MINISTRY OF HEALTH

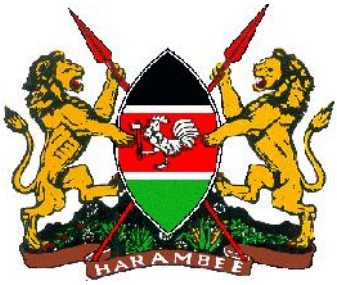
KENYA NATIONAL GUIDELINES FOR THE MANAGEMENT OF EPILEPSY

A Practical Guide for Healthcare Workers

2016

SECOND EDITION

Ministry of Health



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A Practical Guide for Healthcare Workers

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The National Guidelines for the Management of Epilepsy were developed through the collaboration of the

Ministry of Health,

World Health Organization,

National Epilepsy Coordination Committee,

Kenya Society for Epilepsy and

Kenya Association for the Welfare of People with Epilepsy.

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Ministry of Health

KAWE

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Abbreviations

ADHD	***Attention Deficit Hyperactivity Disorder***
AEDs	***Antiepileptic Drugs***
AIDS	***Acquired Immunodeficiency Syndrome***
ADR	***Adverse Drug Reaction***
BD	***Twice daily***
CNS	***Central Nervous System***
CPS	***Complex Partial Seizures***
CT	***Computerized axial Tomography***
DNCD	***Division of Non-Communicable Diseases***
EEG	***Electroencephalogram***
HAART	***Highly Active Anti Retroviral Therapy***
GTCS	***Generalised Tonic Clonic Seizures***
HIV	***Human Immunodeficiency Virus***
ILAE	***International League Against Epilepsy***
IM	***Intramuscular***
INH	***Isoniazid***
IV	***Intravenous***
JME	***Juvenile Myoclonic Epilepsy***
KAWE	***Kenya Association for the Welfare of People with Epilepsy***
KSE	***Kenya Society for Epilepsy***
LGS	***Lennox Gastaut Syndrome***
MRI	***Magnetic Resonance Imaging***
MTS	***Mesial Temporal Sclerosis***
NECC	***National Epilepsy Coordination Committee***
OCP	***Oral contraceptive pill***
OD	***Once daily***
SLE	***Systemic Lupus Erythematosis***
SSPE	***SubacuteSclerosingPanencephalitis***
TDS	***Thrice daily***
WHO	***World Health Organization***

Glossary

Epilepsy*: Epilepsy is a chronic brain disorder characterized by repeated unprovoked seizures occurring more than twice in a year. The disorder may arise from many and varied causes, however in many cases no specific cause can be identified.*

Seizure*: A **seizure** is a transient occurrence of signs and/or symptoms due to abnormal excessive or synchronous neuronal activity in the brain. A seizure therefore represents the physical manifestations of this abnormal uncontrolled electrical activity of the brain cortex which is usually self -limiting.Seizure manifestations are dependent on the site of the excessive neuronal discharge and may be motor, sensory, psychic and/or autonomic.Other terms usedfor seizures include convulsions, fits, attacks etc.*

Catamenial Seizures*: Seizures occurring at specific times during the menstrual cycle.*

Active epilepsy: *Having two or more unprovoked seizures,more than twenty four hours apart in one year*

Serial Seizures: *Having three or more seizures in a 24 hour period (day) with complete recovery or return to baseline between seizures*

Cluster Seizures: *Same as serial seizures*

Breakthrough seizures: *Epileptic seizure that occurs despite adequate use of antiepileptic drugs . This is often as a result of changing drugs, another illness or other situations where the seizure threshold is lowered.*

Status epilepticus: *A condition resulting either from the failure of the mechanisms responsible for seizure termination or from the initiation of mechanisms, which lead to abnormally, prolonged seizures.*

Convulsion*: Rhythmic jerking of a group or groups of muscles - Motor seizures*

Fit: *Colloquial term for seizure*

Attack: *Colloquial term for seizure*

Kifafa: *Swahili for epilepsy*

Clonic: *Rhythmic jerking involving a part of the body (usually a limb)*

Hemiclonia: *Rhythmic jerking involving only one side of the body*

Tonic: *Increased muscle tone, usually lasting for seconds to minutes.*

Epileptic spasm: *Sudden flexion, extension or mixed flexion-extension of proximal and truncal muscles, lasting 1-2 seconds, typically occurs in a series.*

Versive: *Sustained, forced conjugate ocular, cephalic, and/or truncal rotation or lateral deviation from the midline.*

Dystonic: *Sustained contractions of both agonist and antagonist muscles producing athetoid or twisting movements, may produce abnormal postures.*

Myoclonic: *A single or short cluster of brief muscle contractions (jerks). Each jerk is typically milliseconds in duration.*

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Foreword

Epilepsy is a major public health concern in our country with an impact at the individual, family, community and the entire population level. Despite being one of the oldest known conditions, epilepsy is shrouded in myths and misconceptions that perpetuate discrimination and social stigma making treatment and follow-up difficult.

Although epilepsy care in Kenya has been improving steadily in recent years, there are is still a large treatment gap that needs to be addressed. With evidence demonstrating that up to 70% of newly diagnosed children and adults with epilepsy can be successfully treated with anti-epileptic drugs, the ministry of health is committed to reduce the treatment gap and ensure that all persons living with epilepsy have access to effective, safe and sustainable treatment. We are currently improving our infrastructure to ensure constant availability of basic anti-epileptic drugs and an adequate number of well-trained medical personnel to diagnose and handle epilepsy effectively.

The overall goal of epilepsy management is to help individuals with epilepsy and their families gain the necessary knowledge, treatment and support to achieve their highest standards of health and improved livelihood. These National Guidelines for the Management of epilepsy offers a step by step guide to health workers to provide this optimal care. The recommendations in these guidelines are based on local and internationally sound best practices. They will provide up to date instructions and recommendations and form a basic foundation to all health workers when diagnosing and planning treatment for persons living with epilepsy.

These guidelines will harmonise the treatment of epilepsy by providing the standards for care as they are formulated for all health workers including Doctors, Clinical Officers, Nurses and others health workers and are applicable at all levels of care from the primary to the tertiary level of health delivery in Kenya.

I am sure that these guidelines will be informative not only to medical workers and policy makers in the public and private sectors but also to patients, their families and the communities they live in. Periodic reviews of the Guidelines will be necessary to accommodate new information as it becomes available from time to time.

Let us all unite to prevent and effectively treat epilepsy

Dr. Nicholas Muraguri
Principal Secretary; Ministry of Health

Executive Summary

Epilepsy is a neurological disorder that affects people in every country throughout the world. It is also one of the oldest conditions known to mankind. It is characterized by a tendency to recurrent seizures and it is defined by two or more unprovoked seizures.

Seizures are the result of sudden, usually brief, excessive electrical discharges in a group of brain cells (neurons) and different parts of the brain can be the site of such discharges. The clinical manifestations of seizures will therefore vary and depend on where in the brain the disturbance first starts and how far it spreads. Transient symptoms can occur, such as loss of awareness or consciousness and disturbances of movement, sensation (including vision, hearing and taste), mood or mental function.

Epilepsy knows no geographical, racial or social boundaries. It occurs in men and women and can begin at any age, but is most frequently diagnosed in infancy, childhood, adolescence and old age. Anyone can be affected by seizures. Up to 5% of the world's population may have a single seizure at some time in their lives, but a diagnosis of epilepsy is reserved for those who have recurring seizures, at least twice in a year.

Epilepsy is more common in the developing countries. It is estimated that about 70 million people have epilepsy at any one time. Studies have shown that the annual incidence of epilepsy is approximately 50 per 100,000 of the population in developed countries while the figures from developing countries suggest that this figure is nearly double that at 82 per 100,000.

One of the main reasons for the higher incidence of epilepsy in developing countries is the higher risk of experiencing conditions which can lead to permanent brain damage. These conditions include trauma, meningitis, HIV/AIDS, malaria, pre and perinatal complications and neurocysticercosis.

Epilepsy is associated with an increased risk of morbidity and mortality which may be due to:

- Underlying brain disease such as tumour or infection
- Seizures in dangerous circumstances leading to drowning, burns or head injury
- Status epilepticus
- Sudden and unexplained causes. (SUDEP)
- Cardio-respiratory arrest during a seizure
- Depression and Suicide

Recent studies in both developed and developing countries have shown that up to 70% of newly diagnosed children and adults with epilepsy can be successfully treated (i.e., their seizures can be completely controlled for several years) with anti-epileptic drugs. After 2-5 years of successful treatment, drugs can be withdrawn in about 70% of children and 60% of adults without relapses.

The aim of these guidelines is to harmonise the treatment of epilepsy by providing the standards for care. These guidelines are formulated for all health workers including Doctors, Clinical Officers, Nurses and others. The guidelines are applicable at all levels of care from the primary to the tertiary level.

During the development of these guidelines every effort has been made to ensure that the drug dosage schedules are correct and in accordance with current accepted medical practice, however no responsibility can be taken for errors or omissions. Clinicians are urged to confirm dosages before administering or prescribing the drugs.
These guidelines are divided into eight chapters:

- The first chapter describes the definition and epidemiology of epilepsy. In this chapter seizures and epilepsy are defined. It also includes epidemiological description of the disorder.
- The second chapter describes the causes and risk factors of epilepsy and seizures
- The third chapter explains the classification of seizures
- In the fourth chapter the process of diagnosing epilepsy is clearly explained. This includes; taking of medical history, social history, physical examination and diagnostic investigations.
- The fifth chapter describes the management of epilepsy. It details the principles of management such as First Aid, confirmation of diagnosis, choice of drugs, initiation of treatment, maintenance and follow up.
- The sixth chapter looks at Conditions and Situations that co-exist with epilepsy.
- The seventh chapter gives information on epilepsy in special groups; among the elderly, during childbearing years, in neonates and among children.
- The eighth chapter discusses the social aspects on epilepsy; myths and misconceptions, employment, driving and human rights.
- Appendix one describes the structure and organisation of Epilepsy Services while Appendix two provides the basic pharmacology of commonly used Anti-Epileptic Drugs.

CHAPTER 1: INTRODUCTION

Epilepsy is one of the commonest chronic neurological problems in the world and is also one of the oldest conditions known to mankind. The word "epilepsy" is derived from the Greek word "*epilambanein*" which means "to seize or attack from above". The belief held in many countries is that a person with epilepsy is possessed by supernatural forces or powers. This is largely responsible for the stigma against persons living with epilepsy. This widely held belief is incorrect as there is now evidence that seizures are the result of abnormal electrical discharges involving a group of brain cells.

1.1 Definitions

Epilepsy

Epilepsy is a chronic brain disorder characterized by repetitive unprovoked seizures more than two times 24 hours apart in a year. This definition has recently been broadened to include:

- Those patients who after having a single isolated seizure, may be considered to have a risk of seizures similar to the risk after two seizures during the next ten years.
- Patient presenting with characteristics of an identifiable epilepsy syndrome

This would allow the initiation of Epilepsy treatment without having to wait for, and run the risk of a second seizure.

The disorder may arise from many and varied causes, however, in many cases no specific cause can be identified.

Seizure

A seizure is a transient physical manifestation of a sudden excessive and uncontrolled electrical activity of the brain that is usually self-limiting. Seizure manifestations are dependent on the site of the excessive neuronal discharge and may be motor, sensory, psychic or autonomic and be accompanied by loss or impairment of consciousness.

There are four components of a seizure that can be distinguished but not all seizure types will have all four components:

i) Prodromal phase

This phase begins a few minutes to hours or even days before the actual seizure and should not be confused with the aura. Prodromal symptoms occur in up to 40% of subjects and may include headache, irritability, insomnia, bad temper, depression or increased activity.

ii) Aura

An aura precedes the clinically apparent seizure by seconds or a few minutes. It is the beginning of the seizure and signals the focal onset of the seizure. The symptoms depend on the location of this focus. The feelings of the aura are often vague and indescribable, and may lead to extreme anxiety or fear. Strange Epigastric sensations, dreamlike experiences, unpleasant smells, etc. may occur. The patient remembers the aura very well, and although he/she will not always be able to recount it, he/she can affirm the presence of it, as it happens before consciousness is lost.

iii) Seizure (ictus)

In seizures where there is loss of consciousness, the patient is unable to give any information about the actual ictus. To get the description of the ictus we have to depend on the account of the witnesses who have seen the actual seizure since the patient has no memory of it. Important characteristics to note include the:

- Type of seizure
- Duration of seizure
- Frequency of seizure
- Time of occurrence of the seizure and its relation to sleep

iv) Post-ictal phase

This phase may be absent, brief or may last several hours, and sometimes even days. There is usually a deep sleep and waking up with headache, tiredness, irritability, vomiting, confusion, muscular aches or ataxia. Transient limb weakness and altered speech may occur. Altered behaviour such as emotional outbursts and violent

tendencies may also occur. In addition, among children, there may be dullness, lethargy and lack of appetite.

1.2 Epidemiology

Epilepsy knows no geographical, racial or social boundaries. It occurs in men and women at all ages, but is most frequently diagnosed in early childhood (70% are below the age of twenty years) and old age. Anyone can potentially develop seizures. In fact, up to 5% of the world's population may have a single seizure at some time in their lives, but only a proportion will have epilepsy as defined above.

The prevalence of a disorder is the proportion of a population with that disorder at a given point in time usually expressed per 1,000 population. From many studies around the world it has been estimated that the mean prevalence of lifetime epilepsy is approximately 8.2 per 1,000 of the general population. It is likely that around 70 million people in the world have epilepsy at any one time. The lifetime prevalence of epilepsy (i.e. the number of people presently in the world who have epilepsy now or have had it in the past or will experience it in the future) is approximately 100 million people.

