

INDIAN EPILEPSY SOCIETY
Guidelines for the
Management of Epilepsy
in India



INDIAN EPILEPSY ASSOCIATION-
18th INTERNATIONAL EPILEPSY CONGRESS TRUST

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Foreword

Epilepsy is a common neurological disorder affecting an estimated 50 million people worldwide. It has rightly been considered to be a public health problem prompting World Health Organisation (WHO), the International League Against Epilepsy (ILAE) and the International Bureau for Epilepsy (IBE) to launch the Global Campaign. Against Epilepsy in 1997. India accounts for nearly 10- 20% (5 to 10 million) of global burden of epilepsy and has to face the mammoth challenge of providing care to people with epilepsy, particularly to those living in rural and remote areas with scarce health facilities.

In the developed countries the medical care is provided by epileptologists / neurologists, but the scenario in India is quite at variance in view of limited number of qualified neurologists. In India, there is just one neurologist for a population of 1.25million, in stark contrast to USA where there is one neurologist for just 26,200 population. While this target is not likely to be achieved in a long foreseeable future, there is an urgent need to adopt alternative strategies to provide epilepsy care at the community level. Our cause is aided by the fact that epilepsy care is also provided by pediatricians, psychiatrists and neurosurgeons.

Despite all efforts to provide epilepsy care, there remains a wide treatment gap of 38 to 80% which needs to be bridged with optimal utilization of available manpower and resources. The primary care physicians or general practitioners form the backbone of health care in the country and therefore can be entrusted with the responsibility of providing epilepsy care. Regrettably, information, skills and knowledge essential for diagnosis and treatment of epilepsy is not included in the syllabus of undergraduate training programme.

The Indian Epilepsy Society recognizing this lacuna took the lead to develop guidelines for the management of epilepsy in India (GEMIND). The unstinting effort, patience and leadership of Dr Satish Jain, was the force behind this effort. The expert members of the Core Committee gave their valuable time in contributing to the guidelines and the peer reviewers gave valuable suggestions. With advances in understanding of the basic mechanisms underlying epilepsy and changing trends in treatment, we foresee that GEMIND will undergo modifications from time to time.

We ardently hope that the general practitioner will find GEMIND a useful guide in clinical practice in diagnosis and treatment and help people with epilepsy with better management resulting in an improved quality of life.

Prof M Gourie-Devi

President, Indian Epilepsy Society

Dr V S Saxena

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New Delhi, 1st October 2008

Preface

Epilepsy is characterized by recurrent unprovoked seizures. Epilepsy is a chronic disorder that has been known to mankind since its own existence. As per the WHO, epilepsy is the one of the most common serious brain disorders that affects not only the individual, but also has impacts on the family and the society in general. Epilepsy affects all ages, races, and social classes across all geographical boundaries. As per estimates, there may be about 5-10 million people with epilepsy in India accounting for almost one-fifth of the global figures.

Despite its varied etiology, majority of epilepsy cases can be successfully treated with simple medicines, more often with only one type of drug. Although the treatment of epilepsy in most cases is simple, the drugs very often have to be taken for a long duration. It has been estimated that with proper treatment, 70-80% of people with epilepsy (PWE) can lead normal lives. Unfortunately, in most developing countries 50-70% PWE have been estimated to receive either no treatment or inadequate and inappropriate treatment, more often due to inadequacies in the health care resources and societal stigma. Even for those getting some form of treatment, we have no guidelines at the national level in any country among the developing world.

The need for instituting 'Guidelines for the Management of Epilepsy in India' was first stressed in his Presidential Oration by Dr VS Saxena. This was subsequently discussed in the General Body Meeting of the Indian Epilepsy Society (IES) in the annual conference at Jaipur in 2005. The members suggested that the IES should now start working towards forming "Guidelines for the Management of Epilepsy in India". The need to have our own guidelines was under discussion among the members during the next two years.

Epilepsy being a common condition and the number of epilepsy specialists/neurologists in India is limited, many people with epilepsy are being diagnosed and treated by non-specialists in both primary and secondary care. It is obvious that management can many times be sub-optimal in diagnosis, drug treatment, management of children and pregnant women with epilepsy and management of poorly controlled seizures and status epilepticus with limited resources. Further, a large proportion of epilepsy in India is untreated. It was felt that there remains considerable scope for the development of better epilepsy services at both primary and secondary care level in a developing country like India.

It was decided to constitute a core group from among members of the IES with Dr Satish Jain as its convener to take up this responsibility of developing the

Preface contd...

Guidelines for the Management of Epilepsy in India (GEMIND). The core group (14 members) had its first meeting on January 12-13, 2008. There were extensive deliberations over two full days. This was followed by a second meeting of an enlarged core group (18 members) on April 26-27, 2008. The extended core group had a large number of presentations on all aspects of epilepsy in India followed by extensive discussions on each topic. Each member of the core group prepared write-ups on different aspects of epilepsy management in the Indian scenario. The third and final meeting of the core group was held on August 23-24, 2008. The recommendations of the core group were discussed in details with a view to formulate practical and appropriate guidelines.

These guidelines have been formulated by the group of experts from IES based upon a consensus arrived at after reviewing the available scientific literature. The GEMIND are expected to help in improving medical decision - making in India, mainly at a general medical practitioner level. Regardless of overall recommendations for any medical disorder, the problems of an individual patient are still the most important factor while deciding on treatment options. Costs, drug availability, ease of use, severity of the medical condition and many other factors play an important role in the decision-making. Every medical practitioner needs to combine guidelines with his/her own skill, knowledge and experience keeping in mind the needs of the individual patient.

GEMIND - STATEMENT OF INTENT

It may be noted that the GEMIND are to be taken as practice parameters by medical practitioners and should not be regarded as 'standards of epilepsy care' in India. As medical knowledge and diagnostic technology advances, the guidelines will also need to be modified. Since guidelines constitute 'reasonably correct practice parameters', these should be used to formulate and recommend reasonable treatment plans for different clinical situations in regards to management of epilepsy patients in India. It is important to remember that the treating doctor should always make the final decision about the treatment plan keeping in mind the individual patient's problem and the diagnostic and therapeutic options available.

GEMIND - PRACTICAL APPLICATIONS AND LIMITATIONS

The GEMIND are expected to guide the medical practitioners in providing epilepsy care at mainly the primary and secondary levels of healthcare in India. It is obvious that the GEMIND reflect what we know as of today. By using the

Preface contd...

guidelines, it will be interesting to know what we do not know.

I wish to thank all members of the core group who have contributed towards the development of these guidelines. We are aware of the limitations and shortcomings of our effort, but will make all efforts to improve upon this first edition. Our sincere thanks are due to the respective authorities for permitting us to use the methodology followed by the SIGN and NICE guidelines.

The three plenary meetings were made possible through an educational grant by Zydus Cadila and their contribution and support is gratefully acknowledged.

SATISH JAIN, MD; DM; FRCP

Secretary General -Indian Epilepsy Society

Convener of the Core Group for GEMIND

New Delhi

Introduction

Epilepsy is a common neurological disorder affecting 0.5 - 1.0% of the population in India

- There may be about 5-10 million people with epilepsy (PWE) in India accounting for almost one-fifth of the global figures.
- Despite its varied etiology, majority of PWE can be successfully treated with simple medicines, most often with a single, inexpensive drug. Although the treatment of epilepsy in most cases is simple, the drugs very often have to be taken for a long duration.
- It has been estimated that with proper treatment, 70-80% of PWE can lead normal lives. Unfortunately, in most developing countries 50-70% PWE has been estimated to receive either no treatment or inadequate and inappropriate treatment, most often due to inadequacies in the health care resources and societal stigma.

DEFINITION

- Epilepsy is a chronic disorder characterized by recurrent unprovoked seizures.
- An epileptic seizure refers to transient occurrence of signs and or symptoms due to abnormal excessive or synchronous neuronal activity in the brain. The epileptic seizure may be characterized by sensory, motor or autonomic phenomena with or without loss of consciousness.
- All PWE have seizures but all those who have seizures do not have epilepsy. Seizures occurring in a setting of an acute illness or medical condition like high fever, hypoglycemia etc are classified as acute symptomatic seizures.

Diagnosis of Epilepsy

DIAGNOSIS OF EPILEPSY

- Accurate diagnosis of epilepsy is essential for instituting the appropriate treatment and improving quality of life.
- Individuals wrongly diagnosed as epilepsy (when they do not have epilepsy) and individuals with epilepsy wrongly diagnosed as having psychiatric or other disorders, face serious consequences associated with stigma, wrong diagnosis and long-term unnecessary treatment with attendant costs and side effects of medication.
- It is recommended that wherever possible all individuals with seizures should be seen by a medical practitioner with knowledge and experience in epilepsy to ensure correct diagnosis and early initiation of appropriate therapy

Importance of detailed history and examination in the diagnosis of epilepsy

- Detailed clinical history from the patient, the family members and the eye witness (if available) about the event is very important for correct diagnosis.

The following important features are helpful in the diagnosis of seizures:

- Ictus/event could consist of unilateral or bilateral tonic clonic movements, sudden jerking, deviation of eyes and head, alteration or loss of consciousness and may be associated with injuries, tongue bite or incontinence.
- Post-ictally the patient may have confusion, drowsiness, headache or weakness
- Presence of an aura, e.g. motor and/or sensory phenomenon, fear, abdominal discomfort, etc may help to determine seizure type and localize the site of origin of seizure.
- Epileptic seizures may present with various features and not all features need to be present in an individual person.
- Video recording of the event on a mobile phone camera will be valuable.
- Special effort has to be made to elicit the history of sudden jerks (myoclonus).

Careful physical and neurological examinations are important in making a correct diagnosis

- Physical examination should record pulse, blood pressure and look for subcutaneous nodules and examine heart.

- Neurological examination for optic fundi and focal neurological signs and developmental assessment should be done in all children.
- Hyperventilation can be of help if absence seizure is suspected.
- Investigations such as EEG help in the diagnosis of seizures, while imaging procedures like CT or MRI scan of the brain, may reveal an underlying cause.
- If the diagnosis cannot be clearly established, further investigations and/or referral to a specialist should be considered.

Based on expert consensus the key features of history and examination that allow an epileptic seizure to be differentiated from other causes are given below:

The following conditions may mimic or may be mistaken for seizures:

- Syncope
- Hypoglycemic attacks
- Transient ischemic attacks
- Panic attacks
- Physiological jerks during sleep
- Breath holding spells in children
- Psychogenic (hysterical) episodes

The following features help to distinguish between syncope and seizure:

Features	Syncope	Seizure
Precipitating factors	Common	Rare
Occurrence	Awake, mostly when upright	Awake or asleep
Premonition (nausea sweating, light-headedness)	Common	Uncommon
Onset	Less abrupt	Abrupt
Jerking of limbs	Occasional	Frequent
Incontinence	Rare	Common
Post-ictal recovery	Rapid	Slow
Post-ictal confusion	Uncommon	Common
EEG	Usually Normal	May be abnormal

The following features help to distinguish between psychogenic episode and epileptic seizure :

Features	Psychogenic episode	Epilepsy
Age & gender	Usually young, more common in women	Any age
Precipitating factors	Emotional disturbances	Lack of sleep, poor drug compliance
Occurrence in sleep	No	Yes
Duration	Minutes to hours	Seconds to minutes
Movements	Vocalisation pelvic thrusting, bizarre flinging of limbs	Tonic or tonic-clonic jerks
Eyes	Forcibly closed, resistance to opening	Open
Injuries including tongue	Infrequent bite	Frequent
Post-ictal confusion, headache, sleep	Uncommon	Common
Pattern of attacks	Variable	Stereotyped
EEG/video EEG	Normal	Usually abnormal

Classification

CLASSIFICATION OF SEIZURES AND EPILEPSY SYNDROMES

Epilepsy is usually a symptom of an underlying neurological disorder and not a single disease entity. Epilepsy should be classified according to seizure type and epilepsy syndrome, as per internationally accepted classification systems. This helps the PWE in the planning of investigations, treatment, and providing appropriate information.

