



الهيئة السعودية للتخصصات الصحية
Saudi Commission for Health Specialties

Epilepsy And Electroencephalography Fellowship



سَبَّحَ لِلَّهِ الْمَدِينِ

PREFACE

- The primary goal of this document is to enrich the training experience of postgraduate trainees by outlining the learning objectives toward becoming independent and competent practitioners in the future.
- This curriculum may contain sections outlining some regulations of training; however, such regulations need to be sought from the “General Bylaws of Training in Postgraduate Programs” and “Executive Policies” published by the Saudi Commission for Health Specialties (SCFHS), which can be accessed online through the official SCFHS website. In the occasion of discrepancy in regulation statements, the one stated in the most recently updated bylaws and executive policies will be applied.
- As this curriculum is subject to periodic refinements, please refer to the electronic version posted online for the most updated edition at www.scfhs.org.sa.

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2- FOREWORD:

Saudi epilepsy and EEG fellowship are recognized as valuable additions to the local fellowship program, having grown over the last few years. The need for structured and goal-directed curricula has been discussed among trainee and supervising epileptologists.

As the Saudi Commission for Health Specialties adopted the Canadian competency-based education and evaluation system, the epilepsy and EEG fellowship committee were advised to follow the same notion in developing this curriculum.

This curriculum was developed by the fellowship program directors after reviewing each center's regulations and policies. In addition, we discussed the present and past members of the fellowship committee.

The epilepsy fellowship curriculum development team acknowledges valuable contributions and feedback from scientific committee members in the development of this program. We extend special appreciation and gratitude to all members pivotal in the completion of this booklet, especially the Curriculum Group, the Curriculum Specialists, and the Scientific Council.

We would also like 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. This curriculum has been reviewed and endorsed by experts in the fields of epilepsy, EEG, and medical education. We would like to enforce the importance of the periodic revision of this curriculum with the aim of achieving the highest standard via a process for continuous improvement.



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INTRODUCTION:

Epilepsy is one of the most common neurological disorders, known to negatively influence patients' quality of life. Epilepsy represents a burden to the community and economy, which can be aggravated by improper management of the disorder. The World Health Organization (WHO) estimates that 50 million people of all ages are affected by epilepsy worldwide, with more than 85% living in the developing world. Table 1 shows the prevalence of epilepsy in the selected countries.

Table 1. Summary of studies of epilepsy prevalence by country

COUNTRY	POPULATION SIZE	CRITERIA	CRUDE PREVALENCE (PER 1000 POP.)	AUTHORS
Tunisia (1993)	341 900	Active epilepsy	4.04	Attia-Romdhane, Mrabet, and Ben Hamida
Saudi Arabia (2001)	23 700	Active epilepsy	6.54	Al Rajeh et al.
Pakistan (1994)	24 130	Recurrent non-febrile active seizures	9.99	Aziz, Akhtar, and Hasan
Islamic Republic of Iran (2004)	35 014	Unspecified	12.00	Noorbala et al.
Sudan (2004)	50–100 000	Unspecified	10.6–21.2	Perenchio et al.



In Saudi Arabia, the prevalence of epilepsy is thought to be 6.54 per 1000 population (1). However, as per a recent study released in 2017, the prevalence is 3.96 per 1000 (2).

Considering the total population of the Kingdom of Saudi Arabia, which is around 32.6 million, we probably have between 150000 to 200,000 epileptic patients in our country. In general, medicines can control seizures in approximately 70 percent of patients with epilepsy. Drug-resistant epilepsy occurs when a person has failed to become seizure free with adequate trials of at least two anti-seizure medications. Non-drug therapies, such as epilepsy surgery, vagus nerve stimulation, responsive neurostimulation, dietary therapies, or experimental clinical trials, may be good options for some patients. For patients with uncontrollable partial (focal) epilepsy, epilepsy surgery can provide a "cure" by eliminating the source of seizures and epilepsy.

The nature and complexity of epileptic disorders demand advanced knowledge that is not usually acquired completely during residency training programs. The availability of proper epilepsy services requires a knowledgeable team consisting of an epileptologist and neurosurgeon, neuropsychologist, neuroradiology, and technical services, including epilepsy monitoring units (EMUs) and video-EEG.

Epilepsy monitoring units (EMUs) provide long-term video-electroencephalography monitoring, which is an important investigational tool used to improve the accuracy of the diagnosis of different spells, for seizure classification and completing pre-surgical workup in patients with drug-resistant epilepsy.

The Kingdom is becoming a pioneer in the Middle East region in epilepsy and related medical and surgical management, which requires the presence of well-trained epileptologists. Epilepsy/EEG fellowship is the key factor in training neurologist/pediatric neurologists to acquire the required knowledge, skills, professional judgment, and attitudes needed to practice

and teach epilepsy. Since the Epilepsy/EEG fellowship started in 2011, there are 10 graduates from Saudi Arabia and the Gulf countries. After completing the fellowship, some of the graduates went to different cities inside the Kingdom or their original countries to provide medical care for epilepsy patients in these regions. Epilepsy specialists are still required to promote excellence in the diagnosis, management, and research projects for Saudi Arabian epilepsy patients. Ultimately, a dedicated subspecialty training in epilepsy is beneficial for patients, health providers, and our health care system.

