EPILEPSY

National Standard Treatment Guideline

Ministry of Health
Republic of Maldives

ADB

JFPR
Japan Fund for Prosperous and Resilient Asia and the Pacific

From the People of Japan

World Health Organization
Maldives

National Standard Treatment Guidelines

- Acid Peptic Disease
- Acute Anxiety
- Acute Pancreatitis
- Acute Psychosis
- Acute kidney Injury
- Arrhythmia
- Chronic Liver Disease
- Chronic Pancreatitis
- Chronic kidney disease
- Congenital Heart Diseases
- Dementia
- Depression
- Diabetes Mellitus Type 1
- Diabetes Mellitus Type 2
- Gestational Diabetes
- Epilepsy
- Heart Failure
- Hyponatremia
- Hypernatremia
- Hypokalemia
- Hyperkalemia
- Interstitial Lung Disease
- Liver Failure
- Obesity
- Obstructive Sleep Apnoea
- Osteoarthritis
- Ovarian Cancer
- Pneumonia
- Stroke
- Upper Gastrointestinal bleed
- Unstable Angina

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GUIDELINES DEVELOPMENT METHODOLOGY

The development of the Maldives Standard Treatment Guidelines (STGs) followed a structured, evidence-informed, and consensus-driven methodology adapted from internationally accepted guideline-development standards and the Delhi Society for Promotion of Rational Use of Drugs (DSPRUD) model. The process combined systematic evidence retrieval, critical appraisal, contextual adaptation, and multidisciplinary expert review to ensure feasibility, clinical relevance, and national ownership.

1. Determining Scope and Priority Conditions

Priority clinical conditions were identified through consultation with national programme managers, specialty clinicians, and health-system stakeholders. Selection criteria included: (i) major causes of morbidity and mortality, (ii) observed variation in clinical practice or prescribing patterns, (iii) potential to improve patient outcomes, and (iv) the feasibility of implementation across health-facility levels in Maldives. The final list of diseases reflected national epidemiology, service-delivery capacity, and essential-medicine availability.

2. Identification of Existing Evidence and Source Guidelines

A targeted search strategy was used to identify high-quality existing clinical guidelines. Searches were conducted across international guideline repositories (e.g., WHO, NICE, SIGN and other intergovernmental bodies, international and national guideline repositories, specialty societies and professional associations.

3. Quality Appraisal of Source Guidelines

Retrieved guidelines were screened for transparency of development, methodological rigour, clarity of recommendations, applicability to health-system reality, editorial independence. Guidelines were included if they met the Institute of Medicine (IOM) definition of a clinical guideline and addressed treatment or management of priority conditions. Guidelines that did not meet minimum quality standards, review articles, diagnostic criteria, or technical standards were excluded.

4. Adoption, Adaptation, and Contextualization

The guideline-development team employed an adopt–adapt–contextualize model:

- **Adoption**: High-quality recommendations that aligned with Maldivian health-system realities were retained without modification.
- **Adaptation**: Recommendations were modified when local considerations such as diagnostic capacity, medicine availability, workforce skills, referral pathways, or cost constraints affected feasibility.

- **Contextualization**: Where evidence was absent or inconclusive, conditional recommendations were formulated based on expert consensus, with explicit consideration of pragmatism, safety, and local workflows.
  Medicines were selected in alignment with the Maldives National Essential Medicines List (NEML), based on suitability, efficacy, safety, and availability.

5. Expert Consensus and Multidisciplinary Input

Draft recommendations were initially prepared by experts from the DSPRUD, India, providing a strong methodological foundation for the process. Building on this, a collaborative and participatory process brought together clinicians from internal medicine, paediatrics, obstetrics-gynaecology, surgery, emergency medicine, endocrinology, cardiology, general practitioners, and public health representing different levels of healthcare. Consensus was achieved through moderated discussions, iterative revisions, and resolution of divergent views. For topics lacking strong evidence, recommendations were derived from expert clinical judgment grounded in extensive practice experience.

6. Drafting, Peer Review, and Validation

Each guideline section was organized in a standard format including key clinical features, essential investigations, non-pharmacological management, pharmacological therapy (with step-up/step-down options where relevant), referral criteria, paediatric considerations, and follow-up requirements. Drafts were peer-reviewed by senior clinicians and national experts. Reviewer comments were systematically integrated to strengthen clarity, accuracy, and applicability.

7. Addressing Conflicts of Interest

All contributors declared the absence of conflicts of interest. Individuals with potential or perceived conflicts were excluded from authorship or decision-making roles.

8. Updating and Future Revisions

The STGs were conceptualized as a living document. Future updates will incorporate new scientific evidence, changes in essential-medicine availability, national programme priorities, and user feedback from clinicians. Periodic review cycles will ensure the continued relevance and reliability of recommendations.

9. Distinctive Features of the Guidelines

Developed through a collaborative process involving a large group of multidisciplinary experts from different levels of healthcare, the guidelines incorporate the following distinctive features:

- **Diagnostic Assumption and Confirmation**: While assuming that an initial diagnosis has been established by the healthcare provider, the guidelines provide essential information for confirming diagnoses. This includes a comprehensive overview of major signs and symptoms, descriptions of confirmatory tests, and clear guidance on practices that are prohibited, discouraged, or unreliable—promoting evidence-based medicine supported by relevant references.
- **Comprehensive Treatment Approach**: The guidelines offer a systematic, up-to-date framework for managing medical conditions across the continuum of care. They begin at the primary care level and extend to secondary and tertiary care, incorporating protocols for treatment response assessment and referral criteria as integral components.
- **Diverse Treatment Modalities**: Recommendations encompass both non-pharmacological and pharmacological interventions and surgical intervention where applicable, providing flexibility for individualized treatment plans. Cautionary notes are included where necessary to ensure safe and effective use of therapies.
- **Assessment and Referral Criteria**: Clear criteria and goals for evaluating patient response to treatment are provided, along with guidance on when referral to higher levels of care is warranted ensuring continuity and comprehensiveness in patient management.

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The Government of the Republic of Maldives is committed to ensuring universal access to quality health services for all citizens. The Constitution of Maldives mandates the progressive realization of rights, including the right to good standards of health care for the population. In line with this national commitment, standardized quality health services are regarded as the foundation of a strong and equitable healthcare system.

This important work would not have been possible without the cooperation and support of many individuals and institutions. We express our sincere appreciation to the Honourable Minister of Health, Abdullah Nazim Ibrahim, for his leadership, commitment, and continuous guidance throughout the development process. We are grateful to WHO and ADB for their significant contribution, support, and technical assistance.

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It is important to acknowledge the immense efforts, involvement, timely coordination, collaboration, and dedication of the Quality Assurance and Regulation Division team who made it possible for these Clinical Treatment Guidelines to come into existence.

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EPILEPSY

QUICK REFERENCE GUIDE

Epilepsy is one of the most common chronic neurological disorders. The condition can occur at any age but shows bimodal peaks in early childhood and after age 60, though it is not restricted to these groups. Mortality in epilepsy is significantly higher than in the general population primarily due to complications such as status epilepticus, sudden unexpected death in epilepsy (SUDEP), injuries, and undertreatment. Outcomes vary with timely diagnosis and appropriate therapy, 50–60% of children and many adults achieve good seizure control, improving quality of life and reducing complications. However, treatment gaps remain large, especially in resource-limited settings, contributing to preventable morbidity and mortality. Epilepsy is a predisposition to unprovoked, recurrent seizures (≥2 unprovoked >24 h apart, or one unprovoked with high recurrence risk). Seizure classes (International League Against Epilepsy, ILAE 2025) include:

- Focal: preserved or impaired consciousness; may generalize to bilateral tonic-clonic.
- Generalized: absence, tonic-clonic, myoclonic, clonic, tonic, atonic, epileptic spasms.
- Unknown whether focal or generalized; unknown onset (pending data).

Status epilepticus (SE): continuous seizure ≥5 min or recurrent seizures without return to baseline (treat at 5 min).

Causes, risk factors & triggers

- Etiologies: structural (stroke, tumor, malformation), genetic, infectious, metabolic, immune, unknown.
- Risks/triggers: prior brain injury, perinatal insults, febrile seizures, family history, sleep loss, illness/fever, alcohol/withdrawal, flashing lights (photosensitivity), missed medicines, drug interactions.

Evaluation for diagnosis

- Clinical features: description/video of events, aura, motor/non-motor signs, postictal state, injuries, triggers.
- Physical exam: vitals, full neurologic exam, skin (neurocutaneous), developmental screen (children).
- Laboratory: glucose, electrolytes, calcium/magnesium, renal/liver panel; pregnancy test if applicable; toxicology when indicated.
- Electroencephalography (EEG): routine ± sleep deprivation; consider ambulatory/video-EEG if unclear.
- Imaging: magnetic resonance imaging (MRI) brain with epilepsy protocol (preferred); computed tomography (CT) acutely for trauma/bleed.
- Confirmation: seizure semiology + EEG ± imaging consistent with epilepsy; exclude mimics.

Classification / severity assessment

- Classify per ILAE 2025 (class, consciousness, key features).
- Drug-resistant epilepsy (DRE): failure of two appropriate, tolerated antiseizure medicines (ASMs).
- Track severity: frequency, clusters, injuries, status episodes, quality of life.

Differential diagnosis

Syncope, psychogenic nonepileptic seizures (PNES), migraine variants, transient ischemic attack, movement/ sleep disorders (parasomnias), hypoglycemia, electrolyte disorders, tics.

Management goals & principles

Seizure freedom or best possible control with minimal adverse effects, prevention of injuries/SUDEP (sudden unexpected death in epilepsy), treatment of cause, and preservation of cognition, mood, schooling/work, and safety.

Approach to management

1. Confirm diagnosis; classify seizure/ epilepsy syndrome; identify reversible factors.
2. Start monotherapy ASM matched to seizure type and patient context; start low, go slow.
3. Escalate/switch if ineffective or poorly tolerated; avoid unnecessary polypharmacy.
4. Declare DRE after 2 failed ASMs and refer for comprehensive epilepsy evaluation (surgery/diet/ neuromodulation).
5. Plan rescue therapy for clusters/ prolonged seizures; provide an action plan.

Non-pharmacological interventions

- Safety: individualized plan; supervise bathing/swimming; helmets for drop attacks; first-aid training.
- Sleep/stress: regular sleep; manage stress (breathing, mindfulness); treat obstructive sleep apnea.
- Psychosocial: screen/treat depression/ anxiety; school/work accommodations; seizure diary.