The common types of seizures are

1. Partial

- Begin focally in a restricted area of the cortex.
- The symptoms could be simple (motor or sensory phenomenon) or complex (automatisms and/or unawareness)
- Partial seizures can spread to other areas and evolve into generalized tonic-clonic seizure

2. Generalized

- Arise diffusely in both hemispheres, with bilateral non-focal onset, usually with impairment of consciousness at the beginning
- The seizures may manifest with absences, tonic clonic seizures, myoclonic jerks, akinetic or atonic attacks

The International League against Epilepsy classification of seizures is given in Appendix I.

Classification of Epilepsies and Epilepsy syndromes

International League Against Epilepsy (ILAE) has proposed a classification of the epilepsies (See Appendix-II). Epilepsies are broadly classified based on the seizure type, age of onset and possible etiology:

- Localization-related epilepsies characterized by seizures that have a focal or partial onset and generalized epilepsies characterized by generalized onset of seizures
- Epilepsies that are inherited or occur without identifiable pathologic cause are labeled idiopathic
- Symptomatic epilepsies are those associated with a known or suspected brain disease or lesion

- Many epilepsy syndromes are age specific and may begin during infancy, childhood or adolescence.

For example, Juvenile Myoclonic Epilepsy (JME) is a common disorder starting in adolescence and usually characterized by myoclonic jerks, generalized tonic clonic seizures and occasional absences. JME is an example where correct diagnosis and classification is important for proper treatment, since a wrong diagnosis of seizure type or syndrome, might lead to the use of carbamazepine or other drugs which may in fact aggravate the seizures.

The International League against Epilepsy (ILAE) classification of epilepsies and epileptic syndromes is given in Appendix II.

PRACTICE POINTS

- Accurate diagnosis of epilepsy is essential for instituting the appropriate treatment and improving quality of life.
- Detailed clinical history from the patient, the family members and the eye witness (if available) about the event is very important for correct diagnosis.
- Epileptic seizures may present with various features and not all features need to be present in an individual person.
- Epileptic seizures and epilepsy syndromes should be classified using the current internationally accepted classification scheme.
- The seizure type(s) and epilepsy syndrome, aetiology, and co-morbidities should be identified. Failure to classify the epilepsy syndrome correctly can lead to inappropriate treatment and persistence of seizures.
- PWE and their family members should be informed about their seizure type(s), epilepsy syndrome, and the prognosis.
- It is recommended that wherever possible all individuals with seizures should be seen by a medical practitioner with knowledge and experience in epilepsy to ensure a correct diagnosis and early initiation of appropriate therapy.

Investigations

Electroencephalogram (EEG)

- EEG records the electrical activity of the brain.
- EEG is a non-invasive and widely available investigation for evaluating an individual with suspected seizures. EEG is not a substitute for a good clinical history but can add to the value of the diagnosis.
- An EEG should be obtained, whenever there is uncertainty regarding the nature of seizure, epilepsy type or epilepsy syndrome.
- Routine EEG is useful for diagnosis, classification of seizure type and the epilepsy syndrome. It is also useful for predicting seizure recurrence after the first seizure.
- There are better chances of detecting abnormalities if EEG is done soon after the seizure or within 48 hours.
- Epileptiform discharges (ED) in the EEG may occasionally be seen among healthy adults without history of seizures.

A normal EEG does not rule out the diagnosis of epilepsy.
EEG should always be interpreted keeping in mind the clinical situation.

Video EEG (VEEG)

- Long term VEEG is a time consuming and relatively expensive method of investigating patients with difficult to control epilepsy. It involves continuous video and synchronized EEG recording done usually for more than 24 hours with documentation of at least 3 or more events. The VEEG is also used in differential diagnosis of the type of seizures, especially when nonepileptic events are suspected. A short term VEEG (1-2 hours) may be performed in patients in whom psychogenic non-epileptiform events are suspected. It is also useful in patients who have frequent and several episodes in a day.
- Long term VEEG should be carried out in centres having the expertise to perform this procedure.
- Brain mapping of EEG frequencies is not routinely required in clinical practice.
- There are better chances of detecting abnormalities if EEG is done soon after the seizure or within 48 hours.

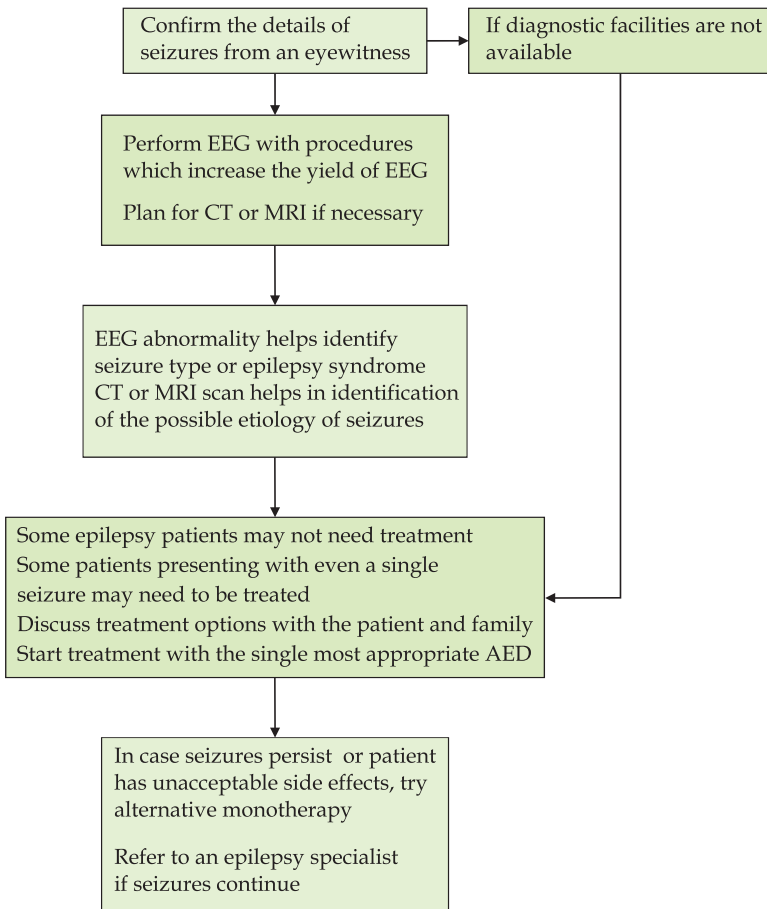
NEUROIMAGING IN EPILEPSY

- Neuroimaging (CT or MRI scan of the brain) is not mandatory for all PWE.
- Neuroimaging in epilepsy is useful in:
 - Focal seizures
 - Seizures suspected to be symptomatic in origin.
 - Difficult to control seizures (MRI using special epilepsy protocol).
- The rationale for use of neuroimaging in epilepsy is to identify pathologies such as granulomas, malformations, vascular or traumatic lesions, tumors and other congenital etiologies like tuberous sclerosis and cortical dysplasias.
- CT head is useful in evaluation of seizures secondary to acute situations such as head injury, intracranial hemorrhage, infarcts or encephalitis.
- In acute settings most of the lesions can be picked up by CT as MRI may be technically difficult.
- MRI may be needed if CT scan is negative or inconclusive like in suspected cases of encephalitis.
- When imaging shows a single ring enhancing lesion a repeat imaging may be needed after 3 to 6 months or as the clinical situation demands.
- MRI is a better diagnostic modality and may be useful in most patients with difficult to control seizures and those suspected to have a structural lesion.

PRACTICE POINTS

- CT scan should be the initial investigation in epilepsy patients in our country.
- MRI may be performed taking into consideration the patient's socioeconomic status and type of epilepsy.
- Advanced epilepsy protocols and newer imaging modalities (fMRI, SPECT, PET) should be performed and interpreted by those working in specialized centres.

Algorithm for investigations of a patients presenting with seizures



TREATMENT OF EPILEPSY

- The aim of treatment is to control seizures with the most appropriate antiepileptic drug (AED) without causing any significant side effects.
- Treatment of epilepsy with AEDs should be started after confirming the diagnosis of epilepsy.
- Treatment should be initiated following the occurrence of two or more unprovoked seizures, after discussion about the risks and benefits of treatment with the person with epilepsy and his/her family members.

Treatment of the first unprovoked seizure

Epilepsy should not be diagnosed after a single seizure. The average risk of developing a second seizure following a single unprovoked seizure is about 35-40%. Many individuals with a first seizure if left untreated may not have a second seizure. The risk of a third seizure following two unprovoked seizures is much higher.

Generally the first seizure is not treated. The individual and family are explained about the possible risk of recurrence and need for follow up. Patients with the first seizure may be treated in the following circumstances.

Circumstances in which a single seizure may be treated

1. Prolonged focal seizure
2. First seizure presenting as status epilepticus
3. presence of neurological deficit, hemiparesis, mental retardation, cerebral palsy etc.
4. Family history of seizures among parents, siblings or children.
5. EEG abnormality
6. Abnormality on brain imaging (CT, MRI)
7. When the patient might have had a seizure before. This may not have been recognized by the patient and may be brought out only by a careful history.
8. High risk jobs (Professional or other activities that may endanger life during a seizure)
9. The individual and family do not accept the expected risk of recurrence

Treatment of newly diagnosed epilepsy

- AED therapy is generally recommended after a second unprovoked epileptic seizure.
- AED therapy should be started only after the diagnosis of epilepsy is confirmed.
- AED treatment may occasionally be deferred under the following circumstances:
 - Infrequent seizures with extremely long / several years interval between seizures.
 - Occurrence of brief (and infrequent partial sensory or myoclonic) seizures without underlying structural lesion.
 - Benign epilepsy with centro-temporal spikes (Rolandic epilepsy in children).

The decision in such situations should be taken by a specialist.

Principles of AED treatment

- The decision to start AED treatment should be made after discussion of the risks and benefits of treatment and taking into account the person's seizure type, prognosis, lifestyle and socioeconomic circumstances.
- Treatment should be started with a single conventional antiepileptic drug (AED monotherapy).
- Start with a low dose and gradually increase the dose until seizures are controlled or side-effects occur.
- If the initial treatment is ineffective or poorly tolerated, then monotherapy using another AED can be tried. The dose of the second drug is slowly increased until adequate or maximum-tolerated dose is reached. The first drug is then tapered off slowly.
- If the second drug is also unhelpful, the drug with lesser efficacy or tolerability should be taken off.

- Combination therapy (polytherapy or adjunctive or 'add-on' therapy) can be considered when two attempts at monotherapy with AEDs have not resulted in seizure freedom.
- If seizures continue despite trial with two AEDs, patient should be referred to a specialist for evaluation.
- The formulation or brand of AED should preferably not be changed (variations in bioavailability or different pharmacokinetic profiles may increase the potential for reduced effect or excessive side effects).
- Modified release formulations offer ease of administration due to less frequent dosing and better compliance. These are costlier than regular formulations.
- Once daily administration of AEDs should be used with caution during pregnancy.