Goals and responsibilities of curriculum implementation:

The aim of the Epilepsy/EEG Fellowship Program is to foster a well-qualified epileptologist capable of handling complex seizure disorders. The Fellow will gain the required expertise in this field by spending adequate time in multiple, well-staffed, and equipped centers that will allow him/her to develop appropriate competence during the fellowship period. The training is comprehensive and emphasizes the role of a multidisciplinary approach. Graduates of this program should be able to deal with various epilepsy cases, have complete knowledge of the latest treatment guidelines, and possess detailed knowledge of all treatment modalities, either medical or surgical.

The main educational goals of the Epilepsy Fellowship include:

1. Provide high-quality training and ensure that trainees completing the training have achieved the required level of skills and competencies.
2. Focus on the outcomes of training to ensure that trainees can perform the required competencies in the essential domains of the epilepsy field.
3. Accelerate the process of learning and skills attainment through focused and up-to-date teaching methods and high-volume exposure to cases with balanced supervision and independence.



4. Demonstrate the trainee's capability to transform their knowledge easily into independent practice after completing the program successfully. The trainee is expected to interpret EEGs expertly and provide tertiary-level epilepsy care, including advanced pharmacologic and surgical management.
5. Construct research projects in epileptic disorders and their related fields by creating appropriate research proposals, obtaining data, performing data analysis, and publishing results.

In summary:

- Epilepsy is a chronic disorder of the brain that affects people of all ages.
- Approximately 50 million people worldwide have epilepsy, making it one of the most common neurological diseases globally.
- Nearly 80% of people with epilepsy live in low- and middle-income countries.
- People with epilepsy respond to treatment approximately 70% of the time.
- About three-fourths of people with epilepsy living in low- and middle-income countries do not receive the treatment they need.
- In many parts of the world, people with epilepsy and their families suffer from stigma and discrimination.

Epilepsy fellows should be able to diagnose and treat patients with epilepsy, including those with drug-resistant epilepsy, surgical options, and diagnostic uncertainties. They should be able to handle outpatient and inpatient EEG facilities, both ambulatory and video/EEG monitoring, and provide appropriate medical and surgical treatment, including epilepsy surgery, such as temporal lobectomy for mesial temporal sclerosis, palliative surgery, vagus nerve stimulation, ketogenic diet, and medications.

During EEG/epilepsy training, fellows will rotate through several services and gain extensive clinical experience with both adult and pediatric video-EEG monitoring, invasive intracranial monitoring, and epilepsy consultations in both ICU and non-ICU settings. Epilepsy fellows have an elective month and

are encouraged to use this time to pursue individual research interests or gain additional experience in neurostimulation, neurophysiology, neuroradiology, neuropathology, sleep medicine, metabolic and genetics, intraoperative and extra operative procedures, and other areas of clinical neurophysiology. There is also an opportunity to teach neurology residents and students rotating in epilepsy units or through the clinic. They will spend time learning cortical mapping procedures (bedside), intra-operative mapping procedures, and the Wada test. Fellows will become adept at creating intracranial electrode montages and lead the weekly multidisciplinary conference presenting cases of patients being considered for epilepsy surgery.

4. 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. 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 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 that can be accessed online (via the official SCFHS website).

Regulations governing duties, leaves, and holidays are stipulated in the hospital’s Fellowship Training Program Policy. Leaves must be submitted in advance for scheduling clinical activities. Each month, there will be one fellow covering EMU on call after working hours as third person on call, in addition to doing rounds for EMU patients during the weekend.



I. Program structure

Program Entry requirement:

The Fellowship Committee will interview the candidates and select the best candidate.

The prospective Fellow must meet the following requirements:

1. Have successfully completed a formal residency training program in adult or pediatric neurology and be board-eligible (passed the written exam at least) in the specialty by an appropriate board such as the SCHS or its equivalent. Board-eligible candidates are expected to be specialty boards certified as mandatory requirements before being certified by epilepsy fellowships.
2. Must be registered and licensed by SCHS.
3. Provide three letters of reference.
4. The candidate must have successfully passed a personal interview designated by each program.
5. Sponsorship covers the duration of the program.
6. Upon admission the fellow must sign a statement to abide by the rules and regulations of the SCHS and the training program.

Program duration: The duration of the Fellowship Program was two years (24 months) including annual and emergency leaves.

Program Rotations:

The duration of the program is 104 weeks (24-months).

The rotations are divided in weeks as follows:

1. 52 weeks of core Epilepsy training in Epilepsy Monitoring Unit.
2. 16 weeks of Clinical Neurophysiology (CNP) which consists of two months of basic CNP and two months of advanced CNP.
3. 8 weeks of Research.

4. 8 weeks of Elective (MEG, IOM, epilepsy radiology including functional MRI, metabolic and genetic epilepsy).
5. 4 weeks sleep medicine rotation in the second year.
6. 4 weeks of annual leave per year (not to exceed 25% of each mandatory core rotation).
7. 8 weeks Epilepsy clinics.

Training Year	Mandatory core rotations*		Elective rotations**	
	Rotation name	Duration In weeks	Rotation name	Duration (weeks)
F1	<ul style="list-style-type: none"> • EEG • EMU • Research • Epilepsy clinics • Annual vacation 	8 28 4 4 4	<ul style="list-style-type: none"> • Elective (from the list written above) 	4
F2	<ul style="list-style-type: none"> • Advanced EEG • EMU • Research • Sleep • Epilepsy clinics • Annual vacation 	8 24 4 4 4 4	<ul style="list-style-type: none"> • Elective 	4

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” that are aimed to be “entrusted” by trainees upon graduation. This will ensure that graduates meet the expected demands of the healthcare system in relation to their 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 that are driven from complex professional competencies.

