section aims to match the competencies and objectives of each rotation. Trainees and trainers should work together to achieve these objectives during teaching and formative assessments. Expectations should evolve as the training level progresses (training stage, milestones).

TRAINING YEAR: F1				
Rotation type	Rotation name	Duration & setting	Specific objectives	CanMED role
Mandatory	Introduction to microsurgery	1 block Lecture-based Simulation lab	1- Demonstrate microsurgical techniques necessary for free tissue transfer 2- Perform the fundamental techniques related to the microvascular anastomosis	MEP CO
	Head and neck reconstruction	Three blocks Whiteboard discussion Operating room	1- Explain the indications for free-flaps vs. local flaps 2- Analyze complex surgical defects and determine appropriate free-flap donor site selection (ALT, PAP, RFF,SCIP, FIBULA FLAP) 3- Develop operative skills under close step-by-step supervision of his/her senior 4- Follow preoperative and postoperative care for free-flap patients 5- Monitor of free-flaps, recognize a failing free-flap, and how to salvage a failing flap 6- Explain the aesthetics of free-flap insetting and skills necessary for shaping osseous free-flap	CMMEP CO

TRAINING YEAR: F1				
Rotation type	Rotation name	Duration & setting	Specific objectives	CanMED role
	Breast reconstruction and lymphedema	Three blocks - Whiteboard discussion - Operating room - Simulation lab	Describe tissue expander and implant methods of breast reconstruction and autogenous tissue methods of breast reconstruction (e.g., DIEP, TRAM, PAP) 1- Demonstrate skills for contralateral breast balancing procedures, nipple reconstruction and fat graft 2- Acquire knowledge of how to diagnose and surgically treat lymphedema (LVA and VLNT)	CME COP
	Facial reanimation and functional muscle transfer	Two blocks - Whiteboard discussion - Operating room	Explain the principles of facial reanimation and functional muscle transfer (face/upper limb).	CME PCO
	Research	Two blocks - Lectures - Lab	Demonstrate the necessary skills and knowledge clinical research, including: - Write a scientific paper - Building and managing database - Learn foundation of statistics - Present at scientific meetings	CMS CO
Elective	Brachial plexus	One block - Whiteboard discussion - Operating room	Outline the principles of acute and late (tendon and muscle transfers, neurotization) management of brachial plexus injuries	CME P

TRAINING YEAR: F1				
Rotation type	Rotation name	Duration & setting	Specific objectives	CanMED role
	Hand surgery	One block - Whiteboard discussion - Operating room	1) Manage commonly encountered acute and chronic hand cases (neurovascular injuries , infection, fractures and soft tissue reconstruction) and Post-op rehabilitation	CME P
	Vacation	1 block		
TRAINING YEAR: F2				
Mandatory	Upper/lower limb and trauma reconstruction	Three blocks - Whiteboard discussion - Operating room	1) Analyze commonly encountered upper/lower extremity defects (acute and chronic) and the appropriate selection of free-flaps, free joint, toe to hand transfer, and hand/finger replantation	CME P CO
	Head and Neck reconstruction	Four blocks - Whiteboard discussion Operating room	1) Learn the indications for free-flaps vs. local flaps 2) Analyze complex surgical defects and determine appropriate free-flap donor site selection (ALT, PAP, RFF,SCIP, FIBULA FLAP) 3) Operate under the close step-by-step supervision of his/her senior, developing techniques and attaining skills 4) Follow preoperative and postoperative care for free-flap patients 5) Monitor free-flaps, recognize a failing free-flap, how to salvage a failing flap, and describe the aesthetics of free-flap insetting 6) Describe and perform the skills necessary for shaping osseous free-flap	CME P CO

TRAINING YEAR: F1				
Rotation type	Rotation name	Duration & setting	Specific objectives	CanMED role
	Breast reconstruction and lymphedema	Four blocks Whiteboard discussion Operating room Simulation lab	1- Explain tissue expander and implant methods of breast reconstruction and autogenous tissue methods of breast reconstruction (e.g., DIEP, TRAM, PAP) 2- Demonstrate skills for contralateral breast balancing procedures, nipple reconstruction, and fat graft 3- Acquire knowledge of how to diagnose and surgically treat lymphedema (LVA and VLNT)	CM ME P CO

*Mandatory core rotation: Mandatory set of rotations that represent program core components.

**Elective rotation: Set of rotations that are related to the specialty, as determined by the scientific council/committee, and the trainee is required to do some of them.

CM: Communicator, ME: Medical expert, L: Leader, CO: Collaborator, S: Scholar, P: Professional, HA: Health advocate

IX. CONTINUUM OF LEARNING

The continuum of learning includes learning that should take place in each key stage of progression within the specialty. Trainees are reminded of the fact of lifelong continuous professional development (CPD). Trainees should keep in mind the necessity of CPD for every healthcare provider in order to meet the demands of their vital profession. The following table shows how the role is progressively expected to develop throughout the junior, senior, and consultant levels of practice.