Choice of AEDs

- Phenytoin (PHT), Phenobarbitone (PB), Carbamazepine (CBZ), Oxcarbazepine (OXC), Valproate (VPA) are usually called 'conventional' or 'first line drugs'. The other AEDs are called 'new' or 'second line drugs'.
- It is preferable to use a conventional AED as the initial drug since those are less expensive and the side effects with long-term use are well known.
- The choice of AED is mainly based on the seizure type and epilepsy syndrome. For partial seizures, the initial choice can be CBZ, OXC, PHT, VPA or PB.
- For generalized onset tonic clonic seizures, the initial choice is VPA, PHT, PB, CBZ, OXC. For absence seizures VPA is the drug of choice. For myoclonic jerks, VPA and benzodiazepines are generally used.
- Prior to initiating treatment it is preferable to have baseline blood counts, liver enzymes and renal functions tested.

Algorithm for choice of AED among new-onset epilepsy patients

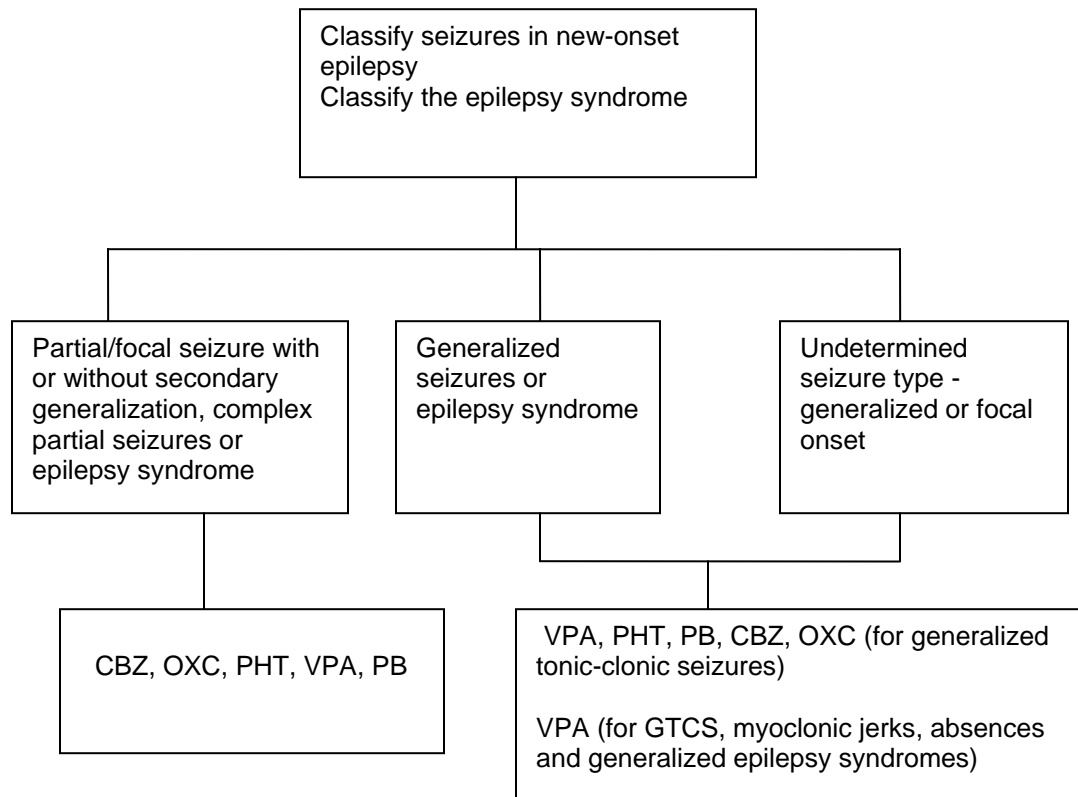


Table. Initial and maintenance daily doses and important side effects of commonly used AEDs

AED	Starting dose in average adult	Maintenance dose in average adults (mg/day)	Important side effects
Carbamazepine (CBZ)	100 mg BID	400 -1000	Sedation, dizziness, ataxia, skin rash (occasionally Steven-Johnson syndrome), hyponatremia, weight gain, seizure worsening in some epilepsy syndromes
Clobazam (CLB)	10 mg OD (HS)	10-30	Sedation, ataxia, somnolence, irritability, depression, weight gain, tolerance (reduced anti-epileptic effect)
Lamotrigine (LTG)	25 mg OD (HS) Lower dose with VPA	100-300	Sedation, ataxia, dizziness, skin rash (occasionally Steven-Johnson syndrome)
Levetiracetam (LEV)	250 mg BID	1000-3000	Somnolence, dizziness, cognitive slowing, psychosis
Oxcarbazepine (OXC)	150 mg BID	600-1800	Sedation, dizziness, ataxia, headache, hyponatremia, skin rash
Phenobarbitone (PB)	60-90 mg OD (HS)	60-180	Sedation, ataxia, depression, memory problems, skin rash, hyperactivity in children
Phenytoin (PHT)	200-300 mg OD (HS)	200-400	Ataxia, sedation, gum hyperplasia, coarsening of facial features, hirsutism, memory problems, osteomalacia and bone loss, skin rash
Topiramate (TPM)	25 mg OD	100 – 400	Sedation, somnolence, cognitive problems, weight loss, word-finding difficulty, renal stones, seizure worsening
Valproate (VPA)	200 mg BID	500-2000	Anorexia, weight gain, nausea, vomiting, tremors, hair loss, polycystic ovarian syndrome, thrombocytopenia
Topiramate (TPM)	25 mg OD	100-400	Sedation, somnolence, cognitive problems, weight loss, word finding difficulty, renal stones, seizure worsening
Zonisamide (ZNS)	50 mg OD (HS)	200-500	Sedation, anorexia, renal stones, forgetfulness, skin rash, weight loss, distal parasthesiae

OD: Once daily

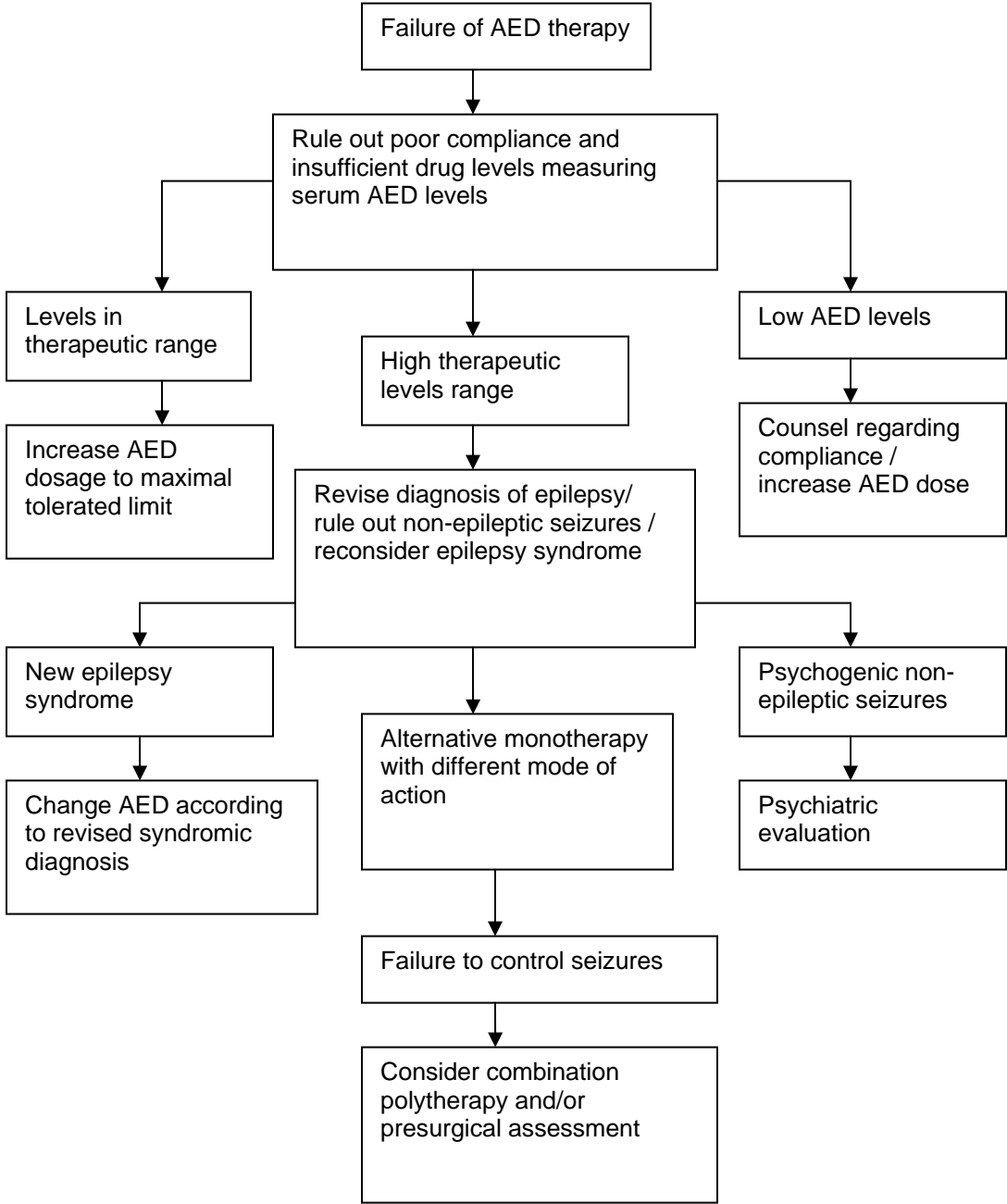
BID: Twice daily

HS: At night

Strategies in case of failure of initial treatment

- Failure of an initial AED should prompt the treating doctor to ascertain the accuracy of the diagnosis of epilepsy, the seizure type or syndrome; the appropriateness of the drug for the particular seizure type, the adequacy of dosage, compliance of the individual and whether there are any remediable structural or other causes for epilepsy.
- All PWE should be asked to note down what happens before and during a seizure and to maintain a 'seizure diary'. They should be encouraged to make a record seizure on a cell phone camera. This will help the treating doctor in arriving at a correct diagnosis.
- Attempt should be made to optimize the AED therapy by using maximally tolerated doses, ensuring compliance and avoiding seizure precipitants.

Algorithm for strategies in case of failure of initial treatment



Role of AED level monitoring

- Routine monitoring of AED blood levels is not recommended and should be done only when clinically indicated.

Indications for monitoring AED blood levels:

- Detection of AED non-compliance in case of uncontrolled seizures.
- Documenting suspected AED toxicity.
- Adjustment of AED dose while managing drug interactions.
- Specific clinical conditions (e.g. status epilepticus, liver or renal disease and pregnancy).

Routine laboratory tests during AED therapy

The following tests may be carried out as necessary:

- Complete blood count, liver enzymes and renal functions before starting AED.
- Serum calcium, alkaline phosphatase and other tests of bone metabolism every year for adults taking enzyme-inducing drug.
- Asymptomatic minor abnormalities in blood test results are not necessarily an indication for changes in medication.

Role of newer AEDs

The newer AEDs (Gabapentin, Lamotrigine, Levetiracetam, Tiagabine, Topiramate, Vigabatrin and Zonisamide) are recommended for the management of epilepsy in people who have not benefited from treatment with the conventional AEDs or for whom the older AEDs are unsuitable because of intolerable adverse events. The new AEDs are almost as effective as the conventional drugs but do add significantly to the cost.

