



Applicable area: **ICU**

These guidelines are intended for and to be used only by experienced critical care staff under direct supervision of HNELHN Intensive Care Specialists in designated HNE Intensive Care Area Clinical Stream units. The authors are not responsible for inappropriate use of these guidelines

ADULT	Insulin IV as an Inotrope in Beta- or Calcium Channel-Blocker Overdose																																	
Authorised prescribers	ICU medical officers under direction from Intensivists or Toxicologists.																																	
Indication for use¹⁻³	Beta- or calcium channel- blocker overdose																																	
Background¹⁻³	<ul style="list-style-type: none"> In the unstressed, aerobic state, the myocardium relies primarily on Free Fatty Acids (FFAs) for mechanical energy. During shock, substrate preference shifts from FFAs to carbohydrate oxidation. At the same time shock is associated with inhibition of insulin release, insulin resistance, poor tissue perfusion and impaired glycolysis and carbohydrate delivery. This results in either systemic hyperglycaemia or poor utilisation of glucose and inefficient myocardial energy transfer. Beta-blockers and calcium channel blockers in overdose produce shock with decreased tissue perfusion, decreased insulin release and exacerbate insulin resistance. Insulin-euglycaemia therapy seeks to address these basic metabolic defects by supplying adequate amounts of substrate (glucose) combined with sufficient amounts of insulin to overcome insulin resistance. 																																	
Dosage¹⁻³	<p>Neutral insulin (Actrapid®) Based on Actual Body Weight</p> <p>Loading Dose</p> <ul style="list-style-type: none"> 1 Unit/kg IV bolus stat Give with 25 mL IV bolus of 50% glucose stat <p>Maintenance Dose - Titrate in consultation with Toxicologist</p> <ul style="list-style-type: none"> 0.5 Units/kg/h up to 10 Units/kg/h Give with 5% glucose at 1 mL/kg/h If required, add IV bolus doses of 25 – 50 mL 50% glucose PRN to maintain blood sugar between 5.5 and 11.0 mmol/L. 																																	
Duration of therapy¹	Until shock resolves																																	
Prescription (for 70 kg pt)	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">Date</td> <td style="width: 55%;">Medication (Print Generic Name)</td> <td style="width: 15%;">Date</td> <td style="width: 15%;"></td> </tr> <tr> <td>18/10</td> <td>Actrapid® 500 Units up to 50 mL Sod. Chloride 0.9%</td> <td></td> <td></td> </tr> <tr> <td>Route</td> <td>Dose & Hourly Frequency</td> <td>PRN</td> <td>Max dose/24 hrs</td> </tr> <tr> <td>IV</td> <td>3.5 – 70 mL / hour for 70 kg</td> <td></td> <td></td> </tr> <tr> <td colspan="2">Indication</td> <td>Pharmacy</td> <td>Dose</td> </tr> <tr> <td colspan="2">Aim BSL 5.5 to 11. See guideline</td> <td></td> <td>Route</td> </tr> <tr> <td>Prescriber Signature</td> <td>Print Name</td> <td>Contact</td> <td>Sign</td> </tr> <tr> <td><i>A. Doctor</i></td> <td></td> <td></td> <td></td> </tr> </table>		Date	Medication (Print Generic Name)	Date		18/10	Actrapid® 500 Units up to 50 mL Sod. Chloride 0.9%			Route	Dose & Hourly Frequency	PRN	Max dose/24 hrs	IV	3.5 – 70 mL / hour for 70 kg			Indication		Pharmacy	Dose	Aim BSL 5.5 to 11. See guideline			Route	Prescriber Signature	Print Name	Contact	Sign	<i>A. Doctor</i>			
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Preparation and administration	IV continuous infusion: Central or Peripheral Venous Line Dilute neutral insulin (Actrapid®) 500 Units up to 50 mL in 0.9% sodium chloride. If required, increase concentration up to 2000 Units in 50 mL 0.9% sodium chloride																																	
Compatibilities	See Australian Injectable Drugs Handbook via CIAP or hard copy on the ward																																	
Monitoring requirements	BSL every 30 min until 6 hours post cessation of insulin infusion Potassium levels (ABG) every 4 hours with replacement when K < 3.0 mmol/L																																	
Management of complications	It is common for the patient to require the glucose infusion for some hours after the insulin infusion is ceased																																	

Basis of guideline	<ol style="list-style-type: none"> 1. HyperTox online (http://curriculum.toxicology.wikispaces.net/Insulin-Euglycaemia) 2. Shephard G. Treatment of poisoning caused by β-adrenergic and calcium channel blockers. <i>Am J Health-Syst Pharm</i> 2006; 63: 1828 – 35. 3. Green S, Gawarammana I, Wood D, et al. Relative safety of hyperinsulinaemia/euglycaemia therapy in the management of calcium channel blocker overdose: a prospective observational study. <i>Intensive Care Med</i> 2007; 33: 2019 – 2024.
Groups consulted	Staff specialists, medical trainees, senior nursing and pharmacists (or relevant directors of pharmacy) of the Intensive Care Area Clinical Stream
Keywords	HNE Intensive Care Area Clinical Stream, ICU, insulin, beta blocker, calcium channel blocker, overdose, prescribing guideline

AUTHORISATION		
Author	Dr Katrina Ellem	Reviewer: Prof Ian Whyte
Position	Medical Director	Director
Department	Intensive Care Unit Calvary Mater Newcastle	Clinical Toxicology and Pharmacology Calvary Mater Newcastle
Department Contact	Lynn Choo Specialist ICU Pharmacist, John Hunter Hospital lynn.choo@hnehealth.nsw.gov.au	
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