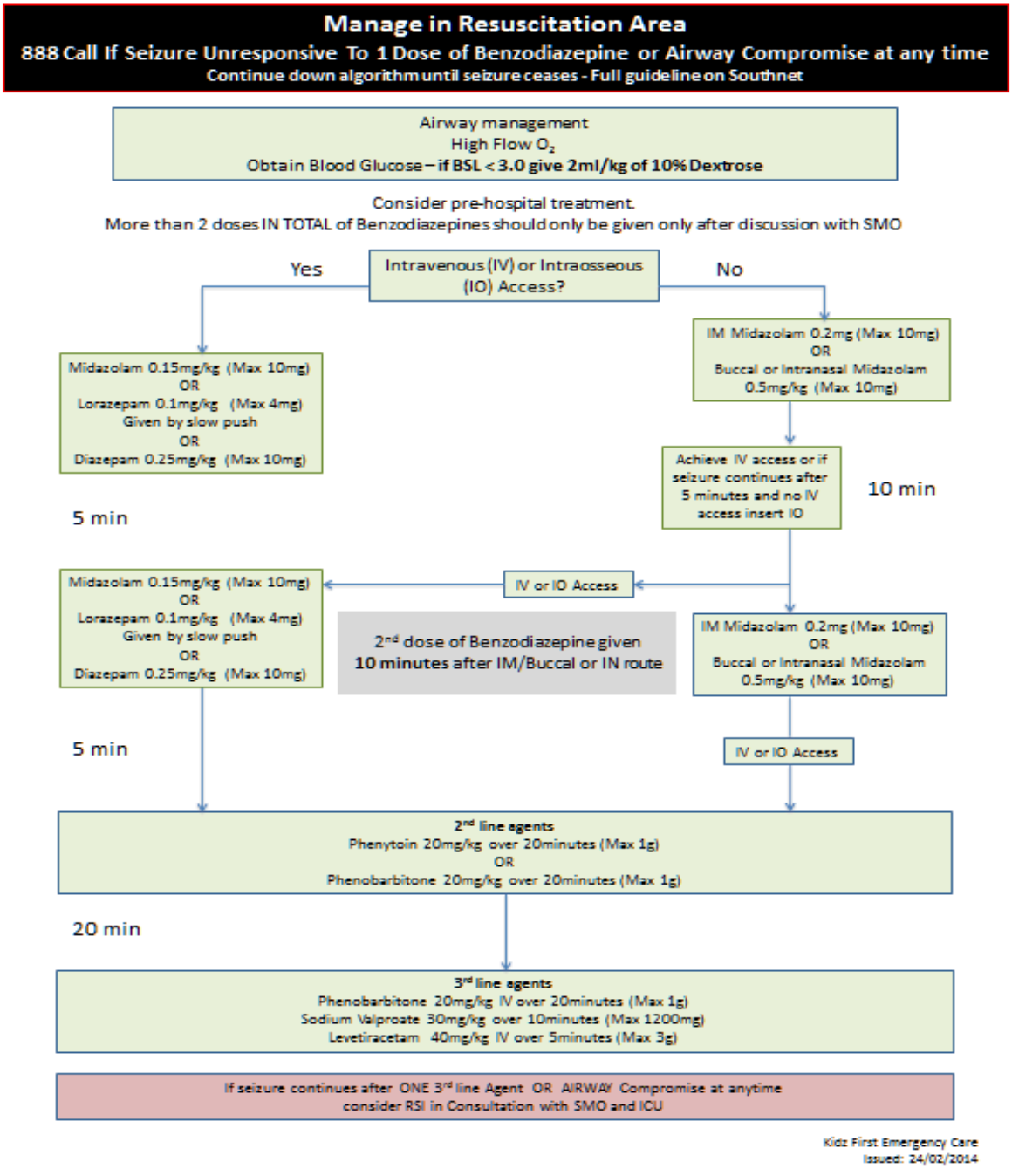
Guideline: Convulsive Status Epilepticus: in Infants (Age >1 month), Children and Adolescents

Note: For guidelines on neonatal seizure management see the ADHB Newborn Services guideline

Convulsive Status Epilepticus:

Infants (Age >1 month), Children and Adolescents Guideline



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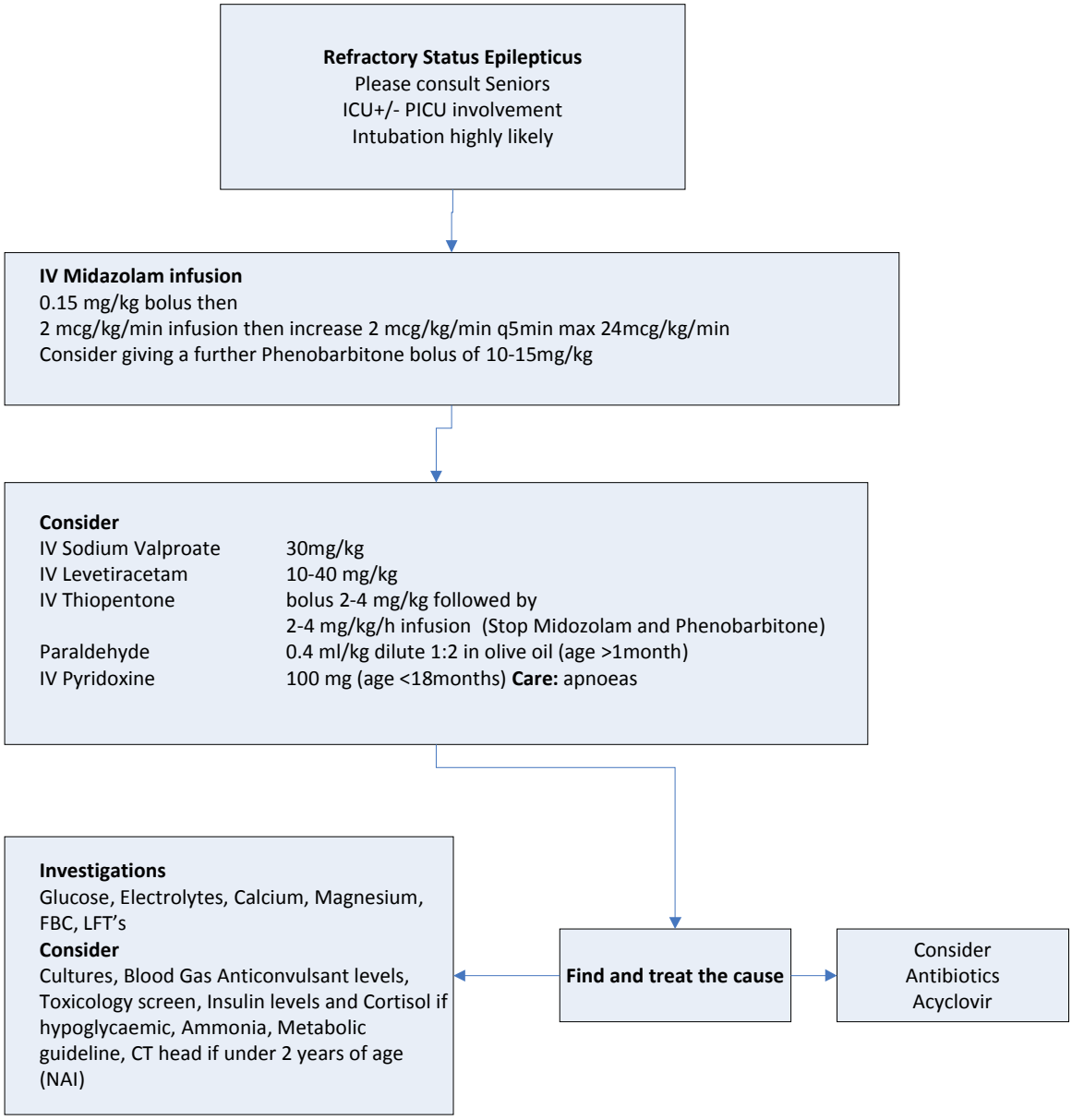
Refractory Status Epilepticus
Please consult Seniors
ICU+/- PICU involvement
Intubation highly likely
IV Midazolam infusion
0.15 mg/kg bolus then
2 mcg/kg/min infusion then increase 2 mcg/kg/min q5min max 24mcg/kg/min
Consider giving a further Phenobarbitone bolus of 10-15mg/kg
Consider
IV Sodium Valproate 30mg/kg
IV Levetiracetam 10-40 mg/kg
IV Thiopentone bolus 2-4 mg/kg followed by
2-4 mg/kg/h infusion (Stop Midozolam and Phenobarbitone)
Paraldehyde 0.4 ml/kg dilute 1:2 in olive oil (age >1month)
IV Pyridoxine 100 mg (age <18months) Care: apnoeas
Investigations
Glucose, Electrolytes, Calcium, Magnesium, FBC, LFT's
Consider
Cultures, Blood Gas Anticonvulsant levels, Toxicology screen, Insulin levels and Cortisol if hypoglycaemic, Ammonia, Metabolic guideline, CT head if under 2 years of age (NAI)
Find and treat the cause
Consider
Antibiotics
Acyclovir

Purpose

This guideline applies to all children over 1 month of age, presenting with a Convulsion.