The newer AEDs can also be used when:

- There are contraindications to the first line drugs due to coexisting illnesses.
- The first line drugs interact with other drugs the person is taking (notably oral contraceptives, anticoagulants, anti-retrovirals or immunosuppressants).
- Always consider factors such as cost and continued availability of medicines before starting newer AEDs.

Drug interactions

There are many interactions between different AEDs and between AEDs and other drugs that the patient might be taking. A detailed knowledge of the pharmacokinetics of AEDs and other drugs is necessary to understand the drug interactions. The important points to remember are:

- Certain AEDs (PHT, PB, CBZ and OXC) induce hepatic enzymes and enhance the metabolism of lipid soluble drugs. Enzyme induction results in rapid clearance and reduced efficacy of other drugs requiring adjustment of the dose of other drugs to a slightly higher level. These interact with other AEDs (necessitating higher dose of concomitant AEDs) oral contraceptives and oral anticoagulants.
- VPA inhibits hepatic enzymes and slows down the metabolism of concomitant AEDs and other drugs causing toxicity and requiring dose adjustments.
- Drug interactions become important while using AEDs with theophylline group erythromycin, ciprofloxacin or ofloxacin; anti-tubercular drugs (like isoniazid and rifampicin are enzyme inducers and also hepatotoxic), anti-retroviral drugs and mefloquin.

Frequency of follow-up

- People with epilepsy should maintain a seizure diary and have regular follow-up to ensure that the prescribed medication is taken as advised and to detect any adverse effects of AED. This will also avoid a situation in which they continue to take treatment that is ineffective or poorly tolerated.
- The first follow-up may be undertaken at anytime within 2-4 weeks of initiation of treatment. Subsequent follow-ups at every 3-6 months, depending on the control of seizures and side-effects.
- The doctor should review the seizure diary (Appendix III) to assess efficacy tolerability and ensure AED compliance. Lifestyle issues such as sleep, regular food intake, alcohol use, driving and pregnancy (if planned) should also be discussed.

- PWE and their care givers should be provided information about the disease, maintaining seizure diary, counselling services, and timely and appropriate investigations.
- In patients with poorly controlled seizures or unacceptable side effects due to AEDs, consider referral to tertiary services for appropriate diagnosis, investigations and advanced treatment including surgery for epilepsy.

When to refer to a specialized 'Epilepsy Centre'

An individual should be referred to a specialized epilepsy centre:

- Seizures controlled despite use of maximum tolerated dose of 2 AEDs
- Seizures are controlled even after 2 years of starting AEDs
- The diagnosis of seizure type and/or syndrome is not certain
- The individual experiences unacceptable side effects of medication
- Abnormal behaviour, progressive deterioration in the intellect, associated psychological and/or psychiatric co-morbidity
- There is a remediable structural lesion that could be the cause of epilepsy

Withdrawal of AEDs

- Withdrawal in most cases after a seizure-free period of two to three years. The decision is mainly based on the type of epilepsy syndrome and cause of seizures. and should be taken after discussion of the risks and benefits of withdrawal with the PWE and family.
- AED withdrawal should be avoided in certain epilepsy syndromes (e.g., juvenile myoclonic epilepsy) because of the higher risk of seizure relapse following AED withdrawal.

How to withdraw AEDs

- AEDs are usually withdrawn gradually over several months (at least 3-6 months or longer). There is possibility of seizure recurrence during and after withdrawal.
- The tapering may be performed at a slower rate for benzodiazepines (6 months or longer).
- Withdraw one drug at a time in those patients who are on multiple AEDs.
- If seizure recurs during or after AED withdrawal, the person may be advised to revert to their AED dose before reduction and seek medical help.

PRACTICE POINTS

- Establish the diagnosis of epilepsy before starting treatment.
- The choice of AED should be based on seizure type, epilepsy syndrome (appropriate drug), affordability and availability of AEDs.
- Initiate treatment with monotherapy. Use polytherapy with caution when monotherapy is not successful.
- The principle, “**start low and go slow**” should be followed for AED dosages.
- Maintain seizure diary, ensure regular follow up and AED compliance.
- Conventional AEDs are generally as effective as newer AEDs and should be the first line of treatment in most cases.
- Consider AED withdrawal after 2 years of seizure-free interval.
- When in doubt or in case of an unexpected situation, refer to a specialist!

Provoked Seizures

MANAGEMENT OF PROVOKED SEIZURES

Synonyms - Situational seizures, acute symptomatic seizures

DEFINITION

- Provoked seizures occur within 7 days of acute brain insult.
- A number of clinical conditions can result in provoked seizures
- The cause of provoked seizures can be broadly categorized into 2 groups:
- Structural: head injury, stroke, CNS infections (neurocysticercosis, tuberculoma, encephalitis, abscess, neurosurgical interventions)
- Metabolic/toxic: alcohol withdrawal, liver and kidney failure.

HEAD INJURY

- Severe traumatic brain injury (TBI) (Glasgow Coma Score less than 8/15) and penetrating head injuries are associated with a significantly increased risk of seizures. Risk factors for seizures in TBI are depressed skull fractures, penetrating injuries, post traumatic amnesia and presence of brain contusions seen on imaging.
- PHT prophylaxis reduces occurrence of early post-traumatic seizure in severe traumatic brain injury. PHT should be given intravenously as a loading dose in such situations.
- Continuation of AEDs after 7 days of the acute insult results in no additional benefit. CBZ has not been proven to have similar benefit as PHT. AEDs have no role in preventing late seizures (epilepsy) in TBI. Continued use of PHT, VPA or CBZ for long term (> 7 days) has no proven role in preventing development of epilepsy later on in such situations.
- Seizures developing within 1 week of TBI also do not influence long term AED therapy.
- In mild head injury, no prophylactic AED's are required. Headache and vomiting after minor head injury do not influence the occurrence of seizures. EEG is not helpful in predicting seizures.
- If patient develops seizures after 2 weeks of TBI, then treatment with AED is advised as for a patient with symptomatic epilepsy (see section on treatment for newly diagnosed epilepsy).

STROKE

- Stroke significantly increases the risk of seizures. In patients with first seizure after stroke, risk of second seizure is still higher. Cortical and hemorrhagic lesion have higher incidence of seizure.
- A single seizure after stroke may not be treated except in certain circumstances.
- Routine treatment with AED in all stroke patients is not recommended though often practised.
- When treatment with AEDs is planned for seizures after stroke, the choice of drug is determined by the effect of AED dose on neurological recovery (PB is not recommended in this regard), bone health (PHT and PB can lead to osteoporosis), interaction of AED with drugs used in the management of stroke such as aspirin, warfarin and statins (PHT, PB and CBZ can have interactions due to their enzyme inducing effect).
- Lamotrigine (LTG) and gabapentin (GBP) have been recommended as first line AEDs in post-stroke seizures due to the above mentioned reasons.
- Central venous sinus thrombosis (CVST) has a high incidence of seizures, serial seizures or even status epilepticus (SE). In CVST, use of AEDs is recommended for 1 year after the acute episode.

BRAIN TUMORS:

- Patients with brain tumors are sometimes given prophylactic AEDs before and after surgery, although there is no convincing evidence to support the prophylactic use of AEDs.

NEUROCYSTICERCOSIS

- Neurocysticercosis is a common cause of provoked seizure in India.
- Single enhancing lesions on CT/MRI scan thought to be due to cysticercosis have been reported commonly from all over India. These lesions most often disappear spontaneously on follow up scans.
- Patients with single enhancing lesions should be treated with AEDs for at least 6 months. If the lesion disappears on a repeat CT/MRI scan done after 3-6 months, AEDs may be tapered off slowly over 8-12 weeks.
- If the single lesion becomes larger or multiple lesions are detected or the patient has recurrent seizures, AEDs should be continued and patient should be referred to a specialist for appropriate management.

ALCOHOL RELATED SEIZURES

- Alcohol related seizures are common. These could be due to alcohol intoxication or acute alcohol withdrawal.
- EEG is indicated in after first alcohol withdrawal seizure. If EEG is abnormal, other causes of seizures need to be considered.
- CT/MRI scan is recommended after first alcohol related seizure to rule out structural lesions.
- Intravenous thiamine (200 mg) should be given before starting glucose (100 ml of 25% dextrose) to prevent precipitation of an acute encephalopathy.
- Long term AEDs (preferred AEDs being PHT, PB and CBZ) should be continued for 6-12 months and then tapered the dose over 8-12 weeks. Oral vitamin B-complex tablets can be given if patients are nutritionally compromised.
- Management of alcohol related seizures with liver disease is given below.

LIVER DISEASE

- Avoid using VPA, PB and benzodiazepine as they may precipitate liver failure.
- GBP, LEV, CBZ and OXC are recommended for seizure prophylaxis.
- In liver failure dose adjustment is not needed while using CBZ, OXC, GBP and LEV.
- For management of status epilepticus – glucose and benzodiazepines may be used.

RENAL DISEASE

- Seizures may occur in up to one third of cases of renal failure and uremic encephalopathy. The seizures can be generalized tonic clonic, myoclonic or even have a focal onset. When focal, a symptomatic cause should be ruled out.
- LTG, VPA, PB and PHT are safer in renal failure. GBP, TPM and LEV require post-dialysis dose supplementation.

Status Epilepticus

STATUS EPILEPTICUS

Status epilepticus (SE) is a common medical and one of the most serious neurological emergency associated with high mortality and morbidity. SE refers to a condition in which there is a failure of the “normal” factors that serve to terminate a typical seizure. SE may be classified based solely on the presence or absence of convulsions into convulsive SE (CSE) and non-convulsive SE (NCSE).

Definitions

- Convulsive status epilepticus (CSE): In adults and children older than 5 years, 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.
- Non-convulsive status epilepticus (NCSE) is change in mental status change from baseline, for at least 30 minutes associated with ictal discharges on EEG.
- Refractory status epilepticus (RSE): defined as seizure activity that continues after first- and second-line AED therapy have failed. RSE can be generalized CSE or NCSE. NCSE though uncommon, should be considered in the evaluation of patients with altered mental state.

Management of convulsive status epilepticus

- Patients must be brought to the hospital at the earliest.
- It is helpful to have a protocol (see p.24) in every hospital.
- Stages for management of SE:
 - Premonitory stage: prolonged seizure at home/before hospitalization (5 minutes)
 - First stage: at hospital. (5 – 20 minutes)
 - Second stage: established status epilepticus (20 – 60 minutes)
 - Third stage: refractory status epilepticus (>60 minutes)

Premonitory Stage – Prolonged Seizures (5 minutes)

Out-of-hospital setting :

- Children and young adults: Rectal diazepam - 0.5 mg/kg or buccal midazolam - 0.2 to 0.3 mg/kg

- Adults: rectal diazepam 10 mg or buccal midazolam 10 mg ;
- Intravenous administration by local doctors or nurse (on doctor's advice): lorazepam 2 mg iv or diazepam 5-10 mg iv.
- General Measures: secure airway, breathing and circulation safety and check random blood sugar.

First stage (5 – 20 minutes)

In a hospital setting :

- Children and adults: lorazepam 0.1 mg/kg IV (maximum, 4 mg) over 1 min or diazepam 0.2 mg/kg/ IV (maximum. 10 mg) over 1 min. Allow 5 minutes to determine whether seizures terminate, if no response repeat once. If patient's age is <2 years consider pyridoxine 100 mg IV.
- General measures: Give oxygen, stabilize airway, respiration, and hemodynamic parameters. Obtain IV access. Check bedside glucose. Monitor ECG and SpO₂.
- Investigations: Random blood glucose, liver function tests, renal function test, electrolytes and blood urea nitrogen, and CT scan. Lumbar puncture and CSF analysis, if CNS infection is suspected.
- Consult neurologist.

