
IN THE NAME OF GOD

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Epilepsy

INTERNATIONAL CLASSIFICATION OF EPILEPTIC SEIZURES

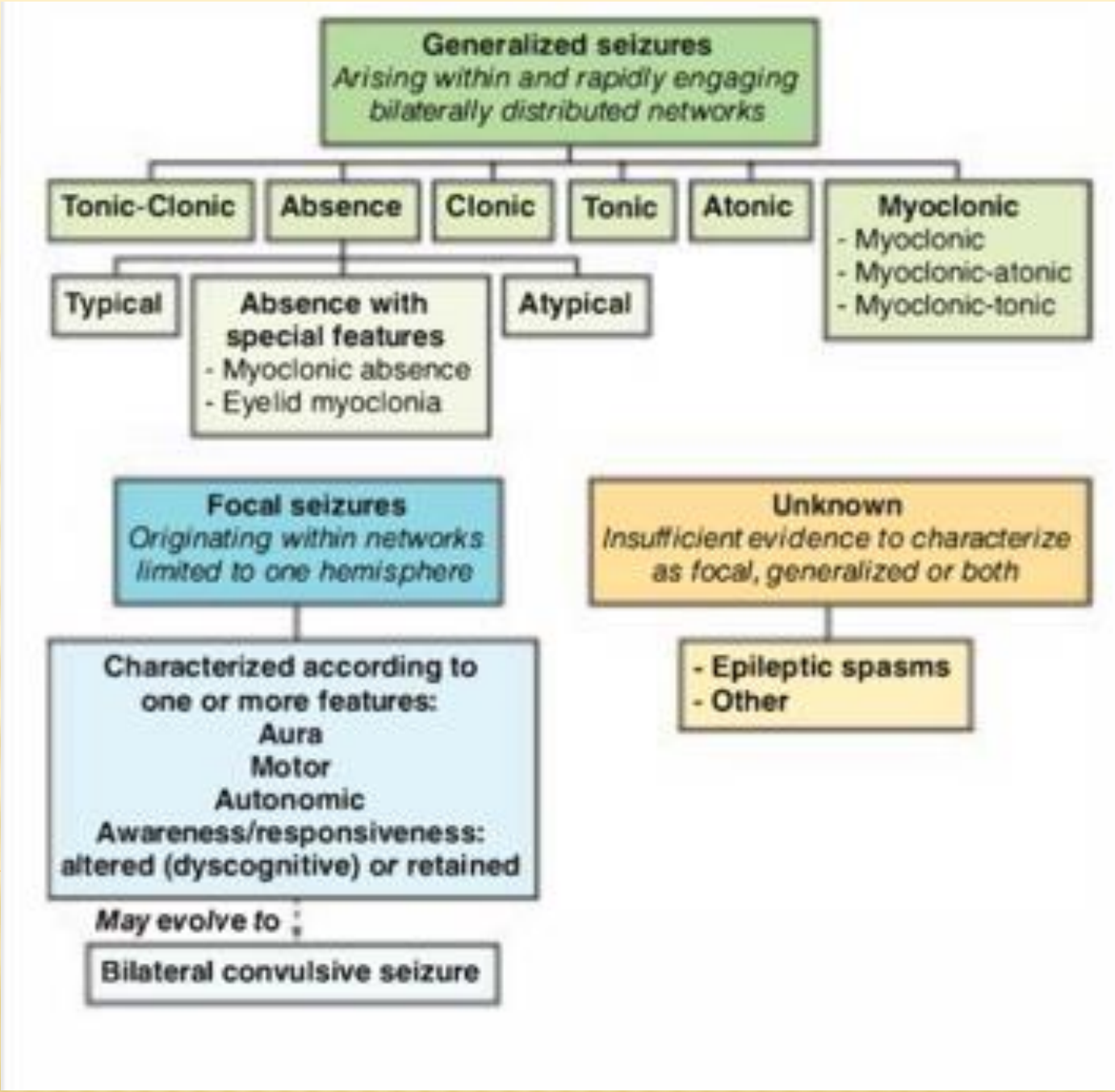
I. Generalized seizures (bilaterally symmetrical and without focal onset)
   A. Tonic, clonic, or tonic-clonic (grand mal)
   B. Absence (petit mal)
      1. typical
      2. atypical
      3. special features
         a. eyelid myoclonia
         b. myoclonic absence
   C. Clonic
   D. Tonic
   E. Atonic
   F. Myoclonic including atonic and tonic types

