Specialised Medication – Intravenous Glyceryl Trinitrate for ADULTS in Critical Care Areas Guideline

1. Purpose

This document provides guidance for the prescribing and administration of glyceryl trinitrate for **adult** patients via the intravenous route for use within **Critical Care Areas only**.

2. Guideline [1]

Organic nitrate; promotes relaxation of vascular smooth muscle, producing dose-related dilation of both arterial and venous beds. Venous dilation predominates, promoting pooling of blood in the peripheries and decreasing venous return to the heart.

2.1 Presentation [2,3]

50 mg in 10 mL ampoule

2.2 Indication [1,2,3,4]

- Recurrent pain in acute coronary syndromes.
- Treatment of hypertension and myocardial ischaemia associated with use of sympathomimetic or catecholamine medicines.
- Treatment of acute cardiogenic pulmonary oedema.
- Blood pressure reduction in hypertensive emergencies.
- Congestive heart failure associated with acute myocardial infarction.
- Blood pressure control in perioperative hypertension.
- Production of controlled hypotension during neurosurgical or orthopaedic surgical procedures.

Note: Glyceryl trinitrate infusions can be used to manage hypertension in patients with an ischaemic stroke. This guideline is not suitable for this indication – seek specialist advice from the appropriate tertiary facility.

2.3 Contraindications [2,3]

- Hypersensitivity to glyceryl trinitrate, organic nitrates or any component of the product.
- Hypotension or uncorrected hypovolaemia.
- Increased intracranial pressure.
- Severe anaemia and arterial hypoxaemia.
- Constrictive pericarditis and pericardial tamponade.
- Concomitant use with phosphodiesterase-5 inhibitors (see drug interactions).
- As a supplementary medication for obstructive cardiomyopathy, especially if it is associated with aortic or mitral stenosis.

2.4 Precautions [2,3,8]

Pregnancy – safety is not established. Category B2. Consultation with KEMH should be considered for pregnant patients.

Right ventricular myocardial infarction – vasodilation and resultant reduction in pre-load can lead to significant hypotension.

2.5 Drug Interactions [2]

- Phosphodiesterase-5 inhibitors including sildenafil, vardenafil and tadalafil - risk of profound hypotension. Combination contraindicated.
- Heparin – concomitant administration may lead to a decreased anticoagulant effect followed by a rebound effect when glyceryl trinitrate is discontinued. Careful monitoring of aPTT (activated partial thromboplastin time) and heparin dose adjustment is recommended.
- Any medication that can reduce blood pressure will have an additive effect.

2.6 Dosage / administration [1,5,6,7]

Peripheral or Central Line use via an Infusion Pump

NOT FOR DIRECT INJECTION – MUST BE DILUTED BEFORE USE.

When given via an infusion pump, glyceryl trinitrate is to be added to glucose 5 % **glass or PVC free** bottles (e.g. EcoFlac® plus, Freeflex®, Via Flo®) and infused with a low sorbing, polyethylene lined PVC giving set (if available) to reduce loss due to adsorption to PVC giving sets (up to 80 % loss).

1. Withdraw and discard 10 mL from a 100 mL glucose 5 % **glass or PVC free** bottle.
2. Add 50 mg of glyceryl trinitrate to the remaining 90 mL glucose 5 %.
3. Invert the bottle several times to ensure uniform dilution of glyceryl trinitrate.
4. Infuse via rate-controlled infusion pump at an initial rate of 25 micrograms/**minute** (= 3mL/hour).
5. Increase by 2 mL/hour every 5-10 minutes according to response.
6. Dose should be titrated against patient's tolerance and therapeutic response (total pain relief, symptom reduction or resolution) rather than to a precise dose. Reduce the infusion rate by 3 mL/hour if the systolic blood pressure falls below 95 mmHg.
   Note: If blood pressure (BP) continues to fall after decreasing the rate, further down titration or cessation may be necessary (see monitoring requirements).
7. Wean the infusion as prescribed by the medical officer. Infusions that have been running for more than 24 hours should not be abruptly ceased.