Pharmacological therapy (individualize therapy)

Focal seizures:

- Carbamazepine 200 mg BID, then increase by 200 mg q1-2 week to 800-1200 mg/day (divided doses). In children: 10-20 mg/kg/day divided into two to four doses, with gradual titration up to a maximum of 35 mg/kg/ day.

- Levetiracetam 500 mg BID (adjust dose in renal impairment). In children dosing varies by age: infants aged 1-6 months start at 14 mg/kg/day divided twice daily, with titration up to 42 mg/kg/day; children aged 6 months to 4 years begin at 20 mg/kg/day and may go up to 50 mg/kg/day; those aged 4 to 16 years can be titrated up to 60 mg/kg/day.
- Lamotrigine- slow titration (as rash risk). Start 0.15 mg/kg/day, double q2 week to ~1-5 mg/kg/day (adjust for interacting drugs). In children aged 2-12 years receiving valproate, the starting dose is 0.15 mg/kg/day with a target of 0.6 mg/kg/day. Without valproate, the starting dose is 0.3 mg/kg/day, titrated up to 5-6 mg/kg/day in divided doses. Adolescents over 12 years usually begin at 25 mg/day, with maintenance doses ranging from 200-400 mg/day depending on clinical response and co-medications. All dosing should be guided by clinical monitoring and adjusted for renal or hepatic function where relevant.

Generalized tonic-clonic:

- **Valproate:** start 10-15 mg/kg/day, increase up to 60 mg/kg/day (avoid in women who could become pregnant when alternatives exist) in 2-3 divided doses.
- **Levetiracetam** 500 mg BID. In children dose as above.

Absence:

- **Ethosuximide** 500 mg BID then increase by 250 mg q1-2 week to 1000-1500 mg/day; or **valproate** if mixed generalized seizures. Dose as above.

Myoclonic:

- **Levetiracetam** 500 mg BID (increase as needed) or valproate as above.

Outside the hospital (home/ community)

1. **Keep the person safe**
   - Protect from injury; remove hazards; do not restrain; do not put anything in the mouth.
   - Turn on side (recovery position) once the convulsion stops or if vomiting/ secretions.
2. **Time the seizure**
   - Start a timer. A convulsion lasting ≥5 minutes is an emergency (status epilepticus, SE).
3. **Give rescue medicine if prescribed**
   - Midazolam (buccal/intranasal): adults 5-10 mg; children 0.2 mg/kg (max 10 mg) Or
   - Diazepam 10 to 20 mg administered slowly over 2 to 5 minutes (max 5 mg/min); 0.1-0.25 mg/kg IV (max 10 mg) or rectal 0.5 mg/kg (pediatric) Or Lorazepam 0.1 mg/kg IV (max 4 mg) once, may repeat in 5-10 min; Or Midazolam 10 mg IM (no IV); or 5 mg intranasal/buccal, may repeat once.

Repeat once after 5-10 minutes if still seizing, per the plan.

4. **Call emergency medical services (EMS) now if any of these**
   - First ever seizure, seizure ≥5 min, repeated seizures without full recovery, injury, breathing trouble/ blue lips, pregnancy, diabetes, occurred in water, or you're unsure.
5. **After recovery**
   - Reassure, let the person rest; check for injuries; do not give food/drink until fully alert.
   - Document time, features, triggers, rescue doses for the care team.

In hospital (emergency department / ward)

0-5 min: Immediate care

- ABC: Airway, Breathing, Circulation
- Oxygen
- Recovery position
- IV access
- Check glucose → If low or unknown:
  - Adults: 25% Dextrose IV 50-100 mL
  - Alcoholic: Give 50 mg IM Thiamine first
- Rapid tests: Electrolytes, drug levels, infection screen
- Transport lateral if needed

First-Line Treatment

- Lorazepam: 0.1 mg/kg IV (max 4 mg) at 2 mg/min or Diazepam: 0.2 mg/kg IV (max 10 mg) at 5 mg/min
- Repeat once if seizures persist after 5 min
- No IV. Use alternate route per protocol

Status epilepticus (SE) - immediate care

Step	Timing	Intervention	Dose/Route
Initial benzodiazepine	0-5 minutes	Stabilize (Airway, breathing, circulation, disability) Finger-prick glucose (give thiamine before dextrose if deficiency suspected) IV access *Metabolic screen & toxicology screen First line abortive Get EEG if the patient doesn't wake -consider non-convulsive SE	IV lorazepam 0.1 mg/kg (max 4 mg) slowly over 2 minutes. If IV unavailable: IM midazolam 0.2 mg/kg (adult usual dose 10 mg) Or IV diazepam 0.15 mg/kg (max 10 mg) Document time and response.
Urgent Control therapy (if seizure continues)	5-10 minutes (early status)	■ Anticonvulsant levels ■ Arterial blood gas ■ Plan for continuous EEG as soon as feasible. ■ Search/treat causes in parallel.	Inj. Phenytoin/Fosphenytoin 15-20 mg/kg slow infusion in saline (not more than 50 mg/min). (**Caution:** Phenytoin is incompatible with glucose-containing solutions; purge IV line with normal saline before administering Phenytoin infusion; IM not recommended as absorption is erratic.) Or Inj. Sodium valproate 20-40 mg/kg IV at the rate of 6 mg/kg/h. If seizures not controlled, repeat the half dose of Valproate. Or Inj. Levetiracetam (1000-3000 mg; 25-30 mg/kg IV to be given at the rate of 100 mg/min. If seizures not controlled, repeat half dose. Or Inj. Phenobarbitone 20 mg/kg IV at 60 mg/minutes (should be considered where ventilator facility is available as it can cause hypotension and respiratory depression.

Refractory status epilepticus (RSE)	If seizures are continuing after 20 -60 minutes -after second ASM	Insert urinary catheter Urinalysis Cardiorespiratory function monitoring: ECG, SpO2, BP Intubate Start continuous EEG, Consider the following during general and neurological examination: Trauma, Infection, Stroke; Drug ingestion/overdose Alert anesthiologist - shift to a higher center capable of dealing with status epilepticus with ventilator and ICU facility.	■ Midazolam infusion (0.2 mg/kg at infusion rate of 0.2 mg/kg/hour) Or ■ Propofol infusion 20 mcg/kg/min with 1-2 mg/kg loading dose (with caution for propofol infusion syndrome) Or ■ Pentobarbital 5-15 mg/kg; may give an additional 5-10 mg/kg; administer at an infusion rate <50 mg/min Or thiopental in select centers 2-7 mg/kg IV at an infusion rate <50 mg/min.
Super Refractory status epilepticus (>60 minutes)	Persistent seizures despite above	ICU care, anesthetic coma; Prepare for mechanical ventilation Continue Airway protection, hemodynamic support (fluids, vasopressors if SBP <90 or MAP <70), temperature, glycemic control, aspiration prevention, VTE prophylaxis, and ICU nursing protocols. Continuous EEG monitoring Place arterial catheter and central catheter	■ Control hyperthermia ■ Treat underlying etiology aggressively (infection, metabolic derangement, structural lesion). Consider immunologic or autoimmune causes if cryptogenic and prolonged. ■ Consider treating acidosis if pH is 7.2 or if symptomatic in the form of cardiac conduction disturbances or hemodynamically unstable. ■ Coma phase: Continue pharmacological coma for 12 h after last seizure with EEG goal of burst suppression ■ Pressor therapy when appropriate
Weaning phase	Seizures controlled	Keep in ICU Airway protection, hemodynamic support (fluids, vasopressors if SBP <90 or MAP <70), temperature, glycemic control, aspiration prevention, VTE prophylaxis, and ICU nursing protocols.	Weaning phase: Continue therapeutic levels of prior agents; many providers maintain infusions ≥24 hours after control, then wean gradually under EEG. (Barbiturates and other agents may be used per institutional practice; ENLS highlights midazolam/ propofol first for adults.) Reduce infusion of the anesthetic agent every 3 hours with EEG monitoring if there are no clinical or electrographic seizures and then wean off. If seizures recur, re-institute coma therapy with the same anesthetic agent to which the seizures responded. Try to wean as outlined above if there are no clinical or electrographic seizures for last 24-48 h.

Investigations during/after control:

- Continuous or serial EEG to detect nonconvulsive seizures.
- Neuroimaging (urgent MRI/CT if new focal features, unknown cause, or poor recovery).
- Blood culture, lumbar puncture if infection is suspected and no contraindications.
- Comprehensive metabolic and toxicology panel as indicated.
  Metabolic panel- glucose; electrolytes (Na, K, Cl, HCO_3^-, Ca, Mg, phosphate); renal (urea/creatinine); liver panel (AST/ALT, bilirubin, INR); complete blood count; venous/arterial blood gas with lactate; serum osmolality, anion/osmolar gaps; ammonia; pregnancy test
  Targeted toxicology (as indicated)- when suspected - serum antiseizure drug levels, lithium, carboxyhemoglobin, urine tox screen (opioids, benzodiazepines, cocaine, amphetamines, cannabinoids), thyroid stimulating hormone
- Repeat/monitor: recheck key electrolytes, glucose, acid-base, and drug levels after stabilization or therapy adjustments.

Special situations

- Pregnancy/eclampsia: treat seizure per above; add magnesium sulfate if eclampsia suspected.
- Children: weight-based dosing; intranasal/buccal midazolam works well before IV access.
- Toxic ingestion (e.g., isoniazid): give antidote (e.g., pyridoxine).

5. **Post-Seizure (In-Hospital)**

- Start/adjust maintenance antiseizure medicine matched to seizure type and then these can be continued as oral maintenance therapy. In patients known to have epilepsy, their usual AED should be maintained, and dose adjustments may be carried depending on serum AED levels.
- Document semiology, duration, triggers, injuries, imaging/lab results.
- Update medication list and adherence strategy
- Develop discharge plan. Prescribe rescue medication if risk of prolonged or cluster seizures. Use standardized seizure documentation Give a written rescue plan and counseling before discharge; arrange follow-up (neurology), and address driving/ safety per local rules.

Assessment of response, review & follow-up

- **At each visit:** seizure diary, adherence, adverse effects (cognition/ mood/sedation/weight), interactions, quality of life; adjust regimen accordingly.
- **Drug levels** when indicated (phenytoin, valproate, carbamazepine).
- **Follow-up:** 1-3 months after start/ change, then every 6-12 months if stable (earlier for breakthroughs, pregnancy, new meds).
- **Step-down/withdrawal:** consider only after ≥2 years seizure free, normal neuro exam, low risk etiology, favorable EEG; taper 10-25% every 2-3 months (slower for benzodiazepines/ barbiturates/long half-life agents). Provide a relapse action plan.

