



Special Care Dentistry for the General Practice Resident: Practical Training Modules

Contributing Authors:

Miriam Robbins, DDS, MPH
Maureen Romer, DDS, MPA
Steven Krauss, DDS, MPH
Evan Spivack, DDS
Nancy Dougherty, DMD, MPH
Robert Marion, MD
Koshi Cherian, MD

Editor:

Funded by the NYS
Developmental Disabilities
Planning Council



Special Care Dentistry For the General Practice Resident Practical Training Modules

- **This educational modular series consists of eight evidence based Power Point presentations designed to give the general practice resident a global view of dental treatment for people with special needs. Approximately 300 references are listed throughout this work. The eight modules address the most important aspects of clinical medicine and dentistry required for treating a patient with special needs. Discussion of access and barriers to dental care, the need for special care dentistry in the pre and post doctoral dental curricula, along with assessment of the competency of participants are included in the modules. Upon completion of the modules, the participant should have the knowledge to assess a patient with special needs.**
- **The educational package is a previously piloted pre and post test exam. The modules are accompanied by “teacher’s notes” which are visible in each Power Point presentation. This format alternately allows the instructor to assign the series as a self-study project.**

continued



Special Care Dentistry For the General Practice Resident Practical Training Modules

- A description of each module follows below:
- **Introduction to Special Patient Care:** discusses the definition of disability, the prevalence and incidence of disability, aspects of “normalization”, and the barriers to care. A list of resources is provided for the individual and family.
- **Special Care Dentistry/ Legal and Ethical Issues:** discusses informed consent and various other types of consent, comprehensive medical history documentation, appropriate use of desensitization and restraint, communication/human rights issues, case law and detailed literature review of restraint.
- **Treatment Modalities/Treatment Planning for Patients with Special Needs:** discusses reasons for sedation, hospitalization OR cases, general anesthesia, pharmacological techniques, IV and enteral drugs.
- **Learning Disabilities/Mental Retardation and Down Syndrome:** discusses the causes and risk factors, diagnosis and intervention, physical findings and medical concerns, dental and craniofacial characteristics of people with learning disabilities, mental retardation and Down syndrome.
- **Neuromuscular Disorders/Cerebral Palsy and Muscular Dystrophy:** discusses types of cerebral palsy, risk factors, oral and dental findings, various forms of muscular dystrophy and treatment planning considerations.
- **Autistic Spectrum Disorders:** defines and describes the spectrum of autistic disorders including Pervasive Developmental Disorder and Asperger’s. A recent review of the literature regarding proposed etiologies (i.e.: genetic links, vaccines) is presented, as well as suggestions for behavior management and treatment strategies.
- **Oral Manifestations/Genetic and Congenital Disorders:** discusses syndromology definitions, gene and chromosomal abnormalities, craniofacial disorders, dental and orthopedic conditions.
- **Seizure Disorders:** discusses definitions of seizures and epilepsy, risk, incidence and prevalence of seizures, classification and treatment of seizures, choice of medication therapies and practical considerations for dental treatment.
- Pre and post tests and the answer sheets are not included in the module series. Please contact Annette Shafer in the Office of Investigations and Internal Affairs at annette.p.shafer@omr.state.ny.us to request a copy and we will forward it to you electronically.



Seizure Disorders

Koshi Alummootil Cherian, MD

Pediatric Neurology

Montefiore Medical Center

Bronx, NY

kcherian@montefiore.org



What is a seizure?

- Manifestation of abnormal, hypersynchronous discharge of a population of neurons. ^{1,2}
- This discharge may produce subjective symptoms or objective signs in which case it is a **clinical seizure**
- If this discharge is only apparent on an electroencephalogram (EEG) it is an **electrographic seizure**



What is Epilepsy?

- **Defined as a tendency toward recurrent (at least 2) seizures that are, unprovoked by an acute systemic insult i.e. hypoglycemia, hyponatremia.²**
- **Widely held belief that person with epilepsy is seized by a supernatural force or power**
- **Derived from the greek word “epilambanein” which means “to be seized”**



Status Epilepticus?

