health
Department:
Health
PROVINCE OF KWAZULU-NATAL

Neonatal Encephalopathy C/L

Date:		**Unit:**	
Name:		**IP Number:**	

The purpose of this management checklist is to guide an appropriate and acceptable standard of management and care for neonatal encephalopathy (NNE). It should be started on admission of any baby with encephalopathy.
It is aimed at nurses and junior/inexperienced medical practitioners.
Individual critical clinical judgment should always be used. It does not replace individualized expert management.

Identify Encephalopathy: Presence of 1 or more of the following	✓		✓
Altered level of consciousness- hyperalert /irritable/lethargic		Abnormal tone	
Seizures -abnormal posturing/staring/blinking/yawning		Abnormal primitive reflexes	
Difficulty in initiating/maintaining respiration -respiratory distress/abnormal breathing pattern /weak or absent cry/ apnoea			

Sign:		**Print:**	
Date:		**Time:**	

Notification: NNE is a potential PSI therefore inform the following individuals as soon as a baby with NNE is admitted:			
Person Notified	**Date**	**Time**	**Sign if notified**
Maternity/Paediatric ANM			
Neonatal unit MO			
Paediatric HOD/ Medical Manager			

Immediate care:	✓		✓
Nurse on Radiant warmer at 36.5°C		Monitor for seizures	
Prevent hyperthermia or swings in temperature		Complete Sarnat and Thompson Score Sheet	
Check and maintain saturations 90-94%		Record initial assessments below:	
Check and maintain blood glucose 2.6-8mmol/l		Sarnat Grade:	
Give 2ml/kg 10% glucose IV bolus if <2.6mmol/l		Thompson Score:	

Sign:		**Print:**	
Date:		**Time:**	

Investigations on admission:	✓		✓
Cord Blood Gas or ABG within 60 minutes of birth.		Urine dipstick (ASAP)	
Blood glucose (within 1hr of birth)		FBC with differential	
CMP (calcium, magnesium and phosphate)		Blood culture	
Troponin 1		CRP	
Chest X-Ray (if distressed)		Ballard Score (within 24hrs)	

Sign:		**Print:**	
Date:		**Time:**	

Further Investigations:	✓		✓
U&E (24-48hrs)		LFT (24-48hrs)	
CRP (48hrs after commencing antibiotics)		Cranial ultrasound (after 72 hours)	
CT or MRI scan of brain – discuss with referral centre			
Lumbar puncture **ONLY IF** baby has seizures **AND/ OR** abnormal WCC or raised CRP			

Sign:		**Print:**	
Date:		**Time:**	

Respiratory support:	✓	**RA=Room air**	✓
1. Maintain saturations 90-94%		2. If SpO_2 < 90% in RA – commence nasal prong oxygen	
3. Consider nCPAP if not maintaining SpO_2 >90% on nasal prong oxygen (NPO_2)		4. Consult referral hospital if sats. <90% on nCPAP.	
DO NOT VENTILATE in the presence of 1 or more of the following:			
No heartbeat at 10 minutes		No spontaneous respiration by 20 minutes	
5-minute Apgar <6 AND cord arterial blood base deficit under -12 AND / OR pH <7,0		Grade III/Severe Hypoxic Ischaemic Encephalopathy (Thompson score >15).	

Sign:		**Print:**	
Date:		**Time:**	

Nutrition/Fluids :	✓
Use Fluid and feed management checklist (C/L) amended as follows:	
Keep nil per os for first 24 hours at least.	
Do not fluid restrict. Give normal daily fluid volume according to checklist eg 60ml/kg/day for term baby using Neonatalyte.	
Introduce feeds once blood gas and BP are stable and baby is passing stool or bowel sounds are present.	
Whenever possible only use expressed breast milk (EBM).	
If unable to feed on day 3 consult referral hospital regarding transfer for possible TPN.	
If mean arterial blood pressure (MAP) low (< 40 mmHg) - Give a SINGLE fluid bolus of: 10ml/kg of 0.9% Saline or Modified Ringers Lactate	
If MAP still low after bolus consult referral hospital regarding possible inotropes.	