For Fellowship programs:

Specialty General Practice	F1 (Junior Level)	F2 (Senior Level)
Sub- specialty Non-practicing	Dependent/supervised practice	Independent practice/provide supervision
Obtain basic health science and foundational level to core discipline knowledge	Obtain fundamental knowledge related to core clinical problems of the specialty and apply knowledge to provide appropriate clinical care related to core clinical problems of the specialty	Acquire advanced and up-to-date knowledge related to core clinical problems of the specialty

Specialty General Practice	F1 (Junior Level)	F2 (Senior Level)
Internship to the practice of discipline	Apply clinical skills such as physical examination and practical procedures related to the core presenting problems and procedures of the specialty and analyze and interpret the findings from clinical skills to develop appropriate differential diagnoses and management plan for the patient	Compare and evaluate challenging and contradictory findings and develop expanded differential diagnoses and management plan

X. TEACHING METHODS

The teaching process in postgraduate Fellowship training programs is based mainly on the principles of the adult learning theory. The trainees feel the importance of learning and play active roles in the content and process of their own learning. The training pogroms implement the adult learning concept in each feature of the activities where the residents are responsible for their own learning requirements. Formal training time includes the following three formal teaching activities:

- Program-specific learning activities
- Universal topics
- General learning opportunities

1.1 Program-Specific Learning Activities

Program-specific activities are educational activities that are specifically designed and intended for teaching during their training time. The trainees are required to attend these activities, and non-compliance can subject trainees to disciplinary action. It is advisable to link attendance and participation in these activities to continuous assessment tools (see formative assessment section below). Program administration should support these activities by providing protected-time for trainees to attend these activities and allow them to participate in such activities.

A) Program Academic Half-Day

Every week, at least 2–4 h of formal training time (commonly referred to as academic half-day) should be reserved. A formal teaching time

is an activity that is planned in advance with an assigned tutor, time slots, and venue. Formal teaching time excludes bedside teaching and clinic postings. The academic half-day covers the core specialty topics that are determined and approved by the specialty's scientific council aligned with the specialty-defined competencies and teaching methods. The core specialty topics will ensure that important clinical problems of the specialty are well taught. It is recommended that lectures be conducted in an interactive, case-based discussion format. The learning objectives of each core topic need to be clearly defined, and it is preferable to use a pre-learning material. Whenever applicable, core specialty topics should include workshops, team-based learning (TBL), and simulation to develop skills in core procedures. Regional supervisory committees in coordination with academic and training affairs, program directors, and chief residents should work together to ensure the planning and implementation of academic activities, as indicated in the curriculum. There should be an active involvement of the trainee in the development and delivery of the topics under faculty supervision; the involvement might be in the form of delivery, content development, or research. The supervisor's educator should ensure that each topic is stratified into three categories of the learning domain: knowledge, skill, and attitude (see Appendix D for the top knowledge topic and procedure list).

The recommended number of half-day activities that are conducted annually is 38 sessions per training academic year, with time reserved for other teaching methods, such as journal clubs and clinical/practical teaching. Through the residency training committee, program directors and chief residents, in coordination with academic and training affairs and regional supervisory committees, should work together to ensure the planning and implementation of academic activities, as indicated in the curriculum. This should aim

for the efficient use of available resources and to optimize the exchange of expertise.

Please provide an example of an academic half-day table as shown in (Appendix E)

Teaching and Training Timetable

- A dedicated timetable that shows the Fellow's weekly activities, including clinical duties and teaching activities, is to be clarified for each Fellow at the beginning of their training academic year.
- An example of such a schedule is shown below.

	Sunday	Monday	Tuesday	Wednesday	Thursday
7:30–08:00	Morning meeting and education conference	Reading	Reading	Morning meeting and education conference	Pre-operative meeting
08:00– 12:00	Theater (OR)	OPD clinic	Theater (OR)	OPD clinic	Theater (OR)
12:00–13:00	Lunch	Lunch	Lunch	Lunch	Lunch
13:00-16:00	Theater (OR)	Tutorial	Theater (OR)	OPD clinic	Theater (OR)

B) Practice-based learning

Training exposures during bedside, labor, OR, and other work-related activities, including courses and workshops (e.g., simulations, standardized patients, bedside teaching) represent excellent targets for learning. Trainees are expected to build their capacity based on self-directed learning.

Practice-based learning also allows the educator to supervise trainees to become competent in the required program practical skills, which ensures the fulfillment of knowledge, psychomotor, and/or attitude learning domains. Each trainee should maintain a logbook documenting the procedures observed, performed under supervision, and performed independently. It would be prudent to determine the minimum number of procedures to be performed before training completion and the minimum number needed to maintain competency after certification.

This section will allow each program to describe the required courses or workshops in detail, including the objectives of the course or the workshop, the teaching methods, the expected time to complete the course/workshop during the training, and the assessment method applied for each activity. It is highly advisable to integrate these activities with formative assessment tools that are relevant to them (e.g., DOPS, mini-CES, Logbook, etc.).

