Critical Care Intravenous Drug Administration Guide

DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Acetylcysteine	Infusion for liver failure	15mg/kg loading dose then 7.5mg/kg over 24 hours for 5 days	**Central line**: May be given undiluted **Peripheral line**: Minimum dilution each 10ml ampoule with 10mls of G or NS Usually dilute daily dose in 100mls NS or G	pH: 7 adjusted with sodium hydroxide. Do not infuse with other drugs if possible	A change in colour to light purple does not indicate any change in safety or efficacy. Use of NS as diluent is not in product licence but manufacturer has stability data. Flush: G or NS Sodium content: 12.78 mmol/10ml
	Infusion for paracetamol overdose	150mg/kg loading dose over 15 minutes, then 50mg/kg over 4 hours, then 100mg/kg over 16 hours			**Refer to section 4 for more information.**
	Infusion for renal protection against contrast media	3 mls (600mg) of 2g in 10ml injection	100mls G or NS, infuse over 15mins.		Dose: 600mg BD day before and day of scan
Aciclovir	Intermittent Infusion	Minimum 1 hour with adequate hydration (aciclovir can precipitate in renal tubules if maximum solubility is exceeded)	Reconstitute vial to 25mg/ml with W or NS if dry powder. Dilute to a concentration not greater than 5mg/ml with NS or glucose/saline. Preferably dilute doses of 250-500mg in 100ml and 500mg-1g in a minimum of 250ml. Can give undiluted (25mg/ml) via central line over at least 1 hour (unlicensed practice)	**Compatible**: ampicillin, cimetidine, cefotaxime, ceftazidime, fluconazole, gentamicin, heparin, magnesium, piperacillin, ranitidine, vancomycin **Incompatible**: amifostine, amsacrine, aztreonam, diltiazem hydrochloride, dobutamine hydrochloride, dopamine hydrochloride, fludarabine phosphate, foscarnet sodium, idarubicin hydrochloride, meropenem, morphine sulphate, ondansetron hydrochloride, pethidine hydrochloride, piperacillin sodium - tazobactam sodium, sargramostim and vinorelbine tartrate. pH: 11	Only stable at concentrations of 25mg/ml **or** 5mg/ml or less. High concentrations are associated with thrombophlebitis and irritation at injection site. Extravasation: May cause tissue damage Flush: NS Sodium content: 1.1 mmol/250mg Should any visible turbidity or crystallisation appear in the solution before or during infusion, the preparation should be discarded.
Adenosine	Rapid IV bolus given by a doctor or under direct supervision	2 seconds	Can be diluted with NS Compatibility with other medicines is not known.	pH 6.3 - 7.3	Follow with rapid NS flush (at least 20mls). **Monitor**: Bronchospasm, bradycardia, facial flushing, dyspnoea and tightness in chest. Requires ECG monitoring. Sodium content: 0.31 mmol/vial

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Adrenaline (Epinephrine)	Infusion via central line with pump	Titrate to response	**General ICU/HDU** Dilute 5mg in 50ml, 10 mg in 50ml or 15 mg in 50ml G (or NS) **Cardiac ICU** Dilute 2mg, 4mg, 8mg or 16mg in 50ml G (or NS)	**Refer to Y-Site Compatibility Chart** **Compatible**: atropine (in G only), doxapram. **Incompatible**: lignocaine	Strengths above 15mg in 50ml should be reserved for exceptional circumstances or if requested by doctor. Less stable in NS. Infusions are given by central line, in emergency situations bolus doses may have to be given by peripheral iv access. **Monitor**: BP, HR, intra-arterial or PCW catheter blood pressure and cardiac monitoring
	IV bolus under supervision of a doctor		1mg in 10ml (1 in 10,000) Minijet	pH: 2.5-3.6	Extravasation: may cause tissue damage Do not flush
Albumin 4.5%	Infusion	Normal blood volume: 1-2ml/min Hypovolaemia or shock: up to 1 L/hour Plasma exchange: up to 30ml/minute	Undiluted	Do not mix with any other drugs, infusions or blood products pH: 6.7-7.3	Do not use if turbid or contains a deposit **Monitor**: rarely allergic reaction. Use within 3 hours of piercing container seal Sodium content: 20% contains 50-120 mmol/L 4.5% contains 100-160 mmol/L
Albumin 20%	Infusion	Normal blood volume: 1-2ml/minute Hypovolaemia or shock: up to 120ml/hour			
Alfentanil	Continuous Infusion with pump	Loading dose 50-100 micrograms/kg over 10 mins or less followed by infusion titrated to effect	Diluted 1mg/ml with G or NS or H	**Refer to Y-Site Compatibility Chart** pH: 4.3-6	Use sedation score and pain tool to titrate to effect **Monitor**: BP, HR, RR, respiratory depression, apnoea, bradycardia, hypotension. Ensure maintenance of ventilation. Flush: NS or G
	IV bolus (under supervision of a doctor in non ventilated patients)	Minimum 30 seconds in spontaneously breathing patients			

