Neonatal Seizures

Clinical Guideline Presentation v3.0

45 minutes

Towards CPD Hours

Clinical Excellence Queensland

Queensland Government

References:

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

Recommended citation:

Queensland Clinical Guidelines. Neonatal seizures clinical guideline education presentation E22.23-1-V3-R27. Queensland Health. 2022.

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.

Feedback and contact details:

M: GPO Box 48 Brisbane QLD 4001 | **E:** guidelines@health.qld.gov.au | **URL:** www.health.qld.gov.au/qcg

Funding:

Queensland Clinical Guidelines is supported by the Queensland Health, Healthcare Improvement Unit.

Copyright:

Objectives

- 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

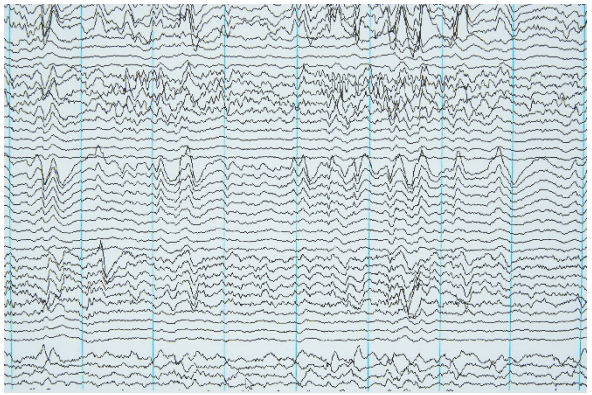
ASM	Antiseizure medication
CNS	Central nervous system
CSF	Cerebrospinal fluid
EEG	Electroencephalogram
HIE	Hypoxic ischaemic encephalopathy
IV	Intravenous
MRI	Magnetic resonance imaging
QCG	Queensland Clinical Guidelines
RSQ	Retrieval Services Queensland
USS	Ultrasound scan

Neonatal seizures

- **Neurological emergency**
- Newborn babies are at high risk for seizures
- Seizures happen when excessive and synchronised depolarisation occurs in large group of neurons
- Contact RSQ for discussion with neonatologist/paediatric neurologist

Neonatal seizures

- Difficult to diagnose and treat
- Clinical signs variable or even absent
- Best diagnosed by EEG (gold standard)
- Associated with greater risk for long term neurodevelopmental difficulties



Causes of neonatal seizures

What are the CNS causes?

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

Causes of neonatal seizures

What are other causes?

- Biochemical (e.g. hypoglycaemia, hyper/hyponatraemia)
- Inborn errors of metabolism (e.g. pyridoxine deficiency)

Causes of neonatal seizures

What are other causes?

- Brain development abnormalities (e.g. schizencephaly)
- Drug withdrawal or intoxication
- Other genetic epilepsies (e.g. self-limited familial neonatal epilepsy)

Presentation

When do neonatal seizures typically occur?

- No typical day of onset–may be variable
- Evolve over time dependent on aetiology
- Peak incidence between 12 and 24 hours of age
- Often cease by 72 hours of age
- Infection may be a cause at any time

Seizure classification

How are neonatal seizures classified?

- Either clinically (with electroencephalogram (EEG) correlation) or only seen on EEG
- At onset, all are considered **acute provoked** (occur in the context of an underlying condition) and focal seizures
- Described according to predominant clinical feature–motor, non-motor, sequential, unclassified

Motor seizures

- **Automatisms**
  - Co-ordinated motor activity–ocular, oral and limbs (e.g. eye deviation, lip smacking, cycling)
- **Clonic**
  - Recurrent rhythmic movements (jerking)–face, arms, legs or trunk
  - Fast contraction then slow relaxation
  - Rate of one to three per second

Motor seizures

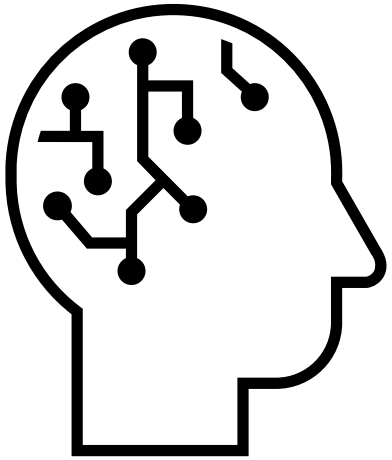
- **Myoclonic**
  - Non-rhythmical, random, sudden and brief– flexor muscles, variable topography
  - Focal or multifocal, bilateral symmetric or asymmetric, EEG changes
- **Tonic**
  - Sustained increased in muscle contraction (seconds to minutes)
  - Extension or flexion, one extremity or whole body, possible eye deviation