II. Focal (formerly "partial"); characterized by main feature(s). See Table 16-2
   A. Simple (*without* loss of consciousness or alteration in psychic function)
      1. Aura; somatosensory or special sensory (visual, auditory, olfactory, gustatory, vertiginous)
      2. Motor
      3. Autonomic
      4. Awareness retained (formerly ("simple") or impaired (formerly "complex")

III. Unclassifiable; cannot be characterized as focal, generalized or both, including epileptic spasms

COMMON FOCAL SEIZURE PATTERNS

CLINICAL TYPE	LOCALIZATION
Somatic motor	
Jacksonian (focal motor)	Prerolandic gyrus
Masticatory, salivation, speech arrest	Amygdaloid nuclei, opercular
Simple contraversive	Frontal
Head and eye turning associated with arm movement or athetoid-dystonic postures	Supplementary motor cortex
Somatic and special sensory (auras)	
Somatosensory	Contralateral postrolandic
Unformed images, lights, patterns	Occipital
Auditory	Heschl gyri
Vertiginous	Superior temporal
Olfactory	Mesial temporal
Gustatory	Insula
Visceral: autonomic	Insular-orbital-frontal cortex
Focal seizure with altered consciousness	
Formed hallucinations	Temporal neocortex or amygdaloid–hippocampal complex
Illusions	—
Dyscognitive experiences (déjà vu, dreamy states, depersonalization)	—
Affective states (fear, depression, or elation)	Temporal
Automatism (ictal and postictal)	Temporal and frontal
Staring	Frontal cortex, amygdaloid–hippocampal complex, reticular–cortical system


Generalized seizures
Arising within and rapidly engaging bilaterally distributed networks
Tonic-Clonic
Absence
Clonic
Tonic
Atonic
Myoclonic
- Myoclonic
- Myoclonic-atonic
- Myoclonic-tonic
Typical
Absence with special features
- Myoclonic absence
- Eyelid myoclonia
Atypical
Focal seizures
Originating within networks limited to one hemisphere
Unknown
Insufficient evidence to characterize as focal, generalized or both
Characterized according to one or more features:
Aura
Motor
Autonomic
Awareness/responsiveness: altered (dyscognitive) or retained
- Epileptic spasms
- Other
May evolve to
Bilateral convulsive seizure

CAUSES OF RECURRENT SEIZURES IN DIFFERENT AGE GROUPS

AGE OF ONSET	PROBABLE CAUSE[a]
Neonatal	Congenital maldevelopment, birth injury, anoxia, metabolic disorders (hypocalcemia, hypoglycemia, vitamin B6 deficiency, biotinidase deficiency, phenylketonuria, and others)
Infancy (1–6 months)	As above; infantile spasms (West syndrome)
Early childhood (6 months–3 years)	Infantile spasms, febrile convulsions, birth injury and anoxia, infections, trauma, metabolic disorders, cortical dysgenesis, accidental drug poisoning
Childhood (3–10 years)	Perinatal anoxia, injury at birth or later, infections, thrombosis of cerebral arteries or veins, metabolic disorders, cortical malformations, Lennox-Gastaut syndrome, "idiopathic," probably inherited, epilepsy (Rolandic epilepsy)
Adolescence (10–18 years)	Idiopathic epilepsy, including genetically transmitted types, juvenile myoclonic epilepsy, trauma, drugs
Early adulthood (18–25 years)	Idiopathic epilepsy, trauma, neoplasm, withdrawal from alcohol or other sedative drugs
Middle age (35–60 years)	Trauma, neoplasm, vascular disease, alcohol or other drug withdrawal
Late life (older than 60 years)	Vascular disease (usually postinfarction), tumor, abscess, degenerative disease, trauma