Professional competencies related to healthcare are usually complex and entertain a mixture of multiple learning domains (knowledge, skills, and attitude). The following CanMed competencies are expected to be gained during the fellowship:

Medical Expert:

Definition

As medical experts, epilepsy fellows integrate all the CanMEDS roles, applying medical knowledge, clinical skills, and professional attitudes in their patient-centered care. A medical expert constitutes the central physician's role in the CanMEDS framework.

Description

Epilepsy fellows possess a defined body of knowledge, clinical skills, and professional attitudes, which are utilized to provide effective patient-centered care. They apply these competencies to collect and interpret information, make appropriate clinical decisions, and carry out diagnostic and therapeutic interventions within the boundaries of their discipline, personal expertise, healthcare setting, and the patient's preferences and context. Their care is characterized by up-to-date, ethical, and resource-efficient clinical practice as well as effective communication with patients, other healthcare providers, and the community.

By the end of the two years, fellows are expected to:

1. Function effectively as an epileptologist treating adult and pediatric epilepsies.
2. Establish and maintain clinical knowledge, skills, and attitudes appropriate to epilepsy.

3. Perform a complete and appropriate assessment of a patient with intractable epilepsy starting from proper selection of the patient; complete pre-surgical evaluation includes reading and interpretation of video EEG, creating efficient report, presenting, and discussing the patient in an epilepsy surgical management conference and participation in choosing the best management options tailored according to patients.
4. Use preventive and therapeutic interventions effectively.
5. Appropriately use and interpret diagnostic tests relevant to epilepsy example of which are MEG, PET, SPECT etc.
6. Able to diagnose and manage metabolic-genetic treatable epilepsies.
7. Seek appropriate consultation from other health professionals, recognizing the limits of their expertise.
8. Appreciate the importance of neuropsychiatric, cognitive, behavioral, and social sequelae of epilepsy, as evidenced by including these variables in patient management in collaboration with specialists.
9. Apply cognitive data (e.g., neuropsychological testing, fMRI, Wada testing) in the diagnosis and surgical planning of epilepsy patients, as demonstrated appropriate data interpretation.

The fellow is expected to demonstrate medical knowledge and expertise in the following areas:

- Basic physiological mechanisms underlying EEG waves in different states and developmental ages, including normal and abnormal features.
- Nervous system neurophysiology includes action potentials, ion channels, neurotransmitters, and epileptogenesis.
- Classification of epileptic seizures and syndromes.
- Epidemiology, genetics, clinical manifestations, treatment, and prognosis of epileptic seizures and syndromes in adults and children.
- Pharmacological principles, complications, and teratogenic effects of anti-epileptic drug administration.



- Non-pharmacological treatment of epilepsy includes a ketogenic diet, surgery, and vagal nerve stimulation.
- Effects of pregnancy on epilepsy and its management.
- Diagnosis and management of status epilepticus.
- Diagnosis and differential diagnoses of non-epileptic seizures.
- Understand the presentation, evaluation, and management of sleep disorders.
- Effect of epilepsy in the elderly and its management.
- Independent findings on EEGs under the supervision of neurophysiological mentors. Special electrographic techniques used in patients with epilepsy include functional mapping, electrocorticography, and use of subdural grids, strips, and depth electrodes.

Medical Knowledge

1. Fellows must demonstrate knowledge of established and evolving biomedical, clinical, epidemiological, and social behavioral sciences, as well as the application of this knowledge to patient care.
2. Fellows must demonstrate competence in their knowledge of:
 - A. Basic science of epilepsy and seizures.
 - B. Genetics of epilepsy and seizures.
 - C. Epidemiology of epilepsy and seizures.
 - D. Neuroimaging and other diagnostic modalities in epilepsy.
 - E. Neuropsychology.
 - F. Pharmacologic treatment of epilepsy.
 - G. Pharmacologic treatments of epilepsy.
 - H. Co-morbidities in epilepsy and seizures.
 - I. Ictal and interictal EEG patterns across the lifespan.
 - J. Prognosis in epilepsy and seizures.
 - K. Surgical treatment in epilepsy.

Communicators

Definition

As communicators, epilepsy fellows should effectively facilitate the doctor-patient relationship and the exchanges that occur before, during, and after the medical encounter.

By the end of the second year, the trainee should be able to perform the following:

1. Develop rapport, trust, and ethical therapeutic relationships with patients and families.
2. Accurately elicit and synthesize relevant information and perspectives of patients, families, colleagues, and other professionals.
3. Convey relevant information and explanations accurately to patients, families, colleagues, and other professionals.
4. Develop a common understanding of issues, problems, and plans with patients, families, and other professionals for a shared plan of care.
5. Convey effective oral and written information about a medical encounter.
6. Maintain clear and accurate records (e.g., manual or electronic) of clinical encounters and plans.

Collaborator

Definition

As collaborators, the trainee should be able to work effectively within a healthcare team to achieve optimal patient care.

By the end of the second year, the trainee should be able to perform the following:

1. Participate effectively and appropriately in an inter-professional healthcare team.
2. Work effectively with other health professionals to prevent, negotiate, and resolve



3. inter-professional conflict.

Managers

Definition

As managers, epileptologists are integral participants in healthcare organizations, organizing sustainable practices, making decisions about allocating resources, and contributing to the effectiveness of the healthcare system.

