phenytoin

100mg/2mL injection, 30mg/5mL oral mixture

Note

This guideline provides advice of a general nature. This statewide guideline has been prepared to promote and facilitate standardisation and consistency of practice, using a multidisciplinary approach. The guideline is based on a review of published evidence and expert opinion.

Information in this statewide guideline is current at the time of publication.

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Health practitioners in the South Australian public health sector are expected to review specific details of each patient and professionally assess the applicability of the relevant guideline to that clinical situation.

If for good clinical reasons, a decision is made to depart from the guideline, the responsible clinician must document in the patient's medical record, the decision made, by whom, and detailed reasons for the departure from the guideline.

This statewide guideline does not address all the elements of clinical practice and assumes that the individual clinicians are responsible for discussing care with consumers in an environment that is culturally appropriate and which enables respectful confidential discussion. This includes:

- The use of interpreter services where necessary,
- Advising consumers of their choice and ensuring informed consent is obtained,
- Providing care within scope of practice, meeting all legislative requirements and maintaining standards of professional conduct, and
- Documenting all care in accordance with mandatory and local requirements

This is a High Risk Medication ⚠

An overdose can be rapidly fatal.
Increases in dose must be in small increments (10%) because metabolism of phenytoin is saturable and rate-limited. Small dosage adjustments may result in large changes in free serum phenytoin levels.

Checklist

Before administering a dose:

- Check if phenytoin serum level results need to be acted upon prior to the administration of the next dose;
- Check if the dose or dosing interval needs amendment as a result of the blood level results;
- Check the date and time when the next blood level is required; and
- Document the ongoing plan in the Nursing Care Plan and/or Medication Chart.

Dose and Indications

Anticonvulsant

Intravenous Loading Dose

15 to 20 mg/kg as a single dose

Intravenous or Oral Maintenance Dose

2 to 4 mg/kg every 12 hrs, commencing 12 hours after the loading dose

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Preparation and Administration

Intravenous

Dilute 1mL (50mg) of phenytoin injection with 9mL of 0.9% sodium chloride (to a total of 10mL). The solution now contains 5mg/mL phenytoin.

Dose	10mg	20mg	30mg	40mg	50mg
Volume	2mL	4mL	6mL	8mL	10mL

Discard remaining solution.

Administer over 30 minutes. Where the phenytoin must be administered more rapidly, the administration rate must not exceed 3mg/kg/min.

Intravenous phenytoin can precipitate in solution: consider the following to lower the risk:

- **Dilute** to 5mg/mL in 0.9% sodium chloride to facilitate infusion of dose and to reduce local irritation of vein. Do not dilute further than this.
- **Administer** via an in-line filter
- **Flush** the line well with 0.9% sodium chloride prior to as well as following drug administration
- **Observe** the line throughout the infusion; if precipitation occurs stop immediately and notify the doctor
- **Use** within one hour of dilution

Oral

Shake the bottle well prior to drawing up a dose as the phenytoin has a tendency to precipitate out of solution. The solution contains 6mg/mL phenytoin.

Dose	3mg	6mg	9mg	12mg	15mg
Volume	0.5mL	1mL	1.5mL	2mL	2.5mL

Oral loading doses should be administered in three divided doses over 6 hours and given with feeds to minimise gastric irritation.

Compatible Fluids

Sodium chloride 0.9%.

Phenytoin may precipitate if reconstituted in any other solution or mixed in the line with any other solution including parenteral nutrition.

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Adverse Effects

Common

Vomiting, agitation, neurological adverse events (sedation, nystagmus), irritation at IV injection site (thrombophlebitis and skin necrosis). Also hirsutism and gingival hypertrophy with long term use.

Rapid IV injection may cause hypotension, arrhythmias, bradycardia, cardiovascular collapse and respiratory depression

Rare

Choreiform movements, hyperglycaemia, osteomalacia and rickets, Stevens-Johnson syndrome, haematologic abnormalities, hepatitis, carditis, nephritis and interstitial pneumonitis

Hypersensitivity reactions (skin rash, fever, abnormal liver function, eosinophilia, blood dyscrasias, albuminuria) are extremely unlikely in this population

Monitoring

- Rapid intravenous dosing can cause cardiovascular side effects and so cardiac monitoring is recommended, particularly for intravenous loading doses
- Therapeutic Drug Monitoring may be required with this medication
- It takes approximately one week of maintenance dosing if no loading dose has been administered to attain steady state. If loading dose has been given trough levels may be taken after 48 hours
- Therapeutic drug monitoring is performed using a trough level (i.e. prior to next dose)
- Therapeutic range: 40 to 80micromol/L total serum phenytoin (protein-bound plus free drug)
- Hypoalbuminaemia or displacement of phenytoin from albumin by bilirubin can increase the percentage of unbound (free, active) phenytoin and this may complicate the interpretation of serum levels. Toxicity may occur even though the total serum phenytoin level may seem within the normal therapeutic range. In such a scenario free phenytoin levels should be measured.

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Practice Points

- Rapid bolus injection should be avoided, as this is associated with hypotension, arrhythmias, bradycardia, cardiovascular collapse and/or respiratory depression
- Saturation of hepatic metabolism may occur where small increases in dose may result in toxic phenytoin levels
- Phenytoin must not be mixed with glucose solutions
- Ampoule also contains propylene glycol, ethanol and sodium hydroxide or hydrochloric acid
- Intramuscular injection is not recommended due to local tissue reactions and very slow absorption
- SUBCUTaneous Injection is not recommended due to local tissue damage
- A continuous intravenous infusion is generally not recommended due to low solubility and resultant precipitation
- Oral absorption of phenytoin is unpredictable in neonates (IV administration recommended)
- Nasogastric feeds may decrease absorption of nasogastric phenytoin; separate administration where possible by 2 hours or change to IV phenytoin
- Phenytoin is contraindicated with hypoglycaemic seizures as well as sinus rhythm bradycardia (sinoatrial or atrioventricular block)
- Phenytoin has also been used as an antiarrhythmic for treatment of paroxysmal atrial or ventricular tachycardia and arrhythmias due to digoxin toxicity
- Phenytoin is a 2nd or 3rd line anticonvulsant; where higher doses of phenobarbitione and/or midazolam have not been effective
- Phenytoin interacts with a range of medications; please check with your local pharmacy department for specific advice.

Version control and change history

PDS reference: OCE use only

Version	Date from	Date to	Amendment
1.0	November 2012	current	Original version

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