COMMON ANTIEPILEPTIC DRUGS

GENERIC NAME	TRADE NAME	USUAL DOSAGE: CHILDREN, MG/KG	USUAL DOSAGE: ADULTS, MG/D	PRINCIPAL THERAPEUTIC INDICATIONS	SERUM HALF-LIFE, H	EFFECTIVE BLOOD LEVEL,[a] µG/ML
Major antiepileptic used as monotherapy						
Valproic acid	Depakote	30–60	1,000–3,000	Generalized tonic-clonic, partial, absence, myoclonic	6–15	50–100
Phenytoin	Dilantin	4–7	300–400	Generalized tonic-clonic, partial, absence, myoclonic	12–36	10–20
Carbamazepine	Tegretol	20–30	600–1,200[b]	Generalized tonic-clonic, partial	14–25	4–12
Oxcarbazepine	Trileptal	10–40	900–2,400	Partial	1–5	—
Phenobarbital	Luminal	3–5 (8 for infants)	90–200	Generalized tonic-clonic, partial	40–120	15–40
Lamotrigine	Lamictal	0.5	300–500	Generalized, partial	15–60	2–7
Levetiracetam	Keppra	20–60	500–3,000[b]	Partial, myoclonic	6–8	—
Adjuvant and special-use anticonvulsants						
Topiramate	Topamax	—	400	Generalized tonic-clonic, atypical absence, myoclonic, partial	20–30	—
Lacosamide	Vimpat					
Zonisamide	Zonegren					
Primidone	Mysoline	10–25	750–1,500[b]	Generalized tonic-clonic, partial	6–18	5–12
Ethosuximide	Zarontin	20–40	750–1,500	Absence	20–60	50–100
Methsuximide	Celontin	10–20	500–1,000	Absence	28–50	40–100
ACTH	—	40–60 Units daily	—	Infantile spasms	—	—
Clonazepam	Klonopin	0.01–0.2	2–10	Absence, myoclonus	18–50	0.01–0.07
Anticonvulsants for status epilepticus *(initial loading or continuous infusion doses shown)*[c]—phenytoin and phenobarbital used in doses higher than shown above						
Diazepam	Valium	0.15–2	2–20	Status epilepticus	—	—
Lorazepam	Ativan	0.03–0.22	2–20	Status epilepticus	—	—
Midazolam	Versed	—	0.1–0.4 mg/kg/h	Status epilepticus	—	—
Propofol	Diprivan	2.5–3.5	2–8 mg/kg/h	Status epilepticus	—	—
Fosphenytoin	Cerebyx	30–50 mg	1,000–1,500	Status epilepticus	—	10–20

CHOICES OF ANTIEPILEPTIC DRUGS BY TYPE OF ADULT SEIZURE DISORDER

SEIZURE TYPE	INITIAL CHOICE	SECOND LINE
Generalized tonic-clonic	Valproate, phenytoin	Lamotrigine, levitiracetam, carbamazepine, oxcarbazepine
Myoclonic	Valproate	Topiramate, levetiracetam, zonisamide
Focal (with or without secondary generalized)	Carbamazepine, phenytoin	Valproate, lamotrigine, oxcarbazepine, levitiracetam, lacosamide,
Absence	Valproate	Ethosuximide
Status epilepticus	Diazepines	Phenytoin, fosphenytoin, propofol, levetiracetam

Status Epilepticus

Recurrent generalized convulsions at a frequency that precludes regaining of consciousness in the interval between seizures (convulsive status) constitutes the most serious problem in epilepsy .

With an overall mortality of 20 to 30 percent .