Referral (tiered approach)

- **Primary care / community:** recognize seizures, stabilize, basic labs, start rescue plan, arrange EEG/MRI referral.
- **Secondary hospital:** EEG, CT/MRI, start/adjust ASMs, manage SE per protocol, investigate common etiologies, structured follow-up.
- **Tertiary epilepsy center:** video-EEG, epilepsy protocol MRI, genetic/ metabolic testing, surgical candidacy, ketogenic diet program, neuromodulation (vagus nerve stimulation, responsive neurostimulation).

Special considerations

Children: development aware therapy; weight based dosing; school plans (individualized education plan, seizure action plan); monitor growth, cognition, mood; consider genetic/metabolic testing early.

Women and pregnancy: avoid valproate when possible (teratogenic); prefer lamotrigine or levetiracetam, if appropriate; use folic acid 4-5 mg/day preconception through first trimester; discuss contraception (enzyme inducing ASMs reduce hormonal efficacy); monitor ASM levels in pregnancy (especially lamotrigine); most ASMs compatible with breastfeeding, individualize.

Complications

Status epilepticus, injuries (falls, burns, drowning), fractures, depression/anxiety, cognitive effects, medication toxicity, SUDEP.

Patient education, objectives & instructions

- **Recognize seizures** and **use rescue meds** (clear "when and how").
- **Adherence:** don't stop medicines abruptly.
- **Safety:** bathing/swimming supervision; sleep hygiene; avoid alcohol/illicit triggers.
- **Diary:** log events, triggers, side effects; bring to visits.
- **Family involvement:** train caregivers in recognition, first aid, rescue dosing; support caregiver mental health.
- **Driving/Swimming/work/school:** follow local regulations; obtain accommodations as needed; maintain regular follow-up.

EPILEPSY

INTRODUCTION

Epilepsy is a chronic brain disorder marked by a tendency for unprovoked, recurrent seizures from abnormal synchronized neuronal firing. Effective diagnosis and management reduce seizure frequency, complications, and the risk of sudden unexpected death in epilepsy (SUDEP), improving quality of life. About 50 million people live with epilepsy worldwide; incidence is ~50 per 100,000 per year, with active prevalence around 700 per 100,000 (idiopathic ~307 per 100,000). Mortality is higher than in the general population, roughly 1.6-11.4 times, driven by status epilepticus, SUDEP, injuries, and undertreatment. The disease shows bimodal peaks in early childhood and after age 60 but can occur at any age. Treatment gaps remain large, often >70% in rural settings and ~45-50% in some urban areas, due to limited access, stigma, and diagnostic constraints. Many pediatric syndromes are controllable, and 50-60% of children achieve seizure control with appropriate therapy. Standardized diagnostic algorithms, stepwise treatment pathways, clear escalation and referral (including timely surgical evaluation for drug-resistant epilepsy) help close gaps, reduce avoidable harm, and enable outcome monitoring.

SCOPE OF THE GUIDELINES

These guidelines give practical, end-to-end recommendations for diagnosing and managing seizures and epilepsy: how to assess a first seizure, classify epilepsy syndromes, identify causes, deliver acute care, start and tailor long-term antiseizure therapy, management of seizure episodes (out of hospital and in hospital), and status epilepticus. They integrate nonpharmacological care including safety, lifestyle, psychosocial support, and patient-caregiver education, and outline pathways for drug-resistant epilepsy with referral for surgical evaluation; surgical indications are covered, procedural details are not. Pediatric content summarizes common childhood syndromes and management principles, with special considerations for children and for women during pregnancy.

Intended Users

The target users span primary care, emergency clinicians, nurses, neurologists, pediatricians, rehabilitation and mental health teams, and public health implementers to promote consistent, evidence based care across settings.

Applicability and Levels of Care

- At the primary care level, priorities are recognition and stabilization using airway-breathing-circulation, bedside glucose, thiamine before glucose if deficiency is possible, rapid benzodiazepine treatment such as midazolam while initiating antiseizure medication, basic labs, and referral for electroencephalography (EEG) and imaging.
- At secondary hospitals/atolls/regional level, provide EEG, computed tomography (CT) or magnetic resonance imaging (MRI) where available, initiate or adjust regimens, manage status epilepticus per protocol, use phenobarbitone for neonates, investigate common causes, and arrange structured follow-up.
- Tertiary centers deliver comprehensive evaluation with long-term video EEG, epilepsy protocol MRI, genetic and metabolic testing, multidisciplinary care, and assessment for epilepsy surgery.

Limitations and mitigations at lower levels:

- EEG unavailability: use structured clinical seizure classification and seizure semiology; consider teleEEG or remote expert review.
- Imaging gaps: prioritize MRI for localization when suspicious focal features exist; basic CT to rule out acute structural causes.
- Specialist shortage: develop clear referral pathways, use tele neurology consults, train primary care in standard algorithms, and implement standardized treatment packs.
- Medication supply instability: use WHO essential medicines list backbone (e.g., phenytoin, carbamazepine, valproate) and levetiracetam IV at the tertiary care with stock management and substitution protocols.

DEFINITION

Epilepsy is a neurological disorder characterized by a persistent predisposition to generate unprovoked recurrent seizures. The current ILAE definition is met if any one of the following holds:

1. Two or more unprovoked (or reflex) seizures occurring more than 24 hours apart
2. One unprovoked (or reflex) seizure and a probability of further seizures similar to the general recurrence risk (at least 60%) after two unprovoked seizures occurring over the next 10 years.
3. Diagnosis of an epilepsy syndrome (clinical electrographic pattern) with underlying predisposition to recurrent seizures.

Acute symptomatic (provoked) seizures, those occurring in close temporal association with an identifiable reversible cause such as metabolic derangement, central nervous system infection, or acute head injury, do not by themselves constitute epilepsy unless the predisposition persists after the provoking factor is resolved.

Seizure types (ILAE Classification 2025)

Class	Type (abbrev.)	Key features	Consciousness	Age / context	EEG / classification cues
Focal (F)	Focal preserved consciousness (FPC)	Localized motor, sensory, autonomic, cognitive or psychic symptoms	Preserved	Any age; structural causes common in adults	Semiology localizes to one region; focal ictal/interictal EEG when available
	Focal impaired consciousness (FIC)	Altered awareness; may have automatisms	Impaired	Any age	Focal onset on EEG supports diagnosis
	Focal-to-bilateral tonic-clonic (FBTC)	Starts focal, spreads to bilateral tonic-clonic	Usually impaired†	Any age	Focal onset pattern with secondary generalization
Unknown whether focal or generalized (U)	Preserved consciousness (PC)	Origin unclear; observable or non-observable features	Preserved	Any	Insufficient data to assign focal vs generalized
	Impaired consciousness (IC)	Origin unclear; impaired consciousness	Impaired	Any	As above
	Bilateral tonic-clonic (BTC)	Generalized tonic-clonic when onset unknown	Impaired	Any	No clear focal or generalized onset captured
Generalized (G)	Generalized tonic-clonic (GTC) including myoclonic-tonic-clonic (MTC) and absence to-tonic-clonic (ATC)	Diffuse tonic then clonic phases; MTC has preceding myoclonus; ATC evolves from absence	Impaired	Any; many syndromes adolescent onset	Generalized spike-wave or polyspike-wave patterns
	Absence seizures (AS): typical (TA), atypical (AA), myoclonic absence (MA), eyelid myoclonia ± absence (EMA)	Brief staring; TA with 3Hz spike-wave; AA slower onset/offset; MA rhythmic myoclonus; EMA eyelid jerks	Usually impaired during events	Absence 4-14 y; EMA often photosensitive	Generalized spike-wave; pattern varies by subtype

	Other generalized seizures: generalized myoclonic, clonic, negative myoclonic, epileptic spasms, tonic, atonic, myoclonic-atonic	Generalized motor phenomena without focal onset	Variable (often impaired)	Varies by syndrome (e.g., spasms in infancy, myoclonic-atonic in childhood)	Generalized epileptiform discharges; syndrome specific patterns
Unknown onset	Unclassified onset	Start not witnessed or info insufficient (e.g., unwitnessed nocturnal tonic-clonic)	Variable	Any	Reclassify when history, EEG, or video clarifies onset

† **FBTC**: seizures from supplementary motor area can preserve consciousness early despite bilateral motor involvement.

Status epilepticus: Any seizure (focal or generalized) with ≥5 minutes or more of continuous clinical and/or electrographic seizure activity or recurrent seizures without regaining consciousness inbetween is labelled as status epilepticus. It is a medical emergency requiring immediate treatment (The Neurocritical Care Society Guidelines 2012).

CAUSES, RISK FACTORS & TRIGGERS

Epilepsy arises from a variety of underlying causes, risk is higher in individuals with prior central nervous system injury or infection, neonatal seizures, perinatal hypoxia, developmental delay, intellectual disability, family history of epilepsy, brain tumors, substance withdrawal or intoxication and cerebrovascular disease in older adults. These contribute to long-term susceptibility and often have structural, genetic, or developmental origins:

Cause/risk factors	Details
Underlying Causes of Epilepsy	■ Structural: Stroke, traumatic brain injury, tumor, cortical malformations, neurocysticercosis. ■ Genetic: Idiopathic generalized epilepsies, channelopathies. ■ Infectious: Meningitis, encephalitis, cerebral malaria, HIV related CNS disease. ■ Metabolic: Hypoglycemia, hyponatremia, hepatic/renal failure. ■ Immune-mediated: Autoimmune encephalitis. ■ Developmental/Perinatal: Birth injury, hypoxia, malformations.
Major Risk Factors	■ Prior CNS insult: Stroke (cortical scarring), head injury (disrupted neural networks, gliosis), CNS infections (inflammation, calcification). ■ Family history: Genetic mutations (e.g., SCN1A in Dravet syndrome), higher risk in first-degree relatives. ■ Developmental delay: Often linked to cortical malformations or genetic syndromes. ■ Neonatal seizures: Due to hypoxic ischemic injury, metabolic disorders, malformations.