Second Stage - Established GCSE (20 – 60 minutes)

- Children and adults: PHT 15 – 20 mg/kg IV at maximum rate of 50 mg/minute (1mg/kg/minute in small children), avoid dilution in glucose solution; monitor heart rate and blood pressure; contraindicated in patients with second-degree heart block or severe hypotension] or fosphenytoin 15 – 18 phenytoin equivalent (PE)/kg iv/im at maximum rate of 150 mg PE/min.
- If seizure still continue after 10 minutes after of loading PHT/Fosphenytoin: Consider PHT 5-10 mg/kg IV at a maximum rate of 50 mg/minute or Fosphenytoin 5 mg PE/kg IV at a maximum rate of 150 mg PE/minute before considering other options.
- Seizures continuing – alternative therapeutic options as given below

Option 1: Sodium valproate 25 – 35 mg/kg IV at a maximum rate of 6 mg/kg/hour.

Option 2: Phenobarbitone 20 mg/kg IV at 60 mg/minute (should be considered where ventilator facility is available as it can cause hypotension and respiratory depression).

- **General Measures:** Cardio-respiratory function monitoring: ECG, blood pressure, SpO₂, vaso-pressors if needed, identify and treat medical complications, treat acidosis.

- **Investigations:** CT/MRI for establishing the etiology, CSF if CNS infection is a possibility, EEG if the facilities are available.

If seizures still continue, patient should be shifted to a higher center capable of dealing with status and having ventilation and ICU facilities.

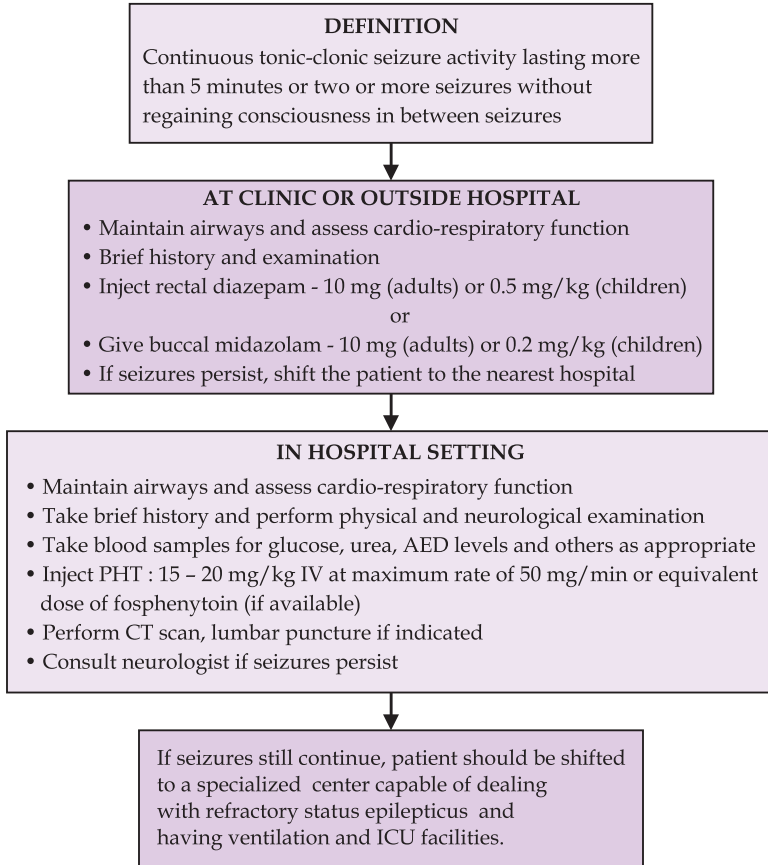
Refractory Status Epilepticus (more than 60 minutes)

- Admit the patient to intensive care unit in a specialized centre. Prepare to mechanically ventilate and obtain central venous access and continuous hemodynamic monitoring through arterial line. Start EEG monitoring.
- Anaesthetic agents: Adults and children - midazolam 0.2 mg/kg IV (maximum 10 mg) bolus over 2 min followed by 0.1 – 0.4 mg/kg/h continuous IV infusion or propofol 2-5 mg/kg IV bolus followed by 5-10 mg/kg/h IV infusion or thiopental 10-20 mg/kg IV bolus followed by 0.5-1 mg/kg/h IV infusion.
- Coma phase: Continue pharmacologic coma for 12 hours after last seizures, with EEG goal of burst suppression.
- Weaning phase: Reduce infusion of the anesthetic agent every 3 hours with EEG monitoring, if there are no clinical or electrographic seizures then wean off. If seizures recur re-institute coma therapy with the same anesthetic agent to which the seizures were responsive. Try to wean as outlined above if there are no clinical or electrographic seizures for 12 hours.
- General Measures: Identification and treatment of medical complications including hyperthermia. Consider treating acidosis if pH 7.2 or if symptomatic in the form of cardiac conduction disturbances or hemodynamic instability.

Non-convulsive status epilepticus (NCSE)

- NCSE is less critical compared to convulsive status but requires intensive care unit with facility for continuous EEG monitoring. General measures and investigations apply as described for GCSE (midazolam and propofol).
- As the NCSE is more common in the elderly, non-anesthetizing anticonvulsants may be tried.

Algorithm for treatment of convulsive status epilepticus



Maintenance AED treatment following control of status epilepticus

- Along with emergency treatment of GCSE and NCSE, maintenance AED therapy should be given to prevent recurrence of seizures.
- In patients known to have epilepsy, their usual AEDs should be maintained and dose adjustments may be required depending on serum AED levels.
- In patients presenting for the first time as status, drugs like PHT or VPA used to control the status can be continued as oral maintenance therapy.
- NCSE patients may not require long-term AEDs. When required choose the AED depending upon the clinical situation. Newer AEDs may be helpful.

Women with Epilepsy

WOMEN WITH EPILEPSY

Women with epilepsy (WWE) who are in the reproductive age group should ideally be evaluated by a specialist. WWE who continue appropriate AEDs under proper supervision have more than 90% chance of having a normal pregnancy and children. The following situations require special considerations:

CONTRACEPTION

- Doctor should keep in mind the possibility of marriage and pregnancy in all WWE who are in the reproductive age group.
- Issues related to epilepsy and use of AED and its interactions with contraception and pregnancy should be discussed in detail.
- All WWE should be advised to plan their pregnancies. They should be cautioned that some AEDs may make oral contraceptive pills ineffective.
- If the woman prefers to continue hormonal contraception, she should be advised to consult a gynecologist. Depot injections of progesterone or oral pills containing higher dose of estrogen (more than 50 microgram) may be preferred. Barrier contraception is an alternative that can be considered.
- Specialist consultation is needed when AEDs need to be started in WWE who are using oral pills.

PRECONCEPTION COUNSELLING

- All WWE in reproductive age group should be advised on the need for preconception counselling.
- It is the responsibility of the doctor to alleviate the undue fears about pregnancy and delivery in WWE and reassure them that more than 90% of WWE have normal pregnancy and delivery.
- All WWE in the reproductive age group should be started on folic acid (5 mg/day) at the time of starting AED.
- The risk of major fetal malformations is approximately 5% more than that among children born to WWE who are exposed to AEDs as compared to that of unexposed fetuses, which is around 2-3%.
- The risk is further reduced when the mother is using monotherapy (a single AED) at low dose along with folic acid. Based on the currently available data there is no superiority for one AED over the other with regard to fetal

malformations. Nevertheless, current signals indicate that VPA at higher doses carries higher risk for neural tube defects.

- Seizures may remain unchanged in 50% WWE or improve (25%) or even worsen (25%) during pregnancy.
- During preconception consultation, the neurologist should review the treatment for all WWE. The accuracy of diagnosis, need for AED, selection of AED and dosage need to be carefully evaluated.
- In well controlled patients, it may be possible to stop treatment, shift to monotherapy or reduce the dose of the treatment. Nevertheless, the risk of a seizure relapse should be carefully weighed against the possible benefits of stopping or modifying the treatment.
- Whenever possible, a woman should conceive on the lowest effective dose of one AED appropriate for her epilepsy syndrome.
- If a woman had an offspring with malformation in the previous pregnancy, the AED therapy need to be carefully reviewed and if necessary the AED could be changed prior to the next pregnancy.

PREGNANCY

- AEDs should be continued in pregnancy. The risks of breakthrough seizures on abrupt discontinuation of AED therapy during pregnancy should be emphasized to WWE.
- Pregnancies in WWE should be jointly managed by the obstetrician and the physician attending to epilepsy.
- All WWE should be started on folic acid 5 mg daily, if it was not previously started. Folic acid needs to be continued until delivery.
- Seizure frequency should be monitored carefully during the pregnancy and adjustments made to AED doses to minimize the number of seizures, particularly generalized tonic-clonic seizures.
- Serum levels of AEDs are of help during pregnancy. The dose of AEDs should not be increased routinely except on clinical grounds.
- All pregnant WWE should be advised screening for fetal malformations by serum alpha fetoprotein at 16 weeks and by detailed ultrasound scanning by an experienced ultrasonologist at 18 weeks.
- If preterm labour is threatened in women taking enzyme-inducing AEDs, 48 mg betamethasone (double the normal dose) should be given over 48 hours.
- All WWE should be given two doses of vitamin K-10 mg IM at 34 and 36 weeks of pregnancy, unless there is a contraindication for the same.

- All infants born to mothers taking AEDs should be given Vitamin K-1 mg intramuscularly at birth.

LABOUR

- Women with epilepsy should have their delivery in hospitals under supervision of gynecologists who have access to specialists. There should be facility for cesarean section and neonatal critical care if required.
- Care should be taken to avoid any AED default when the patient is in the maternity ward. Factors predisposing to seizures in labour (fear, pain, sleep deprivation, hypoglycemia, and concomitant medications) should be reduced as much as possible. There is no contraindication for epidural/spinal anesthesia.
- The usual oral AED medication should be continued during labour and postpartum. In women unable to tolerate oral medication, AEDs can be given by parenteral routes.
- An elective Caesarean section should be considered if there have been frequent seizures towards the end of pregnancy.
- Seizures during labour should be terminated as soon as possible using intravenous lorazepam (4mg iv) or diazepam. If seizures persist, those should be managed as done for status epilepticus.
- If seizures recur during labour, particularly after prolonged remission, other etiological possibilities such as cortical vein thrombosis, eclampsia and other causes should also be considered.

ADVICE FOR MOTHERS IN POSTPARTUM PERIOD

- All WWE should be informed about the safe practices of child rearing and encouraged to breast feed their babies.
- Care should be taken to avoid dropping the baby during a seizure or a myoclonic jerk.
- The dosage of some of the AEDs such as LTG, LEV and OXC may have to be reduced in the post partum period, if it had been increased during pregnancy.
- All WWE in the post partum period should be informed about the need to have sufficient spacing between pregnancies. They should be encouraged to adopt one of the safe contraceptive methods until the next pregnancy is planned.