This may, however, be an underestimate as some studies in developing countries suggest a prevalence of more than 10 per 1,000. In Kenya, the prevalence of epilepsy is approximately 18.2 per 1000 population (Feksi and Kaamugisha 1991), which translates to around 800,000 to 1,000,000 people living with epilepsy.

The incidence of a disorder is the number of new cases reported within a given period of time usually expressed per 100,000 person in the year of observation. Studies indicate that the annual incidence of epilepsy ranges between 50 per 100,000 populations in developed countries to 82 per 100,000 populations in resource poor countries. This regional disparity in the incidence of epilepsy is attributed to the higher prevalence of risk factors or conditions which can lead to permanent brain damage. These conditions include brain trauma, meningitis, HIV/AIDS, cerebral malaria and pre and peri-natal complications.

Of the estimated 70 million people living with epilepsy in the world, nearly 50 million have no access to quality treatment and care.

1.3 Treatment gap

The treatment gap is the difference between the number of people with active epilepsy and the number whose seizures are being appropriately treated in a given

population at a given point in time, expressed as a percentage (The Atlas of Epilepsy care in the World, 2005). A systematic review of the epilepsy treatment gap worldwide reveals a "dramatic global disparity in the care of epilepsy patients between high- and low-income countries and between rural and urban settings".

Compared to high-income countries that have a treatment gap of less than 10%, Kenya has an estimated treatment gap of close to 80%. The World Epilepsy Atlas gives four factors that contribute to the large treatment gap (the four A's): lack of ***available, accessible*** and ***affordable*** health care and lack of ***awareness***. Factors affecting the delivery of treatment and which need to be addressed for effective reduction in the treatment gap include:

- Inadequate health delivery systems
- Lack of trained personnel
- Lack of essential drugs
- Traditional beliefs and practices that often do not consider epilepsy as a treatable condition (De Boer *et al.*, 2007). This is being addressed through a concerted and ongoing awareness campaign by the ILAE and IBE that was dubbed "getting epilepsy out of the shadows".
- High cost of drugs
- Poor infrastructure

There is a need for more comprehensive research on the epilepsy treatment gap to inform epilepsy policy and practice, and to challenge stakeholders to work together.

Epilepsy may result from different pathologies affecting the brain. The younger age groups and the elderly are more susceptible to developing this disorder.

2.1 Aetiological factors associated with epilepsy

In a considerable proportion of persons with epilepsy no specific cause can be identified. However, some of the associated proximate causes are those that occur commonly in these age groups. Some of these are listed in the table below:

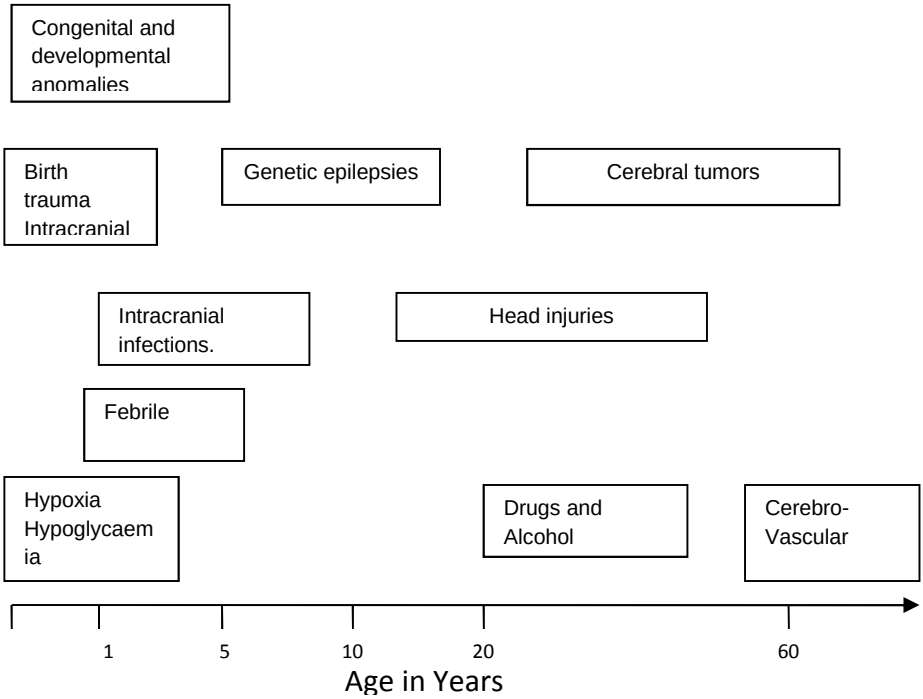
Table 2-1 : Causes/ risk factors for epilepsy and seizures

Common causes of epilepsy	**Common causes of isolated seizures**
Infections Meningitis Encephalitis HIV/AIDS Cerebral malaria Toxoplasmosis Encephalopathy (measles related-SSPE) Febrile illnesses (febrile convulsions)	**Infections** Febrile illnesses (febrile convulsions) Rabies
Metabolic Pyridoxine deficiency/dependency Niemann-Pick disease Inborn errors of metabolism & mitochondrial disease	**Metabolic** Hypoglycaemia Hypocalcaemia/rickets Electrolyte imbalance Hypomagnesaemia Hyperbilirubinaemia (kernicterus Pyridoxine deficiency/dependency Uraemia Phenylketonuria Porphyria Hypothermia
Trauma Birth trauma Head injury **Anoxia** Birth asphyxia	**Trauma** Birth trauma Head injury **Anoxia** Birth asphyxia
Toxic Alcohol and withdrawal from alcohol Carbon monoxide poisoning Drugs (high dose IV penicillin,	**Toxic** Alcohol and withdrawal from alcohol Carbon monoxide poisoning

strychnine, etc.) Lead poisoning Organo-phosphorus insecticide poisoning	Drugs (high dose IV penicillin, strychnine, etc.) Lead poisoning Organo-phosphorus poisoning
Space occupying lesions Hematoma Abscess Tumour Tuberculoma Cysticercosis	**Space occupying lesions** Hematoma Abscess Tumour Tuberculoma Cysticercosis
Circulatory disturbances Cerebro-vascular accident (stroke)	**Circulatory disturbances** Cerebro-vascular accident (stroke)
Congenital/genetic Malformations and developmental defects of the brain (hydrocephalus, microcephaly, etc.) Vascular anomalies Tuberous sclerosis (Bourneville disease) Neurofibromatosis (von Recklinghausen disease) Encephalo-trigeminal facial angiomatosis (eg Sturge-Weber Syndrome)	**Cerebral Oedema** Hypertensive encephalopathy Eclampsia
Degenerative conditions. Dementias	
Others Autoimmune disorders e.g. SLE.	

*****This list may not be exhaustive.***

Figure 1: Causes /risk factors of seizures and epilepsy by age.



**Adapted from the Epilepsy Manual by Appletone and Chadwik Smith.*

2.2 Triggering Factors

Some people living with epilepsy are likely to develop seizures when exposed to certain situations or conditions that are known to reduce seizure threshold. Some of the commonly known triggers include:

- Non-adherence to treatment (missed doses)
- Stopping treatment suddenly
- Sleep deprivation
- Acute infections
- Flickering lights e.g. televisions, computers, disco lights etc
- Alcohol intake/withdrawal
- Substance abuse/withdrawal

- Hormonal imbalances (catamenial-seizures)
- Dehydration
- Electrolyte imbalance like hyponatraemia
- Emotional Stress
- Hyperventilation
- Fever
- Exhaustion

CHAPTER 3: CLASSIFICATION OF SEIZURES

The International League against Epilepsy (ILAE) classifies seizures according to either the clinical presentation or the underlying pathology. There are three major types:

- Focal seizures
- Generalized seizures
- Unclassified seizures

3.1 Focal Seizures

These originate in neural networks limited to one hemisphere that may be discrete or more diffuse and not necessarily confined to the cortex. They can spread to other regions of the brain to become generalized with loss of consciousness.
Focal seizures are commonly classified according to their clinical features into Auras, Motor, Autonomic and Dyscognitive which are described below (ILAE Commission on Classification).

3.1.1 Auras

Auras are subjective and may be sensory or experiential and reflect the initial seizure discharge. An aura may be an isolated phenomenon or progress to a focal seizure with objective features (with or without altered awareness) or to a bilateral convulsion.

3.1.1.1 Sensory aura

A **sensory aura** involves a sensation without an objective clinical sign and is dependent on the area of the brain involved. Sensory auras include the following types:

- **Somatosensory** aura are characterized by sensory phenomena including tingling, numbness, electric-shock like sensation, pain, sense of movement, or desire to move. *Somatosensory auras occur in seizures involving the sensorimotor cortex.*
- **Visual aura** are characterized by elementary visual hallucinations such as flashing or flickering lights, spots or other shapes, simple patterns, scotomata, or amaurosis. Visual auras occur in seizures involving the occipital lobe.

- **Auditory auras** are characterized by elementary auditory phenomena including buzzing, ringing, drumming or single tones. Auditory auras occur in seizures involving auditory cortex in the lateral superior temporal lobe.
- **Olfactory auras** are characterized by olfactory phenomena - usually an odor, which is often unpleasant. Olfactory auras occur in seizures involving the mesial temporal or orbitofrontal regions.
- **Gustatory auras** are characterized by taste phenomena including acidic, bitter, salty, sweet, or metallic tastes. Gustatory auras occur in seizures involving the parietal operculum and the insula.
- **Epigastric auras** are characterized by upper abdominal phenomena including discomfort, emptiness, tightness, churning and a sensation that may rise up to the chest or throat. Epigastric auras occur in seizures involving the mesial temporal lobe.
- **Cephalic auras** are characterized by a sensation in the head such as light-headedness or headache.

3.1.1.2 Experiential aura

An experiential aura involves affective, mnemonic (memory) or perceptual subjective phenomena including depersonalization and hallucinatory events; these may appear alone or in combination and suggest seizure foci in the limbic and complex association cortex.

Experiential auras include the following types:

- **Affective auras** are characterized by phenomena such as fear, depression, joy and anger.
- **Mnemonic auras** are characterized by memory phenomena such as feelings of familiarity (*déjà vu)* and unfamiliarity (*jamais vu*).
- **Hallucinatory auras** are characterized by imagined complex sensory phenomena that may involve visual (e.g. formed images), auditory (e.g. hearing voices) or other sensory modalities, without change in awareness. The sensory phenomena may be accompanied by associated emotion or interpretation e.g. may be experienced as persecutory.

- **Illusory auras** are characterized by an alteration of actual perception involving visual, auditory, somatosensory, olfactory, and/or gustatory phenomena, without change in awareness.

3.1.2 Motor

M**otor** features involve motor manifestations presenting as an increase (positive) or decrease (negative) in muscle contraction. Motor features may be elementary or complex.

3.1.2.1 Elementary motor

An **elementary motor** feature involves a stereotyped contraction of a muscle or group of muscles. Such motor features are predominantly convulsive such as clonic, tonic, myoclonic, spastic, versive or dystonic.

3.1.2.2 Complex motor

A **complex motor** feature involves complex movement patterns. Three types are recognized:

- A **hypermotor** feature involves proximal limb or axial muscles, producing irregular large amplitude ballistic movements, such as pedaling, pelvic thrusting, jumping, thrashing and/or rocking movements.
- A **negative motor** feature is characterized by reduced motor activity.
- ***Negative myoclonic*** features involves an interruption in normal tonic muscle activity for 500 milliseconds or less, without evidence of preceding myoclonus
- **A*tonic*** features involve sudden loss or diminution of muscle tone without apparent preceding myoclonic or tonic activity. This lasts more than half a second but less than 2 seconds. It may involve the head, trunk, jaw, or limb musculature
- ***Hypomotor*** features involve a decrease in amplitude and/or rate or arrest of ongoing motor activity.
- An **automatism** is a coordinated, repetitive motor activity usually occurring when cognition is impaired and for which the subject is usually amnesic

afterward. This often resembles a voluntary movement and may consist of an inappropriate continuation of pre-ictal motor activity. Automatisms include:

- Oro-alimentary: lip smacking, lip pursing, chewing, swallowing, clicking.
- Manual or pedal: bilateral or unilateral distal or proximal movements, including fumbling, tapping, manipulating movements of hands or feet.
- Gestural: often unilateral, fumbling or exploratory movements with the hand intended to lend emotional tone to communication.
- Gelastic: bursts of laughter or giggling, usually without appropriate affective tone and described as 'mirthless'.
- Vocal: single or repetitive sounds such as shrieks or grunts
- Verbal: single or repetitive words, phrases or brief sentences.
- Dacrystic: outbursts of crying.

- **Autonomic** features are characterized by autonomic phenomena, which can involve cardiovascular, gastrointestinal, vasomotor, and thermoregulatory functions. Examples include palpitations, nausea, butterflies, hunger, chest pain, urge to urinate or defecate, goose bumps, sexual sensation, feeling hot or cold, pilo-erection, pallor, tachycardia or bradycardia/asystole, flushing, pupillary changes and lacrimation.

3.1.3 Dyscognitive Focal Seizures (with impairment of consciousness at onset)

Dyscognitive features involve altered awareness or responsiveness. The degree of contact with the environment may vary and it may accompany complex motor or experiential sensory features.

3.1.4 Evolving into bilateral circuits (Secondary Generalised Seizures)

These are seizures that begin as and progress to loss of consciousness with or without other manifestations.

