

HEALTH PROFESSIONS COUNCIL OF SOUTH AFRICA

THE PROFESSIONAL BOARD FOR RADIOGRAPHY AND CLINICAL
TECHNOLOGY

GUIDELINES FOR THE TRAINING OF
ELECTROENCEPHALOGRAPHIC TECHNICIANS

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EEG TECHNICIAN TRAINING REQUIREMENTS AND GUIDELINES FOR ACCREDITATION

1. GENERAL INFORMATION

1.1. JOB DESCRIPTION: EEG TECHNICIAN

The term EEG technician is used to describe the foundational level of operation in this field. An EEG technician is defined as a person who is capable of carrying out routine and ambulatory EEG recording in all patient ages, without direct supervision but not as an independent private practitioner. Routine procedures include photic stimulation, hyperventilation and daytime sleep - both spontaneous and sedated sleep where sedation is administered by a medical practitioner qualified for administration of sedation.

Carrying out recording of routine apnoea specific sleep investigations without direct supervision but not as an independent private practitioner as in Polysomnography, both attended overnight and equipment hook-up and patient orientation for home-based or unattended studies. With no reporting duties.

1.2. REQUIREMENTS FOR ADMISSION TO TRAINING

The minimum requirement is a Senior Certificate or recognised equivalent qualification. Successful completion of examinations at this level in two of the following subjects: biology and/or physical science and/or mathematics is desirable but not essential, but at least one subject of either physical science or mathematics.

1.3. STUDENT REGISTRATION

Student - EEG Technicians must register with Council by submitting the application form for registration as a student together with the registration fee and required documentation at the commencement with training.

Registration for the full period of training is mandatory for entry to the examination. Registration must include details of the accredited EEG technician training unit at which training will occur for the duration of the training period and must include a

signed letter from the Graduate Clinical Neurophysiologist that assumes responsibility for supervision and training of the student.

Any change in supervisory Graduate Clinical Neurophysiologist must be communicated with the board. The whole training period must be spent in an accredited training facility as approved by the board and under supervision of a Clinical Technologist trained in Neurophysiology and with more than five years of independent practice experience.

1.4. TRAINING SYLLABUS AND EXAMINATION

Theoretical instruction must follow the National approved syllabus contained in this document and take place by means of informal lectures in the unit and successful completion of the CNSSA formal EEG technician training course.

At the outset of training all students must attend a mandatory in-person training and practical orientation hosted by the Board where students will receive practical instruction and demonstration on the expected outcome patient preparation using the “standard cup-and-paste electrode placement” and recording standards following minimum technical requirements for recording of routine adult and paediatric EEG as published by the International Federation of Clinical Neurophysiology (IFCN) and the American Clinical Neurophysiology Society (ACNS), compliance to which will be expected at time of examination. The Education Committee of the Professional Board will appoint a moderator and examiner for the examination for EEG technicians on an annual basis. A national examination paper will be drawn up by the examiner and moderator for the annual theoretical and practical examinations to be conducted once per year for trainee EEG technicians. Examination papers will be set to comply with Blooms’ Taxonomy Level 2.

Training units are required to notify the Professional Board by 1 October annually (closing date for the examination) if candidates are eligible for the examination. Applications for registration for the examination must be accompanied by a letter from the training unit, signed by the Graduate Clinical Neurophysiologist of record,

indicating that the unit is currently registered as a training unit and complies with all the requirements for the training of EEG technicians. In the letter the model of equipment currently being used, the name of the clinical tutors in the unit as well as patient numbers during the period in question should also be stated as well as confirmation that the student had received training and supervision on a regular basis.

The student must submit five EEG recordings, including at least one paediatric and one bedside EEG record for evaluation that must comply with the latest international minimum criteria for recording of routine EEGs as proof of ability. The student must submit at least 5 examples of sleep study recordings that include EEG and polygraphic recordings (Respiration effort, Airflow, pulse oximetry, submental and limb EMG per guidelines, and heart rate).