By the end of the second year, the trainee should be able to perform the following:

1. Participate in activities that contribute to the effectiveness of healthcare organizations and systems.
2. Manage their practice and career effectively.
3. Allocate finite healthcare resources appropriately.
4. Serve in administrative and leadership roles.

Health Advocates

Definition

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

By the end of the second year, the trainee should be able to perform the following:

1. Respond to individual patient health needs and issues as part of patient care.
2. Respond to the health needs of the communities they serve.
3. Identify the determinants of health for the populations served.
4. Promote the health of individual patients, communities, and populations.

Scholars

Definition

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

By the end of the second year, the trainee should be able to perform the following:

1. Maintain and enhance professional activities through ongoing learning.
2. Critically evaluate medical information and its sources, making sure of its appropriate applications on practical decisions.
3. Facilitate the learning of patients, families, students, residents, other health professionals, and the public.
4. Contribute to the development, dissemination, and translation of new knowledge and practices.
5. Complete at least one scholarly project under the mentorship of an attending epileptologist.
6. The project should be presented at either a national or international scientific event or published in a peer-reviewed journal.
7. Fellows are encouraged to complete the project or make significant progress toward the completion of training before their final examination.

Professionals

Definition

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

By the end of the second year, the trainee should be able to perform the following:



1. Demonstrate a commitment to their patients, profession, and society through ethical practice.
2. Demonstrate a commitment to patients, profession, and society through participation in profession-led regulation.
3. Demonstrate a commitment to physician health and sustainable practice.
4. Upon completion of training, the trainee is expected to be able to interpret EEGs expertly and provide tertiary level epilepsy care, including advanced pharmacological and surgical management. In addition, the trainee should be able to construct research proposals, obtain data, perform data analysis, and publish results. The skills are aimed at providing the trainee with a comprehensive background to pursue clinical or academic careers.

Rotation Specific Objectives:

EEG

Learning Outcomes:

Neurophysiology Lab:

1. Learn principles of polarity and other fundamentals of EEG technology.
2. Develop an in-depth understanding of normal/abnormal EEG rhythms and their interpretation, EEG technology, and the physiological basis of EEG.
3. Learn the international 10-20 system and principles of montage design.
4. Attend afternoon EEG reading sessions at least three times per week.
5. Observe EEG technologists for one week to learn the basic EEG electrode placement (10-20 system) for adults and pediatrics.
6. Read and interpret EEGs and generate your own report to be discussed later with the epileptologist/neurophysiologist in charge.
7. Read multi-hour EEG and inpatient's (including ICU) long-term EEGs.

Epilepsy Monitoring Unit (EMU)

1. Manage admission and inpatient plans
2. Learn how to manage antiepileptic drugs during admission
3. Master the reading of video-EEG

4. Analyze and interpret different seizure semiologies
5. Propose a surgical plan for patients admitted for surgical work up
6. Develop professional skills on patient counseling
7. Write a comprehensive EMU report
8. Able to read and interpret invasive EEGs

Evaluate patients for epilepsy Surgery:

1. Understand different types of epilepsy surgery
2. Discuss the epilepsy surgery plan with the multidisciplinary team
3. Develop decision strategy on resective versus palliative epilepsy surgery
4. Understand the expected outcome of each type of epilepsy surgery
5. Counsel patients and caregiver on the risk and benefits of the surgery
6. Manage AEDs after surgery
7. Attend surgical procedures with the surgeon in operating room
8. Attend and participate in Eelectrocorticography (ECoG) .

Epilepsy clinic:

1. Evaluation first seizure
2. Master the indications and contraindications of different AEDs
3. Learn the different mechanism of actions of AEDs
4. Manage patients with intractable epilepsy, including when to refer for surgical work-up

Sleep medicine:

1. Learn sleep features
2. How to conduct an all-night sleep study
3. Know about Parasomnias
4. Learn about the differences between Parasomnias and Frontal lobe epilepsy
5. Learn how sleep affects seizures and vice versa
6. Physical changes that occur during sleep and its relations with seizures



Research

At least one research paper should be submitted for publication during the Epilepsy Fellowship period.



TEACHING METHODS:

The teaching process in postgraduate epilepsy training programs is mainly based on the principles of 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 programs implement the adult learning concept on each feature of the activities where 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- Program specific learning activities:

Program-specific activities are educational activities that are specifically designed and intended for trainees' teaching during their training time. The trainees are required to attend these activities, and non-compliance can subject trainees to disciplinary actions.

A) Program Academic half-day:

Every week, at least 2-4 hours should be reserved for formal teaching. A formal teaching time is an activity that is planned with an assigned tutor, time slots, and venue. Formal teaching time excludes bedside teaching, clinic postings, etc. The academic half-day covered the core specialty. The core specialty topics are presented in Appendix A.

B) Epilepsy patients' surgical management conference:



A weekly meeting to discuss difficult or pre-surgical cases in the presence of adult/pediatric epileptologists, epilepsy surgeons, neurophysiologists, neuroradiologists, and psychologists.

C) Monthly Pathology Meeting:

is held to discuss epilepsy surgical cases pathology.

D) Yearly epilepsy course:

A 2-3 days organized epilepsy and EEG group course accredited by the Saudi Commission for Health Specialties.

