



CG011.v1: Adult Drug Infusions

Common Drug Infusions				
Drug	Dose and Diluent	Rate (Note UNITS)	Y site compatibility (Not all-inclusive)	Other
ADRENALINE	Single strength – 4mg made up to 50ml with 5% glucose (80 micrograms/ml)	Titrate to mean arterial pressure	<u>Compatible:</u> Dobutamine, Morphine, Midazolam, Noradrenaline (in 5% glucose), Vasopressin. <u>Incompatible:</u> Aminophylline, Sodium bicarbonate, other alkaline solutions, Thiopental.	Preferably give through central venous line. Peripheral may be appropriate early but use only 4mg/50ml dilution and monitor site for signs of extravasation
	Double strength - 8mg made up to 50ml with 5% glucose (160 micrograms/ml)			
	Quad strength - 16 mg made up to 50ml with 5% glucose (320 micrograms/ml)			
AMIODARONE	LOADING DOSE 300mg made up to 50ml with 5% glucose (6 mg/ml) - central 300mg made up to 250ml with 5% glucose (1.2mg/ml) - peripheral If body weight estimated to be <40kg, use 5 mg/kg	Over 60 minutes	(If all infusions made in Glucose 5%) <u>Compatible:</u> Adrenaline, Alfentanil, Dobutamine, Fentanyl, Insulin, Labetalol, Midazolam, Morphine, Noradrenaline, Potassium chloride.	Concentrations >2mg/ml should preferably be through a central venous line
	MAINTENANCE DOSE 900mg in 500ml or 450mg in 250ml with 5% glucose (1.8 mg/ml)	21.7ml/hr (Over 23 hours)		
GLYCERYL TRINITRATE (GTN)	50mg/50ml (neat) (1 mg/ml)	Start at 0.3ml/hr. Titrate to mean arterial pressure. Usual range 1-12ml/hr	<u>Compatible:</u> Aminophylline, Amiodarone, Glucose 5%, Heparin, Insulin, Labetalol, Midazolam, Morphine, Propofol, 0.9% saline	Central or peripheral
INSULIN ACTRAPID INFUSION	50units Actrapid made up to 50ml with 0.9% saline (1 unit/ml)	Rate in accordance to prescribed protocol	<u>Compatible:</u> Amiodarone, Heparin, Magnesium, Midazolam, Morphine, Propofol, Sodium bicarbonate <u>Incompatible:</u> Aminophylline	Central or peripheral
INSULIN ACTRAPID HYPERKALAEMIA	10units of Actrapid into 50ml of 50% glucose.	Over 15 - 30 mins	<u>Compatible:</u> Amiodarone Heparin, Magnesium, Midazolam, Morphine, Propofol, Sodium bicarbonate <u>Incompatible:</u> Aminophylline	Preferably give through CVC. Consider need for cardio protection with calcium gluconate Monitor BMs
MAGNESIUM SULPHATE 50% <i>Arrhythmia Asthma</i>	4mls (2g) of 50% solution made up to 50 ml with 0.9% saline or 5% glucose	Over 20 minutes	<u>Compatible:</u> Insulin, Morphine, Propofol, Noradrenaline <u>Incompatible:</u> Ketamine, Salbutamol, Sodium bicarbonate, Amiodarone.	Preferably through a central venous line. Must always be diluted before use