Applicants who passed the theoretical paper during the most recent examination cycle may apply for recognition of theoretical knowledge, but may not retain credit for papers passed during previous examinations. Both the theoretical and practical examinations have to be passed during the same examination period unless the current examiner and moderator are satisfied with the quality of answers the student provided during the previous examination. Theoretical paper must be passed with a score of 70% or more to gain access to the practical examination. Accurate 10/20 measurement within 1cm tolerance, and accurate electrode placement within 0.5cm tolerance, is prerequisite to pass the practical examination. Examination will include a placement check followed by short recording and demonstration of recording ability and understanding. A short record review of submitted and standardised examples will be included in the practical evaluation.

Practical assessments will be conducted at a facility specified 3 months in advance by the examiners, with the necessary arrangements for demonstration including persons or mannequin covered by the examination centre.

The students must pass a practical examination demonstrating ability in sleep recording hook-up according to AASM minimum guidelines for full polysomnography and must demonstrate ability in ensuring good quality recording

and performance of patient calibrations at the start of the recording as per international guidelines.

The letter of the Professional Board in which arrangements regarding the examination are reflected together with the examination fee determined by the Board should reach the Registrar at least two weeks before the examination. Alternatively a copy of the letter referred to above together with a copy of the bank deposit slip indicating that the examination fee was deposited into the Council's bank account number 0610-000-169 at any branch of ABSA Bank may be faxed to 012-338 3955 for attention of the Examination Coordinator at the Education and Training Division.

2. GUIDELINES FOR ACCREDITATION OF EEG TRAINING UNITS

2.1. APPLICATIONS FOR ACCREDITATION

Units interested in training EEG Technicians must apply in writing to the Professional Board via the Education and Training Division. An application for accreditation must include the names and registration numbers of training staff including years of independent practice experience, an indication of the available equipment and infrastructure, patient numbers, five EEG and sleep recordings recorded during the preceding six months as well as an undertaking that training will comply with the guidelines set out in this document.

An EEG unit must use standard EEG equipment and perform EEGs and sleep apnoea studies to currently accepted international standards, such as those advocated in the Minimum Technical Requirements for Performing Clinical Electroencephalography of the ACNS and IFCN, and the Manual for Scoring of Sleep of the American Association for Sleep Medicine, provided that the following criteria are met:

2.2. PERSONNEL STRUCTURE OF THE UNIT:

A trainee technician must work under the direct supervision of:

A Graduate Clinical Technologist/Clinical Technologist registered with the Professional Board in the category Neurophysiology and employed on a full-time basis by the Unit:

- a) the relevant Clinical Technologist's three years' experience be inclusive of at least two years spent in an academic training facility.
- b) that the two-year period includes training mentorship by a Clinical Technologist with experience in Neurophysiology training.

An EEG Technician registered with the Professional Board in that capacity for at least five years, and employed on a full-time basis by the Unit may act as a student training tutor, but not in the capacity of supervision.

One of the above persons must at all times be available to oversee the work of the student without having to be in the same room for the total duration of the procedure, but at least part of the patient encounter.

No more than two students should be permitted per registered clinical technologist as set out in 1 and 2 above.

2.3. PATIENT POPULATION AND NUMBERS

The unit should serve both adult and paediatric populations and patient numbers should be such that the trainee is able to personally record no less than 400 EEGs during the one-year training period and 50 Sleep studies. The 400 EEGs recorded should include the personal recording by the trainee of at least 100 routine, 50 ICU cases (of which 5 should qualify for the technical standards required for recording in the case of suspected "Brain Death" as stipulated by the ACNS guidelines, 20 Neonatal recordings (GA < 44wks PMA, or head circumference < 30cm) and 50 "sleep" recordings. These stipulated recordings must be performed using stick-on cup electrodes with electrode positions measured according to the internationally

recognised 10/20 or 10/10 electrode placement system as recognised by the ACNS and IFCN and demonstrated at the mandatory training session.