E) Practice-based learning

allows the educator to supervise trainees to become competent in the required program practical skills. The following procedures are expected to be learned by the authors:

- VNS Programming
- Invasive EEG monitoring
- ECoG
- Status Epileptics pathway
- EMU pathway
- Mapping

2- Universal Topics

Universal topics are educational activities developed by SCFHS, that are intended for all specialties. Priority will be given to high value, interdisciplinary and integrated topics, that require expertise beyond that of local clinical training sites.

Universal topics have been developed by SCFHS and are available, such as 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 will be distributed over the entire period of 2-year training. Please refer to Appendix B for the details of each module.

Modules selected for the EEG and epilepsy fellowship program:

Modules for year 1:

- 1- Safe Drug Prescribing
- 2- Hospital Acquired Infections (HAI)
- 3- Acute Care
- 4- Sepsis, Systemic inflammatory response syndrome (SIRS), and Disseminated intravascular coagulation (DIVC)

Modules for year 2:

- 1- Pre-Operative Assessment
- 2- Post-Operative Care
- 3- Acute Pain Management
- 4- Chronic Pain Management



Training Year	Modules		Topics name	
	Number	Name	Number	Name
F1	Module-1	Introduction	1	Safe drug prescribing
			2	Hospital Acquired Infections (HAI)
			3	Sepsis, Systemic inflammatory response syndrome (SIRS), and Disseminated intravascular coagulation (DIVC)
F2	Module 5	Acute Care	21	Pre-operative assessment
			22	Post-operative care
			23	Acute pain management
			24	Chronic pain management
			25	Management of fluid in the hospitalized patient
			26	Management of electrolyte imbalances

3- General Learning Opportunities:

A formal training time should be supplemented by other practice-based learning (PBL), such as:

- Journal Club
- Grand rounds
- Involvement in quality improvement committees and meeting
- Continuous professional activities (CPD) relevant to specialty (conferences and workshop)
- Morbidity and Mortality (M&M)

The M&M conference offers trainees the opportunity to discuss patient cases in which adverse effects have resulted from 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, while emphasizing error reduction strategies.

Monthly Joint Academic Activities

Each month, a country-based meeting was conducted in all approved programs through teleconference, in which one fellow presented a case in a manner similar to the weekly cases but with more extensive and detailed discussions, as supervised by epilepsy and epilepsy surgery consultants, and with the requirement of mandatory attendance for all fellows. The aim of this activity was to spread knowledge between fellows and share experiences from different centers. This activity was followed by a brief discussion of the topic related to the presented case.

Continuum of learning:

F1	F2	Continuing Development as a consultant
Obtain fundamental knowledge related to epilepsy and epilepsy syndromes	Applies knowledge base to provide appropriate clinical care	Evaluates knowledge and modifies clinical care pathways to enhance patient care
Acquire all basic technical skills in applying EEG electrodes and understands the pitfalls	Proficient at all basic technical procedures, some complex procedures such as how to apply invasive electrodes and how to troubleshoot the problems	Develop complex skills around how to map the brain and when to apply invasive electrodes and how to read them



F1	F2	Continuing Development as a consultant
Develop clinical skills in reading routine, ambulatory and video EEGs.	Analyze clinical findings to derive appropriate differential diagnosis and management plans	Evaluate assessment findings, refine and modify management skills
Perform allocated tasks and begins to plan tasks	Plan and prioritize tasks appropriately	Increasing expertise with evaluation of priorities and appropriate delegation across a wide range of professionals
Perform allocated teaching tasks	Plan and deliver teaching to trainees and other professionals. Develops peer mentoring skills.	Plan and modify curricula, perform assessment and appraisal. Able to provide mentorship
Aware of management issues	Develop management skills and able to take responsibility for a defined project. Contribute to committees	Can negotiate and deal with conflict. Can contribute to and lead committees. Evaluates and modifies management structures.
Understand the principles of critical appraisal and research methodology	Able to appraise the literature critically and apply to clinical practice	Able to evaluate critical appraisal performed by others. Able to lead research projects and support others in research
Work in multi-disciplinary teams	Able to take the lead and accept leadership from other members of the multi-disciplinary team	Evaluate and modify multi-disciplinary team working

Assessment of Trainees

Purpose: The purposes of the assessment during the training are to:

- Support learning
- Develop professional growth
- Monitor progression
- Competency judgement and certification
- Evaluate the quality of the training program

General Principles:

- Judgement should be based on the holistic profiling of a trainee rather than individual traits or instruments.
- Assessment should be continuous in nature.
- The trainee and faculty must review the portfolio and logbook once every two months and at the of a given rotation.
- Assessment should be strongly linked to the curriculum and the content.

General principles

There are two types of assessments: Formative (50%) and Summative (50%).

To obtain certification, the trainee should fulfill the following criteria:

- A. Pass both formative as well as summative assessment.
- B. The passing marks in an individual assessment and cumulative assessment is 70%.
- C. The 75% attendance is required to appear in the examination.
- D. Complete e-portfolio.
- E. Complete logbook.