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NORADRENALINE	Single strength – 4mg made up to 50ml with 5% glucose (80 micrograms/ml)		Titrate to mean arterial pressure	<u>Compatible:</u> Adrenaline, Dobutamine, Morphine, Midazolam, Vasopressin. <u>Incompatible:</u> Aminophylline	Preferably give through central venous line. Peripheral may be appropriate early but use only 4mg/50ml dilution and monitor site for signs of extravasation
	Double strength - 8mg made up to 50ml with 5% glucose (160 micrograms/ml)				
	Quad strength - 16 mg made up to 50ml with 5% glucose (320 micrograms/ml)				
2% PROPOFOL	1000mg in 50ml (neat 2%) (20 mg/ml)		0-4 mg/kg/hour	<u>Compatible:</u> Aminophylline, Dobutamine, Adrenaline, Fentanyl, Heparin, Insulin, Ketamine, Labetalol, Magnesium sulphate, Midazolam, Noradrenaline, Sodium bicarbonate	Change giving set and bottle every 24 hours Central or peripheral
PHENYTOIN Loading dose of phenytoin for status epilepticus	Give undiluted (50 mg/ml) 18 mg/kg no faster than 50 mg/min		Give phenytoin over 30-40 minutes (rate <50 mg/minute). In patients who are elderly, or have pre-existing cardiac disease, give over 60 minutes.	Give through a dedicated lumen and not mixed with any other fluid or medication.	To reduce local venous irritation, flush cannula with 0.9% saline before and after infusion Central or peripheral
PHENYTOIN Dose Table	Weight (Kg)	IV Loading Dose (mg)	Volume of IV Phenytoin ml (vial is 250mg/5ml)		
	35-44	700	14		
	45-54	900	18		
	55-64	1100	22		
	65-74	1250	25		
	75-84	1450	29		
	85-94	1600	32		
>94	1800	36			
TRANEXAMIC ACID (Maintenance)	1 gram made up to 50ml with 0.9% saline (20mg/ml)		6.25ml/hr (over 8 hours)	<u>Compatible:</u> Maintenance fluids containing sodium chloride / glucose. <u>Incompatible:</u> Blood for transfusion or infusion solutions containing penicillin.	1g over 10 minutes IV bolus first before 8 hour infusion Central or peripheral



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Uncommon Drug Infusions					
Drug	Dose and Diluent	Rate (Note UNITS)	Y site compatibility (Not all-inclusive)	Other	
ALFENTANIL Source locally	25mg in 50ml (neat) (500 micrograms/ml)	0.5 - 10 ml/hr	<u>Compatible:</u> Hartmanns, Midazolam, Propofol. <u>Incompatible:</u> GTN, Magnesium.	Central or peripheral	
AMINOPHYLLINE Source locally	LOADING DOSE (5 mg/kg – Ideal Body Weight). Made up to 50ml with 5% glucose or 0.9% saline	Over 30 min Max 25 mg/min	<u>Compatible:</u> Potassium Chloride 40 mmol/litre	Central or peripheral	
	MAINTENANCE DOSE 500mg made up to 500ml with 5% glucose or 0.9% saline. (1 mg/ml)	0.3 - 0.7 mg/kg/hr	<u>Incompatible:</u> Midazolam, Salbutamol, Amiodarone, Dobutamine, Noradrenaline	Omit loading dose if usually taking oral aminophylline/theophylline	
DOBUTAMINE Source locally	250mg made up to 50ml with 5% glucose or 0.9% saline (5 mg/ml). Maximum concentration for peripheral administration is 5mg/mL	0.25 - 10 mcg/Kg/min	<u>Compatible:</u> Adrenaline Noradrenaline Morphine Vasopressin <u>Incompatible:</u> Furosemide Sodium bicarbonate	Preferably give through central venous line	
DOBUTAMINE Dose table	Rate	40kg	50kg	70kg	100kg
	2.5 mcg/kg/min	1.2 ml/hr	1.5 ml/hr	2.1 ml/hr	3.0 ml/hr
	5 mcg/kg/min	2.4 ml/hr	3.0 ml/hr	4.2 ml/hr	6.0 ml/hr
	10 mcg/kg/min	4.8 ml/hr	6.0 ml/hr	8.4 ml/hr	12.0 ml/hr
HYDRAZALINE Obstetric Drug Pack	50mg made up to 50ml with 0.9% saline (1 mg/ml)	<u>Eclampsia</u> Start at 10 ml/hr <u>Hypertensive emergencies</u> Start: 12-18 ml/hr, reducing to maintenance of 3-9 ml/hr once an adequate response is achieved	<u>Incompatible:</u> Glucose, Aminophylline	Central or peripheral	
ISOPRENALINE HYDROCHLORIDE Source locally	2mg made to 50ml with 5% glucose (40 mcg/ml)	Adjust the infusion rate according to patient response Usual range 1-10 mcg/min (1.5-15 ml/hr)	<u>Compatible:</u> Adrenaline, Amiodarone, Dobutamine, Propofol, Potassium chloride	Preferably give through central venous line Isoprenaline sulphate 1.125mg is equivalent to isoprenaline hydrochloride 1mg	