- **Defined as recurrent or continuous seizure activity lasting longer than 30 minutes in which the patient does not regain baseline mental status ²**



Epidemiology of Seizures

- **Epilepsy has no geographical, social or racial boundaries**
- **Occurs in men and women at any age**
- **Most frequently diagnosed in infancy, childhood, adolescence and old age**
- **Up to 5% of the world's population may have a single seizure at some time in their lives ³**



Prevalence of Epilepsy

- **Defined as the total number of existing cases of a disease in a specific population at a stated point in time**
- **Prevalence of active epilepsy (2 or more unprovoked seizures plus use of an antiepileptic medication within the past 5 years) estimated at 2.7 million persons in the United States (range from 0.5 – 1 percent of the population) ³**
- **Tends to increase with age**
- **326,000 school age children through age 14 have epilepsy ³**
- **570,000 persons over 65 years have epilepsy ³**



Incidence of seizures

- **A measure of the number of new cases of a medical condition that occur in the population during a measured amount of time**
- **300,000 people have a first convulsion each year³**
- **120,000 are under the age of 18³**
- **Between 75,000 and 100,000 are children under the age of 5 who have experienced a febrile (fever caused) seizure³**



Incidence of Epilepsy

- **200,000 new cases of epilepsy are diagnosed each year**
- **Highest under age 2 and over 65 years ³**
- **45,000 children under age 15 develop epilepsy each year**
- **Males slightly more likely to develop epilepsy than females**
- **In 70% of new cases, no cause apparent ³**
- **Generalized seizures are more common in children around puberty; after this age more than half of all new cases of epilepsy will have partial seizures ³**



Epilepsy Risk

Special populations

- **Individuals in certain populations are at higher risk of developing epilepsy ³**
 - **Children with mental retardation (10%)**
 - **Children with cerebral palsy (10%)**
 - **Children with both disabilities (50%)**
 - **Alzheimer patients (10%)**
 - **Stroke patients (22%)**



Classification of Seizures

According to the International Classification of Epileptic Seizures ²

Partial Seizures

- **Simple Partial Seizures**
 - with motor symptoms
 - with somatosensory or special sensory symptoms
 - with autonomic symptoms
 - with psychic symptoms



Classification of Seizures

Partial Seizures

- **Complex Partial Seizures**
 - beginning as simple partial seizures and progressing to impairment of consciousness
 - without automatisms
 - with automatisms
 - with impairment of consciousness at onset
 - without automatisms
 - with automatisms
- **Partial seizures (simple or complex) secondarily generalized**



Classification of Seizures

Generalized

- **Absence seizures**
- **True absence**
- **Atypical absence**
- **Myoclonic seizures**
- **Clonic seizures**
- **Tonic seizures**
- **Tonic-clonic seizures (“grand mal”)**
- **Atonic seizures**
- **Unclassified seizures**



Partial Seizures: Types and Features

Simple Partial:

- Consciousness preserved
- Person alert
- Can respond to questions or commands
- Remembers what occurred during seizure
- Auras are simple partial seizures with subjective symptoms
- Can manifest as- ²
- Localized tonic posturing (stiffening)
 - Clonic movements (twitching, jerking)
 - Hallucinations or illusions if discharge in sensory cortex
 - Change in autonomic activity (change in heart rate, breathing, sweating)
 - Change in visceral sensations (in abdomen/chest)
 - Psychic seizures which can alter language perception or memory, evoke spontaneous emotions



Partial Seizures: Types and Features

Complex Partial:

- Consciousness altered or lost
- Often no memory of what happened
- Last from 15 seconds – 3 minutes
- After seizure, post ictal confusion common
- Can manifest as – 2
 - staring accompanied by impaired responsiveness, cognitive function and recall
 - automatic movements (automatisms)
 - mouth – lip smacking, chewing, swallowing
 - upper extremities – fumbling, picking
 - vocalizations – grunts, repeating phrases
 - complex acts – shuffling cards

