Ballarat Health Services

DRUG GUIDELINE

HYDRALAZINE
(Intravenous – severe hypertension in pregnancy)

SCOPE (Area): **FOR USE IN:** Labour Ward, ICU, Theatre and ED
EXCLUSIONS: Paediatrics, Coronary Care Unit and other general wards.
SCOPE (Staff): Medical, Nursing and Pharmacy

This Drug Guideline must be used in conjunction with 'Hypertension Disorders in Pre-eclampsia/Eclampsia' Clinical Practice Protocol - 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. When administered by IV bolus, hydralazine has an onset of action of 5-20 minutes, peak effect at 10-80 minutes and a duration of action of 2-6 hours. Hydralazine is predominantly metabolised by the liver, with active metabolites excreted by the kidney. Generally, the elimination half life is 2-4 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 or related diseases.**
- **Dissecting aortic aneurysm, severe tachycardia and heart failure with high cardiac output (eg hyperthyroidism), heart failure due to mechanical obstruction (eg aortic stenosis) or cor pulmonale.**
- **Porphyria.**
- **Allergy to hydralazine.**

PRECAUTIONS

- **Renal impairment** – may require dose reduction.
- **Hepatic impairment** – may require dose reduction.
- **Angina -** may be exacerbated by reflex tachycardia.
- **Post myocardial infarction –** avoid until condition has stabilised.
- **Coronary artery disease -** may be worsened by excessive drop in blood pressure.
- **Cerebral artery disease -** may be worsened by excessive drop in blood pressure.

PREGNANCY AND BREASTFEEDING

Pregnancy – listed as ADEC (Australian Drug Evaluation Committee) Category C, may be used with caution but has been associated with both maternal side effects, such as hypotension, palpitation and maternal tachycardia and foetal side effects such as acute foetal distress and low Apgar scores at 1 minute. Neonatal thrombocytopenia following maternal use of hydralazine has also been reported in three infants. If hydralazine is the medicine of choice, use the lowest effective dose and closely monitor maternal and foetal wellbeing.

Breastfeeding – small amounts are excreted into breast milk, but serious harmful effects have not been found in breastfed infants. If hydralazine is the medicine of choice, observe the breastfed infant for potential adverse effects, such as drowsiness, hypotension, flushing and weakness.

Seek specialist advice for further information.

DRUG INTERACTIONS

- **Drugs that cause hypotension -** additive effect expected, use with caution.
- **Drugs that cause tachycardia -** additive effect expected, use with caution.
- **NSAIDs** – may diminish the antihypertensive effect of hydralazine, do not use.

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, ICU, 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 ICU (discussion between the Lead Obstetrician and Anaesthetist is required to assess clinical condition). Patients receiving hydralazine IV infusion may be transferred to ICU as soon as practical i.e. the patient is stable and where appropriate the baby has been delivered. Where transfer to ICU 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

- **ICU, 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.

Most patients will require a maintenance infusion of 80 mL/hr compound sodium lactate (Hartmanns). Fluid boluses are no longer given routinely prior to the administration of blood pressure lowering agents due to the risk of complications such as pulmonary oedema. A 250 mL bolus may be given to treat sudden hypotension. The Obstetrician will determine all decisions regarding fluid management.

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 foetal 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 may result in an enhanced hypotensive effect, monitor carefully.

Incompatible with glucose containing solutions.

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 ICU/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.
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 (total 20 mg), 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 ICU/Labour Ward/ED/Theatre, by staff listed in box above

Reconstitute TWO ampoules, and draw hydralazine 40 mg (2 mL of reconstituted solution) into a 50 mL luer lock syringe. Dilute to 40 mL with sodium chloride 0.9% to give a 1 mg/mL solution. Ensure mixed adequately.

Total Volume: 40 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 containing solutions. Solution is clear and yellowish green. 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.

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.

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 and Eclampsia *(see CPP0119 Hypertension Disorders in Pregnancy – Pre-eclampsia/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. Reflex tachycardia may occur with hydralazine.
- 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.

Hydralazine IV Variable Maternal Observations Summary Table	
IV injection (Time from most recent dose)	**Observations**
0-15 min	▪ Blood pressure, heart rate, and SpO2 to be recorded immediately before and after administration of each dose. ▪ Heart rate and SpO2 monitoring must be continuous during administration and recorded with other vital signs. ▪ Repeat blood pressure at 5 mins and 10 mins post IV injection.
15 min-1 hr	▪ If vital signs are stable, monitor blood pressure, heart rate and SpO2 15 minutely. ▪ If unstable, the prescribing Medical Officer will determine the level of monitoring required.
1 hr - BP stable and acceptable according to Medical Officer	▪ 30 minutely blood pressure, heart rate and Sp02 unless otherwise determined by Medical Officer.
Once BP stable - 24 hrs from last injection	▪ Hourly blood pressure, heart rate and SpO2 unless otherwise determined by Medical Officer.
IV infusion	**Observations**
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, heart rate and SpO2 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 AND STORAGE

- Hydralazine 20 mg dry powder ampoule.
- Store below 25 degrees. Do not refrigerate or freeze. Protect ampoules from light.