3.2 Generalized Seizures

A generalized seizure is conceptualized as originating at some point within, and rapidly engaging, bilaterally distributed networks. Such bilateral networks can include cortical and subcortical structures, but do not necessarily include the entire

cortex. The clinical presentation includes loss of consciousness and may be asymmetric.

Generalised seizures are classified into the following categories:

3.2.1 Convulsive : Tonic – Clonic

Generalised tonic-clonic seizures (occasionally clonic-tonic-clonic)) are the best known type of generalised seizures. They present with loss of consciousness at the onset. They are characterised by the following features:

- In the **tonic phase**, cessation of breathing occurs as all the muscles go into spasm and may be accompanied by a cry.
- In the **clonic phase** convulsive movements are marked by alternate contraction and relaxation of the muscles.
- Tongue biting and/or incontinence of urine/stool may occur.
- On regaining consciousness the patient is confused and may feel tired or have a headache.

3.2.2 Tonic Seizures

These types of seizures are accompanied by higher frequency of injuries except when they occur during sleep. They present with:

- Loss of consciousness.
- Sudden stiffening of the extensor muscles and falling if standing.
- Patient fixes the limbs in a strained position.
- Tongue biting may occur
- Tightening of the jaw/clenching of teeth

3.2.3 Clonic Seizures

This is a form of generalized seizures characterised by repeated rhythmic movements or jerks.

3.2.4 Myoclonic Seizures

These consist of sudden brief muscle contractions that may occur singly or in cluster affecting any group of muscles unilaterally or bilaterally. These types of seizures may be repeated many times over a long period.

3.2.5 Typical Absences

These types of generalised seizures mainly affect children in the school going age between 5 -15 years. They manifest at onset with loss of consciousness (sometimes incomplete), staring blankly with or without blinking or lip-smacking lasting for 5-10 seconds that may be mistaken for day dreaming. Some clonic movements of the eye lids, eye brows (eyelid myoclonia), face and mouth may accompany the absence (myoclonic absence).

- Some may go into spontaneous remission during adolescence.
- They may co-exist with tonic-clonic seizures in the same patient.

3.2.6 Atypical absences

An atypical absence seizure has less abrupt onset and prolonged loss of consciousness of loss of awareness than typical absence seizures. They are often associated with other features such as gradual loss of muscle tone of the head trunk or limbs and subtle myoclonic jerks. Atypical absence seizures often occur in individual with intellectual impairment. The loss of awareness may be minimal with patient continuing activity but more slowly or with mistakes.

3.2.7 Atonic Seizures (Drop Attacks)

These seizures are characterised by sudden onset of muscle flaccidity involving the head,(head drop) trunk or limbs with postural collapse. This may result in facial and other injuries. They are very short, lasting only seconds and may occur several times in a day.

3.3 Focal / Generalized (Unclassified) Seizures

This category includes all seizures which cannot be classified into any of the above categories. The commonest example is epileptic spasms which typically present with sudden flexion, extension or both flexion-extension of proximal and trunk muscles lasting 1 or 2 seconds.

Table 3-3-1 : Summary of Classification of Seizures

<table>
<tr><th>Focal (Partial) Seizures</th><th>Generalized Seizures</th></tr>
<tr><td>Aura

a. Elementary
b. Experiential</td><td rowspan="3">Tonic-Clonic

Tonic

Clonic

Myoclonic

Atonic</td></tr>
<tr><td>Motor

a. Elementary
b. Complex</td></tr>
<tr><td>Autonomic</td></tr>
<tr><td>Dyscognitive</td><td>Absence
a. Typical
b. Atypical</td></tr>
<tr><td colspan="2">Evolving into bilateral neural circuits</td></tr>
<tr><td colspan="2">Focal / Generalized (Unclassified) Seizures</td></tr>
</table>

3.4 Classification of Epilepsy and Epilepsy syndromes

Classification of epilepsy and epilepsy syndromes is an evolving process. Identifying the epilepsy syndrome helps in making the appropriate choice of drugs and in giving the patient a more accurate prognosis. The most practical system is based largely on seizure type and the aetiology or the presumed underlying pathology together with EEG abnormalities and possibly other investigations such as MRI scanning.

From an aetiological stand point we have three groups as follows:

- **Primary / Genetic:** The cause has not been established
- **Symptomatic:** Epilepsy follows a definable brain pathology
- **Cryptogenic:** The clinical picture suggests there is a cause but this cause has not been discovered yet. The cause is "hidden" hence the name.

In each of the categories, we can then identify generalized, focal epilepsies and those that are difficult to fit into the other categories giving us a total of seven categories. The table below shows a very simplified version with some examples in each category. In general, the primary / genetic epilepsies have the best prognosis with

more than 80% remission and some may be self-limiting like the benign childhood focal epilepsies.

Table 3-2 : Summary of Aetiological Classification of Epilepsy syndromes

	Primary **Genetic**	**Structural Metabolic (Symptomatic)**	**Unknown (Cryptogenic)**
Generalized	Absences GTCS JME	Progressive Myoclonic Epilepsies Lennox Gastaut Syndrome	West Syndrome Epileptic Encephalopathies Doose syndrome (Myoclonic astatic)
Focal	Benign childhood focal epilepsies	MTS Hippocampal sclerosis	
Undetermined	Undetermined and Special Syndromes e.g. Acquired epileptic aphasia		

It should be noted that the epilepsy classification, like seizure diagnosis and classification is mainly clinical; expensive investigations may be rationally used when available but are not crucial to the diagnosis or the management of epilepsy. Categorising epilepsy according to the underlying etiology is very important but epilepsies may also be organized into epilepsy syndromes. Such syndromes have a typical age of seizure onset, specific seizure types and EEG characteristics and often other features which when taken together allow the specific epilepsy syndrome diagnosis. The identification of an epilepsy syndrome allows for rational choice of anti-seizure medication and an insight into prognosis and expected outcome of treatment.

Table 3-3: Common Age Related Epilepsy Syndromes*

Age group	Benign (Without detectable cerebral pathology)	Severe (with cerebral pathology)
Neonatal/Infantile	• Neonatal and Infantile Epilepsies (familial and non-familial)	• Myoclonic encephalopathy • Ohtahara's syndrome • West Syndrome • Dravet Syndrome • Infantile epilepsy with migrating focal seizures
Childhood	• Focal childhood epilepsies *(Epilepsy with occipital or Rolandic spikes, Panayiotopoulos)* • Childhood and Juvenile Absence Epilepsy	• Epileptic encephalopathy *(with continuous spike and wave during sleep)* • Lennox Gastaut syndrome • Autosomal Dominant nocturnal Frontal lobe epilepsy
Adolescent/Adult	• Juvenile Myoclonic Epilepsy • Epilepsy with GTCS alone • Familial temporal lobe epilepsies	• Progressive myoclonus epilepsy
Variable age	• Familial focal epilepsy with variable foci • Reflex epilepsies	• Progressive Myoclonus epilepsy

**For the purposes of these guidelines benign means favourable prognostic outcomes.*

CHAPTER 4: DIAGNOSIS AND INVESTIGATION OF EPILEPSY

The diagnosis of epilepsy has important and far-reaching physical, psychosocial and economic implications to the patient. It is therefore important that the diagnosis is correct. The initial diagnosis of epilepsy should therefore be made very carefully and if in doubt, consult or refer appropriately.

> ***Important:***
> ***The Diagnosis of Epilepsy is Primarily Clinical and Based on History and Observation.***

4. Medical History

A carefully taken medical history from the patient and eyewitness is the most important step in the diagnosis of patients with repeated seizures.

4.1 Detailed Seizure History

The patient's and an eye witness account of the event are essential in answering questions about the seizures. Take note that the patient may have no recollection of the event or some aspects of the event

First let the patient and the witness tell their story, and then ask pertinent questions about the present seizures and previous medical history.

Specific answers should be sought for the following regarding seizures:

Current Episode

4.1.1 Ictal

- Was there altered consciousness / was the patient able to respond to stimuli appropriately?
- Were there abnormal movements: stiffening, jerks, twitching, smacking, chewing, staring gaze, up turning of the eyes, jaw clenching, tongue biting; what parts of the body were involved
- Where in the body and how did the event start e.g. turning face to one side, or in one part of the body
- Was there change in the manner of breathing (stertorous / snoring, shallow / deep, hyperventilating); what was the duration
- What was the approximate duration of the event

4.1.2 Pre-Ictal

- In what environment or context did the event occur?
- Were there behavioural changes or abnormal experiences prior to the event**?**

4.1.3 Post-Ictal

- What followed the event: behavioural changes (confusion, aggression), sleep, headaches, muscle aches, fatigue, faecal soiling, incontinence
- How was the recovery from the event: spontaneous, gradual and was any medication used
- What was the duration
- Were there focal signs (e.g. Todd's paralysis)

4.1.4 Onset

- At what age was the first seizure?
- Was it in association with a particular event, accident or illness?
- Was there fever with the first seizure?
- Is there always fever with the seizures?
- What investigations were done at onset – specifically enquire about blood sugar, malaria, scans

4.2 *Further History*

4.2.1 Time

- At what time of the day or night do the seizures occur (daytime, when sleeping or awakening)?

4.1.2 Frequency

- When was the last seizure?
- How frequent have the seizures been? Has there been a change in the frequency of seizures?
- What is the interval between seizures?

4.1.3 Triggers

- Are there precipitating factors such as hunger, lack of sleep, emotional stress (anger, excitement, bereavement etc.), alcohol intake, flashing lights, sudden loud noises, menstruation, missed medication etc.

4.1.4 Seizure characteristics

- Are there any consistent prodromal symptoms e.g. unusual sensations (hallucinations)
- Does the seizure event always take the same form or vary?

What has been done until now about the seizures?

- Has the patient been admitted to hospital for the seizures or for any other disease or accident?
- How long was the duration of the admission?
- What kind of treatment has the patient had? Is the patient on treatment now?
- Which medicines, what dosage is the patient on?
- Has the treatment been continuous? If not, what was the reason?
- If the drugs were changed at some point, what was the reason: adverse effects or ineffectiveness?
- Has the patient been put on alternative medicine? If so what was the nature of treatment?

4.1.5 Perinatal history

- How was the pregnancy:
- Any diseases or complaints?
- Were medicines or alcohol used, was the mother a smoker?
- Was the pregnancy of normal duration?
- Was the pregnancy multiple?

How was the delivery?

- Normal, vacuum, forceps, or Caesarean section?
- Was the labour of normal duration, prolonged or precipitate?
- Did the baby cry immediately after birth, or had to be resuscitated?
- Did the baby have a low birth weight?
- Did the baby look yellow?
- Did the baby breast-feed well?
- Was there any disease after birth?
- Did the baby get the usual vaccinations?

4.1.6 Developmental history

- Were the milestones normal?
- Does or did the child go to school?
- How is/was the performance before and after the seizures?
- How was the performance before and after medication?
- If of school-age and not attending school, why not?
- What is the child's behaviour like?
- Does the child sleep well?

4.1.7 *Past Medical History*

- History of other chronic illnesses e.g. hypertension, diabetes, HIV/AIDS, Sickle Cell Disease, liver disease etc.
- History of admissions for other illnesses
- History of surgery
- History of trauma or road traffic accident
- Any previous or current medications being used by the patient
-

4.1.8 Family and Social History

- History of a similar illness (epilepsy, fainting episodes or sudden deaths)

amongst close relatives

- With whom does the patient live (parents, siblings, spouse, child)?
- How far is the home from the nearest health facility?
- If the patient is a child what are the parents' occupations?
- If an adult, what is the marital status?
- What is the source of income (spouse, self-employed, formally employed, parents, charity, others)?
- What is the educational level of the patient or guardian?
- Who takes care of the patient while at home?
- How many dependants are there in the household?
- Are they all well / normal? If not, what is wrong?
- How is the patient doing at school/at work? Is s/he coping?
- Are there any others in the home, the class, the school, the workplace, or the neighbourhood with a similar problem?
- Any history of drug or substance abuse e.g. alcohol, marijuana, cocaine, glue sniffing etc.

4.1.9 Any problems not yet mentioned

- Ask the patient or the parent if there is any problem they would like to talk about that has not yet been dealt with.

4.1.10 Video

Patients, parents, guardians and eye witnesses are advised to take videos of events and should be encouraged to share with the attending clinician.

4.2 *Physical Examination*

Physical examination begins with observation as the patient enters the consulting room. Note the gait (presence of weakness or spasticity), the behaviour (reaction to the surrounding and activity), and ability to communicate

4.2.1 General examination

For all patients, check the general appearance of the skin, subcutaneous tissue and mucous membranes for scars, bruises, and change in pigmentation, adenoma sebaceum, and haemangioma. In acutely ill patients note: fever, bulging fontanels (where applicable), neck stiffness, rash and level of consciousness. This should be followed by an assessment of the vital signs and

the routine examination of all the systems. Presence of asymmetry, congenital anomalies and tongue bite should also be noted. For children: weight, height and head circumference should be taken and charted.

4.2.2 Neurological examination

A full neurological examination should be done. Examination of the cranial nerves and the motor system should be done on all patients, taking note of symmetry of muscle power, muscle tone and tendon reflexes

Remember to look for any signs of drug toxicity e.g. drowsiness, sleepiness, ataxia, nystagmus, and cerebellar dysfunction.

4.3 Investigations

Inability to perform laboratory and radiological investigations does not prevent the making of a diagnosis of epilepsy and the initiation of treatment.

