LIGNOCAINE (Intravenous and endotracheal – cardiac)

SCOPE (Area): FOR USE IN: Critical Care Unit, ED and Theatre
EXCLUSIONS: Paediatrics (seek Paediatrician advice) and General Wards
SCOPE (Staff): Medical, Nursing and Pharmacy

BRAND NAME
Lignocaine hydrochloride.
Xylocard®.
Xylocaine®.
Min-I-jet Lignocaine Hydrochloride Injection®.

PHARMACOLOGY AND PHARMACOKINETICS
Lignocaine is a local anaesthetic with class 1B antiarrhythmic action, which reduces automaticity of myocardial tissue with little effect on cardiac conduction. It has a mild negative inotropic effect and weak neuromuscular blocking activity. Lignocaine has a rapid onset of action and a half life of 1.6 hours (although for the first half hour of an infusion the plasma half life is only 7-10 minutes due to rapid distribution into tissues, including the heart – this contributes to the need for a loading dose and higher initial infusion rate). Lignocaine is predominantly hepatically cleared and has two active metabolites that contribute to the central nervous system toxicity seen with lignocaine (headache, dizziness, drowsiness, mental changes, paraesthesia and visual disturbances).

INDICATIONS
▪ Treatment of serious ventricular arrhythmias (including resuscitation from cardiac arrest) - refer to Australian Resuscitation Council Advanced Life Support guidelines for place in therapy.
▪ Other indications of lignocaine are not covered by this guideline.

CONTRAINDICATIONS
▪ Second or third degree heart block (without pacemaker).
▪ Severe sinoatrial block or intraventricular block (without pacemaker).
▪ Stokes-Adams syndrome (without pacemaker).
▪ Treatment with flecainide, disopyramide – see Drug Interactions.
▪ Lignocaine products containing adrenaline – are not suitable for IV use.
▪ Serious hypersensitivity to lignocaine or other amide local anaesthetic.
PRECAUTIONS

- Hypovolaemia, bradycardia, cardiogenic shock or electrolyte disturbances (particularly hypokalaemia and hyperkalaemia) – increased risk of arrhythmia with lignocaine use, correct before use where possible.

- Atrial and supraventricular tachycardias - there is a high incidence of hypotension when lignocaine is used to treat these conditions.

- Heart failure – lignocaine may worsen condition, also the clearance of lignocaine is reduced and toxicity may be increased.

- Severe renal impairment – active metabolites of lignocaine may accumulate, reduce dose during prolonged infusion (>24 hours).

- Severe hepatic impairment or reduced hepatic blood flow (e.g. heart failure) – lignocaine may accumulate, consider halving dose during prolonged infusion (>24 hours).

PREGNANCY AND BREASTFEEDING

Seek specialist advice before prescribing, information may update regularly.

DRUG INTERACTIONS

- Disopyramide, flecainide – use contraindicated with lignocaine due to proarrhythmic effects. Disopyramide may also increase the concentration of lignocaine.

- Antiarrhythmics - lignocaine has a proarrhythmic effect and combination with other antiarrhythmics increases risk of arrhythmias; avoid combinations if possible.

- Drugs that cause electrolyte disturbances (especially hypokalaemia or hyperkalaemia) – see Precautions.

- Drugs depressing cardiac contractility and contraction – lignocaine may increase the risk of heart failure and/or significant bradycardia when used with these drugs, monitor carefully. See Precautions.

- Phenytoin - phenytoin has cardiac depressant effects, monitor ECG and blood pressure carefully when using phenytoin IV with lignocaine.

- Drugs that may increase the concentration of lignocaine leading to toxicity:
  - Avoid concomitant use where possible - atazanavir, boceprevir, chloramphenicol (systemic), cimetidine, ciprofloxacin (systemic), clarithromycin, darunavir, fluvoxamine, fosamprenavir, indinavir, iraconazole, ketoconazole (systemic), lopinavir, mifepristone, nefazodone, norfloxacin, ofloxacin (systemic), posaconazole, primaquine, ritonavir, saquinavir, telaprevir, vemrufenib, voriconazole.
  - Monitor carefully and reduce lignocaine dose if necessary - abiraterone, amiodarone, aprepitant, beta-blockers, bicalutamide, cyclosporin, dasatinib, diltiazem, erythromycin, ethinylestradiol, fluconazole, gemfibrozil, grapefruit juice, haloperidol, imatinib, metronidazole (systemic), sertraline, tetracycline, tramylcypromine, verapamil.

- Drugs that may decrease the concentration of lignocaine leading to treatment failure:
  - Avoid concomitant use where possible - bosentan, carbamazepine, dexamethasone, etravirine, nevirapine, oxcarbazepine, phenobarbitone, phenytoin, primidone, rifabutin, rifampicin, St Johns wort
  - Monitor carefully - cyproterone.