Common Seizure Triggers	■ Sleep deprivation/fatigue: Reduces GABAergic tone, alters excitability. ■ Emotional stress: Cortisol mediated excitatory effects. ■ Alcohol binge/withdrawal: Withdrawal causes rebound hyperexcitability. ■ Flickering lights: Triggers occipital hyperexcitability (photosensitive epilepsy). ■ Missed medication: Leads to breakthrough seizures/status epilepticus. ■ Acute systemic illness/fever: Particularly in children and autoimmune epilepsy. ■ Hormonal changes: Catamenial epilepsy linked to estrogen progesterone fluctuations. ■ Medications: TCAs, bupropion, certain antipsychotics, CNS stimulants, fluoroquinolones, first-generation antihistamines, meperidine, tramadol.

EVALUATION FOR DIAGNOSIS

Domain	Key Points
Clinical Features	■ Generalized tonic-clonic seizure: Sudden LOC, bilateral rhythmic movements, postictal confusion (minutes-hours), tongue biting (especially lateral), urinary incontinence. ■ Focal seizures: Motor (jerking of limb/face), sensory (tingling, visual changes), autonomic (sweating, piloerection), psychic (déjà vu, fear). May or may not impair awareness. ■ Absence seizures: Brief (5-15 sec) staring spells, abrupt onset/offset, often frequent; common in children. ■ Myoclonic jerks: Rapid, shock like muscle contractions. ■ Atonic seizures: Sudden loss of tone, leading to falls ("drop attacks"). ■ Evolving semiology: May indicate multifocal or progressive disease.
Physical Examination	■ Focal neurologic deficits suggesting structural lesion (weakness, visual field cut, cranial nerve deficits) and complete neurological examination ■ Signs of systemic illness or infection (fever, rash, hepatomegaly, meningism). ■ Assess cognitive function (memory, orientation, executive function) in refractory epilepsy. ■ Look for lateral tongue bite and urinary incontinence , suggestive of epileptic vs. non-epileptic events.
Laboratory Investigations	■ Blood glucose: Rule out hypoglycemia. ■ Electrolytes (Na^+, K^+, Ca^{2+}, Mg^{2+}): Detect metabolic precipitants. ■ CBC: Identify infections or anemia. ■ Renal/Liver function tests: Exclude uremia or hepatic encephalopathy. ■ Toxicology screen: For unexplained/atypical events, esp. in adolescents/adults. ■ CSF analysis: If CNS infection suspected. ■ Malaria smear/HIV serology: In endemic areas to detect infectious triggers.

CONFIRMATION OF DIAGNOSIS

1. **Electroencephalogram (EEG):** interictal abnormalities (spikes, sharp waves) support diagnosis and help classification (e.g., focal vs. generalized). Sleep or sleep deprived EEG enhances sensitivity, especially in subtle cases.

2. **Neuroimaging**

   - CT scan is useful for acute settings, e.g., suspected hemorrhage, mass lesion, or in emergency contexts with focal deficits
   - MRI with epilepsy protocol is preferred for detecting structural abnormalities (e.g., hippocampal sclerosis, cortical malformations).

2. **Video EEG / Long-Term Monitoring Essential for:** Unclear or evolving semiology; differentiating epileptic vs. nonepileptic events (e.g., PNES); presurgical evaluation in refractory epilepsy and monitoring therapeutic response and seizure patterns over time.

CLASSIFICATION / SEVERITY ASSESSMENT

Use International League Against Epilepsy (ILAE) framework:

- Seizure type: focal, generalized, combined generalized and focal, unknown onset
- Epilepsy type/syndrome: genetic, structural/metabolic, unknown
- Severity: frequency, drug responsiveness, impact on function, presence of comorbidities (depression, cognitive impairment)
- Drug-resistant epilepsy: failure of adequate trials of two tolerated, appropriately chosen and used antiseizure medication schedules to achieve sustained seizure freedom.

DIFFERENTIAL DIAGNOSIS

Domain	Key Features
Syncope	Transient loss of consciousness due to cerebral hypoperfusion; may have prodrome or postural association; lacks postictal confusion.
Psychogenic Nonepileptic Seizures (PNES)	Seizure like events without EEG correlates; often prolonged, asynchronous movements; may occur in emotionally stressful contexts.
Transient Ischemic Attack (TIA)	Limb shaking TIA's, sudden focal deficits due to temporary ischemia; no convulsions or altered awareness.
Migraine (especially hemiplegic or visual aura)	Visual or sensory disturbances may mimic aura; gradual onset, longer duration than seizures.

Sleep Disorders (e.g., narcolepsy, parasomnias)	Sudden episodes of behavioral change or sleep attack; during sleep or transitions.
Movement Disorders (e.g., tics, tremors)	Stereotyped movements; preserved awareness; not episodic with sudden onset/ offset.
Metabolic disturbances (e.g., hypoglycemia, electrolyte imbalances)	Can produce altered consciousness or convulsions; reversible with correction.

MANAGEMENT GOALS

- Seizure freedom with minimal adverse effects; avoid unnecessary polypharmacy.
- Prevent injury and mortality (including sudden unexpected death in epilepsy, SUDEP): control generalized tonic-clonic seizures, ensure adherence, teach safety.
- Treat the cause: targeted imaging and metabolic/genetic/infectious/inflammatory work-up.
- Optimize quality of life: education, psychosocial support, stigma reduction; screen and treat mood/cognitive comorbidities; counsel on driving/employment per local rules.
- Minimize treatment burden: simplify regimens, review necessity regularly, and use surgery/dietary therapy/neuromodulation when appropriate while monitoring for side effects.

MANAGEMENT PRINCIPLES

- Classify first (before long-term therapy when feasible): seizure type (focal, generalized, unknown) and epilepsy syndrome; etiologic class (structural, genetic, infectious, metabolic, immune, unknown) using EEG, neuroimaging, and clinical semiology.
- Fix reversible causes/triggers: correct hypoglycemia/electrolytes; treat CNS infections; manage alcohol withdrawal, sleep deprivation, fever; reassess need for long-term ASM after correction.
- Start tailored monotherapy:
  - *Focal:* carbamazepine, oxcarbazepine, lamotrigine, levetiracetam.
  - *Generalized:* valproate, lamotrigine, levetiracetam, topiramate.
  - *Absence*: ethosuximide, valproate.

- *Cautions:* avoid valproate in women of childbearing potential; use lamotrigine with psychiatric comorbidity awareness; levetiracetam suits older adults (low interactions).

- Titrate to effect, minimize harm: start low, go slow; monitor sedation, cognition, mood, weight; use drug levels when indicated (phenytoin, valproate).
- Review every visit: adherence, seizure diary, adverse effects, and life impact (driving, work/school, mood). Remove barriers (cost, understanding).
- Escalate when drug-resistant epilepsy (DRE): failure of two appropriate, tolerated ASMs → rational polytherapy, video-EEG characterization, refer for epilepsy surgery evaluation (temporal lobectomy, lesionectomy, corpus callosotomy). Nonsurgical options: vagus nerve stimulation (VNS), responsive neurostimulation (RNS), ketogenic/ modified Atkins diet.

NON PHARMACOLOGICAL INTERVENTIONS

Nonpharmacologic interventions complement medication and are essential for holistic epilepsy care.

Intervention	Indication	Key steps in implement	Monitor & risks	Referral / follow-up
Seizure safety	All patients; escalate if atonic or frequent generalized tonic-clonic seizures	Home/work risk check; helmets for drop attacks; supervise high-risk tasks (solo swimming, heights, machinery); teach first aid and emergency triggers	Injuries, adherence to safety plan	Reassess each visit; update plan after any seizure related injury
Sleep hygiene	Any sleep complaint; irregular schedules	Regular sleep-wake times; adequate duration; cut late caffeine/screens; screen/treat obstructive sleep apnea (OSA); address shift work	Daytime sleepiness, OSA symptoms; CPAP adherence if prescribed	Refer to sleep clinic for OSA testing/ management
Stress management	Stress triggered seizures; anxiety	Mindfulness/ relaxation, breathing drills, basic cognitive behavioral strategies; routines; trigger log	Mood/anxiety scales, seizure-stress linkage	Psychology/ psychiatry for cognitive behavioral therapy (CBT) when needed
Psychological & psychosocial support	Any quality-of-life impact	Screen and treat depression/anxiety; counsel on stigma; school/work accommodations; caregiver education; seizure diary	Mood/cognition, adherence, social participation	Mental health services, social work; neuropsychology if cognitive issues
Dietary therapy (ketogenic / modified Atkins / lowGI)	Drug-resistant epilepsy after failure of ≥2 appropriate antiseizure medicines	Specialist's initiated, Dietitian led protocol; baseline labs; structured initiation; strict carb control	Lipids, growth/weight, kidney stones, micronutrients	Tertiary center diet program; close monthly review early on

PHARMACOLOGICAL THERAPY

Principles: start with a single antiseizure medication (ASM) appropriate to the seizure type; adjust dose gradually; avoid polypharmacy unless necessary.

Seizure type	First-line options (adult)	Adult dosing	Pediatric dosing	Monitoring
Focal	Carbamazepine, Levetiracetam, Lamotrigine	Carbamazepine: 200 mg BID; increase by 200 mg q1-2 week to 800-1200 mg/day divided. Levetiracetam: 500 mg BID; renal adjust. Lamotrigine: slow titration per protocol.	Carbamazepine: ~5 mg/kg BID then increase by 5 mg/kg q1-2 week - common ≤30 mg/kg/day divided (max ~800-1200 mg/day by age/weight). Levetiracetam: 20 mg/kg/day in 2 doses then increase q2 week to ≤60 mg/kg/day (max ~3000 mg/day). Lamotrigine: 0.15 mg/kg/day, double q2 week; usual dose 1-5 mg/kg/day (adjust with interacting drugs).	Carbamazepine: hyponatremia, liver enzymes, rash. Lamotrigine: slow titration to reduce rash. Levetiracetam: mood/behavior; renal adjustment.
Generalized tonic-clonic	Valproate, Levetiracetam	Valproate: 10-15 mg/kg/day in 2-3 doses then increase to ≤60 mg/kg/day as tolerated. Levetiracetam: 500 mg BID; renal adjust.	Valproate: 10-15 mg/kg/day in 2-3 doses to target 30-60 mg/kg/day (max ~60 mg/kg/day). Levetiracetam: as above (20-60 mg/kg/day, max ~3000 mg/day).	Valproate: LFTs, platelets, weight/teratogenicity (avoid in women of childbearing potential if alternatives available).
Absence	Ethosuximide (Firstline), Valproate	Ethosuximide: 500 mg BID; increase by 250 mg q1-2 week to 1000-1500 mg/day. Valproate: per GTC dosing if needed.	Ethosuximide: 10 mg/kg/day in 2 doses then increase 5 mg/kg q1-2 week to 20-30 mg/kg/day (up to 1000-1500 mg/day in older children). Valproate: per GTC dosing above.	Ethosuximide: GI upset, behavior; periodic counts if clinically indicated. Use valproate if mixed generalized seizures.
Myoclonic	Levetiracetam, Valproate	Levetiracetam: 500 mg BID; titrate as needed. Valproate: 10-15 mg/kg/day to ≤60 mg/kg/day.	Levetiracetam: 20-60 mg/kg/day in 2 doses (max ~3000 mg/day). Valproate: 10-60 mg/kg/day.	Start low, titrate gradually; adjust for age, renal/hepatic function, and interactions.