Dosage table for glyceryl trinitrate 50 mg in **100 mL** glucose 5 %						
micrograms/minute	25	50	75	100	150	200
mL/hour	3	6	9	12	18	24

Central Line use via Syringe Driver

NOT FOR DIRECT INJECTION – MUST BE DILUTED BEFORE USE.

When given via a syringe driver, glyceryl trinitrate should be infused with a low sorbing, polyethylene lined PVC giving set (if available) to reduce loss due to adsorption to PVC giving sets (up to 80 % loss).

1. Draw up 50 mg of glyceryl trinitrate from the ampoule, then dilute to 50 mL with glucose 5 % or sodium chloride 0.9 %.
2. Invert the syringe several times to ensure uniform dilution of glyceryl trinitrate.
3. Infuse via a rate-controlled syringe driver at an initial rate of 25 microgram/ minute (=1.5 mL/hour)
4. Increase by 1 mL/hour every 5-10 minutes according to response
5. Dose should be titrated against patient's tolerance and therapeutic response (total pain relief, symptom reduction or resolution) rather than to a precise dose. Reduce the infusion rate by 1.5 mL/hour if the systolic blood pressure falls below 95 mmHg.
   Note: If BP continues to fall after decreasing the rate, further down titration or cessation may be necessary (see monitoring requirements).
6. Wean the infusion as prescribed by the medical officer. Infusions that have been running for more than 24 hours should not be abruptly ceased.

Dosage table for glyceryl trinitrate 50 mg in **50 mL** glucose 5% or sodium chloride 0.9%						
micrograms/minute	25	50	75	100	150	200
mL/hour	1.5	3	4.5	6	9	12

2.7 Expiry [6,7]

Prepared infusion: 24 hours below 25 degrees C in glass or PVC free bottle.

2.8 Common adverse effects [2,3]

Hypotension, headache, reflex tachycardia, nausea, vomiting, dizziness.

2.9 Monitoring requirements [1,5]

Baseline
- Pulse, blood pressure (BP), respiratory rate, peripheral oxygen saturations.
- Central venous pressure if clinically indicated.
- Pulmonary systemic pressure and pulmonary artery wedge pressure (PAWP) if pulmonary artery catheter is in situ.

Inform the Medical Officer prior to commencing the infusion if:
1. mean arterial pressure (MAP) < 65 mmHg, systolic BP < 100 mmHg and/or 20 mmHg or more below patient's baseline (or as per modifications to MR140A WACHS Adult Observation and Response Chart (A-ORC))
2. heart rate < 50 beats per minute (bpm) or >120 bpm (or as per modifications to A-ORC)
3. impaired conscious state
4. patient feeling dizzy/faint.

Observations during commencement of glyceryl trinitrate infusion:
- every 5 minutes until titrated to final rate
- then every 15 minutes for 1 hour and when required as determined by titration parameters
- then 2 hourly unless patient's clinical condition indicates more frequent observations.

Note: This regimen should be followed for any alteration in the rate of administration of the infusion.

Inform the medical officer if:
1. heart rate is <50 bpm, >120 bpm, or +/- 30 bpm of the pre-infusion pulse rate (or as per modifications to A-ORC)
2. MAP < 65 mmHg, systolic BP < 100mmHg and/or 20 mmHg or more below patient's baseline (or as per modifications to A-ORC)
3. the patient's symptoms remain unresolved.

3. Roles and Responsibilities

The **Medical Officer** is to complete all treatment and duties within scope of practice.

The **Registered Nurse** is to complete all nursing duties for the patient within scope of practice including escalation of care as per the MR140A WACHS Adult Observation and Response chart (A-ORC).

4. Monitoring and Evaluation

4.1 Monitoring

Managers of clinical areas, health sites and services are responsible for monitoring compliance with this guideline.

Any variance from this guideline should be under the guidance of a senior medical practitioner and reported by the nurse manager to the Regional Drugs and Therapeutics Committee. This will prompt a review of the guideline.

4.2 Evaluation

Adverse events and clinical incidents relating to the prescribing and administration of this medicine are to be reported and managed as per the WACHS Medication Prescribing and Administration Policy.