Secondarily generalized seizures:

- Partial seizures that spread to become tonic clonic seizures



Generalized Seizures

Types / Features

Absence (typical)

- Brief episodes, lasting 3-20 seconds of staring with impairment of awareness and responsiveness
- Begin and end suddenly
- Lack of postictal period
- Motor phenomena (eye blinks, brief automatic mouth or hand movements, changes in muscle tone) usually if duration >10 seconds
- Ages 4-14 years, resolve by 18 years
- Usually normal development and intelligence
- Provoked by hyperventilation (rapid breathing)
- EEG signature: generalized 3 Hz spike-wave discharge



Generalized Seizures

Types / Features

Absence (atypical)

- Before 6 years of age
- Last 5-30 seconds
- Not provoked by hyperventilation, EEG: generalized “slow spike-wave” complexes (<2.5 Hz)
- Often in children with global cognitive impairment



Generalized Seizures

Types / Features

Myoclonic

- Brief, shock like jerk of muscle or groups of muscles
- Affects neck, shoulders, upper arms, body and upper legs
- Duration < 1 second
- Consciousness not usually impaired
- EEG: during myoclonic seizure: polyspike-and-slow-wave discharge



Generalized Seizures

Types / Features

Atonic

- Sudden loss of postural tone often resulting in falls
- Milder – head nods or jaw drops
- Consciousness usually impaired
- Duration – several seconds to one minute



Generalized Seizures

Types / Features

Tonic

- Occur often during sleep
- Flexion at waist and neck, abduction and flexion or extension of upper extremities and flexion or extension of lower extremities



Generalized Seizures

Types / Features

Tonic clonic

- Loss of consciousness associated with initial tonic phase of stiffening, a fall, and often a cry evoked by air forced through contracted vocal cords ²
- Legs usually extended and arms may be extended, flexed or each in succession
- Followed by clonic phase – jerking of extremities which slows before stopping



Generalized Seizures

Types / Features

Tonic Clonic (continued)

- Duration 30-120 seconds
- Drooling/foaming
- Biting of tongue, cheek or lip
- Bladder/bowel incontinence
- Postictal confusion and lethargy
- EEG: during event, is obscured by muscle artifact, postictally – background suppression then diffuse



Epilepsies and Epileptic Syndromes

Classification

Separate these disorders according to whether they arise in a circumscribed portion of the brain (partial) or begin diffusely in cortex and its deeper structures (generalized) ⁴

- **Epileptic syndrome:** a cluster of signs and symptoms customarily occurring together ⁵
- **Idiopathic:** disorder not associated with other neurologic or neuropsychological abnormalities
- **Symptomatic:** neurologic abnormality is present and cause is known
- **Cryptogenic:** syndromes that are presumed to be symptomatic but cause in a specific patient is unknown



Epilepsies and Epileptic Syndromes

Classification

Localization – Related Epilepsies and Syndromes ⁵

- **Idiopathic**
 - Benign childhood epilepsy with centrotemporal spikes (“rolandic”)
 - Childhood epilepsy with occipital paroxysms
- **Symptomatic**
 - Chronic progressive epilepsia partialis continua of childhood
 - Frontal lobe epilepsies
 - Occipital lobe epilepsies
 - Parietal lobe epilepsies
 - Syndromes characterized by specific modes of precipitation
 - Temporal lobe epilepsies
- **Cryptogenic**



Epilepsies and Epileptic Syndromes

Classification

- **Generalized Epilepsies and Syndromes** ⁵
 - **Idiopathic**
 - benign neonatal familial convulsions
 - benign neonatal convulsions
 - benign myoclonic epilepsy in childhood
 - childhood absence epilepsy
 - juvenile absence epilepsy
 - juvenile myoclonic epilepsy
 - **Cryptogenic or symptomatic**
 - West syndrome
 - Lennox Gastaut syndrome
- **Epilepsies and Syndromes Undetermined Whether Focal Or Generalized**
- **Special syndromes**