Dose Titration principles:

- Start with monotherapy at a low initial dose, increase gradually ("start low, go slow") to balance efficacy and tolerability, and target the minimum effective dose that achieves control. Adjustments account for drug half-life, age, weight, renal/hepatic function, and interactions. Some situations (e.g., status epilepticus or acute loading) require rapid attainment of therapeutic levels using loading doses (for example, fosphenytoin or valproate in acute settings), but chronic escalation should be stepwise, increasing every 1-2 weeks unless urgency or side effects dictate slower changes.
- Monitor for breakthrough seizures and adverse effects; if control is inadequate despite appropriate titration of one agent, consider a second drug only after confirming adherence and correct dosing.

- When therapy is withdrawn after sustained seizure freedom, taper slowly to avoid rebound, reduce dose in increments (e.g., 10-25% every few weeks to months) tailored to the specific drug and patient risk. For details see section on Assessment of response to therapy.
- Regular review throughout ensures duration and dosing remain aligned with evolving clinical status.

Cautions with antiseizure medications

- Antiseizure drugs carry specific risks that must guide selection and monitoring. Valproate requires caution or avoidance in hepatic dysfunction due to potential liver injury and is highly teratogenic; in women of childbearing age use alternatives when feasible and provide preconception counseling with folate supplementation if retained.
- Before starting carbamazepine or oxcarbazepine in at risk ethnicities (especially people of Southeast Asian descent), test for HLA-B*1502 to reduce the risk of Stevens Johnson syndrome/toxic epidermal necrolysis.
- Many agents have clinically important drug interactions: enzyme inducers (e.g., carbamazepine, phenytoin, phenobarbital) can lower levels of co-administered drugs including hormonal contraceptives, while inhibitors (e.g., valproate) can raise levels of concomitant medications. Adjust doses, review concomitant therapy regularly, and monitor relevant labs (liver function, blood counts, drug levels when indicated) to catch toxicity or subtherapeutic exposure.

Duration of therapy:

- Treatment duration is driven by seizure type, recurrence risk, and response. After a first unprovoked seizure with high recurrence risk or in established epilepsy, therapy is usually continued until the patient has been seizure free for at least two years before considering withdrawal; the decision is individualized based on etiology, neurologic exam, EEG, and patient circumstances.

MANAGEMENT OF SEIZURE EPISODE

Management of a seizure episode breaks down into immediate (acute) care, escalation if it doesn't stop, and postictal handling. Develop an individualized seizure action plan documenting when and how to use these.

Do's	Don'ts
■ Stay with the person; keep calm. ■ Protect from injury: clear nearby hard/sharp objects, cushion head. ■ Turn onto their side (recovery position) if unconscious to keep airway clear. ■ Loosen tight clothing around neck. ■ Time the seizure. ■ After motor activity stops, allow them to rest; reorient gently. ■ If rescue medication is prescribed (for prolonged or cluster seizures), administer per plan.	■ Don't restrain movements. ■ Don't put anything in the mouth. ■ Don't start oral intake until fully alert and swallowing is safe. ■ Don't leave them alone until recovery. ■ Don't try to "shake them awake."

When to call emergency services immediately

- Seizure lasts longer than 5 minutes.
- Recurrent seizures without regaining consciousness (clusters/status).
- First ever seizure.
- Injury during seizure, difficulty breathing, or prolonged postictal confusion.
- Known epilepsy patient with atypical seizure pattern, pregnancy, diabetes, or immunocompromise.

Rescue Medication (if available and indicated): (Use only if seizure persists beyond usual duration or per individualized action plan)

- **Diazepam IV or** lorazepam 0.1 mg/kg (max 4 mg) slowly over 2 minutes. If IV unavailable: IM midazolam 0.2 mg/kg (adult usual dose 10 mg)
- **Buccal midazolam (preferred in community if IV unavailable):**
  - Children ≥1 year: 0.2 mg/kg (max 10 mg) into buccal pouch; may repeat once after 10 minutes if seizure continues.
  - Adults: 10 mg buccal; may repeat once after 10 minutes.
- **Rectal diazepam:**
  - Children: 0.2-0.5 mg/kg (max 10 mg); may repeat once after 10 minutes.
  - Adults: 10 mg; may repeat once.

IN-HOSPITAL SEIZURE EPISODE (FIRST AID AND ACUTE MANAGEMENT)

Phase	Checklist actions	Notes / pearls for practice
Immediate (0-5 min) First stage/Early status	■ Airway, Breathing, Circulation ■ Give oxygen ■ Recovery position if safe ■ IV access ■ Check glucose; treat hypoglycemia ■ Rapid point of care electrolytes, antiseizure drug levels if relevant, infection screen if indicated. ■ Transport patient in lateral position	If hypoglycaemia is established or if blood glucose determination is not available, administer glucose, in adults, 25% Dextrose IV 50-100 mL immediately (to be preceded by 50 mg IM Thiamine if patient is a known alcoholic). 2. Inj. Lorazepam 0.1 mg/kg (maximum 4 mg) at the rate of 2 mg/min IV over 1 min Or Inj. Diazepam 0.2 mg/kg (maximum 10 mg) at 5 mg/min IV over 1 min. If seizures not controlled after 5 minutes, repeat once. Protect from injury; don't force objects into mouth. If no IV, use alternative routes as per local protocol. Use standardized seizure note; update medication list and adherence plan. Provide written rescue instructions.
Post seizure (in hospital)	■ Observe recovery; neuro exam ■ Document semiology and duration ■ Find/correct precipitants (missed meds, metabolic issues) ■ Adjust chronic ASM if indicated ■ If first seizure/new pattern: start workup (EEG, labs, CT/MRI as appropriate) ■ Discharge plan: rescue med if risk of prolonged/cluster seizures	Use standardized seizure note; update medication list and adherence plan. Provide written rescue instructions.
Special considerations	■ Pregnancy: follow protocol; avoid valproate long-term where possible; in status epilepticus, seizure control takes precedence ■ Renal/hepatic impairment: dose adjust second line agents ■ Children: weight-based dosing; follow pediatric status pathways ■ Liaise early with obstetrics, nephrology/hepatology, or pediatrics as needed.	
Implementation	■ Post written algorithms in wards/ED ■ Educate staff on escalation thresholds and rescue pathways ■ Include on call contacts and location of rescue meds/equipment. ■ **Keep a clear written plan for seizure emergencies, tailored to the patient's seizure**	

Do's	Don'ts
■ Monitor vitals, oxygen saturation, cardiac rhythm. ■ Continuous EEG if seizure activity persists or nonconvulsive status suspected. ■ Review antiseizure drug levels, electrolytes, infection, intoxication, withdrawal, hypoglycemia. ■ Escalate early for refractory status to ICU and anesthesia team.	■ Don't give repeated benzodiazepine boluses without reassessing airway/respiratory status (risk of respiratory depression). ■ Don't delay second line therapy beyond 10-20 minutes if seizure persists. ■ Don't assume all postictal deficits are stroke, evaluate but avoid premature closure.

Status Epilepticus Protocol (seizure >5 minutes or repeated without recovery): (Neurocritical care Guidelines 2012)

Status epilepticus (SE) is an emergency condition associated with a high morbidity and mortality if not treated early and effectively. However, about 12-30% of adult patients first present with SE as their first presentation. In patients with known epilepsy, the most common cause is a change in medication. SE can occur due to underlying metabolic disturbances, CNS infections, head trauma and hypoxia.

Step	Timing	Intervention	Dose/Route
Initial benzodiazepine	0-5 minutes	Stabilize (Airway, breathing, circulation, disability) Finger-prick glucose (give thiamine before dextrose if deficiency suspected) IV access *Metabolic screen & toxicology screen First line abortive Get EEG if the patient doesn't wake - consider non-convulsive SE	IV lorazepam 0.1 mg/kg (max 4 mg) slowly over 2 minutes. If IV unavailable: IM midazolam 0.2 mg/kg (adult usual dose 10 mg) Or IV diazepam 0.15 mg/kg (max 10 mg) Document time and response.
Urgent Control therapy (if seizure continues)	5-10 minutes (early status)	■ Anticonvulsant levels ■ Arterial blood gas ■ Plan for continuous EEG as soon as feasible. ■ Search/treat causes in parallel.	Inj. Phenytoin/Fosphenytoin 15-20 mg/kg slow infusion in saline (not more than 50 mg/min). (**Caution:** Phenytoin is incompatible with glucose-containing solutions; purge IV line with normal saline before administering Phenytoin infusion; IM not recommended as absorption is erratic.) Or Inj. Sodium valproate 20-40 mg/kg IV at the rate of 6 mg/kg/h. If seizures not controlled, repeat the half dose of Valproate. Or