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Alteplase (Recombinant human tissue-type plasminogen activator)	IV bolus	Accelerated regimen in MI: give 15mg as a bolus over 2 minutes, followed by:	Dilute each vial with water for injection provided. If necessary further dilute with NS to concentration of 0.2mg/ml or above.	**Incompatible**: Do not use W or G for dilution. Heparin, GTN, dobutamine, dopamine. Manufacturers recommend do not mix with any other drugs	Reconstituted vial stable for 24 hours in the fridge or 8 hours at room temperature. **Monitor**: reperfusion arrhythmias, increased risk of bleeding. May rarely cause allergic reactions.
	Intermittent infusion	50mg over 30minutes, and then 35mg over 60minutes. Adjust dose in patients <65kg as per SPC		pH 7.3	Flush: NS
Amikacin	IV bolus	2 - 3 minutes for doses less than 500mg	Can be diluted in 10 - 20ml NS	**Compatible**: metronidazole, ranitidine, vancomycin I**ncompatible**: amphoteracin, cephalosporins, erythromycin, penicillins, phenytoin, potassium chloride, heparin, thiopentone, tetracyclines, vitamins B and C, nitrofuranoin, warfarin pH: 4.5	Serum level monitoring required. Usually given once daily at 12noon, dose 15-20mg/kg. Trough level taken at 6am should be less than 5 mcg/ml. Flush: NS, G Sodium content: 0.72mmol/500mg Solution may darken from colourless to pale yellow but this does not indicate loss of potency.
	Intermittent Infusion	30-60 minutes	Dilute with 50-100ml NS, G. Preferred concentration 2.5mg/ml in NS.		
Aminophylline	Continuous infusion with a pump	Loading dose 5mg/kg over at least 20 minutes then continuous infusion of 500 micrograms/kg/hour	Usually diluted 500mg in 250 to 500mls (1-2mg/ml) in NS or G. May use undiluted (25mg/ml) via central line at rate not exceeding 25mg/minute.	**Refer to Y-Site Compatibility Chart** **Compatible**: calcium gluconate, meropenem, metoclopramide. **Incompatible**: cefotaxime, ciprofloxacin, clindamycin, hydralazine, pethidine. pH: 8.8-10	**Monitor**: Serum theophylline level required (therapeutic range 10-20 mg/L). BP, HR, ECG, tachycardia and hypotension. Arrhythmias and convulsions may occur if infusion rate is too fast. Extravasation: may cause tissue damage Flush: NS, G

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Amiodarone	Continuous or Intermittent infusion with pump preferably by central line	Loading dose (5mg/kg in 250ml G) by intermittent infusion over 20 to 120 minutes, followed by continuous infusion (up to 15mg/kg in up to 500ml G over 24 hours)	Dilute in G only. Stability concentration dependent - do not dilute to *less than* 300mg in 500mls. Usual dilution 300mg in 100mls G, then 900mg-1.2g in 250mls G (**ICU/HDU**) or 600-900mg in 46-48ml G as appropriate (run at 2ml/hr)(**Cardiac ICU**).	**Refer to Y-Site Compatibility Chart** **Compatible**: gentamicin, isoprenaline, lignocaine, metronidazole, vancomycin **Incompatible**: NS, sodium bicarbonate pH: 3.5-4.5	Irritant, use central line if possible, especially for repeated or continuous infusions. Use via peripheral lines may cause discomfort and inflammation. **Monitor**: BP, HR, RR, rapid administration may cause hypotension & anaphylactic shock, sweating, nausea and in patients with respiratory failure, bronchospasm and apnoea. Cardiac monitoring required. Extravasation: may cause tissue damage Flush: G Sodium content: nil
	IV bolus in medical emergency under direct supervision of a doctor	3 minutes	300mg in 10ml minijet		
Amoxicillin	IV bolus	3-4 min	Reconstitute each 500mg with 10ml W and each 1g vial with 20ml W. Displacement value: 0.4ml per 500mg 0.8ml per 1g	**Compatible**: few compatibilities known, contact pharmacist for advice **Incompatible**: ciprofloxacin, midazolam, aminoglycosides (e.g. amikacin, gentamicin) pH: 8.6-8.8	Flush: NS Sodium content: 1.6 mmol/500mg; 3.3mmol/1g Thrombophlebitis may occur at injection site.
	Intermittent infusion	Over 30-60 minutes	Reconstitue as above. Add to 50-100ml of G or NS		

FUNGIZONE Calculation Example for 17.5mg dose (250 micrograms /kg for 70kg patient)
Reconstitute as below in 500mls buffered glucose 5%
Flush line with glucose 5%
Infuse 1mg over 30 mins (i.e. 1/ 17.5 x 500 = 28mls over 30 mins – 60mls/hr)
Stop infusion and monitor patient for 30 mins
Restart infusion and run over 4 hour (125mls/hr)
Flush line with glucose 5%

AMBISOME Calculation Examplefor 50mg dose (1mg/kg for 50kg patient)
Reconstitute as below in 250mls glucose 5% and protect from light
Flush line with glucose 5%
Infuse 1mg over 10mins (1/50 x 250 = 5mls over 10 mins = 30ml/hr for 10 mins
Stop infusion and monitor patient for 30 mins
Restart infusion and run over 60 mins (250mls/hr)
Flush line with 5% glucose