Epilepsy in Children & Neonates

DIAGNOSIS

Making a correct diagnosis of epilepsy in children is even more important due to the associated health, educational and psychosocial impact on children and their parents. Misdiagnosis is more common as compared to adults, particularly when the diagnosis is made by a non-specialist. There are many sub-syndromes and subtypes of epilepsies peculiar to neonates, infants and children. Subtle manifestations of seizures are common in neonates and infants and these must be looked for very carefully.

CLASSIFICATION

The classification of childhood epilepsy should ideally be made according to the syndromic classification of the ILAE (see appendix). This helps in proper choice of AED and in estimating prognosis and duration of treatment.

INVESTIGATIONS

Electroencephalography (EEG)

It is important that the EEG in children be reported by a person with expertise in pediatric and neonatal EEGs. The role of EEG in children is same as in adults but some important aspects peculiar to children are as follows:

- Ideally all children with epileptic seizures should have an EEG. An early recording may avoid the need for repeated EEG investigations.
- Omission of AED prior to EEG recording is not advisable.
- An EEG at the time of stopping treatment may help in decision to withdraw treatment in childhood epilepsies.

BRAIN IMAGING

- Most children with epilepsy should have an elective MRI brain scan. The yield with MRI brain scan is highest in children with focal seizures, neurological deficits on clinical examination, focal changes on EEG and in neonates.
- CT scan in children with epilepsy has the same role as in adults.
- As children require sedation or general anesthesia for brain imaging, the decision should be made by a specialist.

- Children with the Idiopathic (primary) generalized epilepsies, or benign childhood epilepsy with centrotemporal spikes (benign Rolandic epilepsy) may not need brain imaging.

SERUM LEVELS OF AEDs

Routine AED level monitoring is not indicated in children but can be useful in special situations of suspected drug resistance with ensured good compliance or in mentally retarded children.

TREATMENT

The basic principles of AED treatment in children with epilepsy remain the same as in adults. Children with epilepsy should be encouraged to participate in normal activities with their peers suitably supervised depending on the type of activity and the seizure history.

Certain situations peculiar to children are as follows:

FEBRILE SEIZURES

- Febrile seizures (FS) occur during fever between 6 months to 5 years age in the absence of intracranial infection. Single FS occur in 3-5% children. Recurrent FS occur in about one third to half the cases with FS. Recurrence is higher if the onset is within the first year of life. FS may be simple or complex and this classification helps to prognosticate. Complex FS comprise only 15% of FS, are characterized by partial onset, duration > 15 minutes or multiple episodes in the same illness and have a poorer outcome compared to simple FS.
- Lumbar puncture must be considered when there is any clinical suspicion of meningitis or other infections of the brain, when febrile seizures occur in the first year of life especially during the first episode.
- Recurrent simple febrile seizures do not merit investigations.
- EEG is not required in simple febrile seizures. It can be done in cases with complex febrile seizures, febrile status epilepticus (FSE) or associated afebrile seizures. An abnormal EEG does not predict occurrence of future epilepsy. Neuroimaging has no role in simple febrile seizures.
- FS prophylaxis entails lowering body temperature, although its role in preventing FS has been questioned. Acutely acting antiepileptic drugs at home prevent progression to FSE.
- Parents can be taught to use rectal diazepam (0.5 mg/kg) preferably a liquid or suppository formulation or buccal midazolam (0.2 to 0.3 mg/kg) for acute termination of seizures lasting more than 2 minutes.

- AEDs recommendations for prophylaxis of FS have changed from continuous to intermittent medication. Prophylaxis reduces the recurrence of seizures but does not reduce the risk of future epilepsy. Oral clobazam in a dose of 0.75 mg/kg for 2-3 days in 2 divided doses is most useful drug in preventing recurrence.
- Continuous prophylaxis with AEDs is not recommended routinely but may be considered in cases where the febrile seizures recur beyond 6 years of age.

CHILDREN WITH COEXISTING BEHAVIOR PROBLEMS AND LEARNING DISABILITIES

- A child with history of seizures presenting with recent onset impairment in learning needs specialist consultation. These children may also need neuropsychological & psychosocial evaluation.
- Epilepsy is more common in children with learning disabilities.
- Some childhood epilepsy syndromes like West Syndrome, Lennox-Gastaut Syndrome, are associated with learning disabilities, and may be difficult to treat using conventional AEDs. Occasionally, early epilepsy surgery may be palliative or even effective for controlling seizures in such syndromes.

PROLONGED OR SERIAL SEIZURES AND CONVULSIVE STATUS EPILEPTICUS

- See section on status epilepticus.

WITHDRAWAL OF ANTIEPILEPTIC DRUGS

When appropriate (usually after a 2 years seizure free), tapering of the dose is generally done gradually over 3-9 months. Benzodiazepines and barbiturates should be tapered over 6 months or longer because of the possibility of withdrawal symptoms and/or seizure recurrence. If seizures recur, the child should be given the last dose of AED before withdrawal was attempted and referred to a specialist.

WEST SYNDROME AND INFANTILE SPASMS

In West Syndrome, corticotropin or corticosteroids should be used as first line treatment. Such children are best treated by a specialist. Other drugs such as benzodiazepines, valproate, vigabatrin and topiramate are used as second choice.

NEONATAL SEIZURES

Diagnosis of neonatal seizures is essentially clinical and must be based on observation of rhythmic and repetitive movements like subtle repetitive behavior,

orofacial & limb movements, autonomic abnormalities, jerking not suppressed when the limb is held, stiffening or sustained posturing of the limbs and deviation of eyes. Video recording of the events even at home with cell phone camera can be very helpful in making a correct diagnosis of seizures in neonates. Diagnosis & management of neonatal seizures is preferably done by a specialist in a neonatal ICU.

PAROXYSMAL NON-EPILEPTIC SEIZURES IN CHILDREN

- Distinguishing between non-epileptic events and seizures can be more difficult in children as compared to adults. The most important aspect for diagnosis is a good history from an eye witness.
- Video EEG is useful in the classification of seizure type. Recording of events at home on a video camera or cell phone camera is very useful.

EPILEPSY IN CHILDREN WITH CEREBRAL PALSY, MENTAL RETARDATION AND LEARNING DISABILITY

A 'brain insult' is the common denominator for cerebral palsy (CP), mental retardation (MR), and learning disability (LD). Seizures can be associated with all these conditions. Although CP & MR are non-progressive or static problems, seizures can become uncontrolled or increase in severity and number, thus adding to the disability of patients and anxiety to caregivers. The risk of cognitive problems among PWE is higher due to the disease and AEDs.

Proper management of all these conditions involves early intervention and comprehensive multidisciplinary team approach.

In CP and MR the incidence of seizure disorder is as high as 25-30% as against 1% in the general population. Seizures can manifest at any age, often 'difficult-to-treat' and poorly controlled.

While treating seizures in such children, remember to:

1. Keep a proper record of seizures.
2. Carefully observe the child's alertness and behavior. Hyperactivity may be a common side effect of the AEDs, particularly PB (it should be avoided in such children).
3. It may not be possible to control all seizures. Having an occasional seizure may be better than continuous side effects of AEDs.
4. Most AEDs can be used safely in such PWE. Caution is required while using PB (due to associated hyperactivity) and TPM (associated word-finding difficulty) in those in whom speech and language may already be affected.
5. AEDs are usually needed for prolonged periods, may be even life long.

Epilepsy in Adolescents and Young Adults

Adolescence and early adulthood is a time of physical and emotional changes, a time of greater socialization with peer groups, a time of increased pressure to succeed especially at examinations, a time when one wants to loosen family ties and increase independence and a time when one tends to stay awake well into the night. Education and counselling of the PWE and family members are a must to rectify wrong habits and unwarranted pressures. Important points to remember are:

- Avoid sleep deprivation, alcohol and substance abuse as these can precipitate or aggravate seizures.
- PWE working in shift duties should take fixed time jobs whenever possible. They may have to be given AEDs which are either once a day or at most twice a day and dosing should be done as per their daily routine.
- Driving should be discouraged. Supervised swimming may be allowed if seizures are well controlled. Avoid potentially risky leisure activities like rock climbing, horse riding etc.
- Prolonged TV viewing, playing video games and dancing in dark rooms with flickering/flashing lights (discotheques) can precipitate seizures in some individuals.

Epilepsy in Elderly

The demographic trends clearly show that the population of the world is ageing. Seizures are more common in elderly as compared to general population.

- Generalized tonic clonic seizures dominate for metabolic or toxic etiologies, where as partial seizures with or without secondary generalization are most frequent for vascular or other circumscribed brain lesions.
- Every third acute symptomatic seizure at an advanced age may present as status epilepticus. The mortality rate of SE is higher in the elderly.
- A convulsive status epilepticus (tonic-clonic) is more frequent at an advanced age as compared to younger age group.
- First manifestation of isolated absence with spike-wave complexes at an advanced age as the only seizure type occurs as a part of non convulsive status epilepticus. Patients with NCSE may not have clinical seizures and usually present with history of sudden change in mental status.
- EEG is an important test for evaluation of suspected patient of epilepsy in the elderly, most frequent finding being focal slowing or epileptiform discharges.
- Every elderly patient with epilepsy should undergo, at least a CT scan, though MRI is preferable as symptomatic epilepsy is common in elderly.
- Cardiovascular evaluation with ECG, echocardiography, Holter monitoring, or carotid Doppler study may be needed when syncope is suspected.
- Video EEG is sometimes helpful in establishing diagnosis of epilepsy.

The general principles of epilepsy management in elderly are same as in adults.

- In most cases seizures do not indicate serious brain damage.
- Seizures can be controlled by medicines.
- Medication usually does not cause serious adverse effects.

The choice of AEDs in elderly depends on many factors: changes in liver, kidney, GI system and brain it self. Bio-availability of the drug in elderly is altered. Existence of co-morbid conditions in elderly may cause interaction with AEDs and other drugs leading to AED toxicity or other complications.

- The majority of elderly patients with primary or secondary generalized epilepsy can be controlled with single conventional AED and 70% can expect a 5-years remission.
- The dose required is generally lower as compared to adults.
- PHT, CBZ and VPA have been used for partial or generalized seizure in elderly. Evaluation of liver and renal functions helps in deciding the dose of AEDs in elderly.
- Most of the newer AEDs can safely be used in the elderly.
- Estimation of serum concentrations of AEDs can be of help in elderly to adjust the dose of AEDs and in cases where drug interactions are likely. Care should also be taken while prescribing AEDs that are hepatic enzyme inducers.

Surgery in Epilepsy

SURGERY IN EPILEPSY

With the advancement in technology, surgical management of epilepsy is now possible. Surgery for epilepsy is an effective mode of intervention. This facility is now available at a few specialized centers in India.

Medically Intractable Epilepsy (MIE)

(Synonyms: Intractable epilepsy, difficult to control epilepsy, refractory epilepsy, therapy resistant epilepsy)

DEFINITION

Individuals with medically intractable epilepsy are defined as:

- Those in whom epilepsy is not controlled by 2 or more appropriate AEDs used in their optimal dosage.
- Adults (16 years or above) who continue to have seizures even after 2 year of treatment.
- Pediatric epilepsy patients can be labeled as MIE much earlier (sometime even within weeks of onset of seizures), if they present with epileptic encephalopathy, infantile spasms, catastrophic onset of epilepsy, seizure frequency of >1/ month, and disabling seizures.

Catastrophic epilepsy-induced encephalopathy: Severe developmental disabilities affecting intellect, behavior, and mood as a consequence of frequent seizures during early childhood.

Infantile spasms: A severe form of early onset seizures, usually during the first year of life, characterized by sudden spasms or jerks of the upper arms, legs and trunk in a repetitive fashion. Infantile spasms are strongly associated with severe epilepsy-induced encephalopathy and should be treated as an emergency.