The 50 sleep studies recorded should include the personal recording by the trainee of at least 20 full type one polysomnography recordings.

These EEGs or Sleep studies may be recorded in the primary training unit or under direct supervision, in another unit accredited by the Professional Board as a training unit for EEG Technicians or Clinical Technologists in Neurophysiology.

2.4. CLINICAL TRAINING

Registration for the full period of clinical training is mandatory for entry to the examination.

At the end of the 12-month training period the trainee EEG technician shall apply in writing to the Professional Board for permission to do a final examination. This application must be accompanied by a report from the supervising Technologist/Technician confirming that the applicant complies with the training requirements. A logbook of recordings as per Section 2.3 must be submitted at time of application.

The final examination must include a theoretical and a practical examination conducted by the Professional Board. The moderator has to moderate the theoretical examination papers prior to the practical examination to ensure that the entire content of the syllabus is covered.

Once the individual answer sheets have been moderated final marks expressed as a percentage for both the theoretical and the practical examinations will be made available by the Professional Board. Successful applicants will be registered as EEG technicians. A pass mark of 70% is required for both the theoretical and practical examinations.

The Education and Training Division will supply further information on receipt of written requests.

3. COMMUNICATION WITH THE PROFESSIONAL BOARD FOR RADIOGRAPHY AND CLINICAL TECHNOLOGY

All communication should be addressed to:

The Registrar
Core Operations: Education and Training Division
P O Box 205
PRETORIA
0001

E-mail: RCTexaminations@hpcsa.co.za
Telephone: 012 338-3955

**PROFESSIONAL BOARD FOR RADIOGRAPHY AND CLINICAL TECHNOLOGY
SYLLABUS FOR EEG TECHNICIANS**

4. TECHNICAL SCIENCES

4.1 ELECTRICAL CONCEPTS

4.1.1 Atoms and molecules, conduction and insulation, voltage, current, resistance, power, Ohm's Law, capacitance and inductance, DC and AC, ions, impedance, magnetism and electricity,

4.1.2 Measurement units, meters, transformers.

4.1.3 Sleep Study Sensors, impedance plethysmography, pulse oximetry, piezo electric principles of movement and effort sensors, airflow pressure transducer and thermal airflow measurement principles.

4.2 THE ELECTROENCEPHALOGRAPH

4.2.1 Introduction to the Electroencephalograph - basic concepts.

4.2.2 The Differential Amplifier - basic concepts, tubes and transistors, power supply, input impedance, common mode rejection, input I and output II, polarity.

4.2.3 Filters - Low frequency filters, (time constants), high frequency filters, frequency response, 50 Hz (notch) filter, phase shift, use of controls.

4.2.4 Sensitivity: Individual and master controls, dynamic range, use of controls.

4.2.5 Calibration: instrument calibration and bio-calibration (Equipment) bio-calibration (Patient manoeuvres for EEG and PSG).

4.2.6 Epoch length and sweep speed for EEG and Sleep recordings.

4.2.7 Writing and display mechanisms. Analog to digital conversion for digital display. Horizontal and vertical resolution, bits and pixel definition or digital monitors.

5. RECORDING TECHNIQUE

5.1. ELECTRODES

- 5.1.1. Types, characteristics, materials
- 5.1.2. Methods of application (including scalp preparation)
- 5.1.3. Impedance and resistance
- 5.1.4. Effects of repeated EEG recordings
- 5.1.5. Sterilisation
- 5.1.6. Maintenance and infection control.
- 5.1.7. Measurement and the importance of accuracy
- 5.1.8. AASM adjustments for sleep recording
- 5.1.9. Placement of additional electrodes of the 10/10 system, routine and for special diagnosis (Anterior temporal and Rolandic electrodes etc)
- 5.1.10. Placement of sleep apnoea investigation sensors (Airflow, Effort, EMG etc.)