C) Morning report

The morning report is a case-based teaching session, which is common to many residency programs with varying purposes and focuses. The goals for the morning report are to teach efficient handover strategies and case presentation skills, allow discussion of the management of interesting cases, and enhance problem solving and multidisciplinary team skills.

D) Microsurgery Lab

- In the 1st block of training, all candidates must undertake a microsurgery laboratory course (each candidate must perform 50 successful arterial and venous anastomoses in small animals such as rats or rabbits).

- All Fellows must spend at least half a day per week in the animal lab for continuous practice, either alone or under the supervision of a microsurgeon.

E) Research

- Participate in research projects with consulting staff, including clinical studies and laboratory-based projects.
- Research mentorship is initiated as soon as the Fellow is matched in the Fellowship program.

1.2 Universal Topics

Universal topics are educational activities developed by SCFHS, which are intended for all specialties. Priority will be given to the following topics:

- High value
- Interdisciplinary and integrated
- Require expertise that might be beyond the availability of the local clinical training sites

Universal topics have been developed by SCFHS and are available, such as via e-learning via personalized access, for each trainee (to access the online modules). 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 are distributed over the entire training period.

Selected universal topics as follows:

1. Module 2 “cancer”

Topic Principles of Management of Cancer

At the end of the Learning Unit, you should be able to:

a) Discuss the basic principles of staging and grading of cancers
b) Enumerate the basic principles, (e.g., indications, mechanism, types) of

   a. Cancer surgery
   b. Chemotherapy
   c. Radiotherapy
   d. Immunotherapy
   e. Hormone therapy

2. Module 5 “Acute Care”

Topic, Acute Pain Management

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

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 will benefit from specialized pain services

Topic, chronic pain management

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

a) Review 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 will benefit from specialized pain services

Topic, Management of Fluid in Hospitalized Patients

At the end of the Learning Unit, you should be able to:

a) Review physiological basis of water balance in the body
b) Assess a patient for their 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

3. Module 7 "Ethics and Healthcare"

Topic, Ethical issues: treatment refusal; patient autonomy

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

a) Predict situations where a patient or their family is likely to decline prescribed treatment
b) Describe the concept of "rational adults" 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 their families declining medical treatment in the best interest of patients

These topics are to be completed before the end of the Fellowship training program.

1.3 General Learning Opportunities

Formal training time should be supplemented by other practice-based learning (PBL), in which the Fellows will gain theoretical knowledge in recent advances through discussions, journal clubs, symposia, and seminars.

A) Journal Club

- This will be a monthly meeting as an academic exercise. A list of suggested journals will be provided at the end of this document.
- The candidate will critically appraise critically a scientific article of their choice
- A faculty consultant member should moderate the discussion.
- The contributions made by the article in furtherance of scientific knowledge and limitations, if any, will be highlighted.

B) Grand rounds

- Attendance and coordination of the case discussion with the residents and consultants.

C) Specific Patient Care Responsibilities:

- Taking history and performing examinations on patients admitted or seen in the emergency, outpatient, or inpatient consultation, and discuss all surgical management in the daily meeting, except in urgent cases that require urgent decision from the consultant.
- Making daily rounds.

- Mentoring resident staff as a resource of experience and knowledge.
- Helping in the delivery and follow-up of treatment plans.
- Clinic attendance.

D) Continuous professional discussion activities (CPD) relevant to specialty (conferences and workshops).

E) Morbidity and mortality (M&M)**

The M&M conference offers trainees an opportunity to discuss patient cases where adverse effects have occurred due to errors or complications. The goal of this resource is to refocus on the content of morbidity and mortality and transform it into a platform for teaching patient safety principles and emphasizing error reduction strategies.

XI. ASSESSMENT AND EVALUATION

1. Purpose of Assessment

Assessment plays a vital role in the success of postgraduate training. Assessment will guide trainees and trainers to achieve defined standards, learning outcomes, and competencies. The assessment will provide feedback to learners and faculty regarding curriculum development, teaching methods, and the quality of the learning environment. A reliable and valid assessment is an excellent tool for assessing curriculum alignments between objectives, learning methods, and assessment methods. Finally, assessments assure patients and the public that health professionals are safe and competent to practice. Assessment can serve the following purposes:

a. Assessment for learning: Trainers use information from trainees' performance to inform their learning for improvement. Assessment enables educators to use information regarding trainees' knowledge, understanding, and skills to provide feedback to trainees about learning and how to improve.
b. Assessment as learning: Involves trainees in the learning process, which enables them to monitor their own progress. Trainees use self-assessment and feedback from educators to reflect on their progression. This develops and supports trainees' metacognitive skills. Assessment as learning is crucial in helping residents/Fellows become lifelong learners.

c. Assessment of learning: Is used to demonstrate the achievement of learning. This is a graded assessment and usually counts towards the trainee's end-of-training degree.
d. Feedback and evaluation: Assessment outcomes will represent quality metrics that can improve learning experience.

For the sake of organization, assessment will be further classified into two main categories: *formative* and *summative*.