But probably lower in recent years .

Rising temperature, acidosis, hypotension, and renal failure from myoglobinuria is a sequence of life-threatening events that may be encountered in cases of convulsive status epilepticus .

Prolonged convulsive status (for longer than 30 min) a so carries a risk of serious neurologic sequelae ("epileptic encephalopathy'').

With regard to acute medical complications, from time to time a case of neurogenic pulmonary edema is encountered during or just after the convulsions, and some patients may become extremely hypertensive, making it difficult to distinguish the syndrome from hypertensive encephalopathy .

The etiologies of status epilepticus vary among age groups but all the fundamental causes of seizures are able to produce the syndrome .

The most recalcitrant cases we have encountered in adults have been associated with viral or paraneoplastic encephalitis, old traumatic injury, and epilepsy with severe mental retardation.Stroke and brain tumor have, in contrast, been infrequent causes .

Acute		
Stroke	22%	33%
Metabolic abnormalities	15%	30%
Hypoxia	13%	53%
Systemic infection	7%	10%
Anoxia	5%	71%
Trauma	3%	25%
Drug overdose	3%	25%
CNS infection	3%	0%
CNS haemorrhage	1%	0%
Chronic		
Low concentration of anti-epileptic drugs	34%	4%
Remote symptomatic (eg, tumour, stroke, trauma)	25%	14%
Alcohol misuse	13%	20%
Tumour	7%	30%
Idiopathic	3%	25%

Some patients had more than one aetiology.

APPROACH TO THE TREATMENT OF STATUS EPILEPTICUS IN ADULTS

Initial assessment

Ensure adequate ventilation, oxygenation, blood pressure Intubate if necessary, based on low oxygen saturation and labored breathing Insert intravenous line Administer glucose and thiamine in appropriate circumstances Send toxic screen Assess quickly for cranial and cervical injury if onset of seizures is unwitnessed .

Immediate suppression of convulsions

Lorazepam or diazepam, 2 to 4 mg/min IV to a total dose of 10 to 15 mg with blood pressure monitoring when higher rates or doses are used .