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Drug	Dose and Diluent	Rate (Note UNITS)	Y site compatibility (Not all-inclusive)	Other
KETAMINE <i>Bronchodilation in status asthmaticus.</i> Unlicensed indication	200mg made up to 40ml with 0.9% saline or 5% Glucose (5mg/ml)	0.5 mg/kg/hr	<u>Compatible:</u> Morphine, Propofol	Central or peripheral
LABETALOL Obstetric Drug Pack	200mg in 40ml (neat) (5mg/ml)	<i>Eclampsia</i> Start at 50mg/hr (10ml/hr); max 200mg/hr <i>Hypertension</i> Start at 2mg/min (24ml/hr)	<u>Incompatible:</u> Sodium Bicarbonate 4.2%	Preferably give through central venous line
MAGNESIUM SULPHATE 50% <i>Eclampsia</i> Obstetric Drug Pack	Loading dose 4g 8mls (4g) of 50% made up to 20 mls with 0.9% saline Maintenance dose 1 g/hr 20mls (10g) of 50% made up to 50mls with 0.9% saline If further seizures 2g 4mls (2g) of 50% made up to 10mls with 0.9% saline	60ml/hr for 20 minutes 5ml/hr. Over 5 minutes	<u>Compatible:</u> Insulin, Morphine, Propofol, Noradrenaline. <u>Incompatible:</u> Ketamine, Salbutamol, Sodium bicarbonate, Amiodarone	Preferably give through central venous line Monitor patella reflexes
MANNITOL 10% (0.1g/ml) 20% (0.2g/ml) Source locally	0.25-1 g/kg dose Base on Ideal Body Weight	Over 30 minutes	Do not administer at Y site with other drugs	Inspect the bag for crystals. If present, warm the bag to 50-70°C until they dissolve, and allow to return to body temperature Preferably give through central venous line
METARAMINOL Source locally	20mg made up to 40ml with 0.9% saline (0.5mg/ml)	1 - 20 ml/hr Titrate to MAP		Peripheral. Only as a bridge to BP control while obtaining central access.



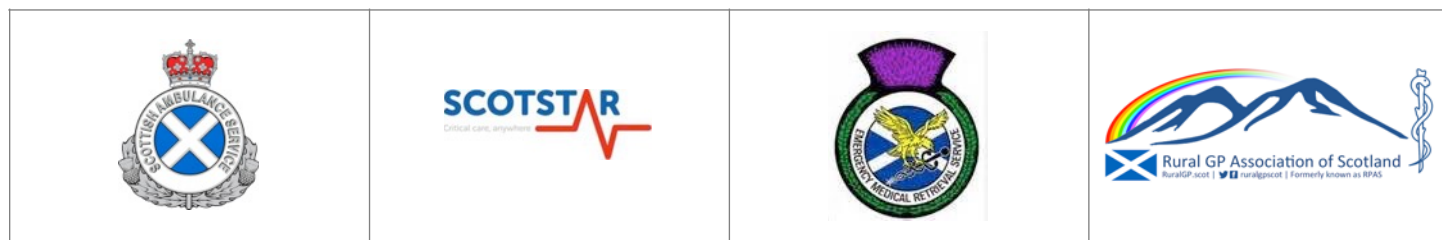
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Drug	Dose and Diluent	Rate (Note UNITS)	Y site compatibility (Not all-inclusive)	Other
MIDAZOLAM	50mg in 50ml (neat) (1mg/ml)	1 - 20ml/hr	<u>Compatible:</u> Amiodarone, Adrenaline, Fentanyl, Heparin, Insulin, Labetalol, Morphine, Noradrenaline, Propofol <u>Incompatible:</u> Sodium bicarbonate	Central or peripheral
MORPHINE	50mg in 50ml (neat) (1mg/ml) Can be diluted in 0.9% saline or 5% glucose	1 - 10ml/hr	<u>Compatible:</u> Adrenaline, Noradrenaline, Dobutamine, Midazolam	Central or peripheral
OXYTOCIN Obstetric Drug Pack	40 UNITS in 500ml Hartmann's solution (0.08 units/ml)	Post partum haemorrhage 125ml/hr (10units/hour)	<u>Compatible:</u> Heparin, Insulin, Morphine	Preferably give through central venous line
SALBUTAMOL	5mg made up to 50ml with 0.9% saline (100mcg/ml)	5 - 20mcg/min. (3-12ml/hr)	<u>Compatible:</u> Glucose 5%, Morphine <u>Incompatible:</u> Aminophylline	Central or peripheral
VASOPRESSIN Source locally	20 units made up to 50mL with 0.9% saline or 5% Glucose (0.4 units/ml)	0.01-0.04 units per min. (1.5 – 6ml/hr)	<u>Compatible:</u> Amiodarone, Dobutamine, Heparin	Preferably give through central venous line