2. Formative Assessment

2.1 General Principles

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

Every 4 weeks, at least 1 h should be assigned by trainees to meet with their mentors, in order to review performance reports (e.g., ITER, e-portfolio, mini-CEX, etc.). Input from the overall formative assessment tools will be utilized at the end of the year to make the decision to promote each individual trainee from the current-to-subsequent training level. Formative assessment will be defined based on recommendations by the scientific council.

According to the executive policy on continuous assessment (available online: www.scfhs.org), formative assessment will have the following features, which will be used based on Miller's pyramid (Appendix F):

a. Multisource: A minimum of four tools

b. Comprehensive: Covering all learning domains (knowledge, skills, and attitude)
c. Relevant: Focusing on workplace-based observations
d. Competency-milestone oriented: Reflecting the trainee's expected competencies that match the trainee's developmental level.

Trainees should play an active role in seeking feedback during training. However, trainers are expected to provide timely and formative assessments. The SCFHS will provide an e-portfolio system to enhance communication and analysis of data arising from formative assessments.

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.

2.2 Formative Assessment Tools

Learning domain	Formative assessment tools	Important details (e.g., frequency, specifications related to the tool)
Knowledge	- Structured Oral Exam (SOE) - Annual Written Progress Test (Local or International) - Case-Based Discussion (CBD)	Annual Annual Two CBD sessions per rotation
Skills	- Log Book - DOPS: Direct Observation for Procedural Skills - Research Activities	*Log book: Fellowship Caseload: The training Fellows are expected to attend and manage at least 60 to 80 complex reconstructive and microsurgical cases during their 2-year training period DOPS: Verification of the skill in the log book by a supervising tutor *Research activities: The Fellow must publish at least one paper in a respected journal, and is encouraged to submit manuscripts for presentation in national or international recognized conferences

Learning domain	Formative assessment tools	Important details (e.g., frequency, specifications related to the tool)
Attitude	ITER: In-Training Evaluation Report	Assessment after each block

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

3.1 Promotion Examination

The promotion examination is a written exam that permit the trainee to be promoted from a "junior" to "senior" level of training. For further details on promotion examination, please refer to the general bylaws and executive policy of assessment (available online: www.scfhs.org).

Blueprint Outlines:

One-hundred MCQ style questions that are distributed over the following topics as follows:

Topic	Volume
Basic science	20%
Head and neck	20%
Breast	20%
Extremity and trauma reconstruction	20%
Hand and peripheral nerve	20%

Example question:

1) To reduce the risk of microvascular anastomosis occlusion in a standard microsurgical case you should:
   A. Keep the operating theatre temperature high
   B. Ensure that both vessels are of the same caliber
   C. Ensure that there is no intimal damage in either vessel
   D. Inject a bolus of heparin before putting the clamp on the vessel
   E. Never release the vein before starting the arterial anastomosis
2) The groin flap is usually based on:
   A. The deep circumflex iliac artery
   B. The superficial inferior epigastric artery
   C. The superficial circumflex femoral artery
   D. The superficial circumflex iliac artery
   E. The lateral circumflex iliac artery
3) Papaverine:
   A. Is an opium alkaloid
   B. Is a vasoconstrictor
   C. Inhibits phosphodiesterase and reduces cAMP levels
   D. Is a local anesthetic
   E. May not be directly applied to blood vessels

Blueprint topics:

- The exam is of multiple-choice nature, and will cover the following topics:

Basic Sciences

- Embryology
- Anatomy
- Depth Identify in detail the anatomy of the vascular tree
- Understanding of the anatomy of blood supply

- Understanding of the physiology of blood supply
- Anatomy and muscle, nerve, bone, and skin metabolism
- Identify in detail the anatomy of the major nerves and their branching in the extremities, including their relationships with surrounding structures
- Wound, tendon, nerve, skin, and bone healing
- Understand the principles of electrical evaluation and show in-depth knowledge of the techniques of electrical examination of the extremities, including conduction studies and EMG evaluation
- Radiologic techniques, including plain radiographic films, ultrasonography, CT scans, angiography, and MRI of the extremities
- Advanced vascular pathophysiology of the body, with an emphasis on the extremities

Principles of Microsurgery

- Magnification
- Instrumentation
- Instrument handling
- Definition of microvascular free tissue transfer
- Indications for microvascular free tissue transfer
- Donor tissue option
- Role of anticoagulants in microsurgery
- The no-reflow phenomenon
- Methods that can be used to minimize ischemia
- End-to-end or end-to-side arterial anastomosis
- Obtain vein grafts option and technical step
- Flap failure and factors leading to free-flap failure
- Methods used to relieve spasm
- Options for flap reconstruction
- Free-flap option for functional muscles

- Perforator flaps
- Osseous flaps
- Chimeric flaps
- Flaps used for facial reanimation

Applied Sciences:

- Microsurgery
- Supermicrosurgery technique
- Reconstruction after extensive soft tissue resection
- Reconstruction of Head and Neck defects
- Reconstruction for pharyngeal or esophageal defects
- Combined mandibular and floor-of-mouth reconstruction
- Reconstruction of the breast
- Reconstruction of the trunk and thoracic
- Hand and wrist reconstruction
- Foot and ankle reconstruction
- Extremities reconstruction
- Lymphedema reconstruction
- Peripheral nerve
- Facial reanimation for paralysis