Treatment of Seizures

- **Initiating therapy with antiepileptic drugs after a first seizure is controversial**
- **Within 5 years after a single, unprovoked seizure, 16-62% of patients have another seizure ²**
- **Recurrence more likely with**
 - **earlier neurologic injury sufficient to cause seizures**
 - **structural abnormality on neuroimaging**
 - **abnormal, especially epileptiform EEG**
 - **family history of epilepsy**



Treatment of Seizures

- **Partial seizures more likely to recur than primary generalized tonic clonic seizures**
- **Treatment can reduce but not eliminate risk of second seizure**
- **Treatment decision must be individualized for each patient**
- **In children – maturational factors and variability in absorption and metabolism mandate careful attention to serum drug concentration monitoring**
- **Specific problems with adverse effects may also require metabolic monitoring**



Medication Choice

Before instituting treatment – are seizures partial or generalized in onset?

- Drug of choice should have best efficacy (ability to stop seizures) and lowest likelihood of side effects ²
- Most patients can be managed optimally on a single antiepileptic
- If patient has persistent seizures but no adverse effects – dose can be increased as tolerated or until seizure control obtained
- The patient's clinical state determines appropriate dose; “therapeutic range” of serum concentration only a guideline ²



Antiepileptic Drugs

Commonly used Antiepileptic drugs for Partial Seizures (with or without secondary generalization)

- Carbamazepine
- Felbamate
- Gabapentin
- Lamotrigine
- Levetiracetam
- Oxcarbazepine
- Phenytoin
- Phenobarbital
- Pregabilin
- Primidone
- Tiagabine
- Topiramate
- Valproate
- Zonisamide



Antiepileptic Drug Therapy

Commonly used Antiepileptic drugs

Generalized seizures

- **Absence:**
Ethosuximide, Valproate, Lamotrigine, Topiramate, Levetiracetam
- **Myoclonic:**
Valproate, Clonazepam, Lamotrigine, Topiramate, Levetiracetam, Zonisamide
- **Tonic:**
Valproate, Phenytoin, Carbamazepine, Felbamate, Lamotrigine, Topiramate, Levetiracetam, Zonisamide



Practical Considerations with antiepileptics:²

- **Phenytoin (one of the most commonly used AED) exhibits non linear kinetics because the metabolic enzymes saturate at commonly used doses, thus small dose changes can produce large changes in serum concentration**
- **Antiepileptics such as Phenytoin, Valproate and Tiagabine are highly bound to serum proteins and may be displaced from binding sites by other highly protein bound drugs ex: Aspirin, Warfarin, Phenothiazines**
- **In these cases, the serum concentration may not accurately reflect the unbound proportion of drug**
- **Unbound or free serum concentrations can be helpful in patients taking these drugs with other highly protein bound drugs or in patients with significant renal disease or hypoalbuminemia**



Practical Considerations with antiepileptics²

- **Most antiepileptics are metabolized by hepatic enzymes, the exceptions being Gabapentin and Levetiracetam**
- **Many antiepileptics associated with potential teratogenic effects**
- **Both Valproate and Carbamazepine may cause neural tube defects which result in spina bifida and anencephaly – may be prevented by folic acid supplementation**



Newer Antiepileptics

Unique features of newer antiepileptics ²

- **Gabapentin, Pregabilin and Levetiracetam:**
 - no hepatic metabolism or protein binding
 - no important pharmacokinetic interactions with other AEDs
- **Lamotrigine:**
 - associated with rash and must be titrated slowly
- **Topiramate, Tiagabine, Zonisamide, Oxcarbazepine:**
 - must titrate slowly to minimize cognitive side effects
- **Topiramate, Zonisamide:**
 - 1-2% incidence of renal stones
- **Felbamate:**
 - aplastic anemia, hepatic failure, weight loss



Non Drug Therapy²

Ketogenic diet:

- based on observation that ketosis and acidosis have antiseizure effects
- initiated in hospital because of risks of severe metabolic abnormalities during and after initial fasting period
- strict protein, calorie, carbohydrate restriction in setting of high fat diet, produces improvement in 30-50% of patients, depending on study
- adverse: after start of diet patient may feel sluggish for few days; if on diet for long time- kidney stones, high cholesterol, dehydration, constipation, slowed growth or weight gain, bone fractures