5.2. POLARITY AND LOCALISATION TECHNIQUES

- 5.2.1. Polarity convention
- 5.2.2. Bipolar and referential recording
- 5.2.3. Montages
- 5.2.4. Effect of system reference electrode placement in digital recordings
- 5.2.5. Earth loops
- 5.2.6. Physiological effects of shocks
- 5.2.7. Safety precautions

5.3. TROUBLESHOOTING, FAULT-FINDING AND MAINTENANCE

- 5.3.1. Equipment calibration including understanding and analysing electrical block calibration
- 5.3.2. Differentiating between electrode and amplifier errors.
- 5.3.3. Maintenance of electrical components and database
- 5.3.4. Electrical safety and grounding

5.4. MEASUREMENT AND DEFINITION OF EEG CONCEPTS

- 5.4.1. Voltage, frequency, waveform

5.4.2. Definition of basic clinical concepts

6. CLINICAL SCIENCES

6.1 NEUROANATOMY

- 6.1.1 Central Nervous System
- 6.1.2 Structure of the brain and cerebral hemispheres, crossed laterality
- 6.1.3 The brainstem, cranial nerves, cerebellum and spinal cord
- 6.1.4 Blood supply
- 6.1.5 Ventricles and CSF Flow
- 6.1.6 Autonomic Nervous System

6.2 NEUROPHYSIOLOGY

- 6.2.1 The action potential and neuronal transmission
- 6.2.2 Transmission at the synapse
- 6.2.3 Excitation and inhibition
- 6.2.4 The relationship between neuronal activity and EEG

7 ANATOMY AND PHYSIOLOGY OF BREATHING

- 7.1 Process of falling asleep
- 7.2 Mechanics of breathing
- 7.3 Methods of airway obstruction

8 INTRODUCTION TO NEUROLOGY

8.1 CLINICAL NEUROLOGY IN THE EEG LABORATORY

- 8.1.1 Neurological Examination
- 8.1.2 An introduction to disease states affecting the CNS genetic and congenital, traumatic, vascular, infective, tumours, degenerative, metabolic and toxic, immunological
- 8.1.3 Epilepsy

8.2 BASIC EMERGENCY PROCEDURES

- 8.2.1 Cardiopulmonary resuscitation
- 8.2.2 Seizures - Patient management
- 8.2.3 Electroencephalographic recording of a seizure

9 CLINICAL EEG

9.8 INTRODUCTION TO CLINICAL EEG

- 9.8.1 Historical introduction
- 9.8.2 Normal: awake and asleep
- 9.8.3 Abnormal: awake and asleep

9.9 ARTEFACTS

- 9.9.1 Sources and elimination
- 9.9.2 Monitoring of artefacts
- 9.9.3 Differentiation from physiological signals

9.10 PHARMACOLOGY AND DRUG EFFECTS

- 9.10.1 Indications
- 9.10.2 Effect on EEG recording

9.11 STANDARDS FOR PERFORMING CLINICAL EEG

- [9.11.1](#) International guidelines as published by IFCN, ILAE and ACNS

9. ELECTROENCEPHALOGRAPHY

9.1. ACTIVATION AND SPECIAL PROCEDURES

- 9.1.1. Natural and sedated sleep
- 9.1.2. Intermittent photic stimulation
- 9.1.3. Hyperventilation
- 9.1.4. Sleep deprived sleep

9.2. CLINICAL CORRELATIONS

- 9.2.1. Epilepsy
 - 9.2.1.1. International classification of Epilepsy (Most recent IFCN/ILAE)

- 9.2.2. EEG findings
- 9.2.3. Head injuries and vascular lesions
- 9.2.4. Space-occupying lesions
- 9.2.5. Infective and non-infective encephalopathies
- 9.2.6. Psychiatric disorders
- 9.2.7. Sleep disorders

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No R245 11 February 1994

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**HEALTH PROFESSIONS COUNCIL OF
SOUTH AFRICAN**

**RAAD VIR GESONDHEIDSBEROEPE
VAN SUID-AFRIKA**

**REGULATIONS DEFINING THE SCOPE OF
THE PROFESSION OF ELECTROENCE-
PHALOGRAPHIC TECHNICIAN**

**REGULASIES WAT DIE OMVANG VAN DIE
BEROEP ELEKTROËNKEFALOGRAFIE
TEGNIKUS OMSKRYF**

The Minister of National Health and Welfare has, in terms of section 33(1) of the Medical, Dental and Supplementary Health Service Professions Act, 1974 (Act 56 of 1974), on the recommendation of the South African Medical and Dental Council, made the regulations set out in the Schedule hereto.