Operative microsurgery:

- Skin and subcutaneous tissue
- Skin graft
- Pedicled flaps
- Regional and\or island flaps
- Free-flap with microvascular anastomosis

Bone and Joints

- Vascularized bone on a pedicle flap

  i. Clavicle on the sternocleidomastoid flap

  ii. Rib on the pectoralis major muscle

iii. Scapula on the trapezius muscle

- Bone transfers with microvascular anastomosis

i. Deep circumflex iliac artery flap
ii. Radial forearm flap
iii. Free fibula flap
iv. Free scapula flap
v. Medial femoral condyle flap
vi. Coracoid bone free-flap for reconstruction of the scaphoid bone
vii. Free toe joint transfer

Nerves

- Microsurgical nerve repair
- Nerve grafting
- Neurotization and conduits
- Neurolysis
- Neuroma
- Nerve tumors

Vascular

- Tumors and vascular malformations
- Replantation
- Revascularization
- Microsurgical arterial anastomosis
- Microsurgical venous anastomosis
- Vein graft
- Lymphatic reconstruction

Other

- Congenital disorders, including mangled hand treatment
- Facial paralysis and facial palsy procedures
- Children's disorders

Amputations

- Hand level
- Metacarpal, carpal, forearm, and proximal upper limb level

Replantation

- Digital level
- Carpal or forearm\upper limb level
- Lower limb

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

- The program director can still recommend the promotion of candidates if the above is not met in some situations.
- If the candidate scores "borderline failure" in one or two components at maximum, and these scores should not belong to the same area of assessment (for example, both borderline failures should not belong to both skills).
- The candidate must have passed all other components and scored a minimum of clear pass in at least two components.

3. Summative Assessment

3.1 General Principles

- Summative assessment is a component of assessment that aims primarily to make informed decisions on trainees' competency. In comparison to 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). To be eligible to sit the final exams, a trainee should be granted a "Certification of Training-Completion".

3.3. Final In-Training Evaluation Report (FITER)

In addition to the approval of the completion of clinical requirements (resident's logbook) by the supervising committee, a FITER is also prepared by the program directors for each resident at the end of their final year of training. This report shall be the basis for obtaining the certificate of training program completion and the qualification to set for the final specialty examinations.

3.4 Certification of Training-Completion

To be eligible 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 is fulfilled:

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

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

3.5 Final Specialty Examinations

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

a) Final written exam: To be eligible for this exam, trainees are required to have the "Certification of Training-Completion." The final written exam comprises 100 MCQ questions.

b) Final clinical/practical exam: Trainees will be required to pass the final written exam in order to be eligible to sit the final clinical/practical exam. Eight stations involving the SOE and the OSCE.

Blueprint Outlines:

One hundred MCQ style questions, which are distributed over the following topics:

Topic	Volume
Basic science	20%
Head and neck	20%
Breast	20%
Extremity and trauma reconstruction	20%
Hand and peripheral nerves	20%

Example question:

1) To reduce the risk of microvascular anastomosis occlusion in a standard microsurgical case you should:
   A. Keep the operating theatre temperature high
   B. Ensure both vessels are of the same caliber
   C. Ensure that there is no intimal damage in either vessel
   D. Inject a bolus of heparin before putting the clamp on the vessel
   E. Never release the vein before starting the arterial anastomosis

2) The groin flap is usually based on:
   A. The deep circumflex iliac artery
   B. The superficial inferior epigastric artery

C. The superficial circumflex femoral artery

D. The superficial circumflex iliac artery

E. The lateral circumflex iliac artery

3) Papaverine:

A. Is an opium alkaloid

B. Is a vasoconstrictor

C. Inhibits phosphodiesterase and reduces cAMP levels

D. Is a local anesthetic

E. May not be directly applied to blood vessels

Basic Sciences

- Embryology
- Anatomy
- Depth Identify in detail the anatomy of the vascular tree
- Understanding of the anatomy of blood supply
- Understanding of the physiology of blood supply
- Anatomy and muscle, nerve, bone, and skin metabolism
- Identify in detail the anatomy of the major nerves and their branching in the extremities, including their relationships with surrounding structures
- Wound, tendon, nerve, skin, and bone healing
- Understand the principles of electrical evaluation and show in-depth knowledge of the techniques of electrical examination of the extremities, including conduction studies and EMG evaluation
- Radiologic techniques, including plain radiographic films, ultrasonography, CT scans, angiography, and MRI of the extremities
- Advanced vascular pathophysiology of the body, with an emphasis on the extremities

Principles of Microsurgery

- Magnification
- Instrumentation
- Instrument handling
- Definition of microvascular free tissue transfer
- Indications for microvascular free tissue transfer
- Donor tissue option
- Role of anticoagulants in microsurgery
- The no-reflow phenomenon
- Methods that can be used to minimize ischemia
- End-to-end or end-to-side arterial anastomosis
- Obtain vein grafts option and technical step
- Flap failure and factors leading to free-flap failure
- Methods used to relieve spasm
- Options for flap reconstruction
- Free-flap option for functional muscles
- Perforator flaps
- Osseous flaps
- Chimeric flaps
- Flaps used for facial reanimation