Vagal Nerve Stimulator:

- device provides intermittent electrical stimulation of vagus nerve
- shown in several studies to be effective in reducing frequency of complex partial seizures
- FDA approval 1997, surgically implanted subcutaneously intermittent stimulation delivered every 0.3 – 10 mins for 7-30 seconds, but device can be triggered manually
- mechanism by which stimulation reduces seizures not well established; effect increases with time
- adverse effects: hoarseness, throat pain, feeling of dyspnea



Dental Considerations

Medical literature contains little information on influence of epilepsy in dental care

- **Patients living with epilepsy have special needs during dental treatment**
- **Oral health and dental status is worse in patients with epilepsy compared with general population^{6, 7, 8}**
- **Patients with poorly controlled epilepsy and experience frequent generalized tonic clonic seizures exhibit worse oral health^{6, 7, 8}**
- **Number of decayed and missing teeth, degree of abrasion and periodontal indexes are worse^{6, 7, 8}**
- **Significantly fewer restored and replaced teeth in patients with epilepsy^{6, 7, 8}**



Questions:

Initial Dental Appointment

- Describe what happens to you when you have a seizure?
- Do you know when you are going to have a seizure?
- Do you know what causes your seizures?
- What time of day, and how frequently do they usually occur?
- What type of medications are you taking to control the seizures?
- Does the medication work?
- Do you take the medication regularly or do you discontinue it at times? If you did discontinue, what happened?
- History of status epilepticus?



Dental Considerations

What can precipitate seizures while in the dental office^{6, 7, 8}

- Even patients who have been compliant with their medications can have breakthrough seizures
- These may be related to fatigue, lack of sleep, menstrual cycle, decreased overall health, missed meal, alcohol use, physical or emotional stress or pain
- Local Anesthetics
 - In overdose or inadvertent intravascular injection can precipitate a seizure in patient prone to epilepsy; **MOST COMMON NON EPILEPTIC CAUSE**
- Hypoxia Secondary to Vasovagal Syncope
- Hypoglycemia/Insulin Overdose
- Cerebral vascular Accident/Transient Ischemic Attacks



Antiepileptics

Dental Considerations

- **First generation: ⁹**
 - **Phenytoin :**
 - gingival hyperplasia
 - scrupulous dental care, visits every 3 months
 - chlorhexidine and folic acid rinses
 - severe cases – surgical reduction
 - **Carbamazepine:**
 - xerostomia and stomatitis with increased caries
 - consider use of topical fluoride to reduce incidence of caries



Antiepileptics

Dental Considerations

- **First generation:**
 - **Valproic acid:**
 - direct bone marrow suppression can impair wound healing and increase post operative bleeding and infection, decrease platelet function – hemorrhages and petechiae
 - for elective surgery – bleeding time, fibrinogen level, PT, PTT, VWF to assess risk of peri and post operative bleeding
 - bleeding to be discussed with patient and their families in prep for surgery
 - aspirin and NSAIDs not used routinely for pain control
- **Second generation:**
 - **Lamotrigine:**
 - Rash that may involve oral cavity
 - **Topiramate:**
 - Metallic taste in mouth⁹



Trauma

Dental Considerations

- **Minor oral injuries ... tongue biting**
- **Tooth injuries**
- **Maxillofacial trauma**
- **Fractures**
 - **Enzyme inducing drugs (phenytoin, phenobarbital, carbamazepine)**
 - **alter metabolism and clearance of Vitamin D and associated with**
 - **osteopenia and osteomalacia**
 - **To minimize risk of fracture – calcium 1,000 mg daily, Vit D 400 IU daily**