MAGNITUDE OF THE PROBLEM:

- Nearly 70% of the new onset epilepsy patients can be controlled with proper medication.

- The remaining patients are considered having medically intractable epilepsy and some of them need to be evaluated for possible surgical intervention.
- Surgery when indicated should be considered as early as possible and should not be an option of last resort.

INDICATIONS FOR SURGERY IN EPILEPSY

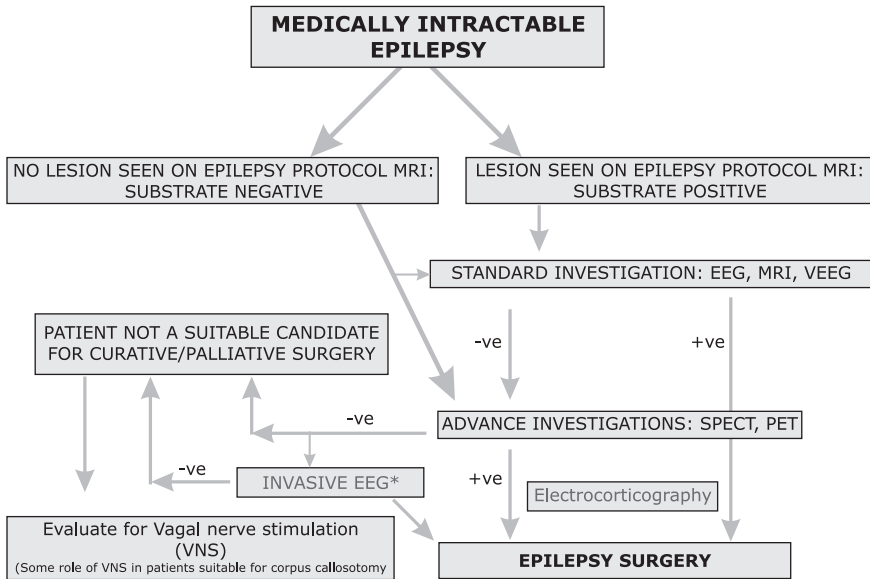
- All patients with medically intractable epilepsy should be evaluated at a centre performing epilepsy surgery.
- A patient having medically intractable epilepsy with an identifiable lesion on imaging, correlated with electrophysiology (EEG, VEEG) is a potential candidate for epilepsy surgery.
- Even if imaging is negative, patients still can be surgical candidates on further investigation.
- Epilepsy surgery should be done only in specialized centres.

Algorithm for approach to patients with medically intractable epilepsy
(See page 37)

BENEFITS OF SURGERY IN EPILEPSY:

- Surgery has been established to be safe (risk of surgery has been shown to be less than the risks associated with the natural course of epilepsy).
- Surgery has a high chance of achieving seizure freedom (in 60-70% of cases) and a reduction in seizure frequency in the remaining 30-40% cases.
- Epilepsy surgery may be resective or non-resective. In some cases epilepsy surgery may be curative.
- Resective surgery includes lesionectomy (resection of the lesion and the surrounding epileptogenic area), amygdalo-hippocampectomy with or without temporal lobe resection, multilobar resection and hemispherectomy.
- Nonresective surgery includes multiple subpial transections, corpus callosotomy and vagus nerve stimulation.

Algorithm for approach to patients with medically intractable epilepsy



Note: Substrate negative: Imaging negative, Substrate positive: Imaging positive. Invasive EEG: EEG performed by placing grids and/ or depth electrodes through surgery followed by long term EEG. Electrocorticography: method of recording EEG at the time of surgery by placing grids on the brain surface

Non-Pharmacological Interventions in Epilepsy

People with refractory epilepsy often resort to alternative therapies that include yoga, biofeedback EEG technique, aerobic exercises, aroma therapy, music therapy, Ayurveda, ketogenic diet, acupuncture, herbs etc. The scientific evidence for their effectiveness is very limited.

YOGA AND MEDITATION

Studies in Yoga have shown to slow the production of stress hormones and increase the level of serotonin, modify brain rhythms resulting in stress reduction and modulation of cardiac autonomic balance in refractory epilepsy. Initial results of randomized controlled trial on the role of yoga in refractory epilepsy are promising.

AYURVEDA

Ayurvedic medicines should not be recommended in refractory epilepsy. As of now there are very limited randomized controlled trials without sufficient scientific evidence for their use.

KETOGENIC DIET

Ketogenic diet (KD) has been used especially in children with refractory epilepsy for many years. KD is high in fat and low in carbohydrates. It induces ketosis in the body and is thought to suppress seizures by release of leptin but the exact mechanism remains uncertain. Diet is difficult to continue for a long time as it is unpalatable & needs supervision from dietician and pediatrician. A modified KD to suit Indian patients is available in a few centres in India.

EEG BIOFEEDBACK

Also known as EEG - operant condition or neurotherapy. It controls internal processes by learning voluntary control over EEG rhythm resulting in suppression of seizure activity.

HERBS

Certain botanical herbs have been used but properly conducted scientific studies proving their usefulness are limited. On the other hand, certain herbs are also known to cause drug interactions with AEDs leading to side effects.

Disabling Epilepsy

Definition

Disabling epilepsy is predominantly characterized by recurrent seizures associated with considerable medical and psychosocial co-morbidity.

Epilepsy can be disabling due to:

- Intractable seizures with a poor response to medical treatment.
- Treatment barriers: availability, accessibility, affordability, and acceptability of AEDs.
- Burden of medical co-morbidity.
- Psychological and psychiatric co-morbidity that accompanies epilepsy, (depression, anxiety and even psychosis being commoner in PWE)
- The stigma and adversity of epilepsy

The medical practitioner is best positioned to address these factors. He/ she may seek help of the following:

- A specialist in optimising AED prescription.
- A social worker, local epilepsy support group or the local chapter of the Indian Epilepsy Association (IEA) in securing for the PWE appropriate social assistance.
- A psychologist or counsellor to tackle emotional and behavioural problems.
- A physical and/or occupational therapist to tackle physical disabilities and limitations.
- The specialist physician to tackle medical co-morbidity.

Action Point

- Referral to a comprehensive epilepsy care centre may be necessary.
- If such centre is not available, refer to specialised services.
- Continue routine care.

Information for People with Epilepsy

INFORMATION FOR PEOPLE WITH EPILEPSY AND THEIR CARE GIVERS

Epilepsy is a condition that affects the brain. There are billions of nerve cells (neurons) in the brain which are linked together to form chains. All of the functions of the brain are controlled by these neuron chains, and so movement, sensations, speech, thoughts and feelings all depend on the signals being passed in a regulated and orderly way. The activity of the neuron chains is coordinated by electrical and chemical signals.

WHAT IS A SEIZURE?

The word 'seizure' is derived from the Latin word 'sacire', which means "to take possession of". A seizure is a paroxysmal event due to abnormal, excessive, hyper synchronous discharges from a group of neurons. The meaning of the term seizure needs to be carefully distinguished from that of epilepsy.

WHAT ARE CONVULSIONS?

Convulsions are attacks of involuntary muscle contractions, which may be either sustained (tonic) or interrupted (clonic). The term does not imply a specific mechanism, and convulsions may be either epileptic or non-epileptic. However, the term is currently used primarily to designate attacks due to an epileptic mechanism.

WHAT IS EPILEPSY?

Epilepsy describes a condition in which a person has recurrent unprovoked seizures due to a chronic underlying process. Epilepsy is a disorder with many possible causes. Anything that disturbs the normal pattern of neuronal activity - from illness to brain damage to abnormal brain development - can lead to seizures.

Having a single seizure or recurrent seizures due to correctable or avoidable circumstances does not necessarily mean that a person has epilepsy. Only when a person has had two or more unprovoked seizures is he or she considered to have epilepsy.

INFORMATION FOR PEOPLE WITH EPILEPSY

Any patient who is suffering from any disease has the right to know about his/her problem, the approach to the disease and its outcome. Similarly caregivers also should be counselled about the disease of their patient. PWE should be provided

the information about their disease in a calculated and comprehensive manner so that it helps them to understand their disease better. The first step should be to take the patient into confidence, develop a rapport and then discuss the problems. As physicians, we owe the responsibility in responding to the information needs of people with epilepsy and their caregivers taking all possible care not to hurt the sentiments and emotions of the PWE and their care givers.

In addition to general information on seizures and epilepsy, physicians should educate PWE and their family members about:

- Information about how to recognize another seizure and what to do if one happens (including first aid information).
- Ask them to note down what happens before and during a seizure and to maintain a 'seizures diary' (Appendix III). They should be encouraged to make a record of the seizure on a cell phone camera. This will help the doctor in arriving at a correct diagnosis.
- Explain about the need and the role of investigations that are being carried out. After the test, the results and what they mean should also be explained. If epilepsy is diagnosed, the person should be informed about the type of seizures and epilepsy, the need to continue treatment, the possible benefits and side effects of AEDs, circumstance and activities that can trigger seizures and the life style modifications required while on treatment. Information on schooling and higher education, career and employment options, marriage, having children, insurance issues, road safety (driving) and leisure activities, local self help groups, national epilepsy organization/bodies etc. should also be provided.
- PWE should be informed that epilepsy in some situations is also preventable. Proper ante-natal care thus reducing birth injuries, good hygiene preventing infections and infestations and proper care of head injuries are examples when epilepsy secondary to those conditions can be prevented.
- As of now PWE in India are not allowed to drive (the law in this regard is under review). Swimming is another activity that is generally not recommended for PWE. Most PWE should be encouraged to engage in normal sports and leisure activities. However, dangerous and combat sports should be avoided.

IMPORTANT INFORMATION FOR CARE GIVERS

In case a person is found having a seizure or is unconscious after a seizure:

DO'S:

- Put the person on one side and allow the fit to be over. The fit is usually over in 1-2 minutes. Loosen the person's clothes.
- Inform his/her relatives and/or the treating doctor in case any contact details are available in his/her pocket.
- Rush the person to the near by hospital/medical facility in case the fits do not stop or there are several fits one after the other.

DONT'S:

- Put anything like a spoon, piece of wood or cloth in between the teeth or in the mouth or a key in his hands.
- Put a shoe or onion in front of his nose.
- Forcibly stop his arms and legs from jerking.
- Give him any thing to drink or eat.
- Crowd around the person having seizure.

EPILOGUE

GEMIND has focussed on practical issues which will aid the general practitioner in establishing the exact description provided by patient/relatives and then ensuring that the episode is indeed a seizure and not syncope or a psychogenic episode.

It is equally important to establish the type of epilepsy to initiate treatment with the most appropriate drug.

Initiation of antiepileptic drug treatment should be done only after due thought. Full and adequate information should be provided to the person with epilepsy and their family members about the risks and benefits of treatment. AED treatment is usually started after a second unprovoked seizure beginning with a single drug and gradual increase of dose till seizure control is achieved or side effects appear. Second drug can be tried as monotherapy with gradual withdrawal of the previous drug. If satisfactory seizure control is not achieved, referral to a specialist for further investigations and treatment is necessary.

Status epilepticus is a serious medical emergency and a detailed protocol has been provided for its management. Extra care is needed for special situations such as women with epilepsy where the type of drugs chosen must safeguard the interests of the mother and foetus. Special care is also needed in treating children and elderly. It should be recognized that for refractory epilepsy, option of surgery needs to be exercised sooner than later. Expertise and infrastructural facilities are available in a few centres in the country.