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2. Document History			
Reference Number	CG011		
Version	1		
Writing group (Chair in bold)	Fiona MacGregor	Pharmacist	Scottish Adult Critical Care Pharmacists Network
	Jimmi Ronaldson	Adv Retrieval Practitioner	EMRS
Associate Medical Director	Andrew Inglis		
Date issued	22nd January 2019		
Date for review	January 2022		
Distribution	ScotSTAR	EMRS West	✓
		EMRS North	✓
		Paediatric	X
		Neonatal	X
	Referring centres via service websites		✓
	BASICS Scotland		X
	Medic 1		X
	Tayside Trauma Team		X
	Rural GPs Association of Scotland		✓
SAS Air Ambulance Division		for information	





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3. Scope and purpose

- Overall objectives:

To support safe prescribing and administration of intravenous (IV) drugs used in the adult critical care retrieval environment. The Intensive Care Society (ICS) introduced recommendations for infusion concentrations of commonly used drugs in critical care areas [1], the importance being improvement in patient safety [2]. A number of the infusions in this guideline follow these standard recommendations [1]. The service has access to syringe pumps and a limited supply of volumetric pumps. Further information can be found in the BNF or the “Intravenous medicines” section of the Injectable Medicines Guide website (Medusa - <http://www.injguide.nhs.uk/>). This contains monographs, which give information on the recommended method(s) of preparing and administering intravenous injections and infusions. The monographs must be used in conjunction with best practice detailed in injectable medicine guidelines in use locally. The appendix includes drug calculation formulae and an intravenous compatibility chart for reference.

- Statement of intent:

This guideline is not intended to be construed or to serve as a standard of care. Adherence to guideline recommendations will not ensure a successful outcome in every case, nor should they be construed as including all proper methods of care or excluding other acceptable methods of care aimed at the same results. The ultimate judgement must be made by the appropriate healthcare professional(s) responsible for clinical decisions regarding a particular clinical procedure or treatment plan. Clinicians using this guideline should work within their skill sets and usual scope of practice.

- Feedback:

Comments on this guideline can be sent to: scotamb.CPG@nhs.net

- Equality Impact Assessment:

Applied to the ScotSTAR Clinical Standards group processes.

- Guideline process endorsed by the Scottish Trauma Network Prehospital, Transfer and Retrieval group.



4. References

1. Borthwick M *et al.* Towards standardisation of drug infusion concentrations in UK critical care units. *Journal Intensive Care Society* 2009;10:197-200.
2. Titiesari Y *et al.* Infusion medication concentrations in UK's critical care areas: are the Intensive Care Society's recommendations being used? *Journal Intensive Care Society* 2017;18:30–35.



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Appendix

1. To Calculate micrograms/kg/min for a Given Flow Rate:

$$\text{Micrograms/kg/min} = \frac{\text{rate (ml/hr)} \times \text{concentration (mcg/ml)}}{\text{Weight (kg)} \times 60}$$

2. To Calculate Flow Rate for a Given Dose in microgram/kg/min:

$$\text{Rate (mL/hr)} = \frac{[(\text{micrograms/kg/min} \times \text{weight (kg)}) \times 60]}{\text{Concentration (micrograms/mL)}}$$

3.

Adrenaline		Directorate of Critical Care IV Drug Compatibility Chart																				
	Alfentanil																					
	Aminophylline																					
	Amiodarone																					
	Atracurium																					
	Ciprofloxacin																					
	Cis-atracurium																					
	Clonidine																					
	Digoxin																					
	Dobutamine																					
	Dopamine																					
	Erythromycin																					
	Fluconazole																					
	Furosemide																					
	Hartmann's (Compound Sodium Lactate)																					
	Heparin																					
	Hydralazine																					
	Insulin																					
	Ketamine																					
	Labetalol																					
	Magnesium in NaCl 0.9%																					
	Midazolam																					
	Milrinone																					
	Morphine																					
	Nitroglycerin (Glyceryl trinitrate; GTN)																					
	Noradrenaline																					
	Phenytoin																					
	Plasmalyte																					
	Potassium Chloride																					
	Potassium Acid Phosphate																					
	Propofol																					
	Rocuronium																					
	Sodium bicarbonate																					
	Thiopental																					
	Vancomycin																					
	Vasopressin																					