DRUG GUIDELINE

HYDRALAZINE
(Intravenous – severe hypertension in pregnancy)

SCOPE (Area): FOR USE IN: Labour Ward, HDU, Theatre and ED
EXCLUSIONS: Paediatrics (seek Paediatrician advice) and other general wards.
SCOPE (Staff): Medical, Nursing and Pharmacy

This Drug Guideline must be used in conjunction with “Hypertension in Pregnancy” Clinical Practice Guidelines - see Related Documents.

BRAND NAMES
Apresoline®.

PHarmacology AND PHARMACOkINETICS

Hydralazine is a peripheral vasodilator that causes relaxation predominantly of arteriolar smooth muscle, resulting in a lowering of blood pressure (diastolic greater than systolic). This fall in blood pressure is compensated for by the sympathetic nervous system leading to a reflex tachycardia, increase in stroke volume and cardiac output. Splanchnic, cerebral, coronary and renal blood flow increase unless hypotension from hydralazine is very marked. Hydralazine can lead to sodium and fluid retention, producing oedema and reduced urinary volume. Administered IV, hydralazine has an onset of action of 10-20 minutes, peak effect at 20-80 minutes and a duration of action of 1-4 hours. Hydralazine is predominantly metabolised by the liver, with active metabolites excreted by the kidney. Generally the elimination half life is 2-3 hours, however it may be prolonged in patients with renal impairment (as long as 16 hours in patients with CrCl less than 20 mL/min).

Hydralazine is second line management for severe hypertension in pregnancy, and reserved for women in whom labetalol is contraindicated or not adequately controlling blood pressure.

INDICATIONS
- Second line drug therapy to lower severely elevated blood pressure of pregnancy, defined as:
  - Systolic BP greater than 160 mmHg and/or
  - Diastolic BP greater than 110 mmHg
Obtained on two readings 10 minutes apart (BP taken manually with appropriate size cuff)
Hydralazine is the drug of choice for women with asthma or congestive cardiac failure.

CONTRAINDICATIONS
- Idiopathic systemic lupus erythematosus.
- Allergy to hydralazine.
- See MIMS for others.
PRECAUTIONS

- See MIMS.

PREGNANCY AND BREASTFEEDING

Pregnancy – listed as ADEC (Australian Drug Evaluation Committee) Category C, may be used with caution but has been associated with fetal distress and fetal cardiac arrhythmias (especially with large IV boluses). Use in pregnancy reserved for severe hypertension of pregnancy.

Breastfeeding – excreted in small amounts into breastmilk, generally safe to use but monitor infant for possible adverse effects (hypotension, bradycardia and fatigue).

Seek specialist advice for further information.

DRUG INTERACTIONS

- See MIMS.

DOSAGE AND ADMINISTRATION

One to one nursing or midwifery care is required during administration of IV hydralazine (injection or infusion), and for 24 hours (or longer if indicated by the Lead Obstetrician) following the end of the last dose of IV hydralazine (injection or infusion). This nursing care may be provided in Labour Ward, HDU, ED or Theatre as determined by the Lead Obstetrician depending on the clinical condition of the patient.

Patients who have received hydralazine IV injection may require admission to HDU (discussion between the Lead Obstetrician and Anaesthetist is required to assess clinical condition). Patients receiving hydralazine IV infusion may be transferred to HDU as soon as practical i.e. the patient is stable and where appropriate the baby has been delivered. Where transfer to HDU is planned post or during IV hydralazine administration, the Lead Obstetrician or senior Obstetric Registrar and a Midwife must remain with the patient until transfer occurs.

For administration only in

- HDU, Labour Ward, ED or Theatre (injection or infusion)

Bolus injection only to be administered by

- Obstetrician or Senior Obstetric Registrar
- ICU Consultant or Registrar
- Anaesthetic Consultant or Registrar after consultation with Consultant
- Nursing and midwifery staff under the direct supervision of the Medical staff listed above

Medical staff must remain present in the room for the duration of IV injection administration and stabilisation of the woman having an IV infusion.

Fluid loading is important when managing severe hypertension. 300-500 mL of sodium chloride 0.9% may be administered under the supervision of the senior clinician prior to commencing hydralazine.

The goal for reduction of severely elevated blood pressure is to achieve and maintain a blood pressure of 140/90 mmHg. Blood pressure should be continuously monitored and reduced gradually to avoid adverse fetal side effects from rapid decrease in uteroplacental
perfusion.

Administer via CVC, midline or peripheral line. Use a dedicated line for infusion.

Note: Co-administration with labetalol, nifedipine or magnesium sulfate can result in an enhanced hypotensive effect, monitor carefully.

Incompatible with glucose 5%. Prolonged contact with metal (e.g. filters, needles) may result in discoloured (yellow or pink) solutions – prepare just prior to use.

**Reconstitution:**
Reconstitute each 20 mg ampoule with 1 mL water for injection and mix until dissolved, this gives a 20 mg/mL solution.

**IV injection (via CVC, midline or peripheral vein):**
**Only to be administered in HDU/Labour Ward/ED/Theatre by staff listed in box above**
Reconstitute ONE ampoule, and draw hydralazine 20 mg (1 mL of reconstituted solution) into a 20 mL syringe. Dilute to 20 mL with sodium chloride 0.9% to give a 1 mg/mL solution. Ensure mixed adequately.