For the long term management of refractory epilepsy the general practitioner should continue to maintain contact with specialists and the families of PWE. Even a greater role exists for the general practitioner as an integral participant to provide counselling to the PWE and the family members about the nature of the disorder so that myths and misconceptions are dispelled. This will help reduce the stigma attached to epilepsy. Advice about education, employment, and marriage goes a long way in improving the quality of life for people with epilepsy. This in return will lead to a more rewarding relationship with the PWE and his family.

Dr M Gourie-Devi

Dr VS Saxena

Glossary

Benign Rolandic epilepsy: A mild form of childhood epilepsy characterized by brief simple partial seizures involving the face and mouth, usually occurring at night or during the early morning hours.

Breakthrough seizures: Seizures that occur while the patient is taking AEDs. The common causes are missing of AEDs, high fever, lack of sleep or other seizure triggering factors, and lowering of AED levels due to drug interactions.

Co-morbidity: The effect of all other diseases a person might have other than the primary disease.

Conventional AEDs: Usually refers to PB, PHT, CBZ and VPA (also called 'first line' or 'old' AEDs).

Corpus callosotomy: A surgical procedure that cuts the corpus callosum, interrupting the spread of seizures from hemisphere to hemisphere.

Drug interaction: A situation when concomitantly administered two or more drugs affect the activity of each other. The effects are increased or decreased, or produce a new effect that neither drug produces on its own.

Epilepsy Centre: A specialized centre providing comprehensive epilepsy care (diagnosis, investigations, medical and surgical treatment and counselling).

Epilepsy India is the joint Newsletter of IEA & IES (www.epilepsyindia.org)

Epilepsy syndrome: Association of certain seizure types with a particular age at onset, possible aetiology, EEG or CT/MRI scan abnormalities, response to AED therapy and prognosis.

Fosphenytoin: Is a water-soluble prodrug intended for parenteral administration. Phenytoin is its active metabolite.

Hepatic enzyme inducer: Drugs which induce hepatic enzymes. These may decrease the bioavailability of other drugs which are metabolised by those hepatic enzymes or they may increase the bioavailability of drugs which require metabolism for their activation.

Indian Epilepsy Association-18th International Epilepsy Trust was formed on 09 April 1992 out of the earnings of the 18th International Epilepsy Congress held in New Delhi in October 1989. This Trust now finances epilepsy related research and travel grants for the members of IEA and IES.

Indian Epilepsy Association - a body of professional and other members such as patients and their carers. IEA was registered in Bombay on 12 March 1970. The membership of IEA is through its 21 Chapters and has currently 2000 members. It is affiliated to IBE. (www.epilepsyindia.org)

Glossary contd...

International Bureau for Epilepsy - is a body to which country chapters concerned with social welfare of patients of epilepsy are affiliated. IBE is more than 60 years old and has the membership of 122 country Chapters.

IES: Indian Epilepsy Society – a body of professionals involved in epilepsy care was constituted and registered on May 13, 1997 in New Delhi. The IES has 230 members and IES is affiliated to ILAE. (www.epilepsyindia.org)

ILAE: International League Against Epilepsy - is the world's preeminent association of physicians and other health professionals working towards a world where no persons' life is limited by epilepsy. As of now the ILAE has members in 98 chapters around the world (www.ilae-epilepsy.org).

Lennox-Gastaut syndrome: A rare but serious epileptic syndrome of early childhood with multiple types of seizures that are difficult to control with a slow spike-and-wave pattern and disorganized background activity in EEG.

Monotherapy: Treatment with a single AED.

New AEDs: The drugs that have been approved for use after the availability of VPA (also called 'second line' AEDs).

Pharmacokinetics: The study of the bodily absorption, distribution, metabolism, and excretion of drugs.

Phenytoin equivalent: Fosphenytoin is prescribed in terms of its phenytoin equivalent (indicated by the abbreviation "PE"). Since fosphenytoin sodium 75 mg is equivalent to phenytoin sodium 50 mg, a 50 mg dose of IV phenytoin should be ordered as "fosphenytoin 50 mg PE," rather than conventionally as "fosphenytoin 75 mg."

Polytherapy: Treatment with more than one AEDs.

Psychogenic episode: An event that mimics an epileptic seizure but is non-epileptic in origin (synonymous with non-epileptic seizures, pseudoseizures)

Steven-Johnson syndrome: An immune-complex mediated hypersensitivity reaction to drugs typically manifesting with eruptions of skin and the mucous membranes. It is a serious systemic disorder with the potential for fatality.

Syncope: An episode of altered sensorium usually as a result of impaired blood supply to the brain.

Vagus nerve stimulation: VNS is an adjunctive treatment for certain types of intractable epilepsy. VNS involves surgical placement of a stimulator that sends electric impulses to the left vagus nerve in the neck. It is an expensive equipment.

Abbreviations

AEDs	: Antiepileptic drugs	LTG	: Lamotrigine
CBZ	: Carbamazepine	MIE	: Medically intractable epilepsy
CNS	: Central nervous system	MRI	: Magnetic resonance imaging
CP	: Cerebral palsy	NCSE	: Non-convulsive status epilepticus
CSE	: Convulsive status epilepticus	OXC	: Oxcarbazepine
CSF	: Cerebrospinal fluid	PB	: Phenobarbitone
CT	: Computerized tomography	PE	: Phenytoin equivalent
EEG	: Electroencephalogram	PET	: Positron emission tomography
ED	: Epileptiform discharges	PHT	: Phenytoin
fMRI	: Functional MRI	PWE	: People with epilepsy
FS	: Febrile seizures	SPECT	: Single photon emission computed tomography
GBP	: Gabapentin	TBI	: Traumatic brain injury
GEMIND	: Guidelines for the Management of Epilepsy in India	TPM	: Topiramate
IES	: Indian Epilepsy Society	VPA	: Valproate
ILAE	: International League Against Epilepsy	VEEG	: Video EEG
JME	: Juvenile myoclonic epilepsy	VGB	: Vigabatrin
KD	: Ketogenic diet	VNS	: Vagal nerve stimulation
LD	: Learning disability	WWE	: Women with epilepsy
LEV	: Levetiracetam	ZNS	: Zonisamide

Appendix 1: Classification of epileptic seizures according to clinical type*

1. Partial (focal, local) seizures

- 1.1. Simple partial seizures (consciousness not impaired)
 - 1.1.1. With motor signs
 - 1.1.2. With somatosensory or special-sensory symptoms (simple hallucinations, for example, tingling, light flashes, buzzing)
 - 1.1.3. With autonomic symptoms or signs (for example, epigastric sensation, pallor, sweating, flushing, piloerection and papillary dilatation)
 - 1.1.4. With psychic symptoms (disturbance of higher cerebral function) (for example, déjà vu, distortion of time sense, fear. Please note these rarely occur without impairment of consciousness and are much more commonly experienced as complex partial seizures {see 1.2})
- 1.2. Complex partial seizures (with impairment of consciousness)
 - 1.2.1. With simple partial onset followed by impairment of consciousness
 - 1.2.2. With impairment of consciousness at onset
- 1.3. Partial seizures evolving to secondarily generalized seizures (may be generalized tonic-clonic, tonic, or clonic)
 - 1.3.1. Simple partial seizures evolving to generalized seizures
 - 1.3.2. Complex partial seizures evolving to generalized seizures
 - 1.3.3. Simple partial seizures evolving to complex partial seizures and then evolving to generalized seizures

2. Generalized seizures (convulsive or non-convulsive)

- 2.1. Absence seizures : (impairment of consciousness alone or with: mild clonic, atonic or tonic components, automatisms and/or autonomic symptoms or signs)
- 2.2. Atypical absence
- 2.3. Myoclonic seizures
- 2.4. Clonic seizures
- 2.5. Tonic-clonic seizures
- 2.6. Atonic seizures

3. Unclassified seizures

Modified from: *Proposal for revised clinical and electroencephalographic classification of epileptic seizures. Commission on Classification and Terminology of the International League Against Epilepsy. *Epilepsia* 1981; 22: 489-501.

Appendix II: Classification of epilepsies and epileptic syndromes*

1. Localization-related (focal, local, partial) epilepsies and syndromes
 - 1.1. Idiopathic (listed in order of age of onset)
 - 1.1.1. Benign childhood epilepsy with centrotemporal spike
 - 1.1.2. Childhood epilepsy with occipital paroxysms
 - 1.2. Symptomatic
 - 1.3. Cryptogenic
2. Generalized epilepsies and syndromes
 - 2.1. Idiopathic (listed in order of age of onset)
 - 2.1.1. Benign neonatal familial convulsions
 - 2.1.2. Benign neonatal convulsions
 - 2.1.3. Benign myoclonic epilepsy in infancy
 - 2.1.4. Childhood absence epilepsy (pyknolepsy)
 - 2.1.5. Juvenile absence epilepsy
 - 2.1.6. Juvenile myoclonic epilepsy (impulsive petit mal)
 - 2.1.7. Epilepsy with grand mal (generalized tonic-clonic) seizures on awakening
 - 2.2. Cryptogenic or symptomatic (listed in order of age of onset)
 - 2.2.1. West syndrome (infantile spasms)
 - 2.2.2. Lennox-Gastaut syndrome
 - 2.2.3. Epilepsy with myoclonic-astatic seizures
 - 2.2.4. Epilepsy with myoclonic absences
 - 2.3. Symptomatic
 - 2.3.1. Non-specific etiology
 - 2.3.1.1. Early myoclonic encephalopathy
 - 2.3.1.2. Early infantile epileptic encephalopathy with suppression burst
 - 2.3.1.3. Other symptomatic generalized epilepsies not defined above
 - 2.3.2. Specific syndromes
 - 2.3.2.1. Epileptic seizures may complicate many disease states. Under this heading are included diseases in which seizures are a presenting or predominant feature.

3. Epilepsies and syndromes undetermined whether focal or generalized
 - 3.1. With both generalized and focal seizures
 - 3.1.1. Neonatal seizures – excluded from G/L
 - 3.1.2. Severe myoclonic epilepsy in infancy
 - 3.1.3. Epilepsy with continuous spike-waves during slow wave sleep
 - 3.1.4. Acquired epileptic aphasia (Landau-Kleffner syndrome)
 - 3.2. Without unequivocal generalized or focal features

All cases with generalized tonic-clonic seizures in which clinical and EEG findings do not permit classification as clearly generalized or localization related, such as in many cases of sleep-grand mal are considered not to have unequivocal generalized or focal features.
4. Special syndromes
 - 4.1. Febrile convulsions
 - 4.2. Isolated seizures or isolated status epilepticus
 - 4.3. Seizures occurring only when there is an acute metabolic or toxic event

Idiopathic: No underlying cause other than a possible hereditary predisposition.

Symptomatic: The consequence of a known or suspected disorder of the central nervous system.

Cryptogenic: A disorder whose cause is hidden or occult. Cryptogenic epilepsies are presumed to be symptomatic, but the aetiology is not known.

Modified from: *Proposal for revised classification of epilepsies and epileptic syndromes. Commission on Classification and Terminology of the International League Against Epilepsy. *Epilepsia* 1989;30:389-99.

SEIZURES DIARY

A Record of fits during the month of _____

Please fill in the number of fits on a date in the appropriate box.

Date	Fit while Awake		Fit while Asleep		Remarks
	Major	Minor	Major	Minor	
01					
02					
03					
04					
05					
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Guidelines for the **Management of Epilepsy** in India

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