- observation is the most important activity when a patient has a single seizure as this is the time to collect evidence of partial onset to imply structural brain disease; the post-ictal examination may identify language, motor, sensory or reflex abnormalities that are evidence of focal pathology
- drugs are a major cause of ICU seizures with causative agents including imipenem, fluoroquinolones & theophylline, hydrosedative withdrawal; recreational drugs including cocaine, methamphetamine and alcohol
- non-ketotic hyperglycaemia and hypoglycaemia can cause status epilepticus
- hypoglycaemia rarely causes seizures beyond the neonatal period and hypomagnesaemia even if present is unlikely to be the cause
- Imaging of the brain should be performed on patients with new seizures in the ICU as vascular, neoplastic or infectious explanations are common in the ICU population
- LP may be required
- EEG is a vital diagnostic tool. Partial seizures show EEG abnormalities that begin in the area of the cortex that produces seizures while primary generalised seizures appear to start over the entire cortex simultaneously
- indications for continuous EEG monitoring include refractory status epilepticus to aid titration of anticonvulsants and to ensure suppression of seizure activity, patients receiving a new neurotherapeutic drug, patients who continue to have poor conscious state after apparent cessation of seizures, suspected non-convulsive status epilepticus in a patient with altered conscious state

I. Generalised seizures

A. Generalised convulsive status epilepticus

1. Primary generalised status epilepticus
   a. Tonic status epilepticus
   b. Myoclonic status epilepticus
   c. Tonic-clonic status epilepticus

2. Secondary generalised status epilepticus
   a. Partial seizure with secondary generalisation
   b. Tonic status epilepticus

B. Non convulsive status epilepticus

1. Absence status epilepticus (petit mal status)
2. Atypical absence status epilepticus
3. Atonic status epilepticus
4. Nonconvulsive status epilepticus as a consequence of partially treated generalised convulsive status epilepticus

II. Partial status epilepticus

A. Simple partial status epilepticus
   1. Tonic
   2. Myoclonus
   3. Atonic

B. Complex partial status epilepticus

C. Neonatal status epilepticus

NB: ‘non convulsive status epilepticus’ may encompass partially treated generalised seizures, complex partial status epilepticus & absence status epilepticus

general:
- making a decision about administering anticonvulsants to an ICU patient requires consideration of a provisional estimation of the likelihood of recurrence and recognition of the utility and limitation of anticonvulsants
examples:
(i) alcohol withdrawal - can be treated with benzodiazepines, phenytoin is ineffective, long-term anticonvulsants are not required
(ii) metabolic disturbances - can be treated temporarily by benzodiazepines while the disturbance is corrected
(iii) CNS disease: the ICU patient with CNS disease who has even one seizure should be started on chronic anticonvulsants. There are some neurologists who believe that this treatment after the first unprovoked seizure may prevent subsequent epilepsy although there is considerable debate about this
(iv) mental retardation: pyridoxine is the drug of choice and specific anticonvulsants for infantile spasms
(v) eclampsia: magnesium sulphate (initial dose of 4-6g over 15-20 minutes is the treatment of choice for eclampsia; if convolution occurs after initial bolus an additional 2gm over 3-5 minutes may be administered)

- generalised convulsive status epilepticus, non-convulsive status epilepticus and complex partial status epilepticus are medical emergencies. In each case, one must act quickly to prevent additional cerebral damage
- patients with simple partial status are less risk for widespread cerebral damage

- seizures complicated by 3% of adult intensive care unit patients admitted with non-neurological conditions - a seizure often indicates a CNS complication has arisen
- since epilepsy affects 2% of the population, patients with epilepsy are admitted to the ICU for other reasons
- status epilepticus refers to prolonged seizure episodes
- definitions used in studies of status epilepticus have varied substantially; however, 30 minutes of continuous seizure activity or repeated seizure activity without recovery
- the diagnosis of seizures in critically ill patients is already receiving sedation and may be paralysed; tachycardia, tachypnoea and hypertension are signs of seizure that are often misinterpreted as evidence of inadequate sedation
- 1/3rd are presenting with a seizure disorder for the first time
- 1/3rd have a structural, toxic or metabolic cause:
   a. Electrolyte abnormalities (hyponatraemia, hypernatraemia, hypercalcaemia, hepatic encephalopathy)
   b. Diseases of the CNS- increased cellular activity of status epilepticus elevates demand for oxygen and glucose and cerebral blood flow initially increases
   c. Metabolic disturbances - can be treated temporarily by benzodiazepines while the disturbance is corrected
   d. Paroxysmal dyskinesias - can be treated with anticonvulsants in the acute setting and long-term anticonvulsants if the disturbance is persistent
- Seizures in patients with status epilepticus are often due to hypoxia, hyperthermia or hypoglycaemia
- Seizures in late pregnancy or post partum may represent eclampsia
- Hypoxia and hyperthermia ensue and glucagon is ineffective, long-term anticonvulsants are not required
- Intravenous administration of diazepam is ineffective, long-term anticonvulsants are not required
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