For guideline on neonatal seizure management, see
http://www.adhb.govt.nz/newborn/Guidelines/Neurology/Seizures.htm

The aim of this guideline is to prevent seizure-induced brain damage by limiting the duration of generalized convulsive status.

It is applicable to the Emergency Department, clinical wards or in the Intensive Care Unit.

Roles and Responsibilities

We acknowledge that this Guideline has been adapted with permission from Starship Children's Health Clinical Guideline by Dr Melinda Nolan, John Beca, Adrian Trenholme Service: Paed Neurology/PICU/SAH. Editor: Dr Raewyn Gavin Date Reviewed: September 2008.

Guideline

Definition of Status Epilepticus

Recurrent seizures without complete recovery of consciousness between attacks or continuous seizure activity for more than 30 minutes, with or without impairment of consciousness.

- Includes generalized convulsive seizures, non convulsive seizures (absence status, complex partial status) and continuous focal motor seizure activity.
- Non-convulsive or partial motor status is not associated with the same severity of sequelae or urgency of treatment as generalized convulsive status, but if sustained may still result in permanent damage.
- Generalized myoclonic Status Epilepticus occurs in children with myoclonic epilepsies.

Most seizures in childhood stop within five minutes, therefore in practice treatment should start if the seizure has not spontaneously terminated after 5 minutes. Seizures of longer duration are more difficult to terminate, prolonged seizures (>30 minutes) can cause neuronal death. Convulsive Status Epilepticus is a life-threatening condition, and may result in serious neurological sequelae. Refractory status occurs in 9-31% of patients and is associated with high morbidity and mortality, the major aetiology in children is infection with fever.

The first episode of Convulsive Status Epilepticus is associated with bacterial Meningitis in 12%.

Absence status may require EEG confirmation, and should be treated with benzodiazepines followed by Sodium Valproate. Phenytoin and Phenobarbitone should be avoided as these agents may aggravate absence status.

Lennox-Gastaut and other myoclonic epilepsies of childhood may be associated with continuous tonic, myoclonic or atypical absence seizures. The most appropriate therapy for these children is sodium Valproate.

Initial Assessment

Resuscitate

A – Airway.
B - **B**reathing 100% oxygen.
C - **C**irculation: pulses and blood pressure, ECG monitor.
D - **D**extrose if low blood glucose.
E - **E**stablish IV access.

Investigations

Glucose, electrolytes, calcium, magnesium, FBC, LFTs.

Consider cultures, blood gas, anticonvulsant levels, toxicology screen, insulin and cortisol if Hypoglycaemic Ammonia Metabolic guideline, CT Head if under 2 years of age (NAI).

Acute Management of Status Epilepticus – Details

The times of drug administration in the guidelines are from time of seizure onset, or if historically unclear, time of arrival in the emergency department.

5 Minutes to 10 Minutes

Benzodiazepines (Choose ONE of the following options at 5 min, repeat at 10 min).
Diazepam IV 0.25 mg/kg (maximum 10 mg); or

Midazolam IV 0.15mg/kg; or

Lorazepam IV 0.1 mg/kg (maximum 8 mg); or

IF NO IV ACCESS is available then choose ONE of the following options at 5 minutes and repeat at 10 minutes.
Buccal Midazolam 0.5 mg/kg.
Intranasal Midazolam 0.5 mg/kg via MADD device (15 mg/3 ml solution) (maximum 10 mg); or IM Midazolam 0.2mg/kg.

OR give
Paraldehyde 0.4 ml/kg (maximum 10 ml) dilute 1:2 in olive oil or Saline (age >1 month) ONCE (see Appendix 1).

For children under 18 months and idiopathic Status Epilepticus, consider IV

pyridoxine 100 mg (possibility of **Apnoea** after administration).

Diazepam is short acting, needs to be followed by Phenytoin infusion or other long-acting anticonvulsant even if seizures terminated acutely.

15 minutes
Phenytoin IV 20 mg/kg maximum dose 1 g.
IV over 20 minutes in a minimum of 50 ml normal saline.

35 minutes
Phenobarbitone IV 20 mg/kg maximum 1 g.
IV over 20 minutes. If necessary may be given as IV push over 5-10 minutes.

Ensure airway support available; monitor blood pressure.