Where possible, patients should have investigations that are tailored to their individual needs. These may include but are not limited to the following:

4.3.1 Laboratory

These are useful especially in acute seizures or status epilepticus:

- Full haemogram
- Serum electrolytes (sodium, potassium, calcium and magnesium)
- Blood sugar
- Blood urea nitrogen
- Liver Function Tests
- Screening for infections (e.g. malaria, HIV)
- Cerebrospinal fluid examination as long as there are no contra-indications for lumbar puncture
- Chest radiograph
- CT brain scan in acute deterioration or acute development of focal features

Other Special Tests (these are useful for longer term epilepsy management, and are

subject to availability in the healthcare facilities)

- Electro-encephalography (EEG - see section below)
- MRI brain scan (see section below on neuro-imaging)

4.3.2 Electroencephalography

Electroencephalography (EEG) is often helpful in the diagnosis and classification of epilepsy but it is essential to understand the limitations of the test. non-specific background EEG abnormalities are relatively common in up to a quarter of the general population who do not have seizures.

Conversely, a person with established epilepsy may have normal EEG findings, and therefore normal findings on EEG do not exclude a diagnosis of epilepsy.

An EEG should be performed:

- õ to support the diagnosis of epilepsy in adults, children and young people.
- õ characterize the type of seizure syndrome e.g. typical absences, Lennox Gastaut syndrome
- õ after the second epileptic seizure but may, in certain circumstances, as evaluated by the clinician, be considered after a first epileptic seizure.
- õ after a first unprovoked seizure to look for unequivocal epileptiform activity and therefore assess the risk of seizure recurrence.

4.3.3 Brain imaging

Brain imaging (MRI and CT scan) detects lesions in a considerable proportion of patients presenting with epilepsy. These lesions may include scars, calcification, small vascular abnormalities, brain atrophy and cerebral malformation. Except for expanding space occupying lesions, most of these lesions do not require any surgical treatment, but their detection may have implications for future management should the epilepsy become intractable.

Brain imaging should NOT be routinely requested in all patients except in those where the risk of a structural pathology is higher like in patients with focal neurological deficit, HIV and Immunosppression states, intractable epilepsy etc.

Magnetic resonance imaging (MRI) scan is the brain imaging investigation of choice in people with epilepsy where there is appropriate indication. MRI brain

scanning is preferred to CT brain scanning as it can detect lesions that are not detected by the CT scan e.g. small tumours, vascular malformations, hippocampal sclerosis and cortical dysplasias.

4.4 Differential Diagnosis of Epilepsy

In making a diagnosis of epilepsy it is important to differentiate it from other clinical conditions with similar presentations. The main differential diagnoses for seizures include the following:

Table 4-1 : Main differential diagnoses for seizures

Syncope and Anoxic Seizures	Behavioural, Psychological and Psychiatric Disorders
Vasovagal syncope Reflex anoxic seizures Breath-holding attacks Hyperventilation syncope Compulsive Valsalva Neurological syncope Imposed upper airways obstruction Orthostatic intolerance Long QT and cardiac syncope Hyper-cyanotic spells	Daydreaming /inattention Infantile gratification Eidetic imagery Tantrums and rage reactions Out of body experiences Panic attacks Dissociative states Non-epileptic seizures Hallucinations in psychiatric disorders Fabricated / factitious illness
SLEEP RELATED CONDITIONS Sleep related movement disorders Hypnogogic jerks Parasomnias REM sleep disorders Benign neonatal sleep myoclonus Periodic leg movements Narcolepsy-cataplexy	**MIGRAINE ASSOCIATED DISORDERS** Migraine with visual aura Familial hemiplegic migraine Benign paroxysmal torticollis Benign paroxysmal vertigo Cyclical vomiting
PAROXYSMAL MOVEMENT DISORDERS Tics Stereotypies Paroxysmal kinesigenic dyskinesia Paroxysmal non-kinesigenic dyskinesia Paroxysmal exercise induced dyskinesia Benign paroxysmal tonic up gaze Episodic ataxias Alternating hemiplegia Hyper-ekplexia Opsoclonus-myoclonus syndrome	**MISCELLANEOUS EVENTS** Benign myoclonus of infancy and shuddering attacks Jitteriness Sandifer syndrome Non-epileptic head drops Spasmus nutans Raised intracranial pressure Paroxysmal extreme pain disorder Spinal myoclonus

Below is a brief of some of the common conditions that may be confused with epilepsy.

4.4.1 Syncope

This is more common than epilepsy. Loss of consciousness is due to sudden transient decrease in the cerebral blood flow. Precipitating factors include anxiety, hunger, unpleasant circumstances, heightened emotions or prolonged standing. It is important to distinguish between different types of syncope

One easy set of rules to remember to diagnose simple uncomplicated vasovagal syncope in the history is to look out for the "Four Ps" (though none are diagnostic on their own):

Posture (onset when upright);
Prodrome (blurring or blacking of vision, light-headedness, nausea, and sweating);
Provoking factors (sight of blood, pain and bathroom); and
Prompt recovery.

Important:

Appreciate that limb jerking can happen during syncope, which is termed convulsive syncope. These are not epileptiform seizures, but manifestations of hypo-perfusion of the brainstem and/or cortex causing associated myoclonic jerks. The limb jerks in convulsive syncope are different to those in epileptic seizures in that they are usually irregular, short lasting (a few seconds) and asymmetric.

The table below shows the differences.

Table 4-2 : Differentiation between epileptic seizures and fainting attacks (reflex syncope)

	Epileptic seizure	Syncope
Circumstances	Could happen anywhere	Usually happens in upright position in crowded, hot surroundings or in emotionally stressful situations
Onset	Sudden or aura	Gradual
Motor phenomena	Tonic or tonic-clonic movements with characteristic amplitude and frequency	Flaccid May be uncoordinated clonic jerks of low amplitude
Skin colour	Pale or flushed	Pale
Respiration	Stertorous, foaming	Shallow, slow
Incontinence	Common	Rare
Tongue-biting	Common	Rare
Vomiting	Unusual	Often
Injury	Common	Rare
Post-ictal	Drowsy, confusion, sleep	Usually rapid recovery without confusion
Duration	Minutes	Seconds

4.4.2 Psychogenic Non-Epileptic Seizures (PNES)

They more commonly mimic generalised tonic-clonic seizures and occur primarily in patients who do not have epilepsy, although 10% of patients with PNES also have epilepsy.

The table below outlines the differences.

Table 4-3 : Differentiation between epileptic and psychogenic "seizures"

	Epileptic "seizure"	Psychogenic "seizure"
Precipitating Circumstances	Generally unprovoked	Usual (emotion, pain)
In sleep	Common	Rare
When alone	Common	Less common (mostly occurs in the presence of observer(s))
Prodrome	Rare	Common
Onset	Sudden or aura	Gradual
Cry at onset	Common	Uncommon
Vocalization	During automatism only	Groans and moans or cries usually throughout fit
Motor phenomena	Stereotyped, usually both tonic and clonic, Clonic movements slow as seizure continues and increase in	Prolonged and unusual movements e.g. pelvic thrusting.
Injury	Common	Rare
Incontinence	Common	Rare
Tongue-biting	Common	Rare
Consciousness	Lost in GTCS, reduced in CPS	Usually not lost. May not respond
Resistance to passive limb movement or eye opening	Unusual	Common
Termination of attack	Usually rapid; confusion, drowsiness or sleep common	Gradual, often with emotional display; confusion, drowsiness or unusual sleep
Recall of seizure events	Very rare	Possible or may be elicited by hypnotic recall

4.4.3 Cardiac syncope (usually due to structural defects or potentially fatal arrhythmias)

This is caused by heart disease or disturbance of the heart's rhythm leading to reduced cardiac output. The attacks can occur in any situation especially exertion. In children, it may be associated with a history of congenital heart disease. The prodromal phase of cardiac arrhythmia is characterised by palpitations pallor, and there may be a few brief jerks or stiffening. The patient is left with residual symptoms of lassitude after the attack.

Hyperventilation or Panic Attack

This is an anxiety disorder provoked by social situations with a prodromal phase characterised by fear and a feeling of unreality, breathlessness and paraesthesiae. The panic attack may present with agitation, rapid breathing and stiffening of hands (carpo-pedal spasm) with residual symptoms after the attack.

Remember:

Falling to the ground, becoming unconscious, having some jerking limb movements and being incontinent of urine is not always diagnostic of an epileptic seizure! These can all happen in convulsive syncope. The clues are all in taking a proper and thorough history and it is absolutely necessary to obtain a witness history of the attack in all cases

CHAPTER 5: MANAGEMENT OF EPILEPSY

5.1 Principles of Management of Epilepsy

5.1.1 Confirm Diagnosis

For effective management of epilepsy, a definitive diagnosis is essential. Characterisation of the specific seizure type (and epilepsy syndrome whenever possible) is important as it has a bearing on the type of treatment to be administered. A good history, corroborated with a witness account is paramount and review may be necessary when in doubt.

5.1.2 When to start treatment

It is recommended that treatment should be initiated after confirmation of the diagnosis of active epilepsy (two or more unprovoked seizures more than 24 hours apart in a year) and after appropriate counselling. However, in special circumstances, anti-epileptic drugs may be used even after a single seizure. Such situations include:

- family history of epilepsy
- relevant neurological deficit
- abnormal EEG showing epileptiform activity or focal slowing where the patient, after adequate counselling, desires treatment

Remember:
The Diagnosis of Epilepsy is Primarily Clinical and Based on History and Observation

5.1.3 Choice of medication

The aim of drug therapy is to control seizures and improve the quality of life with minimum side effects. This is based on seizure type and epilepsy syndrome but should also include such considerations as availability, affordability and side effect profile or toxicity.

Other factors to be considered in the choice of medication are:

5.1.3.1 Sex

Some antiepileptic drugs (AEDs) may interact with oral contraceptive pills (OCP) while others have teratogenic effects. Such medications may not be the first choice in females during child-bearing years. Some medications are contraindicated during pregnancy.

5.1.3.2 Age

Drug metabolism and elimination in extremes of age can affect blood concentrations of AEDs, therefore caution is required when prescribing for neonates and the elderly.

5.1.3.3 Co-morbidities

Presence of some co-morbidities e.g. hepatic diseases can affect the plasma concentrations of AEDs and therefore influence efficacy or toxicity. Whenever possible evaluation for such co-morbidities should be made prior to commencement of medication and during treatment.

5.1.3.4 Drug interactions

Some drugs may interact negatively with AEDs especially those that act on the CNS including tranquilisers and sedatives and their use needs to be considered. Other drugs may be epileptogenic e.g. phenothiazines and other major tranquilisers.

Careful monitoring for side effects and drug interactions is recommended for patients with Epilepsy who are on HAART for management of HIV or on anti-TB medication. Antiretroviral medication and anti-TB medication can reduce the efficacy of AEDs and vice versa.

5.1.4 Initiation of treatment

- Start treatment with one drug.
- Start treatment using the lowest recommended dose compatible with the medication preparation.
- Gradually adjust dosage at two to six weeks intervals until complete seizure control or the maximum pharmacologically tolerated dose is reached. This is the patient's minimum maintenance dose.
- If no seizure control is achieved after attaining the maximum dosage of the initial drug, a second drug should be added while considering gradually reducing or maintaining the initial drug depending on the clinical response. If

monotherapy (single drug) fails then polytherapy (multiple drugs) utilizing drugs with different modes of action is indicated.

- The aim of treatment is to achieve the lowest maintenance dose that provides complete seizure control with the minimum side effects.
- Gradual introduction of an AED can produce therapeutic effects just as fast as rapid initiation with large doses, but with fewer side-effects and is hence recommended.
- Severe "intoxication" side-effects appearing at the beginning of the treatment, can indicate too rapid or too large dose increases. Side-effects that should be anticipated. These include fatigue, excessive sleepiness, dizziness or difficulty walking (ataxia).

5.1.5 Maintenance

- Ideally, only one drug should be used. Once the maximum dose of this medication is achieved without adequate response or if side effects are observed, then another drug should be considered as monotherapy. The first drug should then be withdrawn gradually**.**
- If the first drug has only produced a partial response, then a second drug can be added gradually taking into consideration drug interactions. The aim should be to prescribe a maximum of two drugs concurrently. If the two drugs used at optimal dosage, with adequate compliance fail to achieve seizure control, then refer the patient for further evaluation.
- Partnership between patient and provider is important to ensure that the patient understands the importance of adhering to treatment.

5.1.6 Follow up and monitoring

- Holistic approach to treatment with partnership involving patient, family and care providers enhances the patient's insight and promotes compliance.
- Drug monitor should be done by evaluation of serum levels in cases where there is difficulty in attaining seizure control or significant side effects.
- Compliance is the key to successful seizure control, and counselling the patient is the most critical factor in compliance.

5.1.7 When to withdraw drugs

Drug withdrawal should be considered if the patient has been seizure-free for two to three years, however, prior to drug withdrawal the following should be considered:

- **Focal seizures**: Focal seizures are often very difficult to control especially those arising from the hippocampus and other temporal lobe areas and chances of recurrences are high. It may be better to remain on medicine indefinitely.

- **Generalised seizures**: Generalised seizures especially those of idiopathic / primary aetiology have the best remission rates.

- **Abnormal EEG**: If the EEG is persistently abnormal in the face of good clinical control (remission), it may be prudent to continue treatment until EEG abnormalities have significantly resolved or a normal record is achieved.