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DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Amphotericin deoxycholate (FUNGIZONE®) **CHECK THAT YOU ARE USING THE CORRECT FORMULATION. Risk of confusion between:** ***Fungizone and Ambisome***	Intermittent Infusion See above for calculation example	Test dose of 1mg over 20-30minutes Intermittent infusion: 2 - 4 hours. Decrease rate to decrease incidence of side effects e.g. give over 6 hours. Protect from light. Normal dose range: 250microgramsg/kg, if tolerated increasing slowly to 1mg/kg daily; max. (severe infection) 1.5mg/kg daily or on alternate days	Reconstitute each vial with 10ml W, then dilute dose with G to which 1-2mls of amphotericin buffer (SGH formula) has been added beforehand. Dilution: Peripheral line: 100 micrograms/ml Central line: up to a maximum of 500 micrograms/ml An in-line filter (pore size no less than 1 micron) may be used.	**Compatible**: buffered G, (heparin or hydrocortisone sodium succinate in limited concentrations) **Incompatible**: NS, benzylpenicillin, calcium salts, dobutamine, dopamine, fluconazole, frusemide, gentamicin, ondansetron, piperacillin, Potassium chloride, ranitidine pH: 5.7	A **test dose** is usually given at the start of a new course, by infusing 1mg in 10-50ml G over 20-30 minutes and observing for signs of anaphylactic reaction for a minimum of 30 minutes. The company advise that patient responses to the test dose may not be predictive of subsequent severe side effects. **Buffer** is added to keep pH of G above 4.2 to prevent precipitation. **Monitor**: arrhythmias, convulsions, anaphylaxis, fever, chills, rigors, headache, vomiting. Rapid infusion may increase side effects. May cause pain and thrombophlebitis at injection site. **Flush:** G before and after administration or use separate line Sodium content: 0.25mmol/50mg **Store in fridge (2-8°C).**
Amphotericin liposomal (AMBISOME®) **CHECK THAT YOU ARE USING THE CORRECT FORMULATION. Risk of confusion between:** ***Fungizone and Ambisome***	Intermittent Infusion See above for calculation example	Testdose of 1mg over 10 minutes Intermittent infusion: 30-60 minutes Protect from light. Normal dose range: 1mg/kg daily, increasing slowly to 3mg/kg daily. Febrile neutropenia: testdose followed by 3mg/kg daily	Add 12ml W, and immediately shake vigorously for at least 30 seconds until complete dispersion is obtained. Resulting concentration 4mg/ml. Calculate the amount of this solution to be further diluted. Withdraw the required volume of ambisome into a syringe. Add this volume to the required amount of G via the 5-micron filter provided, to give a final concentration between 200 micrograms to 2mg per ml (usually 250mls)	**Compatible**: G and W **Incompatible**: NS. Do not infuse with any other drugs or infusion fluids. pH:5-6	A **test dose** is usually given at the start of each new course of treatment, by infusing 1mg in 10ml G over 10 minutes and observing for signs of anaphylactic reaction for at least 30 minutes. Use infusion within 6 hours. **Monitor**: Chills & rigors, anaphylaxis, headache, vomiting **Flush:** G before and after administration or use separate line. Sodium content: less than 0.5 mmol/vial **Stored at room temperature.**

DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Aprotinin	IV bolus	Maximum rate: 5ml-10/minute	Provided ready diluted. Can be diluted with NS or G	**Incompatible**: Do not infuse with any other drugs including heparin pH: 5-7	**Monitor**: First 1ml of initial dose should always be administered at least 10 minutes prior to the remainder of the dose due to the risk of allergic reactions. Best given by central line, peripheral administration may cause thrombophlebitis. Flush: NS Sodium content: 7.7 mmol/50ml
	Infusion	20-50ml/hour			
Argipressin	See vasopressin				
Atenolol	IV bolus under supervision of a doctor	Maximum rate 1mg/minute Dose: 2.5mg repeated at 5 minute intervals to a maximum of 10mg	Can be diluted with NS or G	**Compatible**: morphine, pethidine pH: 6	Excessive bradycardia can be countered with IV atropine 0.6-2.4mg given in 0.6mg doses. Overdose may be treated with IV glucagon **Monitor**: BP, HR, severe bradycardia and hypotension. Can cause conduction defects, monitor ECG. Rapid infusion increases incidence of side effects. Flush: NS or G Sodium content: 1.3-1.8 mmol/5mg
	Intermittent Infusion with pump	Dose: 150mcg/kg over 20 minutes repeated every 12 hours if required	Dilute to 50mls with NS, G		

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Atracurium	IV loading dose, then infusion with pump	Loading dose 300-600 micrograms/Kg then 300-600 micrograms/Kg/hour	Usually given neat. Can be diluted with NS or G	**Refer to Y-Site Compatibility Chart** **Incompatible**: barbiturates, ranitidine, alkaline agents pH: 3.5	Stable for 8 hours in G and 24 hours in NS. Patient requires full ventilatory support. **Monitor**: BP, HR, RR, histamine release may produce flushing and rarely bronchospasm. Flush: NS
Atropine Sulphate	IV bolus	Arrhythmia: 0.5-1mg Cardiac asystole: 3mg according to protocol	Dilution not recommended	**Compatible**: buprenorphine, dobutamine, fentanyl, frusemide, heparin, midazolam, Potassium chloride, ranitidine, propofol **Incompatible**: alkalis, thiopentone. pH: 3-6.5	**Monitor**: Give rapidly since slow IV administration may cause paradoxical slowing of the heart. ECG monitoring. Extravasation: May cause tissue damage Flush: NS
Azathioprine	Intermittent Infusion with pump	30-60 minutes	Handle **as cytotoxic drug** Reconstitute in 5-15ml W and dilute in 20-200ml NS	Do not infuse with any other drug	**Only staff trained in administering chemotherapy may do so.** **Monitor**: BP, HR, hypersensitivity, arrhythmias, hypotension. Extravasation: May cause tissue damage Flush: At least 50ml NS since very irritant. Sodium content: 0.2 mmol/vial
Benzylpenicillin	IV Bolus for doses < 1.2g	3-5 minutes (maximum rate 300mg/minute)	Reconstitute each 600mg, with 4 to 10ml W or NS	**Incompatible**: amikacin, amphotericin, chlorpromazine heparin pH: 5.5-7.5	1 mega unit = 600mg **Monitor**: Anaphylaxis. Administration faster than the recommended rate may cause seizures and CNS toxicity. Flush: NS or G Sodium content: 1.68 mmol/600mg
	Intermittent Infusion	30-60 minutes	Reconstitute each 600mg in 10ml NS. For infusion dilute to 100mls with NS		