**Dose:** Hydralazine 5 mg (5 mL of diluted solution) over 5 minutes (first dose may be given as a test dose of 1 mg (1 mL) over 1 minute, then wait 10-15 mins then give remaining 4 mg over 4 minutes)
Dose can be repeated every 20 minutes for unresponsive blood pressure, to a maximum of 4 doses in total.
If 4 doses are required over 80 minutes an IV infusion should be considered.
**Maximum total injection dose:** 20 mg (20 mL of diluted solution).
**Target blood pressure:** 140/90 mmHg, see box above.

**IV infusion (via CVC, midline or peripheral vein):**
**Only for administration in HDU/Labour Ward/ED/Theatre, by staff listed in box above**
Reconstitute THREE ampoules, and draw hydralazine 60 mg (3 mL of reconstituted solution) into a 60 mL luer lock syringe. Dilute to 60 mL with sodium chloride 0.9% to give a 1 mg/mL solution. Ensure mixed adequately.

**Total Volume:** 60 mL.
**Final concentration:** 1 mg/mL
**Starting Rate:** 2 mg/hr (2 mL/hr)
**Rate increase:** For unresponsive blood pressure, infusion may be increased by 2 mg/hr (2 mL/hr) every 10 minutes. Titrate to blood pressure response.
**Usual rate:** 1-5 mg/hr (1-5 mL/hr).
**Maximum rate:** 10 mg/hr (10 mL/hr).
**Weaning rate:** Decrease by 2 mg/hr (2 mL/hr) every 10 minutes. Weaning of the infusion will be done under direction of the lead clinician and will usually occur post delivery.
**Target blood pressure:** 140/90 mmHg, see box above.

**General Administration Information**
- **Infusion preparation:**
  Incompatible with glucose 5%. Prolonged contact with metal (e.g. filters, needles) may result in discoloured (yellow or pink) solutions – prepare injection just prior to use. Reconstituted hydralazine solution may change colour when diluted further, this is not thought to indicate a loss of potency. Mix infusion thoroughly after adding hydralazine to avoid inadvertently giving a more concentrated dose.
  Discard any remaining infusion after 24 hours.
- **Infusion pump:** Alaris® PC unit with syringe module utilising Guardrails®.
- **Routes of administration:**
  - IV injection: Yes (inject slowly)
  - IV intermittent infusion: No
  - IV continuous infusion: Yes
  - IM injection: No
  - Subcut injection: No
- **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)**

- The prescribing Medical Officer must set clear blood pressure and heart rate parameters for Nursing Staff to follow.
- No blood tests are required specific to hydralazine administration.

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**NURSING PRACTICE POINTS**

- **One to one nursing care required**
- Measure supine blood pressure prior to administration by IV injection or infusion. Patients should be kept in the supine position (with lateral tilt) during administration of hydralazine, and for 3 hours after hydralazine was last administered to prevent postural hypotension.
- Strict fluid balance monitoring should occur with accurate documentation under the supervision of the senior clinician. Hydralazine can lead to sodium and water retention producing oedema and reduced urinary volume. Monitor urine output hourly.
- Cardiotocographic (CTG) monitoring – ensure monitoring commences before the administration of hydralazine, and remains insitu until delivery, or as directed by the senior clinician. The record must be signed by the senior clinician and attached to the medical history.
- Observe for other clinical features of Pre-eclampsia (CPP0019 Hypertension in Pregnancy – Pre-eclampsia) and Eclampsia (CPP0037 Hypertension in Pregnancy – Eclampsia).
- Blood pressure, heart rate and SpO2 requires close monitoring as outlined in the table below, with results outside parameters set by the prescribing Medical Officer to be reported. Record results on the Midwifery Frequent Observations Chart MR/571.0.
- If rapid drop in blood pressure occurs the woman must be placed in the left lateral position, oxygen given via mask and a fluid bolus administered.

<table>
<thead>
<tr>
<th>Hydralazine IV Observations Summary Table</th>
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<tbody>
<tr>
<td><strong>IV injection</strong> (Time from most recent dose)</td>
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<tr>
<td>0-15min</td>
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<td>15min-1hr</td>
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<td>Table</td>
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<tr>
<td><strong>1 hr - BP stable and acceptable according to Medical Officer</strong></td>
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<tr>
<td><strong>Once BP stable - 24 hrs from last injection</strong></td>
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<tr>
<td><strong>IV infusion</strong></td>
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| **At start of infusion and during rate change** | 15 minutely blood pressure and heart rate, unless otherwise determined by Medical Officer.  
Heart rate and SpO2 monitoring must be continuous during administration and recorded with other vital signs. |
| **During infusion once blood pressure stable** | 30 minutely blood pressure and heart rate, unless otherwise determined by Medical Officer.  
Heart rate and SpO2 monitoring must be continuous during administration and recorded with other vital signs. |
| **For 24 hours after infusion ceased** | Hourly blood pressure and heart rate, unless otherwise determined by Medical Officer. |

**ADVERSE EFFECTS**

- **Common** - flushing, headache, dizziness, tachycardia, palpitations, oedema (sodium and water retention).
- **Infrequent** - angina, nasal congestion, lupus-like syndrome (fever, arthralgia, myalgia and malaise).
- **Rare** – blood dyscrasia, rash, paraesthesia.

**DRUG PRESENTATIONS, LOCATION AND STORAGE**

- Hydralazine 20 mg dry powder ampoule.
- Imprest locations (at the time of guideline development): 5N, CCU, ED, Theatre.
- Store below 25 degrees. Do not refrigerate or freeze. Protect ampoules from light.