- **Patient views**: Before stopping medication, patients' views should be solicited. In some circumstances, patients may opt to remain on medications despite achieving prolonged remission clinically (usually taken to be more than two to five years). Their choice should be respected since even after successful treatment, there still remains a 5-10 per cent chance of getting another seizure.

- **Counselling**: Counselling of the patient prior to withdrawal of medication is very important to alert them of the possibility of recurrence as a permanent cure cannot be assured.

5.1.8 How to withdraw treatment

This should be done in a very gradual manner over three to six months. In case of poly-therapy, each drug should be withdrawn separately one after the other. Consideration of known side effects and individual medication efficacy guides this process.

5.1.9 First Aid during a convulsive seizure

DO'S

- Move patient away from dangerous situations such as fire, traffic, water etc
- Take away any objects that could harm the patient
- Loosen tight clothes, remove glasses
- Protect the head using something soft
- Turn patient on his or her side, so that saliva and mucus can drain out of the mouth
- Remain with the patient until he or she regains consciousness fully

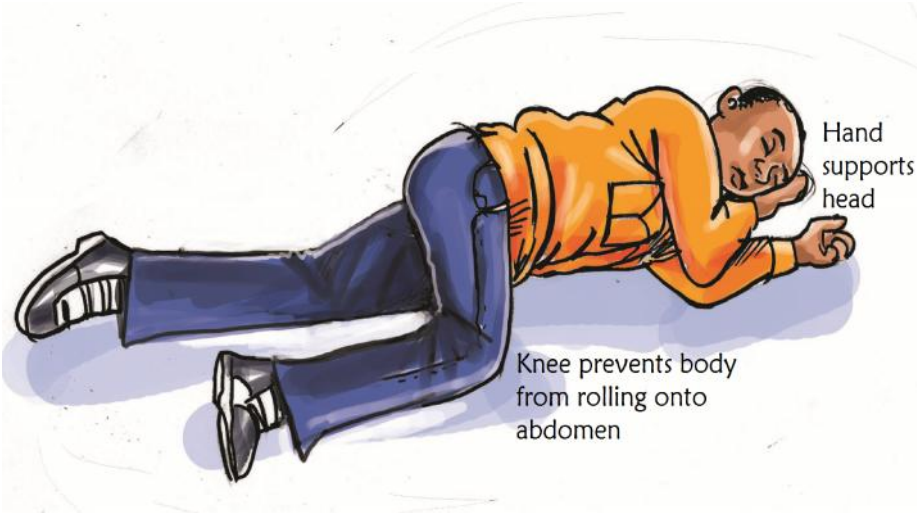
- Then let the patient rest and guide them to a safe place and contact their caregivers / guardians.

DONT'S

- Do NOT put anything into the mouth
- Do NOT give anything to drink
- Do NOT try to stop the jerking, or restrain the movements.

Unconscious patients should be placed in semi-prone/recovery position to minimize the risk of obstruction or inhalation of vomitus as shown below.

Figure 5.1 The recovery position



5.2 Antiepileptic Drugs at Primary Level

5.2.1 Phenobarbitone

- This is the oldest of the current AEDs and is as effective as any other in achieving seizure control.
- The main indications are the idiopathic generalized epilepsies. It is also effective in other generalized seizures and in partial seizures.

- Not effective in generalized absence seizure and it might worsen nocturnal seizures.
- Phenobarbitone has a long half-life time and therefore takes a few weeks before reaching a plasma steady state. This also means that it can be given once a day, preferably after the evening meal before retiring to bed and dose adjustment carried out after three to four weeks.
- Main side-effects of phenobarbitone are drowsiness and changes in behaviour, such as hyperactivity and/or aggressiveness in some children.

5.2.2 Phenytoin

- This is the second oldest anti-epileptic drug .
- Effective for partial seizures (with or without generalization), primary GTCS and seizures during sleep in some patients.
- Not effective for absence seizures and febrile convulsions.
- Has a long half-life, which is furthermore dose-dependent, being longer at higher doses, and it may take up to two weeks before it becomes effective.
- It can be given as a once daily dose. It is slightly irritating to the stomach and therefore, should always be given after a meal and when the dosage is high, it might be better to divide it into two doses.
- **This drug has a narrow safety margin (difference between therapeutic and toxic doses).**
  Increments should therefore not be more than 50 mg to prevent toxic side-effects.
- Phenytoin side-effects are many and include drowsiness, gum hypertrophy, hirsutism, antifolate effects and when the dosage is too high, ataxia and nystagmus.

Important:
Caution should be exercised when utilizing Phenytoin as maintenance therapy.

5.2.3 Carbamazepine

- Main indications are partial seizures and some generalized tonic clonic seizures.
- **MAY WORSEN** generalized absences and myoclonic seizures and is

contraindicated for these seizure types.

- It does not have a long half-life and therefore **cannot be given once daily**. It should be given twice daily and when combined with other drugs it should be given three times daily.
- Side effects include drowsiness, slurred speech and dizziness at initiation of treatment or when the dosage becomes too high. Double vision and ataxia also occur at high doses.

5.2.4 Sodium Valproate

- Main indications are generalized seizures; absence seizures, myoclonic seizures, and atonic seizures. Also used for the Generalised Tonic Clonic Seizures occurring after awakening. Sodium valproate can be used as prophylaxis for atypical febrile convulsions when phenobarbitone cannot be used.
- Has a short half-life and should be given three times daily in order to avoid high peak concentrations.
- Specific side-effects include increase in body weight, loss of hair, and gastric irritation.
- Sodium valproate is associated with higher rates of teratogenic effects in pregnancy such as *spina bifida*. Sodium valproate is contraindicated in pregnant women and should not be initiated during pregnancy. Caution should be exercised in women of child- bearing potential.

Important:
Sodium Valproate is contraindicated in pregnant women and should not be initiated during pregnancy

5.2.5 Benzodiazepines

- Diazepam is only used for emergency care as intravenous or as rectal diazepam Never as intra muscular injections (IM).
- Intramuscular Diazepam takes minutes to hours to be mobilized. Multiple IM doses may lead to respiratory depression with potentially fatal outcomes.

Important note on AEDs

AEDs manufactured by different manufacturers have minor differences in bioavailability and rate of absorption of the different preparations. This has

therapeutic consequences for individual patients and especially in treatment with phenytoin. Minor increase in absorption of the phenytoin tablets could result in toxicity, while a slight decrease in absorption may result in recurrence of seizures. Whenever brand changes for an AED are unavoidable, the dosage of the AEDs has to be adjusted after the change, preferably guided by measurement of the serum drug levels.

At the primary level, sodium valproate where possible should be available in both tablet and sugar free liquid forms. Due to its broad spectrum of activity, it should be used for management of epilepsy especially where the care provider is unable to correctly diagnose the type of seizure. However, making a correct diagnosis remains of critical importance.

NOTE :
ALL FEMALE PATIENTS OF CHILD-BEARING AGE SHOULD BE ON FOLIC ACID IN ADITTION TO THEIR AED.

At secondary and tertiary levels all the above AEDs plus Clonazepam, Clobazam, Lorazepam, Lamotrigine, Gabapentin, Ethosuximide, Oxcarbazepine, Topiramate, and Levetiracetam should be available.

Table 5.1.9 : Choice of AEDs in adults and children based on seizure type

ANTI EPILEPTIC DRUGS OF CHOICE BY TYPE OF SEIZURES			
		Adults	**Children**
PARTIAL SEIZURES	**Focal Seizures** (Activity or uncontrolled sensation when the person is alert)	• Phenytoin • Carbamazepine • Phenobarbitone • Sodium Valproate	• Carbamazepine • Sodium Valproate
	Dyscognitive Focal Seizures (Activity with change in consciousness >15-30 sec).	• Phenytoin • Carbamazepine • Phenobarbitone • Sodium Valproate	• Carbamazepine • Sodium Valproate
	Bilaterally Evolved Seizures (Activity begins in one area and spreads in whole brain)	• Phenytoin • Carbamazepine • Phenobarbitone • Sodium Valproate	• Carbamazepine • Sodium Valproate • Lamotrigine
GENERALIZED SEIZURES	**Tonic Clonic** (Stiffening, falling, followed by a convulsion)	• Phenobarbitone • Phenytoin • Carbamazepine • Sodium Valproate	• Phenobarbitone • Sodium Valproate
	Absence (Staring and blinking, >15 Seconds)	• Sodium Valproate • Ethosuximide • Benzodiazepines	• Sodium Valproate • Ethosuximide • Benzodiazepines
	Tonic (Stiffening, falling, no convulsion)	• Phenobarbitone • Phenytoin • Carbamazepine • Sodium Valproate	• Phenobarbitone • Sodium Valproate • Carbamazepine Lamotrigine
	Myoclonic Jerks (Short jerking movement of parts of the body, <1 sec)	• Phenobarbitone • Sodium Valproate • Benzodiazepines	• Phenobarbitone • Sodium Valproate • Benzodiazepines
	Clonic (Falling and jerking with no stiffening)	• Phenobarbitone • Phenytoin • Carbamazepine • Sodium Valproate	• Phenobarbitone • Sodium Valproate • Carbamazepine
	Atonic (Falling, limply to the ground)	• Phenytoin • Sodium Valproate	• Phenobarbitone • Sodium Valproate

Table 5.1.9 : Algorithm of treatment plan for epilepsy

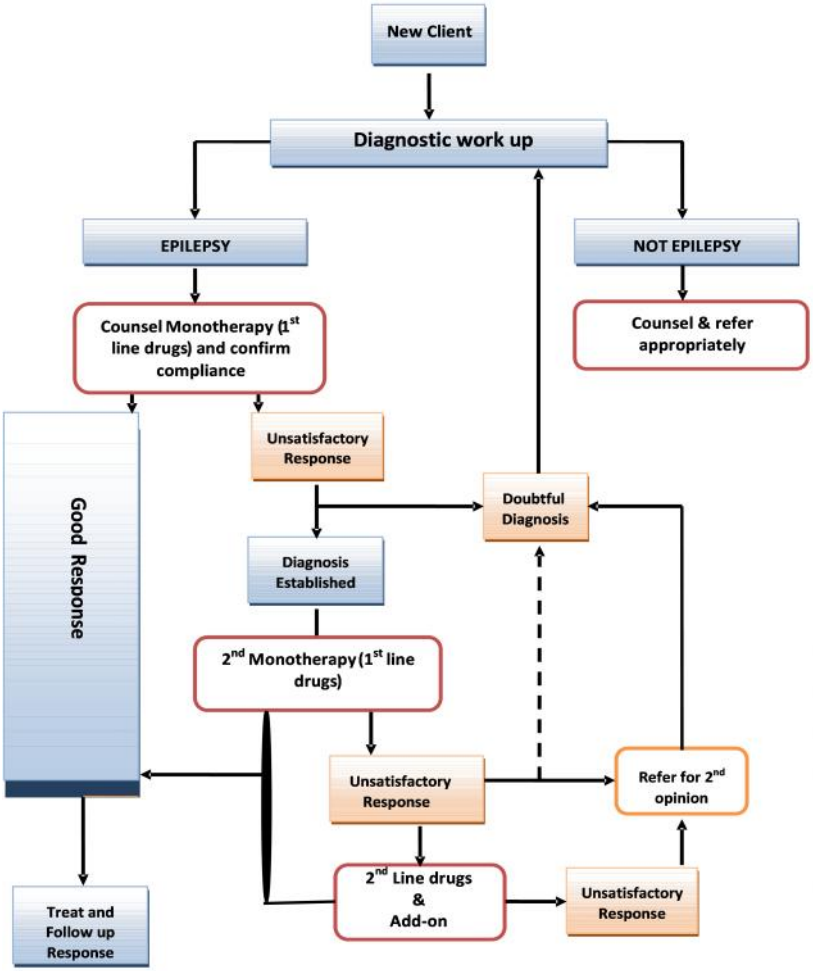


Table 5.1.9 : Anti-Epileptic drugs

ANTI–EPILEPTIC DRUG PROTOCOL TABLE									
DRUG	Adult - Starting Dose	Increment	Maintenance	Half-life	Dosing	Indications	Main Interactions	Dose Preps	Main Side effects
Phenobarbitone	Under 1 yr 15-30 mg/day 1-5yrs: 30-60 mg/day 6-12yrs: 30-90mg/day 12 and above: 60-90 mg/day	30mg 4wkly	2-5 mg/kg/day Adults: maximum180mg/day	Newborn ≥100hrs Child: 30-70hrs Adult: 60-150 hrs	BD for children OD for Adults	GTCS Febrile convulsions Seizures when awake	Decreases: Vit. D. folate, phenytoin, Valproate, OCP carbamazepine Increased by phenytoin, valproate, frusemide	Tabs:30mg	Sedation, mood changes, severe respiratory insufficiency, hyperactivity in children
Phenytoin	Adults: 200mg/day	Adults 100mg wkly	3-5mg /kg/day Adults: maximum 400mg/day	At first 36hrs & Later 12hrs	OD or BD	Seizures during sleep Sec GTCS Partial seizures	Decreases: Vit. D,folate, carbamazepine, Valproate, OCP Increases PB Increased by INH, rifampicin	Tabs: 50mg, 100mg, Caps: 50mg, 100mg Syr:30mg/5mls	Gum hypertrophy, Lack of appetite, headache, dizziness, transient nervousness, GI
Carbamazepine	Under 1 year. 100mg/day 1-5yrs: 150mg/day 6-11yrs: 200mg/day 12 and above: 400mg/day	4wkly Adult: 200mg 4wkly	Child: 10-20mg/kg /day Adults: 10-20mg/kg /day (1400mg)	9-140 hours	BD monotherapy TDS polypharmacy	Complex partial seizures Sec GTCS Simple Partial seizures	Decreases: folate, OCP Decreased by PHT, PB Increases effect of alcohol Increased by INH, erythromycin	Tabs 100mg, 200mg, syrup:100ml	Dizziness, drowsiness, ataxia,GI SE, paraesthesia, arrhythmia, heart failure, impotence and male infertility, gynaecomastia