A) Formative Assessment

Learning Domain	Formative Assessment Tools	Important details (e.g., frequency, specifications related to the tool)
Knowledge	<ul style="list-style-type: none"> - Written Progress Test (Local or International) - Case Based Discussion (CBD) 	Yearly Quarterly
Skills	<ul style="list-style-type: none"> - OSCE: Objective structured clinical examination - Logbook - Research 	Yearly Revised yearly 1 Research submitted at the end of F2
Attitude	ITER: In-Training Evaluation Report	After each rotation

Formative Assessments (Clinical Skills/Patient Management)

Logbook

A logbook for the trainees will be signed by all supervisors at the training centers after completion of each required educational activity. The book is a part of the portfolio. The purpose of the logbook is as follows:

1. Monitor trainees' performance on a continual basis
2. Document and record the cases seen and managed by the trainees
3. Maintain a record of procedures and technical interventions performed
4. Enable trainee and supervisor to determine the learning gaps
5. Provide feedback to the trainee

Minimum requirement

F1 & F2: 100 EEGs (out of which at least 60 EEGs will be performed during F1 year)

5 Invasive EEG including “subdural and depth recording”

5 Brain mapping including: Language, visual, auditory, motor and sensory
“Extra operative or Intraoperative,”

At least 1 MEG if available,

VNS 10

25 cases with details surgical or medical management.

Case Based Discussion (CBD)

Each fellow will have a CBD quarterly per year, and the assessment form for CBD is attached in *Appendix C*.

Research

Each fellow is expected to have at least one published research by a recognized journal by the end of F2

Summative Assessment (Cognition)

Final Written examination (Multiple Choice Questions (MCQs))

The number of exam items, exam format, eligibility, and passing score would be in accordance with the Commission’s training and examination rules and regulations. Examination details and blueprints were published on the commission website (www.scfhs.org.sa). The blueprint of the exam was as follows:

SAQ Test Blueprint For Epilepsy Fellowship Written Exam MCQ for F1 and F2



.No	Sections	(%)
1	Clinical Epilepsy	%25
2	Genetics of the Epilepsies	%15
3	EEG /Technology	%25
4	Antiepileptic medications	%10
5	Epilepsy Surgery	%5
6	Psychosocial Aspects of Epilepsy	%5
7	Physiology	%10
8	Ethical Consideration /Research	%5
Total		%100

Clinical Examination – OSCE

Clinical examination assesses a broad range of high-level clinical skills, including data collection, patient management, communication, and counseling skills. The examination is held at least once a year, preferably in an OSCE format in the form of patient management problems (PMPs). There are 10–12 stations. The exam eligibility, format, and passing score will be in accordance with the Commission’s training and examination rules and regulations. Examination details and blueprints are published on the commission website: www.scfhs.org.sa.

SAQ Test Blueprint For Epilepsy OSCE for F1 and F2

.No	Sections	(%)
1	Clinical Epilepsy	%20
2	Technology	%15
3	Physiology /Basic Science	%15
4	Videos	%10
5	Pathology	%5
6	EEG	%15
7	Cases discussion	%10
8	Radiology	%5
9	Ethics / Counseling	%5
Total		%100

Passing Score

Please visit www.scfhs.org.sa as it might be subjected to changes.

Certification of Training-Completion

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

- a. Successful completion of all training rotations.
- b. Completion of training requirements as outlined by the scientific council/committee of specialty (e.g., logbook, research, others).
- 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 local supervisory committee or its equivalent according to SCFHS policies.



ABBREVIATIONS USED IN THIS DOCUMENT

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

Abbreviation	Description
SCHS	Saudi Commission for Health Specialties
F1	First year of fellowship
F2	Second year of fellowship
OSCE	Objective Structured Clinical Examination
CBD	Case Based Discussion
CEP	Core Educational Program
ITER	In-Training Evaluation Report
ECoG	Intraoperative Electroconvulsography
MEG	Magnetoencephalography
EEG	Electroencephalography
EMU	Epilepsy Monitoring Unit
AED	Antiepileptic drug

APPENDICES

Appendix A

Content to be learned in epilepsy program:

Core condition:

Trainees must be trained to deal with the following core conditions:

- Status epilepticus
- Treatable metabolic/genetic epilepsies
- Patients with high risk of Sudden Unexpected Death in Epilepsy (SUDEP)
- Autoimmune epilepsies

Status epilepticus (SE) is a life-threatening medical emergency that requires prompt recognition and immediate treatment. SE is not a disease, but rather a manifestation of either a primary central nervous system (CNS) insult or a systemic disorder with secondary CNS effects. It is important to identify and specifically treat the precipitating cause, so as to prevent ongoing neurologic injury and seizure recurrence.

Sudden Unexpected Death in Epilepsy (SUDEP)

SUDEP is the most important direct epilepsy-related cause of death.

It is defined as a sudden, unexpected, witnessed, or unwitnessed, non-traumatic, and non-drowning death in a patient with epilepsy.

This may or may not occur in the setting of an epileptic seizure and excludes deaths resulting from status epilepticus.

SUDEP has an estimated incidence of 1.8 per 1000 patient-years (8).



However, higher incidences (3–9/1000 patient-years) have been reported in patients with intractable epilepsy (6).

While SUDEP is rare among the pediatric population, it is estimated to be between 1 and 2 per 10,000 patient-years (7).

Treatable metabolic epilepsy

There are more than 11,000 well-recognized and well-characterized inherited disorders in humans, among which many are associated with seizures and epilepsy.

The daunting task for the clinician is to recognize these important diagnoses in patients with epilepsy so that optimal medical treatment, family counseling, and prognosis can be provided.

Autoimmune Epilepsy:

Recognition of the role of autoimmune mechanisms in the pathogenesis of several acquired neurologic disorders has improved our ability to treat disorders previously considered untreatable.

