CONVULSIVE STATUS EPILEPTICUS IN INFANTS (AGE > 1 MONTH), CHILDREN AND ADOLESCENTS

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For guidelines on neonatal seizure management see the ADHB Newborn Services guideline (http://www.adhb.govt.nz/newborn/Guidelines/Neurology/Seizures.htm)

This guideline is applicable to Emergency Department, Intensive care and clinical wards.

**Definition of Status Epilepticus**

Recurrent seizures without complete recovery of consciousness between attacks or continuous seizure activity for more than 30 minutes. This may occur with or without impairment of consciousness.

Includes generalized convulsive seizures, nonconvulsive seizures (absence status, complex partial status) and continuous focal motor seizure activity.

Non-convulsive or partial motor status is not associated with the same severity of sequelae or urgency of treatment as generalised convulsive status, but if sustained may still result in permanent damage. Further consultation with Neurology Consultant on call should be obtained for these patients before progressing down the treatment algorithm.

Most seizures in childhood stop within 5 minutes. Supportive care is the mainstay of treatment in this time period.

Treatment should start if the seizure has not spontaneously terminated after 5 minutes. Seizures of longer duration are more difficult to terminate and may be associated with neurological sequelae.
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Assessment & Management

Concurrent assessment and management should occur if seizure activity is continuing.

Key features include –

Airway
- Airway compromise
  - Secretions and trismus are common
  - Complete airway obstruction is very rare
- Airway positioning – eg jaw thrust
- Avoid blind suctioning

Breathing
- Peri-oral cyanosis common
- Apply oxygen

Circulation
- Tachycardia and poor peripheral perfusion common
- Shock uncommon (if present consider sepsis as underlying cause)
- Ensure appropriate monitoring, including BP

Disability
- **Check blood glucose**
  - Give IV Dextrose if low (2mLs/kg 10% Dextrose)
- Is the patient still convulsing?
  - **Critical concept is the longer seizures = less motor movements**
  - Limb Tone
  - Pupils – if unreactive then ongoing seizure likely
  - Eyes – if deviation of both eyes then ongoing seizure likely, however absence of eye deviation does not exclude ongoing seizure activity
  - Response to pain – bilateral localisation to pain
- Differential diagnosis – can be difficult
  - Posturing
    - Raised ICP
    - Cerebral Palsy
  - Dystonic reactions
    - Eg post metoclopramide
  - Pseudo-seizures
    - Bilateral motor movements without loss of consciousness
    - Lack of post ictal period
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- Consider cause of seizures as some causes may require specific emergency management
  - Toxicology
    - Wide range of pharmaceuticals (e.g., tricyclic antidepressants)
    - Recreational drugs (unintentional or intentional)
  - Metabolic
    - Hypoglycemia
    - Electrolyte disturbance (e.g., Diabetes insipidus)
  - Infective
    - Meningitis
  - Epilepsy
  - Trauma (including non-accidental injury)
  - Intracranial
    - Blocked VP shunt
    - CVA/Intracranial bleed
  - Hypertensive

- Seek additional information
  - Onset seizure activity
  - Focal onset
  - Pre Hospital treatment and any chronic treatment
  - Previous successful hospital treatment

**Key Resuscitation Measures**

| A | support **Airway**, assume recovery position |
| B | administer 100% oxygen, assess **Breathing** |
| C | **Circulation**: check pulses & blood pressure, ECG monitor |
|   | Secure IV access. |
| D | check blood glucose urgently, replace with **Dextrose** if low (2mls/lkg 10% Dextrose) |

**Investigations:** glucose, electrolytes, calcium, magnesium, FBC
Consider cultures, blood gas, anticonvulsant levels, toxicology screen, insulin & cortisol if hypoglycaemic
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Management algorithm

**Manage in Resuscitation Area**
Continue down algorithm until seizure ceases

Airway management
High Flow O2

Obtain Blood Glucose – if BSL < 3.0 give 2ml/kg of 10% Dextrose

Consider pre-hospital treatment. More than 2 doses IN TOTAL of Benzodiazepines should only be given only after discussion with SMO.

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**Intravenous (IV) or Intravenous (IO) access.**

- Lorazepam 0.1mg/kg (Max 4mg) Given by slow push OR Midazolam 0.15mg/kg (Max 10mg)
  - 5 minutes
  - Lorazepam 0.1mg/kg (Max 4mg) Given by slow push OR Midazolam 0.15mg/kg (Max 10mg)
    - 5 minutes
    - **2nd line agents**
      - Phenytoin 20mg/kg over 20minutes (Max 1g) OR Phenobarbitone 20mg/kg over 20minutes (Max 1g)
        - 20 minutes
    - IM Midazolam 0.2mg/kg (Max 10mg) OR Buccal or Intranasal Midazolam 0.5mg/kg (Max 10mg)
      - 10 minutes
      - IM Midazolam 0.2mg/kg (Max 10mg) OR Buccal or Intranasal Midazolam 0.5mg/kg (Max 10mg)

**3rd line agents**

- Phenobarbitone 20mg/kg IV over 20minutes (Max 1g)
- Sodium Valproate 30mg/kg over 10minutes (Max 1200mg)
- Levetiracetam 40mg/kg IV over 5minutes (Max 3g)