If seizure persists >10 minutes after administration of Phenobarbitone, treat as **Refractory Status Epilepticus** (see next page):

- Neurology and PICU consult.
- High likelihood of requiring intubation and ventilation.
- Admission to PICU.

Management should occur in PICU unless agreed otherwise by PICU and Neurology senior staff.

45 – 60 minutes
Therapy should be individualised at this stage in consultation between ICU/Paediatrics/PICU/ EC Specialists.

1. **Start Midazolam IV infusion**
   - Bolus 0.15 mg/kg followed by 2 microgram/kg/minute infusion.

   Consider further dose of 10-15 mg/kg Phenobarbitone.

If seizure continues:

- Increase Midazolam by 2 microgram/kg/min q 5 minutes to maximum 24 microgram/kg/minute bolus 0.15 mg/kg with increase in infusion as needed.

OR

2. **Thiopental, IV infusion:**
   - Bolus 2-4 mg/kg followed by 2-4 mg/kg/h infusion.
   - Discontinue Midazolam and Phenobarbitone once infusion started.
   - Maintain Phenytoin at therapeutic level.
   - Vasopressor support may be required.
   - Based on EEG suppression of epileptiform discharges, use additional boluses of 2 mg/kg with increase in infusion rate of 1 mg/kg/h every 30 minutes to 6 mg/kg/h as needed.
   - Monitor thiopental levels.

Appendix 1: Paraldehyde for Injection BP

Paraldehyde is formulated for Intramuscular use in the immediate treatment of seizures. However due to the risks of severe muscle necrosis, the most common method of use is to administer rectally. For rectal administration, the intramuscular preparation has to be diluted with oil.

Rectal paraldehyde

- May be effective in terminating status when IV access is not available.
- Dose: 0.4 ml/kg, q 2-4 hours as required.
- Method: Dilute 1:2 in olive oil.
- Action may be delayed up to 2-4 hours.
- Metabolic acidosis is a possible complication in infants.

Notes on Paraldehyde

Can be administered from plastic syringes if used quickly. Undiluted Paraldehyde has had no effect on polypropylene plastic syringes for up to 3 hours. Diluted Paraldehyde is compatible with tubing made of polyethylene or poly-propylene, but adsorbs onto tubing made of polyvinyl (this is of doubtful clinical significance).

Recommended administration in 20 ml syringe attached to 10F feeding tube, inserted 10 cm rectally. Hold buttock cheeks together for 2-3 minutes (PR paraldehyde is a powerful GI stimulant).

Insoluble at room temperature in solutions above 7.8% (1 in 12). Warm ampoules if crystals appear. Do not take from a vial that is discoloured or has been open for a while. Paraldehyde degrades to acetate and acetaldehyde on contact with air, and these may be fatal.

IV paraldehyde should only be considered in the intensive care setting and only after other standard therapies as listed in these guidelines have failed. IM paraldehyde should not be administered.

Appendix 2: IV Valproate therapy

Valproate can be given intravenously in convulsive Status Epilepticus, although there are no prospective studies of its use. A recent adult pilot study showed better efficacy than Phenytoin, and a retrospective study in children demonstrated efficacy as a third line agent. A rapidly infused loading dose is recommended, of 30 mg/kg administered in 1:1 dilution with 5% dextrose at a rate of 3 mg/kg/min. Peak levels are reached within 30 minutes, with an effective half-life of approximately 12 hours. An intravenous infusion can also be considered if the bolus dose has been effective. There are also

reports of the effective use of intravenous Valproate in non-convulsive status.

Appendix 3: Levetiracetam therapy

Dose = 40mg/kg IV levetiracetam (maximum 3gm) given over 5 minutes.

IV Levetiracetam infusions should be given as a 1:1 dilution with normal saline or 5% dextrose.

References

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Definitions

Term/Abbreviation	Description

Associated Documents

Other documents relevant to this guideline are listed below:

NZ Legislation / Standards	Health Practitioners Competency Assurance Act (2003). Health and Disability Code of Consumers Rights (1996). Nursing Council of New Zealand Competencies for Registered Nurses Nurses Scope of Practice Health and Disability Sector Standards (2008).
CM Health documents	Use of Abbreviations in the Clinical Record (A5540). Informed Consent (Children and Youth) Policy (A5529). Standing Orders for Delegated Medical Authority Policy (A7344). Policy; Medication – requirements, administration, certification and registration (A5554). Policy: Identification of patients/clients (A5564). Policy: Refusing Treatment (A5531). Documentation in the Clinical Record Procedure (A7359). Starship Convulsive Status Epilepticus in Infants (>1month), Children and Adolescents
Other documents	Nil