			Inj. Levetiracetam (1000-3000 mg; 25-30 mg/kg IV to be given at the rate of 100 mg/min. If seizures not controlled, repeat half dose. Or Inj. Phenobarbitone 20 mg/kg IV at 60 mg/minutes (should be considered where ventilator facility is available as it can cause hypotension and respiratory depression.
Refractory status epilepticus (RSE)	If seizures are continuing after 20 -60 minutes - after second ASM	Insert urinary catheter Urinalysis Cardiorespiratory function monitoring: ECG, SpO2, BP Intubate Start continuous EEG, Consider the following during general and neurological examination: Trauma, Infection, Stroke; Drug ingestion/ overdose Alert anesthiologist - shift to a higher center capable of dealing with status epilepticus with ventilator and ICU facility.	■ Midazolam infusion (0.2 mg/kg at infusion rate of 0.2 mg/kg/ hour) Or ■ Propofol infusion 20 mcg/kg/ min with 1-2 mg/kg loading dose (with caution for propofol infusion syndrome) Or thiopental in select centers 2-7 mg/kg IV at an infusion rate <50 mg/min. ■ Control hyperthermia ■ Treat underlying etiology aggressively (infection, metabolic derangement, structural lesion). Consider immunologic or autoimmune causes if cryptogenic and prolonged. ■ Consider treating acidosis if pH is 7.2 or if symptomatic in the form of cardiac conduction disturbances or hemodynamically unstable.
Super Refractory status epilepticus (>60 minutes)	Persistent seizures despite above	Continue ICU care, anesthetic coma Continue Airway protection, hemodynamic support (fluids, vasopressors if SBP <90 or MAP <70), temperature, glycemic control, aspiration prevention, VTE prophylaxis, and ICU nursing protocols. Prepare for mechanical ventilation Continuous EEG monitoring Place arterial catheter and central catheter	■ Control hyperthermia ■ Treat underlying etiology aggressively (infection, metabolic derangement, structural lesion). Consider immunologic or autoimmune causes if cryptogenic and prolonged. ■ Consider treating acidosis if pH is 7.2 or if symptomatic in the form of cardiac conduction disturbances or hemodynamically unstable. ■ Coma phase: Continue pharmacological coma for 12 h after last seizure with EEG goal of burst suppression ■ Pressor therapy when appropriate

Weaning phase	Seizures controlled	Continue in ICU Airway protection, hemodynamic support (fluids, vasopressors if SBP <90 or MAP <70), temperature, glycemic control, aspiration prevention, VTE prophylaxis, and ICU nursing protocols.	Weaning phase: Continue therapeutic levels of prior agents; many providers maintain infusions ≥24 hours after control, then wean gradually under EEG. (Barbiturates and other agents may be used per institutional practice; ENLS highlights midazolam/propofol first for adults.) Reduce infusion of the anesthetic agent every 3 hours with EEG monitoring if there are no clinical or electrographic seizures and then wean off. If seizures recur, re-institute coma therapy with the same anesthetic agent to which the seizures responded. Try to wean as outlined above if there are no clinical or electrographic seizures for last 24-48 h.

When to call emergency services immediately:

- Continuous or serial EEG to detect nonconvulsive seizures.
- Neuroimaging (urgent MRI/CT if new focal features, unknown cause, or poor recovery).
- Blood culture, lumbar puncture if infection is suspected and no contraindications.
- Comprehensive metabolic and toxicology panel as indicated.
  Metabolic panel- glucose; electrolytes (Na, K, Cl, HCO_3^-, Ca, Mg, phosphate); renal (urea/creatinine); liver panel (AST/ALT, bilirubin, INR); complete blood count; venous/arterial blood gas with lactate; serum osmolality, anion/osmolar gaps; ammonia; pregnancy test
  Targeted toxicology (as indicated)- when suspected - serum antiseizure drug levels, lithium, carboxyhemoglobin, urine tox screen (opioids, benzodiazepines, cocaine, amphetamines, cannabinoids), thyroid stimulating hormone

- Repeat/monitor: recheck key electrolytes, glucose, acid-base, and drug levels after stabilization or therapy adjustments.

Special situations

- Pregnancy/eclampsia: treat seizure per above; add magnesium sulfate if eclampsia suspected.
- Children: weight-based dosing; intranasal/buccal midazolam works well before IV access.
- Toxic ingestion (e.g., isoniazid): give antidote (e.g., pyridoxine).

MANAGEMENT OF STATUS EPILEPTICUS (SE) IN CHILDREN

Management of status epilepticus (SE) in children.

1. Establish ABCs: Establish IV access; draw blood for laboratory investigations, IV glucose, calcium or Pyridoxine (in neonates and infants)
   IV Lorazepam 0.1 mg/kg
   Or
   IV Diazepam 0.2 mg/kg followed by IV Phenytoin/Fosphenytoin
   (If no IV access, use PR Diazepam 0.5 mg/kg or buccal/nasal/IM Midazolam 0.2 mg/kg; intraosseous access could be considered as a next step if IV still not available)

2. Repeat Lorazepam/Diazepam once more SOS (5-10 minutes)

3. IV Fosphenytoin 20 PE (Phenytoin equivalent)/kg/Phenytoin 20 mg/kg (30 minutes)

(Consider transfer to PICU facilities as child at risk of refractory status)

1. IV valproate (1:1 diluted NS) 20-40 mg/kg over 1-5 minutes; given as continuous infusion at a rate of 5 mg/kg/h, if required
   Or

   IV Levetiracetam (loading dose 5-10 mg/kg IV over 15 minutes)
   OR
   IV Phenobarbital 15-20 mg/kg

2. (Re-assess airway again; consider tracheal intubation if the airway is compromised or the patient develops respiratory depression) (45-60 minutes).

3. Transfer to a PICU set-up is mandatory as the child has refractory SE and will need intensive monitoring in a tertiary PICU set-up.

4. Midazolam infusion (loading dose of 0.2 mg/kg, followed by 0.1 mg/kg/h titrated every 15 minutes upwards by 0.05 mg/kg/h till control; maximum dose 2 mg/kg/h)
   OR
   Propofol infusion/pentothal infusion
   (Propofol not routinely recommended in view of significant morbidity and mortality in children)

5. General anesthesia if above steps fail (Tertiary hospital set-up essential) In refractory SE, needing coma-producing therapies (Pentothal, etc.) EEG monitoring preferably continuous, if available; it should also be used if coma persists despite control of convulsive status epilepticus (to exclude non-convulsive SE)

DRUG-RESISTANT EPILEPSY (PER ILAE DEFINITION)

Failure of adequate trials of two tolerated, appropriately chosen and used antiseizure medications (as monotherapies or in combination) warrants referral to a specialist center. Specialist evaluation should be comprehensive and multidisciplinary. Components include:

- Reconfirmation of diagnosis and seizure classification (review semiology, history, and adherence)
- High-resolution neuroimaging (MRI epilepsy protocol)
- Long-term video EEG monitoring to localize seizure onset and assess concordance with imaging
- Neuropsychological assessment (cognitive baseline, lateralization/localization)
- Functional mapping if surgery is considered (e.g., language, motor areas)
- Review for potential reversible contributors or misdiagnosis
- Discussion of other options:
  - Epilepsy surgery for focal lesions with favorable risk benefit profile
  - Neurostimulation (vagus nerve stimulation, responsive neurostimulation, deep brain stimulation) when resection is not feasible or as adjunct
  - Dietary therapies (e.g., ketogenic variants) if not already trialed and appropriate.

Counsel the patient and family about expected outcomes, risks, and timing; coordinate care to expedite decision-making, since early evaluation improves chances of meaningful seizure reduction or remission.

SPECIAL CONSIDERATION IN MANAGEMENT OF CHILDREN WITH EPILEPSY

Epilepsy in children requires more than seizure suppression. Developmental stage, growth, cognition, behavior, and family dynamics all influence choice of therapy and follow-up. The following points outline key domains that need attention beyond standard seizure control.

Domain	Why it matters	What to do	Review
Development & cognition	Seizures/meds can impair learning, attention, language	Screen development regularly; early speech/OT/educational referral	At diagnosis, then every 3-6 months (younger kids)
School & psychosocial	School failure, stigma, poor adherence	plan; written seizure action plan; exam flexibility; peer education	Revisit each term; coordinate with school nurse/counselor
Age/weight-based dosing	Pharmacokinetics change with growth	Recalculate doses by weight; adjust for enzyme maturation	At every visit and after growth spurts; document mg/kg
Puberty & hormones	Catamenial patterns; growth spurts alter control	Track cycles; adjust therapy around menses; counsel contraception/teratogenic risks	Review every 3-6 months; consider diary apps
Genetic/ metabolic causes	Etiology guides targeted therapy	Order genetic/metabolic testing when red flags (regression, refractory, family history)	Reassess when phenotype evolves; genetics consult
Drug effects on growth/behavior	Bone health, mood, attention, sedation issues	Choose agents with better cognitive profile; supplement calcium/vitamin D if risk; monitor mood/behavior	Growth chart each visit; mood/ attention screening
Ketogenic/ dietary therapy	Effective in drug-resistant/ metabolic epilepsies	Dietitian led initiation; labs for lipids, bicarbonate; kidney stone prevention; family training	Close follow-up monthly initially; monitor growth

Safety & injury prevention	Higher injury risk with uncontrolled seizures	Helmets for drop attacks; supervise bathing/swimming; safe sleep routines; water temp limits	Update plan after any seizure/ injury
Febrile seizures vs epilepsy	Avoid overtreatment of simple febrile seizures	Use clear criteria; evaluate complex/recurrent or abnormal development	Give parental first aid guidance; follow up after events
Status epilepticus	Time dependent brain injury	Teach rescue meds and when to use; implement pediatric SE pathway	Review rescue plan every visit; check device/med expiry
Immunizations	Myths reduce coverage; fevers can trigger seizures	Continue routine vaccines; anticipatory fever advice; antipyretics PRN	Document vaccine counseling; no blanket contraindications
Family involvement	Caregiver skills and stress directly affect outcomes	Train caregivers in seizure recognition, rescue med use, and adherence support; screen caregiver mental health and provide resources	Revisit at each visit; refresh training after any event or medication change

FEBRILE SEIZURES

Febrile seizures are seizures occurring in association with fever (temperature ≥38°C) in children between 6 months and 5 years, without evidence of central nervous system infection or acute metabolic disturbance.

- They are classified as simple (generalized, lasting <15 minutes, not recurring within 24 hours) or complex (focal features, duration ≥15 minutes, or multiple in 24 hours). Most are benign and self-limited.
- Evaluation focuses on confirming true fever, excluding CNS infection (meningitis/ encephalitis) when clinical signs suggest, altered consciousness beyond postictal period, neck stiffness, persistent focal neurologic signs, or if the child is ill appearing.
- Lumbar puncture is indicated if meningitis cannot be reliably excluded (e.g., in infants <12 months with unclear vaccination status or after pretreatment with antibiotics).
- Routine neuroimaging or EEG is not indicated for simple febrile seizures. Consider searching for source of fever (otitis, respiratory, urinary, gastroenteritis) and assessing family history or underlying epilepsy risk factors if seizures are atypical.

Acute management of a febrile seizure

1. Ensure airway/breathing/circulation, protect the child from injury, place in recovery position, do not restrain or put anything in the mouth, and time the event.
2. If a convulsive seizure persists beyond 5 minutes, administer rescue benzodiazepine (e.g., buccal or intranasal midazolam 0.2 mg/kg or rectal diazepam 0.2-0.5 mg/kg, max ~10 mg) and seek urgent care. Antipyretics do not prevent recurrence but can improve comfort.