- Nitric oxide - increased risk of methaemoglobinaemia with lignocaine.

- Suxamethonium – high dose lignocaine may prolong the effect of suxamethonium.
Deferasirox, efavirenz – may increase or decrease the concentration of lignocaine, monitor carefully.

### DOSAGE AND ADMINISTRATION

**Requires continuous ECG monitoring.**

For administration only
- in Critical Care Unit, ED or Theatre
- by MET or Code Blue

**IV loading dose and resuscitation dose:**

Use lignocaine 100 mg/5 mL ampoules.
Lignocaine 1-1.5 mg/kg (maximum 100 mg) undiluted over 1-2 mins.
Dose may be repeated once after 5 minutes if required.

**Endotracheal resuscitation dose (rarely used):**

Use lignocaine 100 mg/5 mL ampoules.
Use 2-3 times the dose calculated for IV resuscitation dose, and dilute to 10-20 mL with water for injection. Wait until end of exhalation and then administer via endotracheal tube.
Dose may be repeated once after 5 minutes if required.

**IV infusion (after loading dose):**

Use lignocaine 500 mg/5 mL ampoules to make up infusion.
Withdraw 5 mL from a 100 mL glucose 5% minibag.
Lignocaine 500 mg (5 mL from one ampoule) added to remaining 95 mL glucose 5% in the minibag.
**Total Volume:** 100 mL.
**Final concentration:** 5 mg/mL.
**Rate:** 4 mg/min (48 mL/hr) for a maximum of one hour, then 1-3 mg/min (12-36 mL/hr). Determine rate by clinical response of patient and any signs of lignocaine toxicity.
**Maximum rate:** 4 mg/min (48 mL/hr).

**Syringe Pump IV infusion (after loading dose):**

**For use in ED only**

Use lignocaine 500 mg/5 mL ampoules to make up infusion.
Lignocaine 250 mg (2.5 mL from ampoule) diluted to 50 mL glucose 5% in a luer lock syringe.
**Total Volume:** 50 mL.
**Final concentration:** 5 mg/mL.
**Rate:** as for IV infusion above.

**General Administration Information**

- **Infusion preparation:**
  Mix infusion thoroughly after adding lignocaine to avoid inadvertently giving a more concentrated dose.
  Glucose 5% can be substituted for different compatible IV fluid as requested by the Medical Officer.
  Discard any remaining solution after 24 hours.

- **Infusion pump:** Volumetric pump.

- ** Routes of administration:**
  IV injection: Yes
IV intermittent infusion (15-60 minutes): No
IV continuous infusion: Yes
IM injection: Yes
Subcut injection: Yes

- **Compatible/incompatible IV drugs/fluids:**
  Consult the Australian Injectable Drugs Handbook (‘Yellow book’) in your ward area. **Assume all unlisted drugs and IV fluids are incompatible** – contact Pharmacy for further advice.

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**MONITORING (INCLUDING BLOOD TESTS)**

- **Central nervous system toxicity** – may occur, look for early signs and symptoms of restlessness, anxiety, tinnitus, dizziness, blurred vision, tremors or drowsiness.

- Baseline 12 lead ECG, urea and electrolytes, calcium, magnesium and LFTs. Repeat as determined by clinical status of the patient.

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**NURSING PRACTICE POINTS**

- Continuous ECG monitoring during infusion.

- Monitor patient for central nervous system toxicity (see Monitoring) and notify Medical Officer if any signs or symptoms are detected.

- Blood tests as ordered by the Medical Officer.

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**ADVERSE EFFECTS**

- **Proarrhythmic effect** – as with all antiarrhythmics, lignocaine has the potential to worsen arrhythmia or provoke a new arrhythmia.

- Adverse effects are dose-related and are more frequent at infusion rates of 3 mg/minute or more.

- **Common** - headache, dizziness, drowsiness, confusion, visual disturbances, tinnitus, tremor, paraesthesia.

- **Infrequent** - hypotension, bradycardia, arrhythmias, cardiac arrest, muscle twitching, seizures, coma, respiratory depression.

- **Rare** - allergy (e.g. urticaria, rash, anaphylactoid reaction), methaemoglobinaemia.

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**DRUG PRESENTATIONS, LOCATION AND STORAGE**

Lignocaine 100 mg/5 mL (2%) ampoules.
Lignocaine 500 mg/5 mL (10%) ampoules.

Imprest locations (at the time of guideline development):
Lignocaine 100 mg/5 mL: CCU, ED, Theatre, 5N, DPU, AAU ECT suite, Radiology and Ultrasound.
Lignocaine 500 mg/5 mL (10%): CCU, ED and Theatre.

Store below 25°C.