Sign:		**Print:**	
Date:		**Time:**	

Medications on admission:	✓		✓
1. Penicillin G 100 000iu/kg BD IVI		**OR** Ampicillin 50mg/kg BD IVI	
2. Gentamycin 5mg/kg/day IVI			

Sign:		**Print:**	
Date:		**Time:**	

Change to second line			
If-Confirmed Meningitis on CSF		**OR** Suspected Meningitis (increased septic markers) but LP unsuitable	
Commence: Cefotaxime 50mg/kg/dose IVI BD			

Discontinue antibiotics:	
1. At 72hrs if 48hr CRP is <10, no growth on blood culture and baby clinically **WELL**	
2. After 7 days for 1st line antibiotics and baby now **WELL**	
3. After 14 days if on Cefotaxime for meningitis or Gram neg. sepsis	

Sign:		**Print:**	
Date:		**Time:**	

Ongoing Management (in addition to routine care)	✓		✓
Daily Thompson Score.		Record initial and ongoing counselling	
Refer to rehab team		Refer mother to social worker/clinical psychologist	
If Ca^{2+} <1.8 mmol/L- Give 10% Calcium gluconate – 1 – 2 ml/kg over 10 – 20 mins			
If poor long term prognosis refer to referral centre outpatients for supportive long term plan			

Sign:		**Print:**	
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Eligibility for cooling. Within 3 hrs of <u>birth</u> - Assess :	✓		✓
1. Gestational age ≥36 weeks **and**		2. Weight >2000g **and**	
3. Age less than or equal to 6 hours **and**		4. Transport available to reach referral centre within **6hrs of birth**	
AND presence of any one or more of the below indicators:			
5. 10 min Apgar score 5 or less		6. 10 or more minutes of assisted ventilation at birth	
7. pH <7.00 or base deficit ≥16 mmol/L		8. Thompson score of 7 or more within 1st 6 hrs	
9. Abnormal aEEG- Regional/ Tertiary only:		Discontinuous normal voltage	
Moderately abnormal or suppressed background		Burst suppression	
Discontinuous normal or Low voltage		Flat trace or seizures	

Sign:		**Print:**	
Date:		**Time:**	

Seizure Management:			
Identify Seizures:	✓		✓
Obvious- Focal Clonic		Subtle- abnormal eye movements	
Multifocal clonic		lip smacking	
Generalized tonic		Cycling movements	
Myoclonic		Apnea or desaturation	
Recurrent – more than 3 seizures per hour		Prolonged- Longer than 3 minutes per seizure	
Cardiorespiratory compromise- Bradycardia / Apnoea / Desaturation			
Commence management ONLY if seizures are recurrent, prolonged or associated with cardio respiratory compromise. **NB Refer to Seizure management guideline/management checklist for detailed management.**			
Stop the seizure:			
Lorazepam (Ativan) 0,05 – 0.1 mg/kg IV or rectal		**OR** Diazepam 0.25mg/kg/IV	
If needed repeat once after 10 mins.		[redacted]	
If seizures persist:			
Phenytoin loading dose 20mg/kg IVI over 20 mins		Then after 12-24hrs: maintenance at 5 mg/kg/IVI/day	
If phenytoin not available/contraindicated commence: Lignocaine infusion: 2mg/kg over 10 mins			
If seizures persist:			
In consultation with paediatrician/neonatologist:			
Commence Midazolam infusion-start at 1µg/kg/IVI/min		Increase to 5µg/kg/IVI/min until seizures stop	
If seizures persist:			
Consult with regional hospital.		Try Pyridoxine 100mg/kg x 2 doses, 2 hours apart.	
Nurse in HC or ICU		Monitor vitals including BP and saturations continuously	
If seizures persist (Status epilepticus) at Regional / Tertiary hospital			
Sodium Valproate loading dose 20 mg/kg over 10 mins		Then 10 mg/kg/day 8 hrly	
OR Topiramate 2 mg/kg per os 12 hourly		**OR** Thiopentone infusion	
NB. If seizures stop AT ANY STAGE, to prevent further seizures, start oral Phenobarbitone:			
Phenobarbitone loading dose 20 mg/kg per os via NGT.		Then after 12-24hrs: Maintenance 4 mg/kg/day	
Wean and stop all anticonvulsants in reverse order except phenobarbitone. Stop before discharge if normal neurological exam.			

Sign:		**Print:**	
Date:		**Time:**	

Determine Diagnosis :
Within 24hrs- in consultation with Neonatal and Maternity Staff-
Based on History, Investigations and Clinical findings complete table below to determine a definitive diagnosis.