Dental Considerations

Prosthetic problems^{6, 7, 8, 10}

- Tendency to become edentulous earlier
- Refracture of incisal restorations
- Use of fixed rather than removable prostheses
- Inclusion of abutments if fixed partial dentures used
- Use of metal base for complete dentures and telescopic retention with denture bases made of metal or reinforced with metal for nearly edentulous patients recommended for those with frequent partial seizures, generalized tonic-clonic seizures and seizures with falls



Dental Considerations

Rash

- **Common side effect of antiepileptic drugs**
- **Phenytoin, Carbamazepine, Lamotrigine**
- **Can be benign, but can become serious – Stevens Johnson syndrome, Toxic epidermal necrolysis**



Drug Interactions

Some drugs prescribed by dentists can jeopardize seizure control because they interact with antiepileptics^{6, 7, 8, 10}

- **Fluconazole: associated with clinically significant increase in phenytoin plasma concentration. The dose of phenytoin may require adjustment to maintain safe therapeutic concentration.**
- **Clarithromycin: increases plasma concentration of carbamazepine; coadministration of these drugs should be monitored carefully to avoid carbamazepine toxicity.**
- **Aspirin: Valproic acid may be displaced from plasma proteins and metabolic pathways inhibited by high doses; increases serum valproate concentration - toxicity**



Inhalational Anesthetics & Seizures

Dental Considerations

Enflurane ^{11, 12}

- Grand mal seizure patterns precipitated by auditory, visual and tactile stimulation at end tidal enflurane concentrations of 3-6%
- Has propensity for inducing epileptiform activity during anesthesia, especially when high concentrations are administered in the presence of hypocarbia
- Various drugs such as diazepam and small doses of thiopental found to intensify enflurane induced seizures in humans
- Larger doses of thiopental diminished seizure activity
- Remains unclear whether diazepam or thiopental should be used to treat perioperative seizures associated with enflurane anesthesia



Inhalational Anesthetics & Seizures

Dental Considerations

Halothane

- Has not been reported to cause convulsions in humans when used alone^{11,12}
- In reports of halothane related seizures, nitrous oxide was also administered
- Electroencephalographic monitoring in normal patients had not revealed epileptiform activity during halothane anesthesia^{11, 12}

Isoflurane

- Administered alone, not found to cause EEG or clinical seizures in anesthetized patients^{11,12}
- In reported cases of isoflurane related seizures nitrous oxide was also administered^{11, 12}



Inhalational Anesthetics & Seizures

Dental Considerations

Sevoflurane & Desflurane

- Newly synthesized volatile anesthetics
- Structurally similar to enflurane and isoflurane
- No EEG or motored evidence of seizures reported during anesthesia with sevoflurane, however not known whether sevoflurane will activate epileptogenic foci in patients with preexisting seizure disorders^{11,12}
- No data on the EEG effects/seizure activity with desflurane in humans^{11,12}



Inhalational Anesthetics & Seizures

Dental Considerations

Nitrous Oxide

- EEG studies performed in patients receiving nitrous oxide alone have not revealed seizure activity ^{11,12}
- One case report, without EEG documentation in which it alone precipitated convulsions
- Alone never demonstrated anticonvulsant properties in humans
- oldest and most widely used anesthetic in clinical practice, epileptogenic potential appears to be extremely low



Intravenous Analgesics & Seizures

Dental Considerations

Meperidine

- Seizures occur after chronic oral and intramuscular administration
- Concomitant therapy of anticonvulsants or phenothiazines may be a contributing factor
- Unknown whether or not acute or chronic meperidine use will activate epileptogenic EEG foci in patients with preexisting seizure disorders ^{11,12}
- Lowest safety margin for convulsions of all narcotic studies ^{11,12}



Intravenous Analgesics & Seizures

Dental Considerations

Morphine

- Never been demonstrated to produce seizure activity in humans after intravenous administration alone

Fentanyl, Sulfentanil, Alfentanil^{11,12}

- Reports of grand mal seizure like motor behavior in patients after administration of low to moderate doses of I.V. fentanyl
- Unclear if these are non epileptic myoclonus, exaggerated form of narcotic induced rigidity or subcortical seizure activity
- Never demonstrated to possess anticonvulsant properties in humans or animals



