Ballarat Health Services

DRUG GUIDELINE

LIGNOCAINE (LIDOCAINE) - Intravenous and endotracheal (Cardiac)

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

BRAND NAME

Lignocaine hydrochloride.
Xylocard®.
Xylocaine®.
Lignocaine is in the process of changing names to lidocaine.

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 90-120 minutes (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). The half-life may be prolonged in liver failure or cardiac failure. 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 anaesthetics.**

PRECAUTIONS

- **Hypovolaemia, bradycardia, hypoxia, acid-base disturbances, cardiogenic shock or electrolyte disturbances (particularly hypokalaemia or 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) or repeated IV doses.
- **Severe hepatic impairment or reduced hepatic blood flow (e.g. heart failure)** – lignocaine may accumulate, consider halving dose during prolonged infusion (>24 hours) or repeated IV doses.

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, cimetidine, clarithromycin, cobicistat, darunavir, dasabuvir, fluvoxamine, fusidic acid, idelalisib, indinavir, itraconazole, ketoconazole (systemic), lopinavir, metoprolol (IV only), mifepristone, nefazodone, ombitasvir, paritaprevir, posaconazole, propranolol (IV only), ritonavir, saquinavir, vemurafenib, voriconazole.
  - **Monitor carefully and reduce lignocaine dose if necessary** - abiraterone, amiodarone, aprepitant, beta-blockers, ceritinib, ciprofloxacin (systemic), clofazimine, crizotinib, dasatinib, diltiazem, erythromycin, fluconazole, fosamprenavir, fosaprepitant, grapefruit juice, imatinib, letermovir, methoxsalen, mexiletine, netupitant, nilotinib, palbociclib, peginterferon alpha-2b, ribociclib, tocilizumab, verapamil.
- **Drugs that may decrease the concentration of lignocaine leading to treatment failure:**
  - **Avoid concomitant use where possible**.- carbamazepine, dabrafenib, enzalutamide, lumacaftor, phenobarbitone, phenytoin, primidone, rifampicin, St John's wort.
  - **Monitor carefully** – bosentan, cigarette smoking, cyproterone, etravirine, leflunomide, modafinil, rifabutin.

- **Lacosamide** – lignocaine may increase toxicity (specifically risk of bradycardia, ventricular tachyarrhythmias, prolonged PR interval).
- **Nitric oxide (inhaled), glyceryl trinitrate, dapsone (topical), tetracaine (topical) -** increased risk of methaemoglobinaemia with lignocaine.
- **Suxamethonium** – high dose lignocaine may prolong the effect of suxamethonium. It is possible this effect may occur with other neuromuscular blockers
- **Deferasirox, efavirenz –** may increase or decrease the concentration of lignocaine.

DOSAGE AND ADMINISTRATION

Requires continuous ECG monitoring.
Avoid administration on lines where other infusions may be bolused or flushed.
For administration only

- **in Intensive Care Unit, Coronary Care Unit, ED or Theatre**
- **by MET or Code Blue**

IV loading dose and resuscitation dose:
Use lignocaine 100 mg/5 mL (2%) ampoules.
Lignocaine 1 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 (2%) 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 (10%) 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 30 minutes (*see below* for LVEF <30*), then
3 mg/min (36 mL/hr) for 60 minutes, then
2 mg/min (24 mL/hr) for a further 5 hours.
Extended infusion beyond this may be required, however duration should not normally exceed 24 hours due to the risk of toxicity.
If infusion is to extend beyond 24 hours reduce infusion to 1 mg/min (12 mL/hr).
**In patients with a left ventricular ejection fraction below 30% start infusion at 2 mg/min (24 mL/hr) and reduce rate to 1 mg/min (12 mL/hr) at 12 hours.*
Maximum rate: 4 mg/min (48 mL/hr).

Monitor patient for any signs of lignocaine toxicity (see Monitoring below). If toxicity occurs, pause infusion and seek immediate Medical advice. See 'CPP0504 – Lignocaine' re management of lignocaine toxicity, including lipid therapy if required.

Syringe Unit/Pump IV infusion (after loading dose):
Use lignocaine 500 mg/5 mL (10%) 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:** Alaris LVP or syringe unit with Guardrails® or ED syringe 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.**

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. Worsening toxicity may lead to perioral numbness, hypertension, slurred speech, visual or auditory hallucinations, disassociation, muscle twitching, hypotension, paraesthesia, convulsions, coma, respiratory arrest, circulatory collapse or death.
- Baseline 12 lead ECG, urea and electrolytes, calcium, magnesium and LFTs. Repeat as determined by clinical status of the patient.

NURSING PRACTICE POINTS

- Continuous ECG monitoring during infusion.
- Monitor patient for central nervous system toxicity (see Monitoring) – pause infusion and notify Medical Officer immediately if any signs or symptoms are detected.
- Blood tests as ordered by the Medical Officer.
- All injections, infusions and lines are to be labelled as per CPP0022 Labelling of Injectable Medicines and Lines.

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.

DRUG PRESENTATIONS AND STORAGE

Lignocaine 100 mg/5 mL (2%) ampoules.
Lignocaine 500 mg/5 mL (10%) ampoules.
Store below 25°C.