This had the greatest impact on disorders of myelin in the peripheral and central nervous systems, leading to improved outcomes in patients with inflammatory neuropathies and multiple sclerosis.

In the field of epilepsy, the role of autoimmune mechanisms has long been overlooked.

Recent research in the field of autoimmune/limbic encephalitis (LE) has yielded a variety of autoantibodies against target antigens that are closely linked to epileptogenesis and cognition (8).

This raised the possibility that autoimmune mechanisms may play a role in the pathogenesis of acquired focal epilepsy syndromes and neuropsychiatric disorders.

Furthermore, nearly one-third of patients with epilepsy do not have a specific etiology for epilepsy (9, 10).

Identification of a specific etiology with therapeutic implications may potentially affect the outcome of these patients (11).

- I. Physiological basis of seizure
- II. Physiological basis of EEG
- III. EEG Generator
- IV. Wave Generation and Baseline Shifts
- V. Focal Activity
- VI. Generalized Tonic–Clonic Activity
- VII. Spreading Depression
- VIII. Substrates of Brain Rhythms

2- Basic Mechanisms Underlying Seizures and Epilepsy

3-Neurophysiology of the Cerebral Cortex

- I. Basic Anatomy of Cortex
- II. Basic Neurophysiology and Neurochemistry Governing Excitability
- III. Factors Governing Excitability of Individual Neurons
- IV. How Network Organization Influences Neuronal Excitability
- V. Physiological Basis of the EEG
- VI. Pathophysiology of Seizures: An Alteration in the Normal Balance of Inhibition and Excitation
 - a. Basic Mechanisms of Focal Seizure Initiation and Propagation
 - b. Current Theories as to How Inhibition and Excitation Can Be Altered at the Network Level
 - c. Epileptogenesis: The Transformation of a Normal Network Into a Hyperexcitable Network

4- EEG Instrumentation, Montage, Polarity, and Localization

- I. Technical Tips:
- II. The Source of EEG



- III. Recording the EEG
- IV. Montages
- V. Acquiring, Filtering, and Displaying the EEG Signal
- VI. Digital EEG Acquisition, Processing, and Display
- VII. EEG and Patient Safety

5-Normal EEG Variants and Artifacts

- I. Physiologic EEG Artifacts
- II. Non-physiologic Artifacts

6-Neonatal EEG and Neonatal Seizures

- I. Technical Information that is Unique in Neonatal EEG and that May Affect Interpretation
- II. Neonatal Montage
- III. Timing of the Neonatal EEG
- IV. Normal Developmental Landmarks
- V. Abnormalities in Voltage
- VI. Normal Graph elements
- VII. Abnormal EEG Findings
- VIII. Neonatal Seizures

7-The Abnormal EEG

Ictal and Interictal EEG

- I. Interictal Epileptiform Discharges
- II. Periodic Lateralized Epileptiform
- III. Discharges (PLEDs)
- IV. Temporal Intermittent Rhythmic
- V. Delta Activity (TIRDA)
- VI. Generalized IEDs
- VII. Ictal EEG

8-EEG and Semiology in Generalized Epilepsies

9-EEG and Semiology in Focal Epilepsy

10-Status Epilepticus

11-EEG in Encephalopathy and Coma

12-Specific Epilepsy Syndromes:

- I. Electro-Clinical Syndromes by Age of Onset- Childhood,
- II. Adolescence, and Adult
- III. Seizures and Epilepsy in Early
- IV. Imitators of Epilepsy
- V. Genetic Analysis of Epilepsies
- VI. Epilepsy Secondary to Specific Mechanisms

13-Management of Epilepsy

- I. Principles of Epilepsy Diagnosis and Management
- II. Old Generation Antiepileptic Drugs
- III. New Generation Antiepileptic Drugs
- IV. Dietary Therapies
- V. Other Pharmacological Therapies: Investigational
- VI. Antiepileptic Drugs
- VII. Hormonal Therapy, Immunotherapy
- VIII. Epilepsy Management in Special Populations
- IX. Animal Models of Epilepsy

14-Presurgical Evaluation and Epilepsy Surgery

- I. Neuroimaging in Epilepsy
- II. Neuropsychological Evaluation in Epilepsy
- III. Magnetoencephalography and Magnetic Source
- IV. Vagus Nerve Stimulation and Other Neuromodulation
- V. Epilepsy Surgery Assessment and Testing
- VI. Procedures and Outcomes in Epilepsy Surgery



VII. Quality of Life in Epilepsy

15-Pharmacology of antiepileptic drugs (AEDs)

- I. Principles of pharmacokinetics and pharmacodynamics
- II. Protein binding of AEDs
- III. Metabolism of AEDs; steady state
- IV. Drug interactions
- V. Mechanisms of action of AEDs, including effects on activity of GABA, sodium channels, glutamate activity, T-type calcium channels, GABA/benzodiazepine receptors, carbonic anhydrase

16- Epidemiology of epilepsy

- I. Incidence and prevalence
- II. Risk factors: family history, febrile seizures, stroke, CNS infection, trauma, cerebral neoplasms, neurocutaneous syndromes, neurodegenerative disorders, cerebral dysgenesis, arteriovenous malformations, and cerebral palsy
- III. Diagnosis of seizures and epilepsy
- IV. Knowledge of semiology of seizures, relating seizure type to epilepsy syndromes
- V. Differentiation of seizures from other paroxysmal phenomena, including paroxysmal non-epileptic events.