5. Compliance

Guidelines are designed to provide staff with evidence-based recommendations to support appropriate actions in specific settings and circumstances. As such, WACHS guidelines should be followed in the first instance. In the clinical context, where a patient's management should vary from an endorsed WACHS guideline, this variation and the clinical opinion as to reasons for variation must be documented in accordance with the Documentation Clinical Practice Standard.

WACHS staff are reminded that compliance with all policies and procedures is mandatory.

6. References

1. Fiona Stanley Fremantle Hospital Group. Specialised Drug Administration Guideline: Glyceryl trinitrate (GTN) infusion.[HealthPoint] 2021 June [cited 20 Sep 2022]. Available from: https://healthpoint.hdwa.health.wa.gov.au/policies/FSH%20Policies/FSFHG%20Specialised%20Drug%20Guideline%20-%20Glyceryl%20trinitrate%20(GTN)%20infusion.pdf.
2. MIMS Online [Internet] DBL Glyceryl Trinitrate Concentrated Injection Product Information 2000 [cited 20 Sep 2022]. Available from: https://www-mimsonline-com-au.wachslibresources.health.wa.gov.au/Search/Search.aspx
3. Australian Medicines Handbook [Internet]. Glyceryl trinitrate. Modified 2022 July [20 Sep 2022] Available from: https://login.wachslibresources.health.wa.gov.au/login?url=http://www.amh.net.au/online/iplogin.php.
4. Therapeutic Guidelines [Internet]. Glyceryl Trinitrate – Indications for use. [cited 20 Sep 2022] Available from: https://tgldcdp-tg-org-au.wachslibresources.health.wa.gov.au/etgAccess.
5. Royal Flying Doctors Service (RFDS). Clinical Manual Part 2: Drug Infusion Guidelines: Glyceryl Trinitrate Infusion. 2018 August [cited 20 Sep 2022] p. 12-13. Available from: https://healthpoint.hdwa.health.wa.gov.au/policies/Policies/WACHS/Royal%20Flying%20Doctor%20Service%20(RFDS)%20Clinical%20Manuals%20-%20EUCP%20Policy.pdf.
6. SHPA. Australian Injectable Drugs Handbook 8th Edition. 2022 August . Available from: https://aidh-hcn-com-au.wachslibresources.health.wa.gov.au/browse/about_aidh.
7. Trissel L. Handbook on Injectable Drugs 15th Edition. 2009
8. Up-To-Date [Internet]. Right Ventricular Myocardial Infarction. 2022 August [cited 20 Sep 2022]. Available from: https://www-uptodate-com.wachslibresources.health.wa.gov.au/contents/search.

7. Definitions

Term	Definition
Critical Care Areas	Includes Emergency Departments, Intensive Care Units, High Dependency Units and Theatre Departments where monitoring capabilities meet those specified in 2.9

8. Document summary

Coverage	WACHS wide
Audience	Clinical Staff in critical care areas
Records Management	Clinical: Health Record Management Policy
Related Legislation	*Medicines and Poisons Act 2014* (WA) Medicines and Poisons Regulations 2016 (WA)
Related Mandatory Policies / Frameworks	Clinical Governance, Safety and Quality Framework
Related WACHS Policy Documents	Medication Prescribing and Administration Policy Documentation Clinical Practice Standard
Other Related Documents	Nil
Related Forms	MR170A Adult Observation and Response Chart (A-ORC)
Related Training Packages	Nil
Aboriginal Health Impact Statement Declaration (ISD)	ISD Record ID: 1790
National Safety and Quality Health Service (NSQHS) Standards	1.27, 4.13, 4.14, 4.15
Aged Care Quality Agency Accreditation Standards	Nil
National Standards for Mental Health	Nil

9. Document Control

Version	Published date	Current from	Summary of changes
2.00	21 Dec 2021	21 Dec 2021	
3.00	22 Dec 2022	22 Dec 2022	Desktop Review Commencing infusion rates changed from 25-50 micrograms/min to 25 micrograms/min.

10. Approval

Policy Owner	Executive Director Clinical Excellence
Co-approver	Executive Director Nursing & Midwifery
Contact	WACHS Chief Pharmacist
Business Unit	Pharmacy
EDRMS #	ED-CO-14-46386

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