Clinical Guideline
South Australian Paediatric Practice Guidelines – Seizures in Children

Policy developed by: SA Child Health Clinical Network
Approved SA Health Safety & Quality Strategic Governance Committee on: 12 December 2015
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Summary
Clinical Practice Guideline for the management of Seizures in children

Keywords
seizure, seizures, convulsion, convulsions, transient disruption, brain function, epilepsy, unconscious, generalised clonic-tonic, clonic-tonic, status epilepticus, CSE, fits, fitting, clinical guideline

Policy history
Is this a new policy? N
Does this policy amend or update an existing policy? Y
Does this policy replace an existing policy? Y
If so, which policies? Management of Seizures in children

Applies to
All SA Health Portfolio
All Department for Health and Ageing Divisions
All Health Networks
CALHN, SALHN, NALHN, CHSALHN, WCHN, SAAS
Other

Staff impact
All Clinical, Medical, Nursing, Allied Health, Emergency, Dental, Mental Health, Pathology

PDS reference CG101

Version control and change history

<table>
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<tr>
<th>Version</th>
<th>Date from</th>
<th>Date to</th>
<th>Amendment</th>
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<td>04/09/2013</td>
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South Australian Paediatric Practice Guidelines
management of seizures in children

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Note
This guideline provides advice of a general nature. This statewide guideline has been prepared to promote and facilitate standardisation and consistency of practice, using a multidisciplinary approach. The guideline is based on a review of published evidence and expert opinion.

Information in this statewide guideline is current at the time of publication.

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Health practitioners in the South Australian public health sector are expected to review specific details of each patient and professionally assess the applicability of the relevant guideline to that clinical situation.

If for good clinical reasons, a decision is made to depart from the guideline, the responsible clinician must document in the patient's medical record, the decision made, by whom, and detailed reasons for the departure from the guideline.

This statewide guideline does not address all the elements of clinical practice and assumes that the individual clinicians are responsible for discussing care with consumers in an environment that is culturally appropriate and which enables respectful confidential discussion. This includes:

- The use of interpreter services where necessary,
- Advising consumers of their choice and ensuring informed consent is obtained,
- Providing care within scope of practice, meeting all legislative requirements and maintaining standards of professional conduct, and
- Documenting all care in accordance with mandatory and local requirements
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Management Flowchart

Management Flowchart
Management flowchart for active seizures

Remember to include out of hospital doses of benzodiazepines in algorithm. Consider child’s normal anti-epileptic medications before administering treatment.

**Active seizure:**
Continuously monitor for airway and respiratory compromise, that may occur from the seizure or treatment medications.

- **High risk or >5-10 minutes duration**
  - Support ABC Check and correct 5%.

- **Low risk <5-10 minutes duration**
  - Continue +5-10 minutes.

- **Seizure stopped spontaneously**
  - End seizure monitoring of ABCs.
  - Determine cause.
  - Consider need for further investigations.

**Benzodiazepines**
Wait 5 min (iv)
30 min (oral, IM)

- **Seizure controlled**

**Ongoing seizure**

- **Phenobarbitone** or
  - Phenytoin iv/vo over 20 min

- **Seizure stopped from senior staff** - needed for notification

**Definition**
Seizure definition:

- A sudden attack of altered behaviour, consciousness, sensation or autonomic function produced by a transient disruption of brain function. The result of this altered brain function is most commonly a tonic (stiffening) or tonic-clonic (stiffening-jerking) seizure.

- When the seizure has motor accompaniments, it is also known as a convulsion. Non-convulsive seizures, ie those not associated with motor phenomena may also occur, but are rare and occur usually in the context of a child with a previous diagnosis of epilepsy.
Important points

A seizure is a sudden attack of altered behaviour, consciousness, sensation or autonomic function produced by a transient disruption of brain function. The result of this altered brain function is most commonly a tonic (stiffening) or tonic-clonic (stiffening-jerking) seizure.

When a seizure has motor accompaniments, it is also known as a convulsion. Non-convulsive seizures, ie those not associated with motor phenomena may also occur, but are rare and occur usually in the context of a child with a previous diagnosis of epilepsy.

Seizures are common in children, with about eight per cent having at least one seizure by 15 years of age.

Generalised tonic-clonic (Convulsive) Status Epilepticus (CSE):

CSE is defined as a generalized seizure lasting 30 minutes or longer, or repeated tonic-clonic convulsions occurring over a 30-minute period without recovery of consciousness between each convulsion.

Although the outcome of CSE is mainly determined by its cause, the duration of the seizure is also relevant and the optimum management is to terminate the seizure rapidly, effectively and safely.

CSE has a mortality in children of approximately four per cent.

Neurological sequelae of CSE (epilepsy, motor deficits, learning difficulties, and behaviour problems) are age dependent, occurring in six per cent of those over the age of three years but in 29 per cent of those under one year.
Causes

Many underlying conditions and neurological challenges may provoke seizures, and in over 50 per cent of children seizures are isolated events associated with either a high fever (febrile seizures or febrile convulsions) or minor head injury in early childhood.

Most acute seizures in children are brief and self limiting, not requiring any treatment. Seizures that persist beyond five minutes may not stop spontaneously and it is usual practice to implement acute seizure treatment when the seizure lasts more than five minutes.

Emergency management should be instituted immediately in the following situations:
- Child presents actively fitting (cause and duration unknown)
- Known cause warranting more urgent treatment:
  - Meningitis
  - Hypoxic injury
  - Trauma
  - Underlying cardio-respiratory compromise

Assessment

Assessment and management need to occur concurrently if the child is actively convulsing.

