

Safety in the Epilepsy Monitoring Unit

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Video EEG Monitoring (VEM)

- Continuous recording of behavior (video) and EEG
- Indications for VEM include:
 - Diagnostic
 - Presurgical evaluation



The Risks of VEM

- Morbidity during VEM
 - 9% (n=44) of 507 patients who underwent VEM had 53 adverse events
- Low occurrence of Sudden Unexpected Death in Epilepsy (SUDEP)

Benefits of VEM

- Study by Lee et al. (2009) concluded:
 - Changes in diagnosis – 41%
 - Management change – 40%
- Benefits > >> Risks

Outline

- Environment of epilepsy monitoring unit (EMU)
- Preadmission screening
- Seizure provocation techniques
- Seizure precautions
- Seizure response protocols and rescue medications
- Postictal aggression and psychosis
- Intracranial electrode safety
- Safe discharge practices

EMU Environment: Patient Room

- Limit equipment and furniture
- Easy access to amplifier box
- Remove potentially dangerous objects
- Limit off-camera time
- Use chairs with heavy and high backs



EMU Environment: Bathrooms

Bathrooms are high-risk area for falls

- Outswing design for doors
- Curtain instead of door
- Padded sink edges and toilet seats
- Repositioning of assistive rails
- “Bird-baths”

EMU Environment: Seizure Detection

- Patient/nurse ratio higher than standard ward
- Resources should meet minimum requirements
 - Example 1: 24 hr video observation by monitoring technician with sitter at bedside (preferable)
 - Example 2: Presence of family member to alert nurses of seizure
- Patient should have designated seizure button in addition to call light

Preadmission Screening: History

- Determine if seizures are cyclic in nature
- Anticipate seizure frequency and semiology
- Collect info on ictal and postictal behavior
- Note behaviors that put patient or staff at risk



Preadmission Screening: History

- Risk of status epilepticus
- Need for nicotine patch
- Contraindications to VEM monitoring:
 - Pregnancy (opinion varies)
 - Poor health
 - Long period of seizure freedom

Preadmission Screening: Consent

- Indication
- Advantages & disadvantages
- Methods of seizure provocation
- Restriction of mobility outside of room
- Use of restraints for safety purposes
- Patient right to request cessation of monitoring
- Recording of video and voice
- Use of recording for academic, educational, research and publication purposes

Seizure Provocation: AEDs

- AED withdrawal protocols help to limit occurrence of status epilepticus
- Different approaches
 - Example 1
 - Example 2
 - Example 3

Rose et al., 2003

Yen et al., 2001

Dewar and Pack, 2008

Hovinga, 2011

Seizure Provocation: AEDs

- Special considerations
- Monitor for withdrawal seizures, seizure clusters and new GTCs
- Monitor withdrawal side effects
- Caution with withdrawing prior to admission

Seizure Provocation

- Extratemporal seizures occur quicker using the same withdrawal techniques
- Caution if seizures appear as clusters or Phase II monitoring is in progress

Seizure Provocation

- Sleep deprivation protocols vary
- Study on use during vEEG monitoring shows it has little effect



Seizure Provocation: Hyperventilation

- Used to induce seizures
- Normal response is generalized slowing of EEG
- Seizures commonly triggered in idiopathic generalized epilepsy and some focal epilepsies

Seizure Provocation: Hyperventilation

Contraindications:

- Acute stroke
- Recent intracranial hemorrhage
- Large-vessel stenosis
- Recent TIA
- Moyamoya disease
- Severe cardiopulmonary disorders
- Sickle cell disease/trait

Seizure Provocation: Photic Stimulation

- Can induce generalized seizures
- Turn off photic light as soon as photoparoxysmal response is observed
- Use caution in proceeding with photic stimulation - myoclonus

Seizure Precautions: EKG

- Cardiac complications
 - Ictal asystole (0.27% w/ epilepsy)
 - Late hypotension in status epilepticus
- Rare but should be taken into consideration because of its suspected role in SUDEP cases

Seizure Precautions

- Side rails up with customized padding
- Low bed height
- Limit off-ward trips
- Suction with Yankeur tip
- Nasal cannula oxygen

Seizure Precautions

- IV access
- Continuous pulse oximetry (optional)
- Camera on patient
- Instruct patient to call if aura is sensed

Seizure Response and Rescue Medication

- Seizure response = preparation
- MD available in house
- Rescue medication readily available
- Protocol for benzodiazepines to treat patients having a seizure before beginning withdrawal

Seizure Response and Rescue Medication

Outline of a competent protocol:

- Customized orders
- Treatment parameters
- When to call physician
- 24 hour limit on IV benzodiazepines
- Ward capabilities and limitations

Management of GTCs

1. Maintain patient's airway. Position on side to avoid aspiration.
2. Loosen gown around patient's neck.
3. Protect head and, if applicable, intracranial electrodes from trauma.
4. Remove potentially hazardous objects from immediate environment.
5. Monitor pulse oximetry and provide oxygen to maintain an oxygen saturation greater than 92%.

Management of GTCs

6. DO NOT forcefully hold patient down.
7. DO NOT attempt to force any object into patient's mouth.
8. DO NOT force a suctioning device into the patient's mouth. Wait until mouth is open and relaxed.
9. Place patient in recovery position once patient is no longer convulsing and is relaxed.

Management of GTCs

10. Suction as needed.
11. Reorient patient to environment upon regaining consciousness.
12. Administer oral hygiene as necessary to remove secretions and bleeding.
13. Notify the covering physician as soon as possible.

Response to Tonic-clonic Status Epilepticus

- Initial stage of status epilepticus (5-10 mins)
 - Benzodiazepines
- Established status epilepticus (20-30 mins)
 - IV fosphenytoin and valproic acid less likely to cause cardiorespiratory side-effects.
 - IV phenobarbital can cause cardiorespiratory depression.

Postictal Aggression

- Response to perceived threat or intent to harm (resistive violence)
- Behavior is brief, undirected, and reactive in nature
- Occurs shortly after one or more seizures
- More likely to occur after a cluster of seizures

Postictal Aggression: Management

- Resolves itself quickly
- Limit patient contact
- No restraining



Postictal Psychosis

- Onset less than a week postictally
 - lucid but irritable, labile mood, and insomnia
- Psychosis period: 15 hours – 2 months
 - Delirium, paranoid delusions, auditory and visual hallucinations
- Occurs shortly after one or more seizures and more likely to occur after a cluster of seizures

Postictal Psychosis: Management

- Self limiting
- Treat if psychosis gets progressively worse
 - Tranquilizers and sedatives
 - Benzodiazepines for delirium
- If necessary, neuroleptics
- Balance patient safety and need for data

Intracranial Electrode Safety

- Voluntary restraints or one-to one sitter
- Ambulate with assistance at all times
- Secure extra wiring to avoid falls
- Monitor for signs of infection
- Frequent neurological checks

Safe Discharge

- Seizure within 24 hours before discharge
 - Benzodiazepine for breakthrough seizures
- Review with patient and family
 - Summary of findings, education
 - Medication changes and uptitration plan
 - Symptoms of postictal psychosis
- Follow-up appointments

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