If seizure continues after ONE 3rd line Agent OR ANY AIRWAY Compromise Contact PICU

Consider RSI in Consultation with CED SMO and PICU

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# CONVULSIVE STATUS EPILEPTICUS IN INFANTS (AGE > 1 MONTH), CHILDREN AND ADOLESCENTS

## APLS Medication List – Drugs in Status Epilepticus

From APLS 5th Edition Course manual

<table>
<thead>
<tr>
<th>Drug</th>
<th>Route</th>
<th>Dose</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midazolam</td>
<td>IV/IO</td>
<td>0.15 mg/kg. IM 0.2 mg/kg, Buccal 0.5 mg/kg, Intranasal 0.5 mg/kg</td>
<td>Takes effect within minutes but shorter duration of effect than lorazepam. Can depress respiration, particularly if repeated dosing. Is usually short-lived and is usually easily managed with bag-mask-valve ventilatory support. IM midazolam more effective than buccal or intra-nasal routes. Intra-nasal route requires mucosal atomiser device for optimal delivery. Buccal midazolam is twice as effective as rectal diazepam, but both drugs produce the same level and degree of respiratory depression.</td>
</tr>
<tr>
<td>Diazepam</td>
<td>IV/IO</td>
<td>0.25 mg/kg. PR 0.5 mg/kg</td>
<td>Max 10mg. Rapid onset, duration less than 1 hour. Well absorbed rectally. Widely used but may now be superseded by the more effective midazolam or lorazepam where available.</td>
</tr>
<tr>
<td>Lorazepam</td>
<td>IV/IO</td>
<td>0.1 mg/kg</td>
<td>Max 4 mg Dilute with saline or water to at least twice the 'neat' volume and give over 2 minutes. Consider using 0.05mg/kg if prior benzodiazepines or likely to have impaired respiratory drive. Equally or more effective than midazolam and diazepam, possibly less respiratory depression. Longer duration of action (12-24 hours)</td>
</tr>
<tr>
<td>Phenytoin</td>
<td>IV/IO</td>
<td>20 mg/kg</td>
<td>Max 1g. Give over 20 minutes, made up in 0.9% sodium chloride solution to a maximum concentration of 10mg in 1 ml. Can cause dysrhythmias and hypotension, therefore monitor ECG and BP. Little depressant effect on respiration.</td>
</tr>
<tr>
<td>Phenobarbitone</td>
<td>IV/IO</td>
<td>20 mg/kg</td>
<td>Max 1g. Give over 20 minutes. Ensure airway support available, often causes respiratory depression. Monitor blood pressure.</td>
</tr>
<tr>
<td>Paraldehyde</td>
<td>PR</td>
<td>0.4 ml/kg</td>
<td>Max 10 ml. Make up as 50:50 solution in olive oil or 0.9% sodium chloride (avoid Arachis oil because children with peanut allergy may react to it). Can cause rectal irritation. Avoid IM use as causes severe pain and may lead to sterile abscess formation. Paraldehyde causes little respiratory depression. Avoid in liver disease. Takes 10-15 minutes to act, sustained for 2-4 hours. Don't leave paraldehyde standing in a plastic syringe for longer than a few minutes.</td>
</tr>
</tbody>
</table>
Appendix: Drug Summaries

Paraldehyde

Paraldehyde is formulated for Intramuscular use. However due to the risks of severe muscle necrosis, the most common method of use is to administer rectally. For rectal administration, the intramuscular preparation has to be diluted with oil.

Rectal paraldehyde
May be effective in terminating status when IV access is not available.
Dose: 0.4ml/kg, q 2-4 hours as required
Method: Dilute 1:2 in olive oil
Action may be delayed up to 2-4 hours.
Metabolic acidosis is a possible complication in infants.

Notes on Paraldehyde
Can be administered from plastic syringes if used quickly.
Recommended administration in 20ml syringe attached to 10F feeding tube, inserted 10cm rectally. Hold buttock cheeks together for 2-3min (PR paraldehyde is a powerful GI stimulant)
Insoluble at room temperature in solutions above 7.8% (1 in 12). Warm ampoules if crystals appear. Do not take from a vial that is discoloured or has been open for a while. Paraldehyde degrades to acetate and acetaldehyde on contact with air, and these may be fatal.

Valproate therapy

Valproate can be given intravenously in convulsive status epilepticus.

Dose = 30 mg/kg administered IV over 10 minutes
IV Valproate infusions should be diluted to a maximum concentration of 50mg/ml with 0.9% NaCl or 5% dextrose

Peak levels are reached within 30 minutes, with an effective half-life of approximately 12 hours. An intravenous infusion can also be considered if the bolus dose was effective. There are also reports of the effective use of intravenous valproate in non-convulsive status.

Levetiracetam therapy

Dose = 40mg/kg IV levetiracetam (maximum 3g) given over 5 minutes
IV Levetiracetam infusions should be diluted to 50mg/ml with 0.9% NaCl or 5% dextrose

Evidence for use of IV Levetiracetam in status epilepticus is increasing.
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References