Applied Sciences

- Microsurgery
- Supermicrosurgery technique
- Reconstruction after extensive soft tissue resection
- Reconstruction of Head and Neck defects
- Reconstruction for pharyngeal or esophageal defects
- Combined mandibular and floor-of-mouth reconstruction
- Reconstruction of the breast
- Reconstruction of the trunk and thoracic
- Hand and wrist reconstruction

- Foot and ankle reconstruction
- Extremities reconstruction
- Lymphedema reconstruction
- Peripheral nerve
- Facial reanimation for paralysis

Operative microsurgery:

Skin and subcutaneous tissue

- Skin graft
- Pedicled flaps
- Regional and\or island flaps
- Free-flap with microvascular anastomosis

Bone and Joints

- Vascularized bone on a pedicle flap
    i. Clavicle on the sternocleidomastoid flap
    ii. Rib on the pectoralis major muscle
    iii. Scapula on the trapezius muscle
- Bone transfers with microvascular anastomosis
    i. Deep circumflex iliac artery flap
    ii. Radial forearm flap
    iii. Free fibula flap
    iv. Free scapula flap
    v. Medial femoral condyle flap
    vi. Coracoid bone free-flap for reconstruction of the scaphoid bone
    vii. Free toe joint transfer

Nerves

- Microsurgical nerve repair
- Nerve grafting
- Neurotization and conduits
- Neurolysis

- Neuroma
- Nerve tumors

Vascular

- Tumors and vascular malformations
- Replantation
- Revascularization
- Microsurgical arterial anastomosis
- Microsurgical venous anastomosis
- Vein graft
- Lymphatic reconstruction

Other

- Congenital disorders, including mangled hand treatment
- Facial paralysis and facial palsy procedures
- Children's disorders

Amputations

- Hand level
- Metacarpal, carpal, forearm, and proximal upper limb level

Replantation

- Digital level
- Carpal or forearm\upper limb level
- Lower limb

Learning domain	Summative assessment tools	Pass score
Knowledge	- Final Written Examination	At least a borderline pass in each tool in accordance with the standard setting method used by the executive administration of assessment
Skills	- Objective Structured Clinical Examinations (OSCE) - Structured Oral Examinations (SOE)	At least a borderline pass in each tool in accordance with the standard setting method used by the executive administration of assessment
Attitude	FITER: In-Training Evaluation Report	Successfully pass FITER

XII. PROGRAM AND COURSE EVALUATION

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 Central Training Committee at the SCFHS. The results of the assessment (both formative and summative) will be analyzed and mapped to curriculum content. Other indicators that will be incorporated include the following:

- Report of the annual trainees' satisfaction survey
- Reports from trainees' evaluation of faculty members
- Reports from 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 intended achievement of milestones will be evaluated at the end of each stage to assess the progress of the curriculum delivery. Any deficiency will be addressed in the following stage, utilizing the time devoted to trainee-selected topics and professional sessions.

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

XIII. POLICIES AND PROCEDURES

This curriculum represents the means and materials outlining learning objectives with which trainees and trainers will interact to achieve 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), which regulate all processes related to training. General bylaws of 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 applied. Trainees, trainers, and supervisors need to apply this curriculum in compliance with the most updated bylaws and policies, all of which can be accessed online (via the official SCFHS website).

XIV. APPENDICES

A. Top conditions and procedures in the specialty

B. Examples of academic half-day tables

C. Miller's Pyramid of assessment

D. Glossary

E. How to write objectives in SMART style

F. Example of research rotation objectives

G. References

H. Additional resources

Appendix-C

Universal Topics

Intent:

Universal topics are high-value interdisciplinary topics that are of outmost importance to the trainee. The reason for delivering the topics centrally is to ensure that every trainee receives high-quality teaching and develops essential core knowledge on these topics. These topics are common to all specialties.

The included topics meet one or more of the following criteria:

- Impactful: Topics that are common or life-threatening
- Interdisciplinary: Topics that are difficult to teach by 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 centrally by the Commission through an e-learning platform. A set of preliminary learning outcomes for each topic will be developed. 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 workshops and other planned face-to-face interactive sessions.

The suggested duration of each topic is 1.30 hours.

Assessment:

The topics will be delivered in a modular fashion. There will be an online formative assessment at the end of each learning unit, and there will be a combined summative assessment in the form of context-rich MCQ after completion of all topics. 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 examples include case studies, high-quality images, worked examples of prescribing drugs in disease states, and internet resources.