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Bumetanide	IV bolus	Maximum 1mg/minute	Dilute in NS or G or may give undiluted	**Compatible**: doxapram, flucloxacillin, frusemide, morphine, pethidine, piperacillin **Incompatible**: dobutamine, midazolam pH: 6.8 - 7.8	Discard infusion if cloudiness develops. **Monitor**: BP, Hypotension. Myalgia is common if doses above 5mg are given as an IV bolus. Flush: NS Sodium content: 0.007 mmol/1ml
	Intermittent Infusion	30-60 minutes	Maximum concentration 25mg/litre (2.5mg/100mls) in NS or G		
Calcium Chloride	IV bolus Emergency use via central line	10ml of 10% injection repeated at 10 minute intervals	May be given undiluted by central line	**Compatible**: amikacin, aminophylline, heparin, potassium chloride **Incompatible**: adrenaline amphotericin, bicarbonates, cefalosporins, dobutamine chlorpheniramine, meropenem, phosphates, propofol, sulphates, tartrates pH: 5-7	Calcium chloride 7.35% contains 5 mmol/10mls (0.5mmol/ml) of calcium **Monitor**: BP, HR, ECG, rapid IV administration may cause vasodilatation, decreased blood pressure, bradycardia, cardiac arrhythmias, syncope and cardiac arrest. Extravasation: Very irritant; will cause tissue damage. Flush: NS
	Intermittent or continuous infusion via central line with pump	Usually 20 mmol over 4 hours	Draw up 40mls of 7.35% injection which gives 20 mmol in 40mls		
	Intermittent or continuous infusion via peripheral line with pump	20 mmol over 8 to 12 hours	20 mmols in 500ml of NS or G		
Calcium Gluconate	IV bolus Emergency use	10-20ml repeated at 10 minute intervals	May give undiluted	**Compatible**: amikacin, aminophylline, heparin, potassium chloride **Incompatible**: amphotericin, bicarbonates, cefalosporins, chlorpheniramine, dobutamine, meropenem, phosphates, sulphates, tartrates. pH: 5-7	Calcium gluconate 10% contains 0.225mmol of calcium per ml (2.25 mmol in 10mls) **Monitor**: HR, BP, rapid IV administration may cause vasodilatation, decreased blood pressure, bradycardia, cardiac arrhythmias, syncope and cardiac arrest. Extravasation: May cause tissue damage. Flush: NS
	Intermittent or continuous infusion via central line with pump	Usually 13.5 mmol over 2 hours	May give undiluted or may dilute in NS or G		
	Intermittent or continuous infusion via peripheral line with pump	22.5 mmol over 6-8 hours	22.5 mmol (100ml) in 500ml NS or G		

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Cefotaxime	IV bolus preferred	3-5 minutes	Reconstitute 1 gm with 10mls W	Cefotaxime can be added to an infusion bag of metronidazole. **Compatible**: aciclovir, heparin morphine **Incompatible**: alkalis (pH >7.5), aminoglycosides (e.g. gentamicin), aminophylline, doxapram, fluconazole, hetastarch pH: 5-7	**Monitor**: Anaphylaxis Flush: NS or G Sodium content: 2.09 mmol/g
	Intermittent Infusion	30 minutes	Reconstitute as above then dilute each 1g in 50mls NS or G		
Ceftazidime	IV bolus	3-5 minutes	Reconstitute 1g or 2g in 10ml W, NS or G. Carbon dioxide is released; see package insert	Ceftazidime can be added to an infusion bag of metronidazole. Compatible: aciclovir, heparin, hydrocortisone, Potassium chloride Incompatible: aminoglycosides (e.g. gentamicin), fluconazole, midazolam, ranitidine, sodium bicarbonate, vancomycin. pH: 5-8	Monitor: Anaphylaxis Flush: NS or G Sodium content: 2.3mmol/1g
	Intermittent Infusion	Maximum 30 minutes	Reconstitute as above then dilute to 1g in 50-100mls with NS or G		
Cephradrine (Cefradine)	IV bolus	3-5 minutes	1g in 10mls W	**Incompatible**: Adrenaline, aminoglycosides (e.g. gentamicin), aminophylline, mannitol, metronidazole, noradrenaline, phenytoin, thiopentone pH: 6.5-8.5	**Monitor**: Anaphylaxis Flush: NS or G
	Intermittent Infusion	30 minutes	Reconstitute as above and dilute in 50mls NS or G		

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Chloramphenicol sodium succinate	IV bolus	3-5 minutes	Reconstitute 1g in 10mls W, NS or G. Displacement: 0.8ml/1g. Add 9.2ml diluent to 1g vial for 1g in 10ml (100mg in 1ml)	**Compatible**: dopamine, heparin, hydrocortisone. **Incompatible**: ampicillin, chlorpromazine, erythromycin, fluconazole, phenothiazines, phenobarbitone, phenytoin, tetracyclines, vancomycin, solutions with pH <5.5 or >7. pH: 6-7	**Monitor**: RR, BP, vomiting, respiratory difficulties, pale cyanotic skin and hypotension. Flush: NS Sodium content: 3.14 mmol/1g
	Intermittent infusion	30-60 minutes	Reconstitute as above then dilute in 50-100mls NS or G		
Chlorpheniramine (Chlorphenamine)	IV bolus	Minimum 1 minute	Dilute with 5-10mls NS or W	**Incompatible**: do not infuse with any other drug including calcium salts, noradrenaline. pH: 4-5.2	**Monitor**: Rapid injection can cause transitory hypotension or CNS stimulation. Flush: NS
Chlorpromazine	Intermittent Infusion	Maximum 1mg over 2 minutes	Dilute 1mg to at least 1ml in NS. May be further diluted to 500mls to 1 litre.	**Incompatible**: Do not infuse with any other drugs including benzylpenicillin, phenobarbitone. pH: 5-6.5	IV use is unlicensed indication. Very irritant: avoid IV administration if possible. **Monitor**: BP, HR, ECG, RR, arrhythmias, respiratory depression, hypotension, especially with rapid administration. May discolour urine pink/reddish brown. Flush: NS Sodium content: 0.2mmol/2ml
Ciprofloxacin	Intermittent Infusion	200mg over 30 minutes 400mg over 60 minutes	Ready diluted.	**Compatible**: NS or G **Incompatible**: aminophylline, amoxicillin, ceftazidime, co-amoxiclav, dexamethasone, frusemide, heparin, hydrocortisone, magnesium, methylprednisolone, phenytoin, propofol, sodium bicarbonate pH: 3.9-4.5	**Monitor**: Anaphylaxis, convulsions, CNS stimulation. Caution in G6PD deficient patients. Flush: NS Sodium content: 7.7 mmol per 50ml bottle, Flexibag nil (i.e. 200mg & 400mg infusions).
Clarythromycin	By intravenous infusion	60 minutes	Reconstitute each 500mg vial with 10ml W then dilute with NS, G or Hartmann's to 250ml (2mg/ml) **In fluid restriction:** 5mg/ml (e.g. 500mg in 100ml) via a **central line**	**Do not infuse with other medicines** pH: 5 (in NS)	Phlebitis, tenderness and inflammation at injection site. Rapid administration can cause arrhythmias. Flush: NS or G Sodium content: negligible Shelf life: once reconstituted in 10ml W stable for 24 hours at 5-25C. Once diluted in 250ml diluent, stable for 6 hours at 25C or 24 hours refrigerated.