Valproate	Under 1yr: 100mg/day 1-5yrs: 150mg/day 6-11yrs: 400mg/day 12yrs and above: 400-600mg/day	Adult: 200mg/ 4weeks	Child: 10-30mg/kg/ Day Adults: 10-20mg/kg/ day Maximum 2400mg	16 hours	OD, BD,TDS	Absences, Myoclonic, Awakening seizure	Decreased by PB, PHT Increases PB, phenothiazines Antidepressants	Tabs: 150mg, 200mg, 300mg, 500mg Syrup: 200mg/5ml IV: 400mg	Gastro intestinal disturbances, increased appetite and weight gain, neurological SE, thrombocyte-penia
Clonazepam	Under 1yr 0.125mg/day 1-5yrs: 0.25mg/day 6-15yrs: 0.5mg/day Adults 1mg/ day	Adult: 1mg wkly	Under 1yr 0.5-1mg/day Child:- 6mg/day Adults: 4-8mg/day	20-60 hrs	BD or TDS	GTCS Idiopathic or symptoma-tic	Decreased by carbamazepine PB, PHT, Increases effect of alcohol	Tabs: 0.5mg, 2mg,	Drowsiness, salivary and bronchial hyper secretion, extra pyramidal disorders

Important !
Dosages in Neonates and children should always be expressed as mg/kg/bw. Please refer to Appendix 2 for the exact dosing

5.3 *Status Epilepticus*

Convulsive Status epilepticus is a common medical emergency and one of the most serious neurological emergencies associated with high mortality and morbidity. It is characterized by continuous, convulsive seizures lasting more than 5 minutes or two or more seizures during which the patient does not return to baseline consciousness. Other forms of status epilepticus should also be recognised. The following is a brief look at the various presentations of status epilepticus:

- Convulsive
  - Generalised
  - Partial (Epilepsia partialis continua)
- Non convulsive
  Wandering confused
  - Dyscognitive status
  - Absence status

  Comatose
  - Subtle ill
- Refractory
  - Non response to 2 standard AEDs and include

The following discussion relates to the management of the generalised convulsive status epilepticus as it is the most dangerous

5.3.1 Management of status epilepticus

Airway, Breathing and Circulation should be managed as per standard emergency guidelines (APLS, ATLS etc.).

On gaining intravenous access, blood samples should be taken to assess blood glucose. Other initial investigations that can be considered at this stage depending on clinical presentation and availability of resources include electrolytes assessment, malaria test, full haemogram and liver function tests.

The following interventions can then be administered:

- **Glucose solution**

If hypoglycaemia is confirmed or suspected, administer 2-5 mls/kg of 10% dextrose intravenously with thiamine in adults. In children 5mls/kg of 10% dextrose is advised.

- **Diazepam**

Administer 0.3mg/kg of diazepam intravenously over an approximate rate of 1mg/min, until seizures stop or up to 5 mg in children under 2 years: 5-10 mg in children 2-12 years; and 10mg in older individuals. This may be repeated after 10 minutes if the seizures persist.
If intravenous access is difficult, diazepam may be given rectally via a catheter or syringe at a dose of 0.5 mg/kg or using diazepam rectal tubes.

N.B. Do not give diazepam intramuscularly.

If the seizures persist 20 minutes after administration of the second dose of diazepam, consider using phenobarbital or phenytoin as follows:

- **Phenytoin**

Administer a loading dose of phenytoin intravenously at 15-18 mg/kg over a period of 30 minutes, not exceeding 1,000 mg, or give 5-6 mg/kg IV three times with 30 min in between.

N.B. Dextrose solutions may cause precipitation of phenytoin; therefore avoid administering phenytoin using the same IV line used for dextrose based maintenance fluids. Do not give phenytoin intramuscularly or in dextrose containing fluids

- **Phenobarbitone**

15 mg/kg as a loading dose IM or slow IV infusion (when given IV, closely monitor the pulse, respiration and blood pressure)

Do not use phenobarbitone or phenytoin for patients with epilepsy who are currently using either drug as part of their epilepsy treatment.

Maintenance dose

After the loading dose is given, continue with the maintenance dose of the drug used. Thus, phenytoin will be administered at 2.5mg/kg twice a day and phenobarbital at 3-5 mg/kg once a day. If the patient is able to tolerate oral medication, provide the maintenance orally.

If the seizures are refractory to second line treatment, consider use of continuous infusion of a benzodiazepine suh as midazolam or use of anaesthetic agents like thiopental. Ideally, such considerations should be made in consultation with a senior health worker, with a view for referral to a secondary or tertiary health facility with capability for close monitoring and mechanical ventilation if necessary.

- ***Other therapy***

Depending on the results of investigations and identification of the underlying pathology, institute the appropriate therapy (for instance, if meningitis, start IV antibiotics).

5.3.2 Further diagnostic procedures

Consider imaging (CT scan or MRI) if there are any lateralising signs.

Important:

The medical emergency is stop the convulsions. Other investigations to establish the cause are considered important but secondary.

5.3.3 Short history

- Is the patient known to suffer from epilepsy? Did he/she take antiepileptic drugs? Did he discontinue the intake? If so, when?
- Is the patient known to use alcohol or other drugs? Did he/she discontinue using this recently?

- Whether any symptoms have been noticed that might indicate a disorder likely to cause convulsions?
- When was the last meal taken?
- Were any alternative medicines, especially herbs, taken recently?

  (The answers to the last three questions above could indicate a hypoglycaemic state.)

5.3.4 Diagnostic procedures

- Do a quick blood glucose level test.
- Draw blood for laboratory investigations (full haemogram, peripheral blood film, blood smear for malaria blood glucose, calcium, electrolytes and urea).
- Lumbarpuncture to be done when fever is present or patient's immune system function is poor.
- Other investigations to be done after the seizures are under control.

5.4 Febrile Seizures

Febrile seizures are seizures associated with fever in the absence of central nervous system infection or acute electrolyte imbalance in a young child. They may occur before the fever is apparent and early or late in the course of a febrile illness. Febrile seizures are defined as occurring between 6 months and 6 years of age and are mostly brief (less than 10 minutes), generalised tonic-clonic seizures but about 4-16% may have focal features. Recently, febrile myoclonic seizures have been described. The prevalence of febrile seizures is around 8% in children of up to 7 years of age. Febrile seizures are essentially benign and have normal cognitive outcome.

The differentiation therefore between seizures secondary to central nervous system infection / pathology, typical febrile seizure and finally seizures triggered by fever in children with epilepsy is important.

Thirty per cent of children have recurrent typical febrile seizures during subsequent illnesses. Typical febrile seizures are classified as simple or complex.

Complex (atypical) febrile seizures are associated with an increased risk of epilepsy.

Complex (atypical) febrile seizures are defined by at least one of the following features: duration longer than 15 minutes, multiple seizures within 24 hours, and focal features. These features are absent in simple febrile seizures, which make up 75% of these seizures.

Other risk features in complex (atypical) febrile seizures, include neurological abnormality, a family history of epilepsy, and short duration of fever (<1 hour) before the seizure.

5.4.1 Management of Typical Febrile seizures

An important factor in managing febrile convulsions lies in fever control. Parents and care givers need to be given precise advice on fever management using tepid sponging or bathing and antipyretics e.g. paracetamol 10 - 15 mg/Kg per dose 6-8 hourly and/or ibuprofen 10 mg/Kg/dose 8 hourly. However, some children still go on to have a seizure even with adequate temperature control.

Acute treatment is indicated for prolonged seizures. Where a seizure continues for more than five minutes, diazepam should be administered, either 0.3mg/Kg slowly intravenously or rectally at 0.5mg/Kg. A 1 or 2 ml syringe can be used for this. (Do not give intramuscularly due to slow and irregular absorption.) If the seizures are not abolished within 10 minutes, the status epilepticus protocol should be adopted.

No evidence exists that prophylactic anticonvulsant drugs improve outcomes in children with typical febrile seizures or prevents development of epilepsy. Considerable potential for side effects exist and given the benign prognosis of typical febrile seizures, prophylactic treatment is generally not indicated.

5.5 Prognosis of Epilepsy

Early onset of treatment with good compliance improves outcomes in epilepsy. In general, studies have indicated that seizures can be satisfactorily controlled in over 70% of all patients using current medication but about 15% remain refractory to all therapeutic measures. This group of patients have considerably higher incidence of epilepsy associated co-morbidities. Generalized idiopathic epilepsies have better prognosis than symptomatic epilepsy. The following are factors associated with poor prognosis:

- A combination of different seizure types in one patient (as in symptomatic or cryptogenic generalized epilepsy)
- Complex partial seizures
- Somatic neurological deficits
- Psychiatric abnormalities
- Neonatal seizures
- Infantile spasms
- Occurrence of status epilepticus

5.6 Prevention of epilepsy

The following measures should be considered in the prevention of epilepsy:

- Education and improvement of community awareness regarding aetiology, presentation, management and outcomes of Epilepsy would help institute implementation of preventive strategies and reduce stigma associated with Epilepsy.
- Provision of accessible and effective maternal services especially at the time of delivery to save the mother and prevent life-long disabilities from birth asphyxia or trauma in the new-born child
- Early diagnosis and adequate treatment of meningitis and encephalitis
- Prevention of malaria attacks (mosquito nets, etc.)
- Prevention of neuro-cysticercosis (hygiene; no raw human manure for agriculture)
- Completion of vaccination schedules for all children under five years.

- Prevention of road traffic accidents, traumatic occupational hazards, and other causes of head injury.
- Improve treatment and management of other conditions, such as metabolic disturbances e.g. hypoglycaemia, electrolyte imbalance and hyperbilirubinaemia that may worsen the outcomes of Epilepsy.
- Improvement in treatment and management of prolonged febrile convulsions
- Effective and early treatment of seizures and status epilepticus so that further brain damage is prevented.
- Genetic counselling where a hereditary disease is diagnosed.

The following illustrates some precipitating factors and possible preventive measures.

Table 5.4.1.3 :Seizure precipitating factors

Some common Seizure Precipitating factors	
Flashing lights	When watching TV, sit in a well-lit room and as far as possible from the TV screen
Alcohol and substance abuse	Avoid alcohol and other intoxicating drug
Hypoglycaemia	Do not skip meals, eat at regular times
Physical stress	Understand your individual body limits and do not exceed them. Regular physical exercise may be beneficial.
Mental stress	Stress cannot always be avoided but should be minimised wherever possible. Seek counselling to help you cope with Epilepsy.
Sleep deprivation	Sleep adequately (6-8 hours each night)
Systemic illness	Should be treated promptly

CHAPTER 6: CONDITIONS CO-EXISTING WITH EPILEPSY

Epilepsy like any other disease may coexist with other conditions. The coexistence of these conditions affects the choice of treatment for epilepsy and prognosis.

The following are some of the common conditions that co exist with epilepsy.

6.1 Cerebral Palsy

Cerebral palsy is classified into the following syndromes:

- Spastic (hemiplegic, tetraplegic and diplegic)
- Ataxic
- Dyskinetic (choreo-athetotic and dystonic)

Epilepsy is most common in the spastic and rare in the ataxic and dyskinetic syndromes.

6.2 Cognitive impairment

Children with cognitive impairment have a higher incidence of epilepsy compared to the general population. However, cognitive impairment is not more common in patients with epilepsy.

6.3 Psychiatric Disorders

Epilepsy is not a mental disease, although a small number of patients will develop psychiatric problems. This is more likely when there is organic brain damage, an early age of onset, a chronic form of epilepsy, special location (e.g., temporal lobe epilepsy), or a difficult adjustment to social surroundings.

When the psychiatric problems need medical treatment, it must be remembered that Chlorpromazine (Largactil) and Haloperidol (Serenace) lower the threshold for seizures. If possible, benzodiazepines or other less seizure-inducing drugs should be used.

6.4 Behavioural Disorders

Epilepsy may be associated with behaviour problems such as hyperactivity, irritability, lack of concentration and aggression. Behaviour problem may also occur as a side-effect of medication (phenobarbitone or clonazepam).

6.5 Learning Disorders

Unfavourable environmental factors for children with epilepsy at school and at home causing emotional problems might be the most important factors causing learning disorders and social under-achievement.

Causes of learning disabilities include:

- Presence of actual seizures
- Presence of subclinical epileptic activity
- Structural brain abnormality
- Inappropriate use and side-effects of anticonvulsant drugs

6.6 Dementia

When there are many long-lasting seizures or repeated status epilepticus, loss of nerve cells results in the development of cognitive impairment. Early and quick medical control of seizures is therefore very important.

CHAPTER 7: EPILEPSY IN SPECIAL GROUPS

7.1 *Epilepsy in the Elderly*

People age sixty and over may experience unusual feelings such as lost time appreciation, suspended awareness and confusion as part of a seizure and may wrongly attribute the symptoms to old age. The clinician should take a history of common conditions of old age such as hypertension, stroke, diabetes, dementia etc; whose symptoms can mimic seizures. This may delay diagnosis of epilepsy in this age group.

7.1.1 Seizure Types

Partial seizures particularly complex partial seizures are common in the elderly because secondary epilepsy is a common entity. However, other types such as secondary generalized seizures and atonic seizures may also be seen.