Initiation or reloading with anticonvulsants

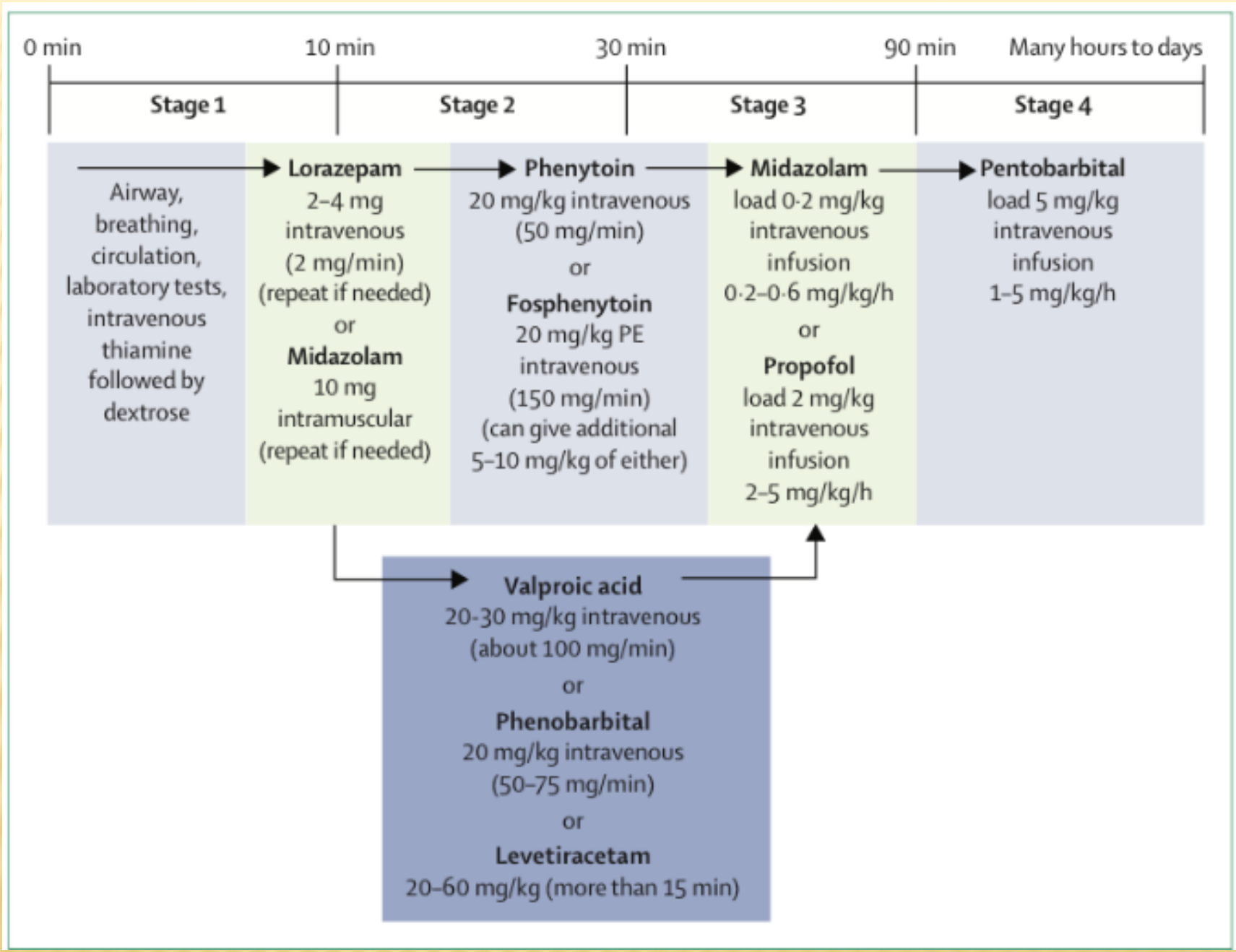
Phenytoin 15-20 mg/kg IV at 25-50 mg /min in normal saline or fosphenytoin at 50 to 75 mg/min .

General anesthetic doses of medication or persistent status epilepticus

Midazolam 0.2 mg/kg loading dose followed by infusion at 0.1 to 0.4 mg/kg/h or propofol 2 mg/kg/h .

Further treatment if convulsions or electrographic seizures persist after several hours

May add valproate or phenobarbitall10 mg/min to total dose of 20 mg/kg as additional anticonvulsants intravenously, or carbamazepine or levetiracetam by nasogastric tube if there is gastric and bowel activity Consider neuromuscular paralysis with EEG monitoring if convulsions persist Pentobarbital 10 mg/kg/h Inhalational anesthetics (isoflurane) .


0 min
10 min
30 min
90 min
Many hours to days
Stage 1
Stage 2
Stage 3
Stage 4
Airway, breathing, circulation, laboratory tests, intravenous thiamine followed by dextrose
Lorazepam
2–4 mg intravenous (2 mg/min) (repeat if needed)
or
Midazolam
10 mg intramuscular (repeat if needed)
Phenytoin
20 mg/kg intravenous (50 mg/min)
or
Fosphenytoin
20 mg/kg PE intravenous (150 mg/min)
(can give additional 5–10 mg/kg of either)
Midazolam
load 0·2 mg/kg intravenous infusion 0·2–0·6 mg/kg/h
or
Propofol
load 2 mg/kg intravenous infusion 2–5 mg/kg/h
Pentobarbital
load 5 mg/kg intravenous infusion 1–5 mg/kg/h
Valproic acid
20-30 mg/kg intravenous (about 100 mg/min)
or
Phenobarbital
20 mg/kg intravenous (50–75 mg/min)
or
Levetiracetam
20–60 mg/kg (more than 15 min)


Thanks For Your Attention