Key considerations in assessment include:
- Any compromise to ABC
- Duration of seizure including pre-hospital period
- Significant past history including seizures, neurological comorbidity including VP shunts, renal failure (hypertensive encephalopathy), endocrinopathies (electrolyte disturbance)
- Focal features
- Fever (Febrile convulsion or CNS infection)
- Anticonvulsant medications including any acute pre hospital treatment
- Previously successful acute anticonvulsant management
- Evidence of underlying cause that may require additional specific emergency management
  - Hypoglycemia
  - Electrolyte disturbance including hypocalcemia
  - Meningitis
  - Drug overdose
  - Trauma (consider occult head trauma)
  - Stroke and intracranial haemorrhage
Management

Initial support

> Monitor oxygen saturation with a pulse oximeter.
> All fitting children should receive high flow oxygen through a face mask with a reservoir as soon as the airway has been demonstrated to be adequate.
> If the child is hypoventilating, respiration should be supported with oxygen via a bag-valve-mask device and experienced senior help summoned.
> Prolonged seizures and/or repeated doses of anti-epileptic medications may lead to compromise of breathing requiring ongoing support including intubation. Help from senior clinicians should be obtained for intubation.

Acute Management:

In most situations (see above) supportive care for 5 - 10 minutes is appropriate. Ensure adequate airway and breathing while waiting for convulsion to stop spontaneously.

If seizure persists or the onset has not been witnessed, pursue active management (see management algorithm and drug dose table).

Include benzodiazepines given on the way to hospital (eg by parents or paramedics) when using this algorithm.

> Support airway and breathing, apply oxygen by mask, and monitor.
> Secure IV access, check bedside BSL and send urgent specimen for calcium / electrolytes and venous blood gas. If hypoglycaemia present (BSL<3.5), give 5mL/kg 10% Dextrose IV as bolus. Then commence 5mL/kg per hour 10% dextrose IV infusion and repeat BSL within 5 minutes.
> Give benzodiazepine.
> Repeat benzodiazepine after 5 minutes of continuing seizures.
> If convulsion continues for a further 5 - 10 minutes, commence IV phenytoin or phenobarbitone. If IV access cannot be secured and seizures refractory to benzodiazepines, consider IO access.
> Consider pyridoxine (100mg IV) in young infants with seizures refractory to standard anticonvulsants. This is given by slow injection, and is not recommended without prior discussion with paediatric neurologist.
> Seek senior assistance if seizure not controlled. Anticipate need to support respiration. Thiopentone or Propofol and rapid sequence induction (RSI) may be required for seizure control.
> Also see Active seizure management flowchart
Consider consultation with local paediatric team:

- Infants
- Prolonged seizures
- Incomplete recovery
- Focal seizures or post ictal findings
- Previous seizures
- Developmental delay
- Existing comorbidities

When to consider transfer to tertiary centre:

- Child requiring care beyond the comfort level of the hospital.

References


Royal Children’s Hospital, Melbourne, Australia, Clinical Practice Guideline on Febrile Seizures, [Internet, last updated 27 November 2012; cited 20 May 2013], Available from: http://www.rch.org.au/clinicalguide/index.cfm
### Appendix

**Table of Medication**

<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/IM</td>
<td>0.15 mg/kg</td>
<td>IV route preferable but alternate routes can be used if rapid IV access not achieved. If 2 appropriate doses fail to terminate the seizure, further doses are unlikely to be effective and increase the risk of respiratory depression. Use plastic ampoules for buccal and intranasal dosing.</td>
</tr>
<tr>
<td></td>
<td>Buccal</td>
<td>0.3 mg/kg (max 10mg)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Intranasal</td>
<td>0.2-0.5 mg/kg (max 10mg)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IV route</td>
<td></td>
<td>IV route preferable but alternate routes can be used if rapid IV access not achieved. If 2 appropriate doses fail to terminate the seizure, further doses are unlikely to be effective and increase the risk of respiratory depression.</td>
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<tr>
<td>Diazepam</td>
<td>IV/IO/PR</td>
<td>0.1-0.3 mg/kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.3-0.5 mg/kg (max 10mg)</td>
<td></td>
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<tr>
<td></td>
<td>IV route</td>
<td></td>
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</tr>
<tr>
<td>Phenytoin</td>
<td>IV/IO</td>
<td>20mg/kg</td>
<td>Given over 20 minutes in monitored patient.</td>
</tr>
<tr>
<td>Pheno-barbitone</td>
<td>IV/IO</td>
<td>20mg/kg</td>
<td>Given over 20 minutes in monitored patient.</td>
</tr>
<tr>
<td>Midazolam infusion</td>
<td>IV/IO</td>
<td>Titrate dose (1-5microgram/kg/min )</td>
<td>Incremental increase until control. Only to be initiated in a high dependency setting with involvement of senior staff. May be considered for treatment of refractory seizures as an alternative to RSI and ventilation.</td>
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<tr>
<td>Propofol</td>
<td>IV/IO</td>
<td>2.5mg/kg stat followed by infusion at 1-3mg/kg/hr for no longer than 48 hours</td>
<td>Use only with involvement of senior staff confident with airway management. For refractory seizures requiring RSI and ventilation. Beware hypotension.</td>
</tr>
<tr>
<td>Thiopentone</td>
<td>IV/IO</td>
<td>2-5 mg/kg slowly stat followed by IV infusion at 1-4 mg/kg/hr</td>
<td>Use only with involvement of senior staff confident with airway management. For refractory seizures requiring RSI and ventilation. Beware hypotension.</td>
</tr>
<tr>
<td>Paraldehyde (Not available at all hospitals)</td>
<td>PR</td>
<td>0.3mL/kg (Adult 10mL)</td>
<td>Consider in refractory seizures, particularly if IV access not available.</td>
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