

Neuroprotection Checklist

Airway/Breathing/C-Spine

- Consider intubation if GCS ≤ 8 , hypoventilation or irregular breathing
- SpO₂ target 94-99%
- CO₂ target of 35-40mmHg
- Protect c-spine ((sandbags are preferred), use thoracic elevation device for children < 8 years), log roll on movement of patient.

Circulation

- Ensure SBP or MAP ≥ 50 th percentile for age (see table 1)
- If hypotensive: treat with Sodium Chloride 0.9% +/- Adrenaline infusion +/- Adrenaline push-dose pressor – refer to CREDD for dosing
- Consider the placement of arterial line for invasive BP monitoring

Brain

- Bed position:
 - If signs/at risk for raised intracranial pressure (ICP) - elevate head of bed to 30 degrees
 - If acute arterial ischaemic stroke suspected - bed flat
- Head neutral
- Ensure adequate analgesia & sedation
- Minimum hourly pupil checks (more frequently if indicated by clinical condition)

Age	MAP Centiles	
	50	95
0-3 months	55	77
3-6 months	61	86
6-9 months	66	93
9-24 months	69-70	97-98
2-6 years	71-73	98-99
6-12 years	75-76	101-103
12-18 years	78	104-105

TABLE 1: Adapted from Eytan, Goodwin, Greer, Guerguerian, Lauren (2017).

Temperature Control

- Active temperature control with targeted temperature management (36-37 degrees Celsius)
- Avoid HYPERTHERMIA - treat temperature > 37.5 degrees Celsius with external cooling strategies and paracetamol

Fluids /Medications

- Prepare a dose of 3 mL/kg 3% Sodium Chloride
 - Aim Sodium of 145-155 mmol/L
- BSL 6-10 mmol/L. If hypoglycemic (BSL < 3.0 mmol/L), treat 2 mL/kg 10% Glucose.
- Seizures - Levetiracetam loading dose followed by maintenance dose (see CREDD)
 - Where diagnosis of acute arterial ischaemic stroke, also notify neurologist in event of seizure
- Prophylactic Ondansetron to prevent vomiting.
- Consider if IV antibiotics are required
- Use Sodium Chloride 0.9% as the diluent in preparation of medications to be infused.



ALERT- Cerebellar Herniation

signs include Cushing's response +/- blown pupil

Any intervention should not delay patient transfer to neuroimaging once the child is safe to attend with escort.

- 3mL/kg 3% Sodium Chloride bolus
- Bolus sedation infusion
- Titrate CO₂ aiming for 30-35mmHg
- Urgent CT and neurosurgical involvement

Reassess pupillary dilation for effect of any temporising intervention.



For further information:

[Children's Resuscitation Emergency Drug Dosage Guide \(CREDD\)](#)

[QCH Guideline: Management of severe traumatic brain injury in the paediatric intensive care unit \(QH only\)](#)

[QCH Guideline: Acute Arterial Ischaemic Stroke Management in Children](#)

[CHQRS Paediatric Acute Ischaemic Stroke Retrieval Guideline \(QH Only\)](#)

References:

Children's Health Queensland. (2023). Acute Arterial Ischaemic Stroke Management in Children. Accessed April 3, 2024 from https://www.childrens.health.qld.gov.au/_data/assets/pdf_file/0028/180199/gdl-00734.pdf

Children's Health Queensland. (2022). Cervical spine injury – Emergency management in children. Retrieved April 3, 2024 <https://www.childrens.health.qld.gov.au/for-health-professionals/queensland-paediatric-emergency-care-qpec/queensland-paediatric-clinical-guidelines/cervical-spine-injury>

Children's Health Queensland. (2023). CHQRS Paediatric Acute Ischemic Stroke Retrieval Guideline (Code Stroke). Accessed April 3, 2024 from https://qheps.health.qld.gov.au/_data/assets/pdf_file/0034/2557618/gdl-00747.pdf/nocache

Children's Health Queensland. (2023). Management of severe traumatic brain injury in the paediatric intensive care unit. Retrieved April 3, 2024 from https://qheps.health.qld.gov.au/_data/assets/pdf_file/0031/1807645/gdl-80114.pdf

Eytan, D., Goodwin, A. J., Greer, R., Guerguerian, A.-M., Laussen, P. C. (2017). Heart rate and blood pressure centile curves and distributions by age of hospitalized critically ill children. *Frontiers in Pediatrics*, 5. <https://doi.org/10.3389/fped.2017.00052>

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