Appendix-D

Top conditions and procedures in the specialty

Basic Sciences

- Embryology
- Anatomy
- Depth Identify in detail the anatomy of the vascular tree
- Understanding of the anatomy of blood supply
- Understanding of the physiology of blood supply
- Anatomy and muscle, nerve, bone, and skin metabolism

- Identify in detail the anatomy of the major nerves and their branching in the extremities, including their relationships with surrounding structures
- Wound, tendon, nerve, skin, and bone healing
- Understand the principles of electrical evaluation and show in-depth knowledge of the techniques of electrical examination of the extremities, including conduction studies and EMG evaluation
- Radiologic techniques, including plain radiographic films, ultrasonography, CT scans, angiography, and MRI of the extremities
- Advanced vascular pathophysiology of the body, with an emphasis on the extremities

Principles of Microsurgery

- Magnification
- Instrumentation
- Instrument handling
- Definition of microvascular free tissue transfer
- Indications for microvascular free tissue transfer
- Donor tissue option
- Role of anticoagulants in microsurgery
- The no-reflow phenomenon
- Methods that can be used to minimize ischemia
- End-to-end or end-to-side arterial anastomosis
- Obtain vein grafts option and technical step
- Flap failure and factors leading to free-flap failure
- Methods used to relieve spasm
- Options for flap reconstruction
- Free-flap option for functional muscles
- Perforator flaps
- Osseous flaps
- Chimeric flaps
- Flaps used for facial reanimation

Applied Sciences

- Microsurgery
- Supermicrosurgery technique
- Reconstruction after extensive soft tissue resection
- Reconstruction of Head and Neck defects
- Reconstruction for pharyngeal or esophageal defects
- Combined mandibular and floor-of-mouth reconstruction
- Reconstruction of the breast
- Reconstruction of the trunk and thoracic
- Hand and wrist reconstruction
- Foot and ankle reconstruction
- Extremities reconstruction
- Lymphedema reconstruction
- Peripheral nerve
- Facial reanimation for paralysis

PRACTICAL

- A list of the procedures is shown. This list of operations is to be independently performed by the Fellow, or, for complex cases, as an assistant surgeon. The list shows different examples of the procedures to be performed and does not necessarily outline the requirements of the Fellowship completion.
- Microsurgical experience is essential.

Surgical procedures can be listed as follows:

Skin and Subcutaneous Tissue

- Skin graft
- Pedicled flaps
- Regional and\or island flaps
- Free-flap with microvascular anastomosis

Bone and Joints

- Vascularized bone on a pedicle flap
- Clavicle on the sternocleidomastoid flap
- Rib on the pectoralis major muscle
- Scapula on the trapezius muscle
- Bone transfers with microvascular anastomosis
- Deep circumflex iliac artery flap
- Radial forearm flap
- Free fibula flap
- Free scapula flap
- Medial femoral condyle flap
- Coracoid bone free-flap for reconstruction of the scaphoid bone
- Free toe joint transfer

Nerves

- Microsurgical nerve repair
- Nerve grafting
- Neurotization and conduits
- Neurolysis
- Neuroma
- Nerve tumors

Vascular

- Tumors and vascular malformations
- Replantation
- Revascularization
- Microsurgical arterial anastomosis
- Microsurgical venous anastomosis
- Vein graft
- Lymphatic reconstruction

Other

- Congenital disorders, including mangled hand treatment
- Facial paralysis and facial palsy procedures
- Children's disorders

Amputations

- Hand level
- Metacarpal, carpal, forearm, and proximal upper limb level

Replantation

- Digital level
- Carpal or forearm\upper limb level
- Lower limb

Contracture and functional impairments

- Volkmann's
- Stiffness
- Burns

Appendix-E

The following table provides example topics that illustrate the half-day activities as they span over the course of 1 year (or the cycle of teaching if more than 1 year is required to cover all of the topics).

An example:

Academic week	Section	Date	Time	Sessions	Presenters
1	Fundamentals in surgery	MM-DD	13:00–14:00	Welcoming to the program	Program director
			14:00–15:00	Case base study**	A
			15:00–16:00	Topic 2	B
2		MM-DD	13:00–14:00	Topic 3	C
			14:00–15:00	Case base study	D
			15:00–16:00	Topic 5	E
3		MM-DD	13:00–14:00	Topic 6	F
			14:00–15:00	Case base study	B
			15:00–16:00	Topic 8	C
4		MM-DD	13:00–14:00	Journal club*	K
			14:00–15:00	Case base study	B
			15:00–16:00	Topic 10	A

* Journal club could be conducted in the evening or during the half-day

** Case based study could be conducted in the evening or during the half-day

Appendix-G

Glossary

Glossary	
Blueprint	Description correlating educational objectives with assessment contents; for example, test blueprint defines the proportion of test questions allocated to each learning domain and/or content.
Competency	Capability to function within a defined professional role that implies entrustment of a trainee by graduation of the program, with the required knowledge, skills, and attitude needed to practice unsupervised.
Specialty core content (skills, knowledge, and professional attitude)	A specific knowledge, skill, or professional attitude, which is specific and integral to the given specialty.
Formative assessment	An assessment that is used to inform the trainer and learner of what has been taught and learned, respectively, for the purpose of improving learning. Typically, the results of formative assessment are communicated through feedback to the learner. Formative assessments are not intended to make judgments or decisions (although this may be a secondary gain).
Mastery	Exceeding the minimum level of competency to the proficient level of performance, indicating rich experience with possession of great knowledge, skills, and attitude.