Hypoxic ischaemic encephalopathy (HIE)	History	Poor mat. Wt. gain		Maternal infections		Acute sentinel event		Hypertension	
		Chorioamnionitis		Fetal distress		CPD		Nuchal cord.	
	Assess	IUGR		Apgar <7 at 5mins		Early encephalopathy		Multi-organ involvement	
		Hypoxia		Cardiac arrest		[redacted]			
	Invest.	pH <7.0 / BD>12		Urine-blood/protein		Troponin I: >0.04µg/L			
	Sentinel events include: Abruptio placentae, cord prolapse or severe fetal heart rate (FHR) abnormality on CTG								
Infection	History	Maternal infection.				Initial asymptomatic period.			
	Assess	IUGR / Cataracts		Hepatosplenomegaly		Signs of sepsis		Rash	
	Invest.	RPR +ve.		+ve Blood Culture		↑ WCC		↑ CRP	
		CSF:		↑Protein (>1.5g/L)		↓ Glucose (<2.0g/L)		Cells (>40/cc)	
CNS /Genetic	History	Family history		Consanguinity		Prev. affected preg.		Abnorm. scan	
	Assess	Microcephaly		Macrocephaly		Neurocutaneous lesions			
	Invest.	Abnormal cranial ultrasound				[redacted]			
Vascular	History	Maternal Bleeding tendency		Cocaine use		Newborn Bleeding tendency.			
	Assess	Focal neurological deficits		Congenital heart disease				Sepsis.	
	Invest.	Cranial ultrasound – focal pathology.				[redacted]			
Metabolic	History	Consanguinity		Early neonatal death -sibling		[redacted]			
	Assess	Intractable seizures		Abnormal smell		Corneal clouding		Cataracts	
	Invest.	**Persistent:**	Metabolic acidosis			Hypoglycaemia		↑lactate	
		Urine – +ve ketones		↑ Anion gap		[redacted]			
Abstinence syndrome	History	Recreational drug use.							
	Assess	Preterm / IUGR		High pitched cry		Autonomic instability			
Final Diagnosis:									

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Case Review	✓		✓
Review with maternity team as soon as possible after birth.			
Document in detail: Antenatal history		Any sentinel event	
Intrapartum history		Resuscitation	

Paediatric MO Sign:		**Print:**	
Obstetric MO Sign:		**Print:**	
Date:		**Time:**	

Investigation results:											
Cord Blood Gas /ABG	**Date:**				**Time:**						
	PH:		**HCO_3:**		**BE:**		**PCO_2:**		**Lact:**		
Urine dipstick	**Date:**				**Time:**						
	Result:										
Bloods:	**Date:**				**Time:**						
	Gluc:		**CRP:**		**Troponin 1**						
	FBC & Differential:	**Date:**									
	CMP:	**Date:**									
	Culture:	**Date:**									
	U&E	**Date:**									
	LFT	**Date:**									
	CRP	**Date:**									
Neuroimaging	**Cranial US**	**Date:**									
	CT/MRI	**Date:**									
Lumbar Puncture	**(If indicated)**	**Date:**									
Maximum Thompson's score		**Date:**									

Discuss with referral centre if:	✓		✓
1. Requiring & eligible for ventilation/inotropes		2. Eligible for total body cooling	
3. Refractory seizures-more than one agent to control		4. Intolerance of enteral feeds from 72 hours of life	
5. Uncertain diagnosis			
Down refer if:			
1. Acute phase is over and the baby is stable but requires ongoing rehabilitation			
2. Needing palliative care			

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Follow up planning	✓		✓
3 days-At local clinic		6 weeks-Neonatal follow up clinic THEN	
3 monthly-Neonatal follow up clinic		**NB** Include Rehab. team	
If poor long term prognosis refer to referral centre outpatients for supportive long term plan			

Sign:		**Print:**	
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Following Discharge:		**Completed.**		
	Secure Clinical Records for 21 years:	**Date:**	**Print:**	**Initial:**
1.	Copy (Electronic/Hard) of Full Maternal Record			
2.	Copy (Electronic/Hard) of Full Neonatal Record			
3.	Copy of CTG tracing			
4.	Detailed summary –Maternity care (antenatal and intrapartum)			
5.	Detailed summary –Neonatal Care (Discharge summary)			
6.	Copy of neonatal section of Road to Health Book			
7.	Encephalopathy record audit performed			
8.	Records stored –Medical records and Unit			

Authorized By:		Dr N. McKerrow-KZN Provincial Paediatrician	
Date:	4 April 2019	**Review Date:**	4 April 2022