For children with recurrent complex febrile seizures or high recurrence risk (younger age at first seizure, family history, low-grade fever at onset), discuss anticipatory guidance; chronic prophylaxis is not routinely recommended due to side effects, though intermittent rescue therapy (home benzodiazepine at early prolonged fever) can be considered in selected high-risk families.

Education for caregivers is critical: how to recognize a seizure, first aid steps, when to activate emergency services (seizure >5 minutes, difficulty breathing, prolonged postictal state, or signs of serious infection), and reassurance about generally excellent long-term prognosis.

Most children outgrow febrile seizures, and the risk of subsequent epilepsy is low (slightly higher after complex febrile seizures but still modest).

APPROACH TO MANAGEMENT OF CHILDHOOD EPILEPSY SYNDROMES

Childhood epilepsy syndromes have distinct age of onset, seizure types, prognosis, and treatment pathways. Key examples:

1. **Benign epilepsy with centrotemporal spikes (Rolandic epilepsy):** Begins in school aged children and presents with nocturnal focal motor seizures, commonly involving facial twitching. Management is often conservative, with observation being appropriate in many cases. However, if seizures are frequent or disrupt daily functioning, treatment with carbamazepine or oxcarbazepine may be initiated.

2. **Childhood absence epilepsy:** Emerges between the ages of 4 and 10 years and is characterized by brief, sudden staring episodes accompanied by impaired awareness. These seizures often occur multiple times a day and can be subtle, making them easy to overlook. The Firstline treatment options include ethosuximide or valproate, both of which are effective in managing absence seizures. Lamotrigine may be considered as an alternative therapy, particularly when tolerability or specific patient factors warrant a different approach.

3. **Juvenile myoclonic epilepsy:** Begins in adolescence and is characterized by myoclonic jerks that occur most often in the morning. These seizures may be accompanied by generalized tonic-clonic seizures and, in some cases, absence seizures. Valproate is the preferred treatment due to its broad efficacy across seizure types, though it should be avoided in females of childbearing potential if safer alternatives are available. Levetiracetam or lamotrigine can be considered as adjunctive or alternative options depending on individual tolerability and clinical context.

4. **Dravet syndrome:** also known as severe myoclonic epilepsy of infancy, often beginning with prolonged febrile seizures that progressively evolve into multiple seizure types, including myoclonic, tonic-clonic, and atypical absence seizures. The condition is commonly linked to mutations in the SCN1A gene, resulting in sodium channel dysfunction that contributes to its refractory nature. Management requires careful avoidance of sodium channel blockers(carbamazepine and lamotrigine), which can exacerbate symptoms. Instead, treatment regimens often include stiripentol, clobazam, valproate, and cannabidiol, aiming to reduce seizure burden. Beyond pharmacologic control, a multidisciplinary approach emphasizing aggressive seizure management and comprehensive developmental support is essential to improve outcomes and quality of life.

5. **Lennox-Gastaut syndrome:** It is a childhood onset epileptic encephalopathy characterized by multiple seizure types, tonic, atonic, and atypical absence seizures, along with cognitive impairment and a characteristic slow spike-and-wave pattern on EEG. Management is multifaceted: Firstline pharmacotherapy uses broad-spectrum agents such as valproate, clobazam, and rufinamide, often in combination.
   Dietary therapy (e.g., ketogenic diet (a high fat, low carbohydrate, adequate protein) in drug-resistant epilepsy, particularly in children (specific syndromes: GLUT-1 deficiency, Dravet syndrome, Doose syndrome, infantile spasms, and tuberous sclerosis complex). The diet must be prescribed by a neurologist and implemented under the supervision of a specialist nutritionist or dietitian.
   For selected patients with persistent disabling seizures, surgical options like corpus callosotomy or neuromodulation (vagus nerve stimulation or other neurostimulation techniques) are considered to reduce seizure burden and improve quality of life.

6. **West syndrome (infantile spasms):** It manifests in infancy and is characterized by a clinical triad of epileptic spasms, arrest or deterioration of psychomotor development, and a characteristic EEG pattern called hypsarrhythmia. It is a severe epileptic encephalopathy requiring prompt recognition and intervention. First-line treatments include adrenocorticotropic hormone (ACTH) or vigabatrin, with the latter particularly effective in cases associated with tuberous sclerosis. Alongside medical therapy, early developmental support and intervention are essential to optimize neurodevelopmental outcomes and improve long-term prognosis.

6. **Focal epilepsies with structural/genetic causes** (e.g., tuberous sclerosis complex): These require a tailored management approach that aligns with the underlying syndrome. Treatment often includes syndrome specific interventions and early evaluation for epilepsy surgery in cases of refractory focal seizures. mTOR inhibitors, such as everolimus, may be indicated, especially when seizures are linked to dysregulated cellular pathways characteristic of tuberous sclerosis. Adjunctive ASMs alternatives are available. Levetiracetam or lamotrigine can be considered as adjunctive or alternative options depending on individual tolerability and clinical context.

8. **Self-limited (benign) familial epilepsies** (Examples: benign neonatal familial seizures, childhood epilepsy with centrotemporal spikes. These have a favorable course and often remit spontaneously. Because natural history is benign, treatment is reserved for cases where seizure frequency or severity interferes with function or safety. When therapy is needed, monotherapy with well tolerated agents tailored to the seizure type is used, and the aim is minimal intervention with regular reassessment to discontinue treatment as remission ensues.
9. **Rasmussen's encephalitis** is a progressive form of epilepsy in which half the brain shows chronic inflammation.

SPECIAL CONSIDERATION IN WOMEN WITH EPILEPSY

Women with epilepsy face unique challenges across reproductive life stages, drug interactions, and comorbidities. Goals of management of women with epilepsy include:

- Protect mother and fetus by preventing breakthrough seizures and related trauma or obstetric complications.
- Minimize congenital risks through preconception planning, appropriate drug choice, and folate.
- Maintain stability during pregnancy by adjusting for altered pharmacokinetics (e.g., lamotrigine, levetiracetam).
- Enable informed reproductive decisions on contraception and timing.
- Address depression, anxiety, and stigma to improve adherence and quality of life.
- Preserve bone health with anticipatory screening when on enzyme inducing drugs.
- Prevent seizure recurrence from abrupt medication changes with structured plans.
- Reduce sudden death in epilepsy patient (SUDEP) and injury via seizure control and safety counseling.
- Support long-term function through coordinated, documented, patient centered care.

Proper management must account for fertility, contraception, pregnancy, hormonal effects, bone health, and psychosocial burden while maintaining seizure control.

Domain	Key Recommendations
Preconception Counseling	■ Aim for seizure freedom on simplest, lowest risk monotherapy; avoid valproate unless no alternative (document decision). ■ Start folate 4 mg/day ≥1 month before conception; continue through first trimester, adjust dose based on risk profile. ■ Review drug-contraceptive interactions; adjust medications. ■ Provide written pregnancy/seizure action plan and relapse risk counseling.
Contraception	■ Enzyme inducing ASMs (carbamazepine, phenytoin, phenobarbital, high dose topiramate) reduce hormonal contraceptive efficacy, consider higher dose, backup, or nonhormonal methods (IUD, barrier). ■ Estrogen containing methods may alter seizure threshold; monitor for bleeding or seizure change
Pregnancy Management	■ **Therapeutic drug monitoring**: □ Lamotrigine: Levels fall by 30-60%. Check every trimester/4 weeks if concern. Increase dose by 25-50% q1-2 weeks if drop >20-30% or seizures recur. Postpartum: taper to baseline over 1-2 weeks. □ Levetiracetam: Levels fall by 40-60%; adjust proportionally; taper postpartum. ■ Continue folate ≥4 mg/day through 12 weeks; tailor after. ■ Avoid unless monotherapy fails; prefer low risk combos; avoid valproate + other high-risk drugs. ■ Coordination: Neurology + obstetrics high-risk pathway; vitamin K late pregnancy if on enzyme inducing drugs. ■ Maintain seizure diary; address breakthrough seizures promptly; have emergency plan.
Delivery & Postpartum	■ Vaginal delivery unless obstetric contraindications. ■ Continue ASMs; adjust postpartum to pre-pregnancy levels. ■ Encourage breastfeeding; monitor infant for sedation/feeding issues. ■ Do not stop therapy abruptly.
Catamenial Epilepsy	■ Identify menstrual linked seizure patterns. ■ Consider cyclic progesterone, targeted dose adjustment, or adjunctive therapy.
Bone Health	■ Enzyme inducing ASMs increase osteoporosis risk. Ensure adequate vitamin D/calcium; encourage weightbearing exercise; consider DEXA in high-risk cases.
Mood & Psychosocial Support	■ Screen for depression/anxiety preconception & postpartum. ■ Provide stigma reduction, reproductive decision support, and integrate mental health care.
Special Considerations	■ Evaluate epilepsy surgery candidacy early in drug-resistant cases. ■ Offer genetic counseling for inherited syndromes/familial epilepsy.
Documentation & Shared Decision Making	■ Document teratogenic risk counseling, contraception choice, medication/folate plan, pregnancy management strategy. ■ Provide written plan with emergency contacts and warning signs.

OTHER INTERVENTIONS

Intervention	Indication	Key steps in implement	Monitor & risks	Referral / follow-up
Neurostimulation: vagus nerve stimulation (VNS), responsive neurostimulation (RNS)	Drug-resistant epilepsy not resectable or residual after surgery	Multidisciplinary evaluation; device implantation; iterative programming	Infection, voice changes (VNS), device issues; gradual benefit over months	Epilepsy center for implantation and periodic programming
Epilepsy surgery	Focal drug-resistant epilepsy with resectable focus	Presurgical workup: video EEG, high-resolution MRI, functional mapping ± invasive monitoring; resective/ disconnective procedure	Neurologic deficits, neuropsychological impact; seizure outcomes	Comprehensive epilepsy center; long-term surgical follow-up

ASSESSMENT OF RESPONSE

Assessment of response tracks effectiveness, safety, and real-world impact of therapy.