7.1.2 Causes/ Risk Factors of Epilepsy in the Elderly

- Genetic / Unknown
- Hypertension / Stroke
- Head Injury
- Ischemic heart disease with attendant cerebral ischemia
- Complications of kidney and Liver diseases
- Alcoholism
- Diabetes
- Brain tumours
- Brain Surgery with cortical scarring
- Central nervous system infections (Cerebral malaria, Meningitis, HIV etc.)
- Idiopathic

Appropriate investigations are particularly important in this age group and should therefore be requested depending on clinical evaluation.

7.1.3 Clinical Presentation

Clinical manifestations such as confusion, disorientation, odd behaviour or reduced alertness may be dismissed as 'problems of old age' hence delaying diagnosis of epilepsy. Seizures occurring at night are more common. Clinicians should have a low threshold for making diagnosis of epilepsy in the elderly and request appropriate investigations like blood workups, EEG and neuroimaging . The majority of seizures and epilepsy occurring at this age are likely to be secondary. Similarly, all the causes of epilepsy at this age group can have symptoms and signs of impaired consciousness as a non-epileptic phenomenon which should not be mistaken for seizures and vice versa.

7.1.4 Antiepileptic Drug Therapy

Elderly people with epilepsy are often on multiple medications. They may be on antihypertensives, anticoagulants, oral hypoglycaemic agents or insulin, statins, ARVs etc. It is therefore important to particularly review these drugs interactions with antiepileptic drugs.

- Avoid carbamazepine and benzodiazepines because they may cause undue prolonged drowsiness in the elderly thereby increasing the risk of falls with consequent injury.
- It is important to have directly observed drug administration as the elderly may have memory loss.
- Elderly people have slower drug metabolism which may affect dosing schedules and increase the risk drug intoxication from cumulation.

7.2 Epilepsy during child bearing years

Women of child bearing age who have epilepsy should be keenly followed up. Preconception counselling and review of antiepileptic drugs has a significant role in improving the quality of life of the mother and the offspring. Folic acid given at a dose of 5mg taken once a day reduces the incidence of neural tube defects in up to 85% of the children.

7.2.1 Terratogenicity

It has been established that foetal exposure to anti-epileptic drugs (AEDs) in the first trimester increases the incidence of foetal malformations. There are minor and subtle effects of maternal epilepsy and its treatment on the new born such as low verbal intelligence, earning difficulties, mild cognitive deficits that may go unrecognized. Generally, there is a 3% teratogenic risk for pregnant women with epilepsy. The use of sodium valproate at doses over 1.5g per day alone increases the risk to more than 20%. An even higher risk is present when the drug is used in combination with any other antiepileptic drugs including carbamazepine and phenobarbitone or phenytoin. The use of valproate or polypharmacy during pregnancy should be avoided as far as possible. When appropriate and the patient can afford newer safer drugs such Lamotrigine have been recommended.

7.2.2 Pregnancy

The aim of epilepsy treatment is to have well controlled epilepsy and a normal healthy offspring devoid of malformations and capable of developing normally not only physically, mentally, socially and intellectually. A multidisciplinary approach to management is advocated.

About a third of pregnant mothers have a decrease in seizure frequency. The apparent improvement of seizure control may be due to the rising progesterone levels in pregnancy as progesterone is known to have anticonvulsant effects. An appreciable proportion of mothers will have their seizure control deteriorate. In some of these patients the cause may be non-adherence due to concern over teratogenicity. Such mothers should be counselled regarding the equally harmful effects of having seizures during pregnancy including premature births and abortions. Co-morbid diseases such as diabetes mellitus, hypertension, HIV/AIDS, anaemia, and infections should promptly and optimally managed as these may adversely affect the outcome.

7.2.3 Labour and Postnatal period

During labour 1 – 2% of mothers may have generalised tonic-clonic seizures or present with poorly controlled focal dyscognitive seizures and

Caesarean Section may at times be resorted to. Intravenous Lorazepam [4mg] is given in repetitive or prolonged seizures in preference to phenytoin. It has been shown that intravenous phenytoin inhibits myometrial contraction and therefore should be avoided in labour. Vitamin K should be administered routinely for all babies born of mothers on antiepileptic drugs to prevent the risk of hemorrhagic disease of newborn.

Postnatally, patients should be evaluated for seizure frequency to determine if the dosage of the AEDs should be updated. .

Breastfeeding poses a challenge, however, in our set up it must be encouraged and the baby watched closely. Anti-epileptic drugs can cross into breast-milk and therefore the neonate should be monitored for neurodevelopmental outcomes.

The clinician should watch for irritability and drowsiness in the neonate. This may be a manifestation of AED toxicity at this age or more likely manifestation of rapid withdrawal. It is also important to educate the mother on handling of the baby, taking into account that drowsiness is a common side effect of AEDs. Maternal fatigue and sleepiness that often ensues in the immediate post natal time can lead to accidental dropping and suffocation of the neonate.

Important:

Over 90% of pregnant mothers with epilepsy have a perfectly uneventful pregnancy, child delivery and postnatal period with a perfectly normal offspring. It is, however, crucial for the clinician to be vigilant in the 10% or so of the cases who may have complications during pregnancy and thereafter

7.3 Epileptic seizures in Neonates

Generalised tonic-clonic seizures do not occur in neonates, most seizures being localised, fragmentary, clonic, tonic, or myoclonic. Many are ‘subtle’ and consist of abnormal movement patterns such as mouthing/chewing, bicycling or boxing

or apnoea, and are frequently unrecognised. However, not all abnormal movements are seizures. Neonatal seizures may be both over- and under-diagnosed. This difficulty in seizure recognition is greatest in premature infants. Appropriate investigations should include laboratory work up, EEG and neuro-imaging as appropriate.

7.3.1 Aetiology and onset of neonatal seizures

7.3.1.1 Within 24 hours of birth

- Perinatal asphyxia
- Periventricular haemorrhage
- Hypoglycaemia
- Sepsis including meningitis
- Congenital infection (herpes simplex, rubella, cytomegalovirus, toxoplasmosis)
- Laceration of the tentorium or falx (perinatal trauma)
- Cerebral malformation/dysgenesis
- Drug withdrawal
- Pyridoxine deficiency or disorders of pyridoxine metabolism

7.3.1.2 At 24-72 hours

- Metabolic disorders (non-ketotic hyperglycaemia, urea cycle disorders)
- Benign familial (autosomal dominant) neonatal convulsions
- Hypocalcaemia
- Brain contusion with subdural haemorrhage
- Kernicterus

7.3.1.3 At 1 week

- Cerebral malformations/dysgenesis
- Herpes Simplex (acquired)
- Ketotic-hyperglycaemia
- Maple Syrup Urine disease and other metabolic diseases

7.3.2 Investigations

- Blood glucose, calcium, magnesium, electrolytes and acid-base status
- Complete blood count and film
- Cerebrospinal fluid examination (glucose, protein, cell count)
- Cultures of blood, cerebrospinal fluid, urine
- Cranial ultrasonography
- Neuro-imaging where possible

7.3.3 Treatment

Any underlying aetiology such as drug withdrawal, electrolyte disturbance or a treatable underlying metabolic disorder, including hypoglycaemia should be corrected or treated.Anticonvulsant treatment is virtually always indicated if a correctable metabolic cause is not identified; pyridoxine should be given early if seizures are resistant to conventional anticonvulsant therapy.

Phenorbarbitone and Phenytoin tend to be the first-line antiepileptic drugs.

7.4 Epilepsy in Children

Most epilepsy has an onset or occurs in childhood, usually before 15 years of age.Epilepsy is at its most varied in childhood and particular attention needs to be given at making the correct diagnosis and using appropriate treatment. Ageing and growth have important effects on drug dose requirements and drug metabolism. Acute seizures are also common in these age groups and should be ruled out.

7.5 Epilepsy and Adolescents

Some types of epilepsy like GTCS on awakening and JME are more likely to manifest during teenage years. Sleep deprivation, photosensitivity, alcohol and substance abuse and stresses such as school examinations are common triggers. Partial seizures can also present during adolescence and are due to recurrence of a childhood condition such as one or more prolonged febrile convulsions in infancy.

The choice of appropriate treatment should be considered.

1. Choose a drug that is well tolerated.
2. Bear in mind that an adolescent may be using hormonal based contraception.
3. Choose a simple regimen that will enhance compliance (dose frequency).

The teenage years too are an appropriate time for counselling on contraception, clarifying possible side effects of AED, predicting prognosis and drug withdrawal.

Driving, social interactions and career advice are other issues that the clinicians caring for adolescents with epilepsy must address.

CHAPTER 8: SOCIAL ASPECTS OF EPILEPSY

Any seizure is a frightening experience, especially for the parents and close relatives of anyone with epilepsy. The frightening experience of the seizures can make people try any available means to lessen their severity e.g. witchcraft, herbal treatment, offerings, prayers and also modern drugs. As complete cure is the real aim, various treatments are tried and/or discarded while others are adopted and tried sometimes simultaneously.

8.1 *Myths and misconceptions*

Throughout the world and ages epilepsy has been regarded as a supernatural happening as it is inexplicable and unpredictable. It is often believed to be a consequence of possession, curse(s), witchcraft or punishment for some ancestral error. Epilepsy is often believed to be a contagious disease, and that anyone who touches the patient or his excreta, will acquire the disease themselves. Some people may believe in prayers more than drugs. A healthcare provider should assure the person that taking AEDs does not mean lack of faith in God.

8.2 *Facts about epilepsy*

Epilepsy is a medical condition often with identifiable causes. It is not contagious and anyone can touch a patient while having a seizure. It is not as a result of possession, not a curse, witchcraft and not a punishment from ancestors.

8.3 *Social considerations before treatment*

Before starting treatment some aspects of epilepsy have to be made clear to enhance compliance and follow up:

- Drugs have to be taken for many years, possibly a life-time.
- About 30% of the patients may not respond to AED treatment
- Sudden discontinuation of the drugs may result in recurrence of the seizures or in life-threatening status epilepticus.
- It may take several days to a few weeks before the drugs have any effect.
- A combination with herbal treatment might be dangerous as interaction

between the drugs and the herbs cannot be predicted.

- The disease is not contagious and anyone can touch the person while they are having a seizure (e.g. to remove them from the danger of fire or water) or in between the seizures.
- If the child is of normal intelligence he should be placed in a normal school.
- Over-protection is not helpful in a child's upbringing, but reasonable precautions should be taken if there are still occasional seizures (e.g. protection from fire, swimming under supervision, not climbing trees).
- Epilepsy has to be talked about in the family, at school or in the work surroundings.
- Epilepsy is not a reason for being unable to marry and have a family.

8.4 *Epilepsy and Employment*

Career choices should be based on an individual's potential e.g. personality, ability and attitude and exposure to potential triggers and precipitators of seizures. Employment opportunities for people with epilepsy are hampered by:

- Seizure type and frequency.
- Physical, neurological and psychiatric/behavioural disorders.
- Presence of learning disability
- Epilepsy stigma.

Only a few jobs are potentially hazardous since onset of a seizure may lead to injury to self or others e.g.:

- Driving (Public Service Vehicles, trains, etc.)
- Piloting (airplanes)
- Operating unguarded machinery
- Electrical tasks
- Climbing heights
- Military, police and fire services
- Handling valuables/fragile equipment

8.5 *Epilepsy and driving*

Persons with active epilepsy should be advised not to drive or operate motorized vehicles.

8.6 *Epilepsy and Human rights*

Rights for persons with epilepsy

Persons with epilepsy have basic human rights like anyone else. However, not all of them are well informed about these rights. This may make it difficult for them to stand up for these rights when others abuse or violate them. Service providers for persons with epilepsy are advised to contribute in the awareness creation of their rights so that they feel encouraged to make use of them:

1. The right to life
2. The right to human dignity
3. The right to security
4. The right to be treated equally with others
5. The right not to suffer discrimination.
6. The right to education
7. The right to health
8. The right to fair conditions of work
9. The right to informed consent for treatment
10. Right to refuse treatment

Persons with epilepsy also have extra rights if they are hindered in carrying out their day-to-day activities due to any 'physical, sensory, mental, psychological or other impairment, condition or illness' such as:

1. The right to be treated with dignity and respect and to be addressed and referred to in a manner that is not demeaning
2. The right to be educated in schools and other institutions that are integrated
3. The right to reasonable access to all places, public transport and information
4. The right to have materials and devices to overcome challenges arising from their physical challenge

5. The right to participate in all matters taking place in Kenya, including standing for Parliament or county governments

If their rights are violated, they can report the case to the police, seek legal advise or obtain assistance from: The Kenya National Commission on Human Rights (KNCHR), The National Cohesion and Integration Commission (NCIC), The Kenya Human Rights Commission (KHRC), Kituo Cha Sheria and The Federation of Women Lawyers (FIDA-K).

APPENDICES

Appendix 1: Organisation of Epilepsy Services

Epilepsy management at various Levels of Health Care Provision:

Community Level: At the community level, it is important to sensitize the public in recognition of seizures and encourage them to seek medical help. Of particular importance are schools. Teachers can be very helpful in recognizing pupils and students who may have seizures while in class and refer them to health care facilities. Administration of rectal diazepam should be taught to mothers with children who have epilepsy. The community should also be sensitized on principles of First Aid to a person having a seizure attack.

