

Neonatal seizures

Clinical Guideline Presentation v2.0



45 minutes

Towards CPD Hours

References:

The Queensland Clinical Guideline *Neonatal seizures* is the primary reference for this package.

Recommended citation:

Queensland Clinical Guidelines. *Neonatal seizures* clinical guideline education presentation E17.23-1-V1-R22 Queensland Health. 2017.

Disclaimer:

This presentation is an implementation tool and should be used in conjunction with the published guideline. This information does not supersede or replace the guideline. Consult the guideline for further information and references.

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Learning outcomes

- In relation to neonatal seizures:
 - Understand causes
 - Understand and describe the classification
 - Identify assessments and investigations
 - Understand treatment and management
 - Identify important factors regarding ongoing care

Abbreviations

AED	Antiepileptic drugs
CNS	Central nervous system
CSF	Cerebrospinal fluid
EEG	Electro-encephalogram
HIE	Hypoxic ischaemic encephalopathy
MRI	Magnetic resonance imaging
USS	Ultrasound scan

Definitions

Apoptosis

- Cell death

Automatisms

- Non-purposeful, stereotyped, and repetitive behaviours
 - Most common are oral lip smacking, chewing, swallowing and cycling; performed without conscious control

Hyperekplexia

- Neurologic disorder where there is a pronounced startle response to tactile or acoustic stimuli, and hypertonia

Definitions

Hypsarrhythmia

- Abnormal inter-ictal pattern with electroencephalogram (EEG) high amplitude and irregular waves and spikes with background of chaotic and disorganised activity

Ictal

- Relating to seizures

Opisthotonos

- Abnormal extensor posture where the head and lower limbs are bent backwards and the body is arched forward

Introduction

- Neonates are at high risk for seizures
- Neurological emergency
- Difficult to diagnose and treat
- Clinical signs variable and may be absent
- Associated with greater risk for long term neurodevelopmental difficulties
- Occurs when excessive and synchronised depolarisation occurs in large group of neurons

Causes of seizures

What are the CNS causes?

- Hypoxic-ischemic encephalopathy
- Intracranial haemorrhage
- Infection of CNS
- Other cerebrovascular (e.g. stroke)

What are other causes?

- Biochemical e.g. hypoglycaemia
- Inborn errors of metabolism e.g. pyridoxine deficiency
- Developmental/congenital
- Other e.g. drug withdrawal

Presentation

When do neonatal seizures typically occur?

- Evolve over time dependent on aetiology
- Typical day of onset may be variable
- Peak incidence between 12 and 24 hours of age
- Often cease by 72 hours of age
- Infection may be a cause at any time

Day 1

- Traumatic brain injury
- HIE
- Stroke
- Hypoglycaemia
- Neurometabolic disorders
- Drug withdrawal
- Pyridoxine dependent

Day 2

- Stroke
- Glucose transporter deficiency
- Electrolyte disturbance

Day 3

- Neurometabolic disorders
- Cerebral malformations
- Other genetic malformations

Seizure classification

How are neonatal seizures classified?

- Clonic—recurrent muscle contraction
- Tonic—sustained muscle contraction
- Myoclonic—brief active muscle contraction
- Subtle—automatisms, autonomic phenomena, ocular phenomena and include seizures with apnoea

Seizures may be:

- Generalised-involving bilateral brain structures
- Focal-involving one part of the brain

Jittery versus seizure

Clinical feature	Jitteriness	Seizure
Abnormal gaze or eye movement	No	Yes
Predominant movement	Tremor, rapid, oscillatory	Clonic, jerking, tonic
Movements cease with passive flexion	Yes	No
Stimulus provoked movements	Yes	No
Conscious state/ Autonomic change	Awake or asleep	Altered

Assessment



History:

Ask about maternal, family and birth history

Examination:

- Physical—congenital anomalies, head circumference, birth marks, somatic abnormalities, facial dysmorphology
- Neurological
- Sepsis

Investigations

- Pathology
 - Blood, urine, CSF
- Neurophysiology
 - EEG
- Neuroimaging
 - MRI (to identify brain malformations, intracranial haemorrhage, ischaemic damage)
 - USS (to detect haemorrhage)

Principles for acute management

- Rapid, accurate diagnosis by EEG
- Rapid titration of medication to stop seizures
- Early discontinuation of medications once seizures ceased
- Prevention of secondary problems by maintaining physiological vital signs, blood glucose and ventilation



Management

What is the initial management?

- Resuscitation
- Ongoing assessment and examination
- Treat underlying causes
- Medications—antibiotics, antivirals, antiepileptic drugs (AEDs), others as indicated

What other care?

- Documentation of seizure activity
- EEG—correlate with videorecording of baby's activity (if available)
- Family centred care and ongoing parental support
- Referral for ongoing care and management

Drug therapy

Principles:

- Treat underlying cause
- Commence AEDs treatment when:
 - Seizures clinically apparent lasting more than 3 minutes
 - More than two briefer seizures
 - Electroencephalographic seizures present

Administer anti-convulsants:

- IV to achieve rapid onset of action and predictable blood levels (at high therapeutic range)
- Give maximum dosage before introducing second line medication

Duration of treatment

What is the optimal duration of AEDs?

- Unknown
- Usually ceased after 72 hours of no seizures and normal neurological examination



Consider risks and benefits:

- Potential efficacy
- Potential toxicity
- Side effects
- Anticipated rapidity of response

Assess:

- Baby's neurological status
- EEG
- Underlying aetiology

Antiepileptic drugs

First line

Phenobarbital

- First line treatment
- Controls seizures in 43%–85% babies
- Administer loading dose
 - Commence daily maintenance doses if seizures continue
- Side effects include respiratory depression, hypotonia, hypotension, reduced level of consciousness—monitor baby

Second line

- No general agreement on preferred second line drug(s)

Practice tip:

Always refer to Australian pharmacopoeia for complete drug information

Discharge planning

Provide parents with:

- Seizure emergency management plan
- Copy of discharge summary including type of seizures and medications
- Copies of referrals
- Follow up appointments/plan
- Contact details of support services
- Queensland Clinical Guidelines information sheet about neonatal seizures