17- Classification of seizures

18- Epilepsy syndromes

- I. Localization-related versus generalized epilepsies, symptomatic vs. idiopathic epilepsies, cryptogenic epilepsies
- II. Age-related syndromes: neonatal convulsions, neonatal myoclonic epilepsy, childhood and juvenile absences, juvenile myoclonic epilepsy, awakening grand mal epilepsy, West syndrome, Lennox-Gastaut syndrome
- III. Genetics of epilepsy, including genetic counseling

IV. Diagnostic evaluation

19- Electroencephalography (EEG): routine EEG, ambulatory EEG, video-EEG monitoring, ECoG, chronic intracranial EEG monitoring, intraoperative/extraoperative cortical functional mapping, and magnetoencephalography issues in epilepsy.

20- Neuroimaging: structural and functional magnetic resonance imaging; positron emission tomography, single photon emission computed tomography, magnetic resonance spectroscopy.

21- Special

- I. Psychosocial: employment, schooling, quality of life; psychiatric complications
- II. Driving: knowledge of state regulations, medical guidelines
- III. Pregnancy and epilepsy: assessment of appropriate therapy before and after pregnancy, serum AED levels, role of folic acid, risk assessment, breastfeeding, and AEDs
- IV. Contraception: role of enzyme-inducing drugs on hormonal contraception
- V. Economics of care
- VI. The single seizure: treatment options
- VII. Patient and family education; appropriate referral for psychosocial support
- VIII. Prognosis of epilepsy: relation to various epilepsy syndromes
- IX. Surgical therapy of epilepsy

Definition of drug-resistant epilepsy

Identification of Surgical Candidates

Preoperative diagnostic evaluation: supervision and interpretation of EEG/video monitoring, interictal and ictal brain imaging, coregistration and subtraction imaging, intracarotid amytal test, neurocognitive function tests, sphenoidal electrode placement



- Management of AED withdrawal for diagnostic and pre-surgical EEG monitoring.
- Selecting patients for invasive EEG monitoring
- Electrode placement: subdural, epidural, intracerebral.
- Selection of placement sites according to clinical and EEG findings
- Selection of operative strategies, including temporal lobectomy, amygdalohippocampectomy, hemispherectomy, corpus callosotomy, subpial transection
- Recognition of seizure semiology and its relation to the localization of seizure onset
- Assessment of operative outcomes
- Choosing patients for reoperation

22- Other therapies for epilepsy

- Vagus nerve stimulation (VNS)
- Choosing patients for VNS.
- Initiating and adjusting stimulation parameters
- Ketogenic diet: selection of patients, understanding principles of initiation and maintenance of the diet, and adverse effects

23- Non-pharmacologic treatments, including behavioral techniques, stress management

24- Psychogenic non-epileptic seizures

- a. Epidemiology
- b. Etiology
- c. Clinical Features for the events
- d. Common comorbidities
- e. Differential Diagnosis
- f. Diagnosis

Appendix B

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

- a) Recognize importance of safe drug prescribing in the healthcare
- b) Describe various adverse drug reactions with examples of commonly prescribed drugs causing 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, pediatric age group patients, and in pregnancy and lactation
- f) Promote evidence-based cost-effective prescribing
- g) Discuss ethical and legal framework for safe-drug prescribing in Saudi Arabia

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

- 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 healthcare
- c) Identify the common sources and set-ups of HAI
- d) Describe the risk factors of common HAIs such as ventilator-associated pneumonia, MRSA, CLABSI, and vancomycin-resistant Enterococcus (VRE)
- e) Identify the role of healthcare 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, systemic inflammatory response syndrome (SIRS), and disseminated intravascular coagulation (DIVC): At the end of the learning unit, you should be able to

- a) Explain the pathogenesis of sepsis, SIRS, and DIVC
- b) Identifying 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

Pre-operative assessment: At the end of the learning unit, you should be able to

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

Post-operative care: At the end of the learning unit, you should be able to:

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

- h) Monitor patients for possible post-operative complications
- i) Institute immediate management for post-operative complications

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 potentially 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:

- 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 to uncomplicated patients with chronic pain
- d) Identify and refer patients with chronic pain who can benefit from specialized pain services



Appendix C

Case Based Discussion (CBD)



Saudi Commission for
Health Specialties
*SCFHS – Epilepsy

Evaluated By: evaluator's name

Evaluating By: person (role) or moment's
name (if applicable)

Dates: start date to end date

* indicates a mandatory response

*Brief Summary of cases:

	n/a	Below expectations (1)	Borderline (2)	Meets expectations (3)	Above expectation (4)
*1) Medical Interview Skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
*2) Physical Examination Skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
*3) Counselling and Communications Skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
*4) Clinical Judgement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
*5) Consideration for Patient/Professionalism	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
*6) Organization/Efficiency	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
*7) Overall Clinical Competence	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



*Comments:

*Which aspects of the encounter were done well?

*Suggested areas for improvement and development?

*Agreed actions / learning plan

*Student's reflections on patients and areas of learning

* Assessor's position:

Consultant

Others

Others (specify):

Time taken for Observation & Feedback (in minutes):

The following will be displayed on forms where feedback is enabled... (for the evaluator to answer...)

*Did you have an opportunity to meet with this resident to discuss their performance?

Yes

No

(for the subject to answer...)

*Are you in agreement with this assessment?

Yes

No

Please enter any comments you have (if any) on this evaluation.



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