Primary Referral Level:

The Primary Care level is the first point of contact for the patient and this would usually be at community, dispensary and health centres. Currently care providers at this level are Clinical Officers, Nursing Officers and Community Health Workers. First Aid principles should be well known and administration of intravenous diazepam or rectal diazepam should be effected where necessary. Commencement of basic AEDs such as phenobarbitone, phenytoin and carbamazepine can be done after adequate clinical diagnosis.

National Referral Level: Patients with secondary epilepsy who may require more advanced diagnostic facilities such as brain CT-scans or brain MRI scans and those with difficult to manage epilepsy should be referred.

Clinicians in the respective levels will be trained and retrained to ensure quality epilepsy care

Criteria for Referral:

Patients should be referred to the next level of care for appropriate management if there is:

- Failure to make a satisfactory diagnosis at primary level
- Failure to respond to adequate treatment

- Evidence of complications or focal neurological deficit and drug reactions
- Pregnancy
- Breakthrough seizures
- Co-morbidity.
- Epilepsy with heavy genetic links
- Recurrent febrile seizures

Appendix 2: Antiepileptic Drugs (AEDs)

PHENOBARBITONE

Starting dose
Newborns: 15-20 mg/kg once only (loading dose)
Children: 30 mg daily (N.B. children with febrile convulsions 5 mg/kg immediately, usually 45-60 mg daily)
Adults: 60 mg daily.

Increments
30 mg every 4 weeks.

Maintenance dose
Newborns: 3.5 mg/kg/day
Children: 2-6 mg/kg/day
Adults: 0.5-4 mg/kg/day, maximum 180 mg/day.

Elimination half-life time
Newborns: ± 100 hours
Children: 30-70 hours
Adults: 60-150 hours

Infants and children metabolize phenobarbitone quicker than adults. Therefore a higher dose per kilogram body weight has to be given. But in newborns, half-life is longer—up to 100 hours and in pre-term newborns it is up to 200 hours.

Steady state (reached after five times the half-life)

- Reached in children in one and half weeks after starting therapy
- Reached in adults in 3-4 weeks after starting therapy.

Dose frequency
In children and adults: once daily
In infants: twice daily.

Indications

First drug in:

- Primary and secondary generalized tonic-clonic seizures

Not indicated in

- Absence seizures
- Seizures which occur mainly during sleep
- Children with hyperactive behaviour.

Interactions

Phenobarbitone decreases the serum levels of:

- Bilirubin, folate, cortisol, vitamin D and K
- Carbamazepine, phenytoin, valproate
- Chloramphenicol in neonates, doxycycline
- Digitoxin, griseofulvin, warfarin
- Contraceptive hormones

Phenobarbitone levels are increased by:

- Phenytoin, valproate
- Frusemide

Pregnancy

During pregnancy the phenobarbitone level tends to fall and it rises again in the puerperium.

Toxicity

Local effects

- Very rare

  Dose-determined effects
- During the first few days of treatment drowsiness may occur, but this disappears by itself without reducing the dosage
- When increasing the dosage drowsiness may recur, now a sign of toxicity, and

  dosage should be reduced

- Hyperactivity and irritability occur in some children but the condition of the children should be noted before treatment is started: the irritability and hyperactivity might be due to organic brain damage rather than the phenobarbitone
- Decline in scholastic performance, lethargy, hyperactivity, ataxia
- Confusion in the aged.

Idiosyncratic effects

- Skin rash, exfoliative dermatitis, porphyrinuria
- Agranulocytosis, aplastic anaemia, jaundice and hepatitis, but very rarely. Dupuytren's contracture and frozen shoulder are more common.

Effects on the foetus and newborn

- Congenital malformations are sometimes associated with phenobarbitone therapy especially when caffeine or other anticonvulsants are used in addition
- Increased bleeding tendency due to decreased vitamin K levels in the newborn
- Phenobarbitone-withdrawal syndrome (hypotonia and irritability) in newborns born to mothers on phenobarbitone treatment—may be prevented by breastfeeding.

Breast milk

Phenobarbitone is present in breast milk, and sometimes produces drowsiness in infants when the mother is on a high dosage.

PHENYTOIN (DIPHENYL HYDANTOIN)

Starting dose
3 mg/kg/daily
For instance:

1-6 years:	50 mg daily
7-14 years:	100 mg daily
Adults:	200 mg daily

Increments
25 mg in children every 3-4 weeks
50 mg in adults every 3-4 weeks.

Maintenance dose
3-8 mg/kg/daily (maximum 400 mg if serum levels are not available. If they are available, serum level generally to be kept below 20 µg/ml, but may exceed this level if need be and if toxicity is not a problem).

Elimination half-life time (From 9-140 hours).
The half-life depends on the dosage and the duration of intake. The elimination time becomes longer the higher the dosage. On the other hand, when treatment is started, people metabolize phenytoin slower until more liver enzymes are induced. The enzyme system is satiable, therefore at higher doses a small increase in the dosage could suddenly result in a toxic phenytoin serum level. Patients who, on genetic basis, metabolize phenytoin slowly will get intoxication more easily.

Children metabolize quicker and therefore need more mg/kg a day than an adult. Increments should never be 100 mg, but 50mg in adults and 25 mg in children.

Steady state
Steady state is reached in 7-30 days after starting therapy.

Dose frequency

In children:	Twice daily
In adults:	Once daily (unless gastrointestinal discomfort, then divide in two dosages)

Absorption
Absorption is different in tablets and capsules from different manufacturers. If possible, do not change suddenly from one manufacturer to another. If such a change is unavoidable, consult.

Indications
As first drug in:

- partial seizures with or without secondary generalization.

Also active in:

- primary generalized tonic-clonic seizures (beware of provocation of absence seizures)
- status epilepticus

NB: Phenytoin is not indicated in absence and myoclonic seizures or febrile convulsions.

Interaction
Phenytoin decreases the serum levels of:

- Folate, vitamin D, griseofulvin
- Carbamazepine, clonazepam
- Contraceptive hormones
- Vitamin K in newborns

Phenytoin sometimes *increases* the levels of phenobarbitone

The phenytoin level may be *increased* by INH, rifampicin and ketoconazole.

Toxicity
Local effects

- Slight upper abdominal discomfort, nausea, vomiting.
  Dose-determined effects
- Nystagmus, ataxia, diplopia, drowsiness, slurred speech, vomiting, choreiform movements
- Gingival hyperplasia, can be reduced by good dental hygiene (regular teeth brushing)
- Hirsutism, acne, coarse facies
- Re-occurrence of seizures
- Cerebellar syndrome.

Idiosyncratic effects

- Morbilliform rash rarely progressing toexfoliative dermatitis
- Lymphadenopathy, fever, eosinophilia
- Bone-marrow depression
- Hepatitis.

Effects on the foetus and newborn

- There is an increased occurrence of cleftlip and palate, and increased congenital heart malformations.
- In the newborn vitamin K deficiency with bleeding may occur.

Breast milk

- Phenytoin is present in breast milk but in amounts too small to be harmful. Breastfeeding should therefore be encouraged

CARBAMAZEPINE

Starting dose (First week administer half the starting dose)

Under 1 year:	100 mg daily
1-5 years:	150 mg daily
6-10 years:	200 mg daily
11-15 years:	200-300 mg daily
Adult:	200-400 mg daily.

Increments

Children:	50 mg weekly
Adults:	100 mg every 1-2 weeks.

Maintenance dose

Children:	10-30 mg/kg/day
Adults:	10-20 mg/kg/day (400-1400 mg).

Elimination half-life time

- Up to 36 hours after the first dose

- Decreasing to up to 12 hours when taken regularly, and even shorter when combined with phenobarbitone and/or phenytoin.

Steady state
Reached in up to 8 days

Dose frequency
- 2 times daily when it is the only drug
- 3 times daily when the dosage is high or in combination with other drugs.

Indications
- Benign childhood epilepsy with centrotemporal spikes - childhood epilepsies with occipital paroxysms
- All other partial seizures, with simple and complex symptomatology
- Primary generalized tonic-clonic seizures (beware of provocation of absence seizures)
- Secondary generalized tonic-clonic seizures.

NB: Carbamazepine is not indicated in absence and myoclonic seizures or febrile convulsions.

Interactions
- Carbamazepine decreases the serum levels of folates, warfarin, doxycycline and oral contraceptives
- Carbamazepine serum levels are decreased by phenytoin and phenobarbitone
- Carbamazepine levels are increased by erythromycin and INH.

Toxicity
Local effects
- Occasionally anorexia, nausea or vomiting

Dose-determined effects
- Headache, dizziness, somnolence, ataxia,disturbed vision, diplopia

- Over dosage might give tremor, excitation and convulsions.

Idiosyncratic effects
- Hepatitis, jaundice, fever
- Skin rashes (especially sunshine induced), generalized erythema, erythema multiforme exudativum (Stevens-Johnson syndrome), exfoliative dermatitis, lymph-node swelling
- Aplastic anaemia, leucopenia, neutropenia.

Effects on the foetus and newborn
Congenital malformations have been reported (spina bifida). Treatment with carbamazepine can be continued during pregnancy when given as monotherapy.

Breast milk
Carbamazepine passes into the breast milk, but not in sufficient amounts to stop breastfeeding.

VALPROIC ACID (valproate; dipropylacetic acid)

Valproate is manufactured either as the acid, the sodium salt (sodium valproate) or the magnesium salt (magnesium valproate).

Starting dose

Children:	15-20 mg/kg/day
Adults:	10-15 mg/kg/day

For instance:

1-2 years:	150-200 mg daily
3-5 years:	200-300 mg daily
6-10 years:	300-400 mg daily
11-15 years:	450 mg daily
Adults:	600 mg daily

Increments

In children: 100 mg after 4 weeks

In adults: 200 mg after 4 weeks

Maintenance dose

10-30 mg/kg/day (in adults 600-2400 mg daily).

Elimination half-life time

Approximately 16 hours.

Steady state

Reached in 3-4 days.

Dose frequency

Three times daily.

Indications

- Absence seizures
- Myoclonic forms of generalized epilepsy
- All generalized tonic, clonic or tonic-clonic seizures. -All varieties of partial seizures.
- Photosensitive epilepsy.

NB Valproic acid should be avoided in hepatic impairment

Interactions

- Valproate increases the serum level of phenobarbitone, lamotrigine, phenothiazines and antidepressants
- Valproate levels are decreased by phenytoin and phenobarbitone but not by carbamazepine.

Toxicity

Local effects

- Mild such as nausea, vomiting, diarrhoea may occur, mainly at the beginning of treatment. Decreased or increased appetite with weight gain may occur if the tablets are not enteric-coated gastric distress is frequent.

Dose-determined effects

- Tremor, weakness, ataxia
- Excitement, mental stimulation.

Idiosyncratic effects

- Thrombocytopenia and prolonged bleeding time
- Acquired factor VIII deficiency (*von* Willebrand disease) –
- Hair loss (temporary and reversible)
- Impaired hepatic function, especially in children under two years on polytherapy (but an isolated increase in gamma GT in some cases is not a reason to lower the valproate dose)
- Polycystic ovaries
- Pancreatitis.

Effects on the foetus and newborn:

- Risk higher than in other AEDs, in particular spina bifida.

Breast milk

- Valproate passes into the breast milk but this is not a reason to stop breastfeeding.

CLONAZEPAM

Starting dose

0.01-0.03mg/kg/day

For instance:

Up to 1 year:	0.125 mg daily
1-5 years:	0.250 mg daily
6-12 years:	0.500 mg daily
Adults:	1 mg daily.

Increments

Children under 6 years: 0.250 mg after 4 weeks

Children over 6 years:	0.500 mg after 4 weeks
Adults:	1 mg after 4 weeks.

Maintenance dose

Up to 1 year:	0.5-1 mg daily
1-5 years:	1-3 mg daily
6-12 years:	3-6 mg daily
Over 12 years:	4-8 mg daily.

Elimination half-life time

20-60 hours.

Steady state

Reached in 8-14 days.

Dose frequency

- A once-daily dose is possible in adults
- In children it should be divided into 2-3 doses.

Indications

- Symptomatic generalized epilepsy
- Idiopathic epilepsy
- Status epilepticus
- Myoclonic seizures.

Interactions

- Clonazepam serum levels are decreased by phenobarbitone, phenytoin and carbamazepine
- Clonazepam increases the effects of alcohol.

Toxicity

Local effects

Almost no local effects.

Dose-determined effects

- drowsiness, fatigue, dizziness, muscle weakness, ataxia
- increased bronchial excretion and salivation
- paradoxical aggression, irritability, hyperactivity.

Idiosyncratic effects

Skin rash (very rarely).

Teratogenic effects

An increased risk of oral clefts has been reported.

Breast milk

Lethargy and weight loss may occur in infants.

Note:

A good measure of tolerance is usually developed so that the dosage has to be increased over time to give the same antiepileptic effect. If this tolerance has caused the clonazepam to reach too high a dosage, it is better to withdraw the clonazepam very gradually and to introduce another antiepileptic.

Caution:

Never stop Clonazepam therapy suddenly. Severe withdrawal symptoms may occur and a status epilepticus be introduced.

DIAZEPAM

This drug is mainly used as first line treatment for status epilepticus, or prolonged febrile convulsions. It is given intravenously or rectally (do not give intramuscularly as then action is unpredictable and absorption slow).

- Dosage in status epilepticus or prolonged febrile convulsions (up to 10 years of age): 0.3 mg/Kg. The drug is administered intravenously at an approximate rate of 1mg/minute.15-20 mg in older children and adults

Side-effects

Respiratory depression is possible, especially if patient is on maintenance dose of phenobarbitone.

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