Non- motor seizures

- **Autonomic**
  - Alteration in autonomic nervous system functioning–cardiopulmonary, pupillary, gastrointestinal, sudomotor, vasomotor, thermoregulatory
- **Behavioural arrest**
  - Pauses in activity
  - Confirmed on EEG

Other presentations

- **Epileptic spasm (motor)**
- **Sequential**
- **Unclassified**



Jitteriness versus seizure

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

Assessment

History:

- Maternal, family and birth history

Examination:

- Physical–congenital anomalies, head circumference, birth marks, somatic abnormalities, facial dysmorphology
- Neurological–physical feature, posture, tone, cry, reflexes, behavioural state, movements
- Sepsis–bulging fontanelle, rash

Neurological examination

- Refer to QCG *Neonatal seizures Appendix B Abnormal neurological examination*

Appendix B Abnormal neurological examination of term/near term baby

Aspect/test	Consideration	Abnormal
History	• Family, maternal, antenatal, intrapartum and birth • Gestational age • Apgar score and resuscitation • Morphology scan or fetal MRI findings	• Family history of: o Genetic disorders o Birth defects o Seizures, developmental delay, thromboembolic or coagulation disorders o Stillbirths or early unexpected deaths • Difficult birth
General	• Normal resting posture–moderate flexion of four limbs, held off bed	• Constant tight flexion • Full extension, flaccid or forced
	• Observations (temperature, heart rate, respirations, oxygen saturation, colour) and growth	• Apnoea • Small for gestational age or fetal growth restriction
	• General appearance–normal features, facial symmetry, eye movement symmetry	• Dysmorphic features, facial asymmetry, eye movement asymmetry, facial palsy
	• Examination of the skin (presence of lesions or rashes), and spine	• Hair tufts, tracts along spine • Pale pink macular lesion (portwine stain); petechiae
Head shape, size and facial features	• Fontanelles, sutures • Facial features	• Caput succedaneum • Cephalhaematoma • Subgaleal haemorrhage • Bulging fontanelles • Widely separated, open sutures • Abnormal head shape with rigid sutures • Facial dysmorphism • Facial palsy • Abnormal eye movements • Sunset sign
	• Head circumference (10th–90th percentile)	• Microcephaly • Macrocephaly
Level of alertness	• Normal response to arousal	• Irritability, lethargy
Behavioural state (state of consciousness)	• Light sleep, drowsiness, quiet alert, active alert, crying	• Stupor, coma • Irritable • Lethargic
Cry	• Loud, strong	• High pitched • Weak or monotonous

Assessment

Observations:

- Vital signs
- Day of life seizure first presented
- Seizure events
  - Date, time, duration of events
  - Type of seizure activity, including location
  - Progression of events
  - Autonomic changes
  - Provoking stimuli
  - Response to restraint or posture change
  - EEG correlation

Assessment

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 identification
- Anti-seizure medication (ASM)
- Other medication as indicated and advised (e.g. pyridoxine)
- Early discontinuation of ASM once seizures ceased
- Prevention of secondary problems by maintaining physiological vital signs, blood glucose and ventilation

Management

What is the initial management?

- Resuscitation and stabilisation
- Ongoing assessment and examination
- Treat underlying causes
- Medications–ASM, antibiotics, antivirals, others as indicated

What other care?

- Documentation of seizure activity including video recording
- EEG—if available
- Family centred care and ongoing parental support
- Early referral for ongoing management

Medications

Principles:

- Treat underlying cause
- Commence ASM when:
  - Seizures clinically apparent lasting more than 5 minutes
  - Repeated seizure events occur
- Refer to NeoMedQ

Treating underlying cause(s) is critical to prevent clinical deterioration, further brain damage and poor long term neuro-developmental outcomes

Duration of treatment

What is the optimal duration of ASM?

- Unknown
- Usually ceased after 72 hours of no seizures, normal neurological examination and only one ASM required to control seizures

Assess and consider

- Baby's neurological status
- Underlying aetiology
- EEG (if available)
- Risks and benefits of ASM
  - Potential efficacy and toxicity
  - Side effects
  - Anticipated rapidity of response

Antiseizure medications

Phenobarbital

- First line treatment
- Controls seizures in 43%–85% babies
- Administer loading dose
  - Commence daily maintenance doses if seizures continue
- Refer to NeoMedQ Phenobarbital

Practice tip:
Refer to NeoMedQ for medication information

Second line ASM

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

Discharge planning

Provide parents with:

- Seizure emergency management plan
- Copy of discharge summary including type of seizures and medications
- Medications–information, education, prescription
- Copies of referrals and follow up appointments/plan
- Contact details of support services
- QCG parent information *Seizures in newborn babies (*and others as indicated)