Domain	What to track	When to check	How to act	Notes / tools
Seizure diary	Type, date/time, duration, triggers, recovery	Every visit; review 3-6 monthly or sooner if change	Adjust meds if clusters/ breakthroughs; address triggers; refine rescue plan	Paper/app diary; ask for missed entries and context (illness, sleep loss)
Drug levels (when indicated)	Phenytoin, valproate, carbamazepine (± others per lab)	At steady state; after dose changes; poor control; suspected nonadherence/toxicity; interactions	Titrate to clinical response within target range; correct albumin for phenytoin; check interactions	Interpret with albumin, renal/hepatic function, acute illness
Adverse effects	Cognition, mood, sedation, dizziness, GI, hepatic/hematologic signs, weight, sexual function	Each visit; within 2-4 weeks after starting/ changing meds	Reduce dose, switch agent, or deprescribe if harms > benefits	Use checklists; involve caregiver report
Quality of life / function	Work/school performance, driving, social participation, sleep, stigma, mood/ anxiety	Baseline, then 3-6-monthly	Treat depression/ anxiety; add supports; document fitness-to-drive/swimming/ operating heavy machinery per local rules	Tools: QOLIE10/31, PHQ9, GAD7; sleep screen
EEG (repeat)	Change in semiology; new breakthroughs after stability; suspected nonconvulsive seizures; atypical postictal states	Not routine in stable patients; order when above triggers occur	Refine diagnosis; guide escalation or surgical candidacy	Consider ambulatory or video EEG if events unclear

Note: Combine these elements at defined intervals (e.g., every 3-6 months or sooner if clinical change) and after any treatment modification. Document trends to distinguish evolving epilepsy from treatment failure or external triggers.

Phase	What to assess / do	Timing	Actions / adjustments	Notes & triggers
Initial follow-up	Seizure control (diary), adherence, adverse effects, mood/ cognition, comorbidities, drug tolerability; review triggers; reinforce safety/education	1-3 months after starting therapy (or sooner if issues)	Adjust dose/ formulation to response and tolerability; address triggers; update rescue plan	Use structured checklists; document baseline QOL for comparison
Ongoing follow-up	Seizure diary, adverse effects, mood/anxiety, cognition, quality of life; meds review (interactions)	Every 6-12 months if stable; earlier for breakthroughs, side effects, pregnancy, new interacting drugs, sleep disruption, evolving comorbidity	Optimize regimen; add supports (psychology, sleep clinic); refresh education and driving/ work advice	Reassess fitness-to-drive/Swimming/ operating heavy machinery per local rules; update problem list
Stepping down therapy, candidacy	Confirm all: seizure free ≥2 years, normal neuro exam, low risk etiology	Consider at stable review	Proceed only if favorable features: single seizure type; control on low/ moderate single ASM; normal/mildly abnormal interictal EEG (no persistent epileptiform discharges); later onset; no status epilepticus; no major structural lesion; no strong genetic relapse risk; resolved provocation/remitting syndrome	Discuss quantified relapse risk; shared decision and documentation required
Gradual taper, principles	Plan drug specific taper based on dose, duration, seizure history	Start once criteria met	Reduce total daily dose 10-25% every 2-3 months; slower for long half-life (e.g., levetiracetam, lamotrigine); avoid rapid discontinuation, benzodiazepines/ barbiturates need very slow tapers; if multiple ASMs, taper one at a time (least essential first)	Provide a seizure action plan; define pause/ reverse rules if breakthrough occurs
Monitoring during/after withdrawal	Seizure diary, triggers, adherence to lifestyle, mental health	Every 1-2 months during taper; continue closer follow-up 6-12 months after cessation	If seizure recurs, reinitiate prior effective regimen promptly; revisit diagnosis/plan	Document trends; counsel on temporary activity/driving restrictions after relapse

PROGNOSIS AND PROGRESSION

Many patients achieve good seizure control; a subset progresses to drug-resistant epilepsy. Key determinants of prognosis are underlying etiology (structural lesions carry higher risk), age at onset (early childhood and late onset can have different trajectories), seizure type and burden, and how promptly effective treatment is initiated.

Early and sustained seizure control lowers risks of cognitive decline, physical injury, and SUDEP. In contrast, refractory epilepsy is associated with higher morbidity, neurodevelopmental impact in children, psychiatric comorbidity, and reduced quality of life.

Multidisciplinary care (neurology, neuropsychology, rehabilitation, psychosocial support, and when indicated surgical/neurostimulation evaluation) improves long-term outcomes by addressing both seizures and their broader functional and behavioral consequences.

REFERRAL CRITERIA (TIERED APPROACH)

- **Primary care:** first unprovoked seizure with any focal features, status epilepticus, unclear diagnosis (possible PNES), poor control on initial therapy, suspected structural cause, high-risk features (developmental delay, cognitive decline) → refer to secondary or neurology.
- **Secondary care:** patients with persistent seizures despite two medications, complex seizure semiology, need for EEG/ MRI, or presurgical workup, refer to tertiary epilepsy center.
- **Tertiary/quaternary care:** drug-resistant epilepsy, evaluation for epilepsy surgery, vagus nerve stimulation, genetic/metabolic testing, refractory status epilepticus management.

COMPLICATIONS

Complication	Clinical Implications	Red Flags / Warning Signs
Status Epilepticus	Neurological emergency; prolonged or recurrent seizures cause neuronal injury, hypoxia, and systemic complications, and can be fatal without rapid intervention.	Seizure lasting >5 minutes, repeated seizures without recovery, altered consciousness, cyanosis, respiratory distress.
SUDEP (Sudden Unexpected Death in Epilepsy)	Rare but devastating; risk higher with uncontrolled generalized tonic-clonic seizures, nocturnal seizures, and nonadherence to medication. Prevention: seizure control and adherence.	Recurrent uncontrolled seizures, nocturnal seizures, nonadherence, frequent tonic-clonic seizures.

Cognitive Impairment	Memory loss, attention deficits, slowed processing, executive dysfunction due to seizures, brain pathology, or long-term drug effects; impacts education, employment, and independence.	Rapid worsening of memory or cognition, confusion out of proportion to seizure frequency, inability to perform daily tasks.
Psychiatric Comorbidities	Depression, anxiety, psychosis may be underdiagnosed; affect quality of life and adherence. Bidirectional link with epilepsy increases relapse risk.	Suicidal thoughts, severe anxiety, new onset psychosis, withdrawal from social contact, poor adherence.
Injury	Falls, burns, head trauma, drowning; seizures during risky activities pose significant morbidity. Requires preventive counseling and safety planning.	Seizures in water, at heights, near fire or machinery, repeated trauma or unexplained injuries.
Medication Side Effects	Antiseizure medications can cause bone density loss, liver dysfunction, cytopenia's, teratogenicity. Need baseline and periodic monitoring.	Jaundice, easy bruising/bleeding, recurrent infections, fractures, menstrual irregularities, rash with systemic symptoms.
Social Consequences	Stigma, educational/work limitations, driving restrictions, interpersonal strain. Contributes to isolation, unemployment, and depression.	Social withdrawal, unemployment due to epilepsy, unsafe driving, nondisclosures leading to unmanaged risk.

PREVENTION AND HEALTH PROMOTION

- Early treatment of CNS insults: Prompt diagnosis and management of CNS infections, measures to prevent head injury (helmets, seat belts, fall prevention), and optimized perinatal care reduce provoked epilepsy risk.
- Immunization: Ensure up-to-date vaccines that prevent neuroinvasive infections (e.g., meningococcal, pneumococcal, influenza, varicella where appropriate) to lower seizure provoking illnesses.
- Trigger avoidance: Educate patients to maintain regular sleep, avoid alcohol bingeing, and prevent abrupt withdrawal of alcohol or antiseizure drugs. Identify and mitigate individual precipitants.
- Family and community education: Reduce stigma through accurate information, promote early presentation for first seizures, reinforce adherence, and build support networks.
- Safe pregnancy planning: Preconception counseling for women with epilepsy, including review and optimization of antiseizure medication (minimize teratogenic risk, folate supplementation), seizure control assessment, and coordinated obstetric neurology care to balance maternal and fetal risks.

PATIENT EDUCATION

- Recognize seizure types and triggers: Help patient/caregiver identify their specific seizure manifestations and common precipitants so they can anticipate, record, and modify exposures.

- Understand importance of adherence and regular follow-up: Convey why consistent medication use, dose timing, and scheduled reviews affect control, prevent breakthrough seizures, and enable timely adjustments.
- Know safety precautions and when to seek urgent help: Teach basic seizure first aid, environmental risk reduction, and clear criteria for emergency response (status epilepticus, clusters, prolonged recovery, injury, atypical events).
- Family and support training: Train caregivers in seizure first aid, use of prescribed rescue medications, documentation (seizure diary), and how to support recovery and emotional needs.
- Reproductive and medication counseling: Provide guidance on how antiseizure drugs interact with pregnancy and contraception, importance of preconception planning, teratogenic risk mitigation (e.g., folate), and managing seizures during pregnancy.

Instructions to patients/caregivers

Do's	Don'ts
Keep a written record: seizure type, triggers, duration, emergency contacts, rescue medication, and when to call for help (e.g., >5 min, repeated seizures, injury, breathing difficulty).	Don't skip, double, or change doses without medical advice.
Take medicines exactly as prescribed.	Don't stop or start any medication, supplement, or herbal product without consulting your clinician.
Maintain a seizure diary: log date, time, type, trigger, duration, recovery, and side effects.	Don't hide seizure history from school, work, or caregivers - it delays help during emergencies.
Reduce injury risks: pad edges, avoid heights, unsupervised swimming, unsafe cooking/bathing, swimming, driving, operating heavy machinery etc.	Don't drive, swim or operate machinery until cleared by your doctor.
Maintain regular sleep, manage stress, limit alcohol, and avoid abrupt withdrawal of risky substances.	Don't ignore side effects or new seizure patterns - report promptly.
Keep rescue medication accessible; ensure you and caregivers know when and how to use it.	Don't restrain a person during a seizure or put objects in their mouth.
Learn early warning signs/auras and act promptly if seizures cluster or last longer.	Don't neglect hydration, nutrition, or mood and cognition issues.
During a seizure: protect head, turn patient on the side, time the seizure, ensure airway safety.	Don't delay calling emergency services if seizures last >5 min or occur in clusters.
Plan pregnancy with your neurologist; use suitable contraception and know drug-hormone interactions.	Don't plan pregnancy or change contraception without medical consultation.
Inform trusted people at school/work to reduce stigma and ensure timely help.	Don't isolate or avoid social/work environments due to fear of seizures.
Attend all scheduled reviews, report changes, and carry updated medical records.	Don't miss follow-up appointments, even if seizures are controlled.

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