Die Minister van Nasionale Gesondheid en Welsyn het kragtens artikel 33(1) van die Wet op Geneeshere, Tandartse en Aanvullende Gesondheidsdiensberoep 1974 (Wet 56 van 1974), op aanbeveling van die Suid-Afrikaanse Geneeskundige en Tandheekkundige Raad, die regulasies in die Bylae uiteengesit, uitgevaardig.

SCHEDULE

1. In these regulations "the Act" means the Medical, Dental and Supplementary Health Service Professions Act, 1974 (Act No 56 of 1974), and any expression to which a meaning has been assigned in the Act shall bear such meaning and unless the context otherwise indicates - "clinical technologist" means a clinical technologist registered in the category neurophysiology.

2. The following acts, known as standard electroencephalographic and sleep apnoea specific sleep study recordings, are hereby specified for the purposes of the Act to be acts

BYLAE

1. In hierdie regulasies beteken "die Wet" die Wet op Geneeshere, Tandartse en Aanvullende Gesondheidsdiensberoep, 1974 (Wet No 56 van 1974), en het 'n uitdrukking waaraan 'n betekenis in die Wet geheg is daardie betekenis, en, tensy uit die samehang anders blyk, beteken - "kliniese tegnoloog" 'n kliniese tegnoloog wat in die kategorie neurofisiologie geregistreer is.

2. Die volgende handeling wat bekend staan as standaard elektroënkefalografieopnames en slaap apnea spesifieke slaap

that pertain specially to the profession of electroencephalographic technician:

(1) The recording of a summary of the patient's clinical history.

(2) The attaching of electrodes to the scalp of the patient according to standards acceptable to the profession.

(3) The attaching of additional electrodes and physiological sensors for the recording of sleep and breathing

(4) The recording of an electroencephalogram for a period prescribed by a medical practitioner or clinical technologist using appropriate paper speeds, amplification, time constants and filters.

(5) The utilisation of hyperventilation, photic stimulation and sleep as routine activating procedures in the recording of the electroencephalogram, if prescribed by a medical practitioner or clinical technologist.

(6) The recording of an apnoea specific polysomnogram sleep study for a period prescribed by a medical practitioner or clinical technologist using appropriate paper speeds, amplification, time constants and filters.

studies, word hierby bepaal as handeling wat vir die toepassing van die Wet geag word handeling te wees wat by die beroep van elektroënkefalografietegnikus tuishoort:

(1) Die dokumentering van 'n opsomming van die pasiënt se kliniese geskiedenis.

(2) Die plasing van elektrodes op die skedel van die pasiënt volgens standarde wat in die beroep aanvaarbaar is.

(3) Die plasing van addisionele elektrodes en fisiologiese sensors vir die opname van slaap en asemhaling.

(4) Die neem van 'n elektroënkefalogram vir 'n tydperk wat 'n geneesheer of kliniese tegnoloog voorskryf deur die gebruik van toepaslike papierspoed, versterking, tydkonstantes en filters.

(5) Die gebruikmaking van hiperventilasie, fotiese stimulasie en slaap as roetine aktiveringsprosedures by die neem van die elektroënkefalo-gram, indien voorgeskryf deur 'n geneesheer of kliniese tegnoloog.

(6) Die neem van 'n slaap apnea polisomnogram slaap study vir 'n tydperk wat 'n geneesheer of kliniese tegnoloog voorskryf deur die gebruik van toepaslike papierspoed, versterking, tydkonstantes en filters.