Glossary	
Portfolio	A collection of evidence of progression towards competency; this may include both constructed components (defined by mandatory continuous assessment tools in the curriculum) and unconstructed components (selected by the learner).
Summative assessment	An assessment that describes the composite performance of the development of a learner at a particular point in time and is used to inform judgment and make decisions about the level of learning and certification.
Universal topic	Knowledge, skills, or professional behavior that is not specific to the given specialty but universal for the general practice of a given healthcare profession.

Appendix-I

2.2.6 RESEARCH ROTATION

Research rotation is intended to prepare the training Fellow to acquire the necessary skills and knowledge about research to prepare them to conduct their research project throughout their Fellowship training period.

MEDICAL EXPERT

Goals:

- To demonstrate an understanding of the basic principles of research design, methodology, data analysis, and clinical epidemiology. In addition, they have advantages and disadvantages from the perspective of surgery.

- To familiarize themselves with the ethical requirements of research and demonstrate an understanding of the responsible use of informed consent.
- To understand and practice appropriate methods for writing the research manuscript, data collection, and analysis and discussion of results.
- To demonstrate the awareness of the current research topics in radiology using available medical informatics systems.
- To acquire the skills for scientific presentations and public discussions.

Requirements

- Clinical studies (case reports), basic and applied science, laboratory, and translational science research projects are encouraged.
- The project should be intended for publication in a peer-reviewed journal and it is a requirement to publish at least one paper in a respected peer-reviewed journal prior to completion of the Fellowship training.
- Assigned a senior faculty member involved in microsurgery.

Training Methods

- A dedicated 1-month, full-time rotation in research is conducted.
- It is expected that the project will span more than 1 month. Therefore, the completion of the work should be performed in parallel to the other subsequent rotations.
- The Fellow must choose a supervisor to help access the essential resources who will facilitate an appropriate understanding of research skills and periodically discuss the progress.
- Attendance at dedicated courses or workshops that enhance research skills may be required by the program.
- The Fellow must finish the research proposal by the end of the first 6 months and should be accepted by the IRB committee.
- The oral abstract of the study results is encouraged to be presented on the Fellows Research Day.

- It is highly desirable for Fellows to work on presenting the research results at national and/or international meetings and work to publish their work in indexed journals.

COMMUNICATOR

- Demonstrate skills in conveying and discussing scientific research to scientific communities through posters, abstracts, teaching slides manuscripts, or other scientific communications
- Communicate and collaborate effectively with research supervisor to conduct the research.

COLLABORATOR

- Identify, consult, and collaborate with appropriate experts to conduct the research.

LEADER

- Demonstrate the ability to identify an area of research interest and a research supervisor in order to engage in the scholarship of scientific inquiry and dissemination.
- Demonstrate the ability to utilize available resources and regularly meet with an identified research mentor.
- Demonstrate the ability to set realistic priorities and use time effectively to optimize professional performance.
- Demonstrate an understanding of the cost-effective use of health care resources.

HEALTH ADVOCATE

- Recognize the contributions of scientific research in improving the health of patients and communities.

SCHOLAR

- To demonstrate the ability to pose an appropriate research question, recognize and identify gaps in knowledge and expertise around this question, and formulate an appropriate study design to answer it.
- Demonstrate the ability to conduct the research outlined in the proposal.
- Demonstrate the ability for data collection, data analysis, and preparation of an abstract and manuscript.
- Demonstrate the ability to identify areas for further research.

PROFESSIONAL

- Ethical and professional research expectations are consistent with Institutional Review Board guidelines, including the maintenance of meticulous data and conduct of ethical research.
- Demonstrate personal responsibility for setting research goals and working with supervisors to set and achieve research timeline objectives.
- Publish accurate and reliable research results, with attention to appropriate authorship attribution criteria.
- Disclose potential financial conflicts of interest (including speaker fees and consultative relationships) as appropriate when engaging in and disseminating research results.

Appendix-J

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Appendix-K

RECOMMENDED TEXTBOOKS & JOURNALS

TEXTBOOKS

- Microsurgery Practice Manual by Robert. D. Acland and Raja S Sabapathy.
- Operative Microsurgery by J. Brian Boyd and Neil F Jones.

JOURNALS

- Plastic and Reconstructive Surgery and Plastic and Reconstructive Surgery global open journals
- Archives of Plastic Surgery Journal
- Plastic surgery clinics
- Journal of Hand and Reconstructive Microsurgery
- Scandinavian Journal of Plastic and Hand Surgery
- Orthopedic Surgery Literature
- Plastic Surgery clinics
- JPRAS
- Microsurgery Literature
- Hand Clinics of North America

INTERNET SOURCES

- Medscape
- PubMed
- Web of Science

2.1 MEETINGS

- World congress of World Society for Reconstructive Microsurgery
- International perforator course
- Korean Association of Plastic Surgery Meeting
- Different national and international congress and meetings