Other Agents

Dental Considerations

Propofol

- Non barbiturate intravenous agent
- Has both pro and anticonvulsant effects
- Reports of myoclonic movements and opisthotonus present in literature – however as it is rarely administered without adjunct medications and inavailability of EEG evidence of seizures, difficult to conclude that it produces seizures ^{11,12}

Local anesthetics

- Lidocaine/Ropivacaine/Bupivacaine
- Need to be used with caution
- May be associated with seizures if absorbed systemically



Anesthetics & Seizures

REVIEW: Points to Remember

- **Inhaled anesthetics recommended for treatment of continuous seizures refractory to conventional intravenous anticonvulsant agents**
- **Halothane not reported to cause convulsions in humans**
- **Enflurane has propensity to induce epileptiform activity during anesthesia, especially when high concentrations are administered in presence of hypocarbia**
- **Although no EEG or motor evidence of seizure activity reported during anesthesia with sevoflurane in non epileptic patients, not known whether or not sevoflurane will activate epileptogenic foci in patients with preexisting seizure disorders**
- **Newer agents to be used with caution**
- **Use caution when using I.V. opioids to patients with epilepsy undergoing non seizure surgery**



Dental Treatment Plan: Seizure Control^{6,7,8,10}

- **Determine degree of seizure control**
 - Is masticatory apparatus involved?
- **Patients with seizures can receive dental treatment when:**
 - Seizure free (with or without medication)
 - Rare seizures (less than once/year)
 - Seizures that do not involve masticatory apparatus (absence, myoclonic)
 - No special needs
- **Special Consideration for Dental Treatment:**
 - Seizures that involve masticatory apparatus
 - Generalized tonic-clonic seizures



Dental Treatment Plan: Seizure Control^{6,7,8,10}

- **Recommendations For Patients Needing Special Consideration**
 - Amalgams better than composites as they are more resistant to abrasion
 - Avoid use of ceramic inlays and replacement of edges
 - Replace missing teeth
 - Dental prosthesis with implanted radiopaque wires to increase their visibility on radiographs
 - Use metal plates with complete dentures



Seizure First Aid

- **Do The Following When Patient Seizes in the Dental Chair:**^{6,7,8,10}
 - Clear all instruments away from the patient
 - Place dental chair in a supported, supine position as near to the floor as possible
 - Place the patient on his or her side (to decrease chance of aspiration of either secretions or dental materials in patients mouth and to control airway)
 - Do not restrain patient
 - Do not put your fingers in patients mouth
 - Time the seizure
 - Call 911 if seizure lasts > 3minutes or if patient becomes cyanotic at onset
 - Can administer oxygen at a rate of 6-8 L/minute if patient is cyanotic
 - If a seizure last longer than 5 minutes or is repetitive, it is status epilepticus



Treatment of Status Epilepticus

Timetable²

TIME (min)	DRUG & NON-DRUG TREATMENT
0	Ensure adequate respiration – intubation may be necessary & low flow O ₂ should be started
2-3	Start IV with normal saline. Draw blood for anticonvulsant levels, glucose, hepatic & renal function, CBC with diff., electrolytes, Ca, Mg, blood gases & toxicology screen. Obtain urine for routine U/A
5	Start second IV line. Lorazepam 4 mg (0.1 mg/kg) or diazepam 10 mg (0.2 mg/kg). Infuse IV over 2 minutes with saline for simultaneous administration of second medication & IV fluids
7-8	Thiamine 100mg, 50% D5W 25cc IV push. Phenytoin or Fosphenytoin – 20mg/kg (betw 1000 & 2000mg in most adults) IV push. Dilute in saline & infuse at a rate of no more than .75mg/min/kg of body weight (no more than 50mg.min phenytoin or 150 mg/min phenytoin equivalents of fosphenytoin in adults). EKG & BP monitor



Treatment of Status Epilepticus

Timetable²

TIME (min)	DRUG AND NON DRUG TREATMENT
10	Benzodiazepine may be repeated
30-60	Start continuous EEG monitoring unless status has stopped and the patient is waking up
40	Phenobarbital – 20mg/kg (between 1000 and 2000 mg in most adults). Dilute in saline and infuse at a rate of no more than .75mg/min/kg of body weight (50mg/min in adults)
70	Pentobarbital – load with 3-5mg/kg given over 3-5 minutes. Then start continuous infusion at 1mg/kg/hr and increase continuous infusion with additional smaller loading doses until EEG burst/suppression. (Alternative is Midazolam at a loading dose of 0.15-0.20mg/kg followed by infusion of 0.05 – 0.30mg/kg/hr. EEG should be monitored and infusion stopped at least temporarily after 12 hrs to check for seizure recurrence.)



Seizure is Over

Dental Considerations^{6,7,8,10}

No further dental treatment that day

- Try to talk to the patient to evaluate level of consciousness
- Do not attempt to restrain the patient
- Do not allow patient to leave office if their level of awareness not fully restored
- Contact patients family, if he or she is alone
- Brief oral examination for sustained injuries
- Depending on post ictal state, discharge patient home with a responsible person, to his/her physician or to an Emergency Room for further assessment



REFERENCES

1. Engel J Jr, Pedley TA, eds. **Epilepsy: A Comprehensive Textbook**, Vols II, III, Philadelphia: Lippincott-Raven 1998.
2. American Epilepsy Society - Clinical Epilepsy Education program. At: www.aesnet.org/go/professional-development/education/epilepsy-education-program. Accessed November 16, 2007.
3. Epilepsy Foundation - Epilepsy and Seizure Statistics. At: www.epilepsyfoundation.org/about/statistics. Accessed November 22, 2007.
4. Pellock JM, Dodson WE, Bourgeois BFD, eds. **Pediatric Epilepsy: Diagnosis and Therapy**, 2nd Edition, New York: Demos Medical 2001:69-72, 81-87.



REFERENCES

5. Holmes GL. Epilepsy Syndromes. At: <http://professionals.epilepsy.com/page/syndromes.html>. Accessed December 10, 2007.
6. Kennedy BT, Haller JS. "Treatment of the epileptic patient in the dental office." NY State Dent J. 1998; 64:26-31.
7. Sanders BJ, Weddell JA, Dodge NN. "Managing patients who have seizure disorders: dental and medical issues." J Am Dent Assoc. 1995 Dec;126(12):1641-7.



REFERENCES

8. Aragon CE, Burneo JG. "Understanding the patient with epilepsy and seizures in the dental practice." J Can Dent Assoc. 2007 Feb;73(1):71-6.
9. Brodie MJ, Dichter MA. Antiepileptic drugs. New Eng J. Med 1996;334:168-175.
10. Stoopler ET, Sollecito TP, Greenberg MS. "Seizure disorders: update of medical and dental considerations." Gen Dent 2003 Jul-Aug;51(4):361-6.
11. Modica PA, Tempelhoff R, White PF. Pro- and Anticonvulsant Effects of Anesthetics (Part I). Anesth Analg 1990; 70:303-315.



REFERENCES

12. Cheng MA, Templehoff R. Anesthesia and Epilepsy. *Curr Opin Anest* 1999; 12(5):523-28.
13. Commission on Classification and terminology of International League Against Epilepsy. Proposal for revised classification of epilepsies and epileptic syndromes. *Epilepsia* 1989;30:389-399.
14. Working Group on Status Epilepticus. Treatment of Convulsive Status Epilepticus. *JAMA* 1993; 270:854-9.



THANK YOU

- Thank you to the Task Force on Special Dentistry Committee for their dedication to this project.
- Special thanks to the past and current Chair members of the Task Force on Special Dentistry:

**Dr. Alicia Bauman
Dr. Craig Colas
Dr. Nancy Dougherty
Dr. Vincent Filanova**

**Dr. Gary Goldstein
Dr. Roderick MacRae
Dr. Edward Riggins
Dr. Maureen Romer
Dr. Carl Tegtmeier**