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Clindamycin	Intermittent infusion	Rate should not exceed 30mg/minute.	Dilute in NS or G. Concentration must not exceed 18mg/ml.	**Compatible**: amikacin, ceftazidime, cefotaxime, gentamicin. **Incompatible**: alkaline drugs and drugs which are unstable at acid pH, ampicillin, aminophylline, calcium gluconate, magnesium, phenytoin, ranitidine. pH: 5.5 - 7.0	**Monitor:** antibiotic associated colitis, thrombophlebitis, erythema, pain and swelling at injection site. Sodium content: not significant Flush: NS
	Continuous infusion (for doses above 1.2g)		NS or G		
Clonazepam	IV bolus Emergency use	Maximum rate 1mg over 2 minutes.	Immediately before use dilute each 1mg in 1ml with 1ml W (diluent supplied) to produce a 1mg in 2ml solution	pH: 3.4-4.3	Protect infusion from light. Use infusion within 12 hours. **Monitor**: BP, RR, hypotension, apnoea. Salivary or bronchial hypersecretion Extravasation: May cause tissue damage
	Intermittent Infusion with pump		Dilute up to 3mg in 250ml of G or NS		Flush: NS Sodium content: Nil Rapid administration may produce transient hypertension and then hypotension. Flush: NS Sodium content: 0.15 mmol/1ml
	Continuous Infusion with pump	Usually 500micrograms - 3.5mg/24 hours Opiate withdrawal or agitation: 10-25 micrograms per hour	150 to 750 micrograms with 50mls NS or G		
Colistin (Colistimethate)	Intermittent infusion	30-60 minutes	Reconstitute with W or NS then dilute further with NS or G to 50-100mls	Do not infuse with any other drug pH 7 - 8	Use within 6 hours of reconstitution **Monitor**: Cardiovascular instability, apnoea, neurological changes Flush: NS Sodium content: 0.22 mmol/1 million units

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Co-amoxiclav	IV bolus	3-5 minutes	Reconstitute each 600mg with 10ml W	**Incompatible**: aminoglycosides (gentamicin etc.) ciprofloxacin, propofol pH: 8.8-9	Use infusion within 4 hours **Monitor**: Anaphylactic reaction Flush: NS Sodium content: 3.2mmol/1.2g Potassium content: 1mmol/1.2g
	Intermittent Infusion	30 minutes	Reconstitute as above then dilute in 50-100ml NS		
Co-trimoxazole	Intermittent Infusion	At least 60-90 minutes, normally 2-3 hours	Dilute each 480mg (5ml) to 125mls with NS or G. If fluid restricted each 480mg in 50-75mls over 1 hour in G only	Do not infuse with any other drugs. pH: 9-10.5	More stable in G than NS. Use dilute infusion within 6 hours and concentrated solution within 1 hour, flush carefully before and after dose. Monitor all infusions carefully for turbidity and precipitate formation, if this occurs the mixture should be discarded. **Monitor**: Nausea and vomiting; slowing rate of infusion may avoid this. Thrombophlebitis at site of infusion. Localised pain and irritation during infusion. Extravasation: May cause tissue damage Flush: NS Sodium content: 1.64mmol/480mg
	Infusion via a central line with pump	Minimum 1 hour	Dilute as above. Has been given undiluted over 1-2 hours.		
Cyclizine	IV bolus	3-5 minutes	Can be diluted with W if necessary	**Incompatible**: Solutions of pH greater than 6.8 pH: 3.3-3.7	**Monitor**: BP and HR for hypotension and tachycardia. Pain at injection site. Extravasation: May cause tissue damage Flush: G
Cyclosporin (Ciclosporin)	Infusion via pump	2-6 hours	Dilute to a maximum concentration of 50mg in 20-100ml (maximum 2.5mg/ml) of NS or G	Do not infuse with any other drug. pH: 6-7	Use infusion within 6 hours if adding to minibag because the solution contains polyethoxylated castor oil, which causes phthalate leaching from PVC containers and tubing. Can give via syringe driver to avoid PVC leaching. Immunosuppressant caution handling. **Monitor**: Anaphylactic reactions; observe patient continuously for first 30 minutes Flush: NS

DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Dalfopristin - Quinupristin	Intermittent infusion	60 minutes	Slowly inject 5ml G to each vial. Gently swirl the vial to ensure dissolution of contents whilst limiting foam formation and leave to stand for two minutes until clear. Inspect and discard if precipitate present. Add required dose to 250ml G, although 100ml G can be used for central administration.	**Compatible:** ciprofloxacin, fluconazole, metoclopramide, morphine, potassium (but solutions must be in G not NS) **Incompatible**: NS, heparin.	Increase infusion volume to 750ml to alleviate peripheral venous reactions such as thrombophlebitis. The first dose may be initiated by peripheral infusion until a central line is in place. Flush: G
Dantrolene	IV bolus	Given rapidly	Dilute each 20mg vial with 60ml W and shake until solution is clear	**Incompatible**: NS, G Do not infuse with any other drugs. pH 9.5	**Monitor**: extravasation may cause tissue damage Give centrally where possible Sodium content: 0.08mmol per vial
Desmopressin	IV bolus	Diabetes insipidus: 5 minutes	May be given undiluted	pH: 4	**Monitor**: monitor BP continuously during infusions, risk of tachycardia and hypotension; Fluid overload likely, restrict fluid intake. Flush: NS
	Intermittent Infusion with pump	Haemophilia and Von Willebrands's: 20-30 minutes	Dilute dose with 50ml NS		
Dexamethasone sodium phosphate Each ml contains 4 mg of dexamethasone phosphate equivalent to 3.8 mg dexamethasone base	IV bolus	3-5 minutes	Undiluted or may dilute in NS or G	**Compatible**: Heparin, meropenem **Incompatible**: Amikacin, bleomycin, ciprofloxacin, daunorubicin, doxorubicin, midazolam, phenothiazines, vancomycin pH: 7-8.5	Administer by infusion if there is underlying cardiac pathology. **Monitor**: Serious anaphylactic reactions e.g. bronchospasm have occurred. Rapid administration may cause perianal itching Flush: NS Sodium content: 0.021mmol/1ml
	Intermittent Infusion	Minimum 5-10 minutes	May dilute with NS or G		
Diamorphine	IV bolus	Usual maximum rate 1mg/minute	Usually reconstitute 5mg and 10mg ampoules with 1ml W, NS or G. May use very small volumes if necessary (0.1ml or less). Minimum 1ml for 100mg, 2ml for 500mg. Can dilute with NS or G (preferably G).	**Compatible**: See BNF (prescribing in palliative care) for details of syringe compatibility when given sc. **Incompatible**: Alkaline solutions pH 3.8 - 4.4 (in glucose)	Infusion is more stable in G than NS **Monitor**: BP, HR & RR. Respiratory depression, apnoea, hypotension, peripheral circulatory collapse, chest wall rigidity, cardiac arrest and anaphylactic shock may occur. Flush: NS or G Sodium content: nil
	Intermittent or Continuous infusion with pump				

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DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Diazepam emulsion (Diazemuls)	IV bolus	3-5 minutes. Maximum rate 5mg/minute	Do not dilute	**Compatible**: Intralipid **Incompatible**: buprenorphine, NS, Potassium chloride pH: 8.5	Use infusion within 6 hours. Diazepam is absorbed by plastic infusion equipment. **Monitor**: RR and BP for risk of apnoea and hypotension. Rash/urticaria at injection site. Rarely anaphylaxis. Flush: G (do not use NS)
	Infusion with pump	Titrate dose to response	Dilute 2-8ml with 100ml G to produce a concentration between 100-400 micrograms/1ml		
Diclofenac	Intermittent Infusion	25-50mg over 15-60 mins 75mg over 30-120 mins for max. of 2 days	Buffer 100-500mls NS or G by adding 0.5ml of 8.4% sodium bicarbonate before adding diclofenac	**Refer to Y-Site Compatibility Chart**	**Monitor**: injection site reaction, GI side-effects, hypersensitivity reaction, fluid retention, renal failure, worsening asthma Contraindicated with concomitant NSAID or anticoagulant use (incl.low dose heparin), surgery with high risk of haemorrhage, asthma, hypovolaemia, dehydration Do not use infusion if crystals or precipitate are observed.
	Continuous Infusion	5mg/hr	ditto		
Digibind (digoxin-specific antibody fragments)	IV bolus (in emergency such as imminent cardiac arrest)	3 - 5 minutes	Add 4ml W to each vial, then add to a convenient volume (such as 100ml) of NS	Do not mix with any other drugs. pH 6.0 - 8.0	A 0.22 micron filter is recommended to remove any incompletely dissolved aggregate. **Monitor**: ECG, BP, body temperature, potassium and digoxin levels. Allergic reactions have been rarely reported. Digoxin levels may rise after administration but will be almost entirely bound to Fab and not able to react with receptors of the body Sodium content: 1.28mmol per vial Flush: NS
	Intermittent infusion	30 minutes			
Digoxin	Intermittent infusion	Minimum 10-20 minutes, preferably 60 minutes	Dilute 1 part digoxin with at least 4 parts NS or G (250micrograms to 5mls). Final volume usually 20 to 100ml	**Compatible**: bretylium, frusemide, heparin, lignocaine, morphine, Potassium chloride, verapamil **Incompatible**: dobutamine, doxapram, fluconazole, propofol pH: 6.8-7.2	**Monitor**: HR and ECG for risk of arrhythmia. Rapid injection may cause nausea and risk of arrhythmia. Flush: NS
Disopyramide	IV bolus under supervision of a doctor	5 minutes (not faster than 30mg/minute)		pH 4.0 - 5.0	**Monitor**: ECG and HR, CVP or CO, CI. Widening of QRS complex or prolonged QT interval, ventricular tachycardia or fibrillation, negative inotropes may cause decreased cardiac output.
	Continuous Infusion with pump	After loading dose 20-30mg/hour	Dilute with NS or G		

DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Dobutamine	Continuous infusion with pump by central line	Titrate to effect	Dilute 250mg to 50ml with G (or NS). Concentrations up to 10mg/1ml (500mg in 50 ml) are used.	**Refer to Y-Site Compatibility Chart** **Compatible**: atropine, isoprenaline, hydralazine, lignocaine, meropenem, pethidine, phentolamine, propranolol, ranitidine, streptokinase, **Incompatible**: aciclovir, alteplase, digoxin, doxapram, flucloxacillin, magnesium sulphate, phenytoin, sodium bicarbonate, tazocin and alkaline drugs. Any product containing ethanol or sodium metabisulphite. pH: 2.2-5.5	Less stable in NS. Concentrations above 5mg in 1ml must be given via central line. Infusion may turn harmless pink colour. Due to sodium metabisulphite content. Anaphylaxis or symptoms of asthma are possible. **Monitor**: Cardiovascular and haemodynamic monitoring required. Extravasation: may cause tissue damage Flush: Do not flush, replace giving set. Sodium content: 0.046mmol/vial
Dopamine	Infusion with pump by central line.	Titrate to effect	Dilute with G (or NS). Usual concentration 200mg in 50ml (4mg/1ml) and 400mg in 50ml (8mg/ml)	**Refer to Y-Site Compatibility Chart** **Compatible**: chloramphenicol, doxapram, labetolol, lignocaine, meropenem, pancuronium, ranitidine, streptokinase. **Incompatible**: aciclovir, alteplase, amphotericin, ampicillin, iron salts, sodium bicarbonate and alkaline solutions. pH: 2.5-4.5	Less stable in NS. For peripheral administration use a dilute solution (< 2mg/ml) and a large vein. **Monitor**: ECG and intra-arterial BP. Extravasation: Causes local vasoconstriction leading to severe tissue hypoxia and ischaemia; may consider irrigating affected area with 5-10mg phentolamine in 10-15ml NS. Do not flush - replace giving set Sodium content: 0.52mmol/200mg
Dopexamine	Continuous infusion with pump.	Titrate to effect	Dilute 50mg in 50ml G or NS. Maximum concentration 200mg in 50ml (4mg/ml).	**Refer to Y-Site Compatibility Chart** **Incompatible**: Alkaline solutions, sodium bicarbonate. pH: 2.5	For peripheral administration use a large vein. Concentration for peripheral administration must not exceed 1mg/ml. Can be diluted with Hartman's. **Monitor**: HR, ECG and BP Do not flush - replace giving set Sodium content: 0.09mmol/5ml

DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Doxapram	Continuous Infusion via pump	Start at 5mg/minute and decrease to maximum of 3mg/minute	Ready diluted 1g in 500ml (2mg/ml) G	**Compatible**: adrenaline, bumetanide, dopamine, Potassium chloride **Incompatible**: alkaline solutions e.g. aminophylline, cephalosporins, digoxin, dobutamine, folic acid, frusemide, hydrocortisone, ketamine, sodium bicarbonate, thiopentone. pH: 3-5	**Monitor**: RR and in COAD blood oxygen and carbon dioxide saturation. Moderate increase in BP and HR Extravasation: May cause tissue damage Flush: NS or G
	IV bolus under supervision of a doctor	Minimum 30 seconds	Ampoule can be diluted with NS or G		
Ephedrine	IV bolus under supervision of a doctor	3-5 minutes	Dilute to 3mg in 1ml with NS or G	**Compatible:** atracurium, dobutamine, dopamine, frusemide. **Incompatible**: alkaline solutions, hydrocortisone sodium succinate, phenobarbitone, thiopentone pH: 4.5-7	**Monitor**: BP, hypertension, CNS disturbances, HR, tachycardia, arrhythmia. Flush: NS
Epoprostenol (Prostacycline) Flolan®	Continuous Infusion with a pump	During CVVHD to protect filter in patients with low platelet count or heparin intolerance. Given at a rate of 5 nanograms/kg/min into the blood supplying the dialyser. Attach the 5 micron filter supplied between syringe and administration line. The enclosed filter unit must be used once only and then discarded after use.	Reconstitute using the diluent provided to give a concentrate of 10,000 nanograms/1ml (10mcg/ml). Withdraw 25mls into 50ml syringe and dilute to 50ml with NS or use undiluted (stable for 12 hours at room temperature). Keep remaining 25mls of concentrate in fridge to be used within 24 hours (Use IV label to sign, time and date vial).	**Incompatible**: do not infuse with any other drugs including G pH: (of diluent) 10.5	Reconstituted concentrate stable for 72 hours in refrigerator. Discard any infusion kept at room temperature after 12 hours. **Monitor**: BP, HR, tachycardia, bradycardia, hypotension. Extravasation: May cause tissue damage. Do not flush - replace giving set Sodium content: 2.5 mmol/reconstituted vial

DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Erythromycin	Intermittent Infusion via peripheral line	30-60 minutes	Reconstitute each 1g with 20ml W to produce 50mg/1ml then further dilute in NS to 1mg/ml. Maximum concentration of 5mg/1ml with NS (250mg in 50ml, 500mg in 100mls, 1g in 250mls)	**Compatible:** heparin, hydrocortisone, midazolam, and morphine. **Incompatible**: amikacin, aminophylline, ampicillin, fluconazole, heparin, metoclopramide, gentamicin, phenytoin, vancomycin and all other solutions of pH less than 5.5 pH: 6.5-7.5	Reconstituted vial stable for 24 hours in fridge. Prepare infusions fresh. If patient is sodium restricted then G may be used but add 1ml sodium bicarbonate 8.4% to minibag as a buffer. **Monitor**: IV infusion may cause thrombophlebitis, particularly concentrations exceeding 5mg/1ml. Arrhythmias may occur when administered as concentrated infusion, cardiac monitoring necessary.
	Intermittent Infusion via central line	60 minutes	Reconstitute as above then dilute to 1g in 100ml		
Esmolol	Continuous Infusion preferably via central line	Loading dose: 500 micrograms/kg/min for 1 minute only Then Maintenance: 50 microgram/kg/min for 4 minutes then assess for desired response, if achieved continue at 50 microgram/kg/min. If not controlled within 5 minutes repeat loading dose then dose at 100 microgram/kg/min for 4 minute Reassess, if controlled continue at 100 microgram/kg/min. If not controlled reload then dose at 150 microgram/kg/min for 4 minutes. Reassess. if controlled continue at 150 microgram/kg/min. If not controlled reload then dose at 200 microgram/kg/min for 4 minutes. Reassess. If controlled continue at 200 microgram/kg/min.	Available as 10mg/ml ready diluted 250ml solution for infusion.	No additional drugs should be added to the ready diluted infusion bag pH: 3.5-5.5	Doses greater than 200 microgram/kg/min are not recommended. Half life is 5-10 minutes, action lasts about 20-30 minutes. Titration intervals may be increased to 10 minutes if desired. Intended for short term use only, transfer to an alternative agent once control of HR or BP is achieved. **Monitor**: HR, BP and ECG and blood glucose. Extreme caution in asthmatics due to risk of bronchospasm. Do not flush - replace giving set The 250ml ready diluted bag has a medication port. This is to be used for withdrawing the initial bolus from the bag and is not intended for repeat bolus administration. No additional drugs should be added to the bag through the port. If ready diluted solution for infusion is unavailable dilute a 2.5 gram vial in 250ml G or NS to provide 10mg/ml. DO NOT USE 250MG/ML AMPOULES UNDILUTED. Also available as 100mg in 10ml vials.

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DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Etomidate	IV bolus into a large vein under supervision of a doctor	3 minutes	May be diluted with NS or G	**Compatible**: alfentanil, midazolam, morphine **Incompatible**: pancuronium, vecuronium, Hartman's pH: 4-7	Monitor: BP, HR, and RR. Muscle movement and pain on injection: diazepam or an opioid analgesic will reduce muscle movement. Respiratory depression and hypotension can occur if given too quickly. Flush: NS or G
Fentanyl	IV bolus under supervision of a doctor in non ventilated patients	3-4 minutes	May be diluted with NS or G if necessary	**Compatible**: atracurium, atropine, droperidol, heparin, Potassium chloride, midazolam propofol, vecuronium **Incompatible**: alkaline solutions including thiopentone pH: 3.3-6.3	Monitor: BP, HR and RR. Transient hypotension may occur especially in hypovolaemic patients. Muscular and chest wall rigidity may occur with rapid injection. Severe respiratory depression, apnoea, peripheral. circulatory collapse, cardiac arrest and anaphylactic shock. Maintain ventilation. Extravasation: May cause tissue damage. Flush: NS Sodium content: 0.3mmol/1ml
	Continuous Infusion via pump				
	PCA	As Per Pain Service Protocol (10mcg bolus with hourly limit of 80, 100 or 120micrograms)	500mcg diluted to 50ml with NS or G		
Flecainide	Emergency use: IV bolus under supervision of a doctor.	2mg/kg over a minimum of 10 minutes. Maximum recommended bolus dose is 150mg.	Can be diluted with G	**Compatible**: digoxin, streptokinase **Incompatible**: alkaline solutions and those containing chloride, phosphate or sulphate ions pH: 5-6	Do not use parenteral route of administration for longer than necessary. Monitor: ECG, arrhythmia. Flush: G
	Intermittent or Continuous Infusion with pump	Loading dose 2mg/kg over 30 minutes then 1.5mg/kg over 1 hour then 0.1-0.25 mg/kg/hour	Dilute in 50ml G for intermittent infusion. For continuous infusion dilute in 250-500mls G If using NS then minimum volume is 150mg per 500mls to prevent precipitation		
Flucloxacillin	IV bolus preferred method	3-5 minutes	Reconstitute 500mg in 5-10ml and 1g with 15-20ml W. Can be diluted with NS or G	**Compatible**: aminophylline, bumetanide, heparin, piperacillin, ranitidine **Incompatible**: aminoglycosides, lipid emulsions (including propofol) pH: 5-7	**Monitor**: Anaphylaxis Flush: NS Sodium content: 0.57mmol/250mg
	Intermittent Infusion	30-60 minutes	Reconstitute as above then dilute in NS or G to 50-100ml		

DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Fluconazole	Intermittent Infusion	Infuse at a rate of approximately 5-10ml/min (10-20mg/min)	Provided ready diluted 2mg/ml in 0.9% Sodium Chloride.	**Incompatible**: amphotericin, ampicillin, ceftazidime, digoxin pH: 4-8	**Monitor**: Anaphylaxis, angioedema Flush: NS Sodium content: 15 mmol/200mg (100ml bottle) Chloride content: 15 mmol/200mg (100ml bottle)
Flumazenil	IV bolus under supervision of a doctor	200 micrograms over a minimum of 15 seconds. If the desired level of consciousness is not obtained within 60 seconds a further dose of 100 micrograms can be injected and repeated at 60-second intervals where necessary, up to a maximum total dose of 1mg or in intensive care situations, 2mg. The usual dose required is 300 - 600 micrograms.	Can be diluted with NS or G	Do not infuse with any other drug pH: 4	If resedation is likely to occur, additional doses may be given at 20 minute intervals **Monitor**: Excessive and/or rapidly injected doses of may induce benzodiazepine withdrawal symptoms such as anxiety attacks, tachycardia, dizziness and sweating in patients on long-term and/or high dose benzodiazepine treatment ending at any time within the weeks preceding administration (depending on the half-life of the benzodiazepine used). Transient increases in blood pressure, flushing and rarely seizures especially in epileptic patients Flush: NS
Folic acid	IV bolus	3-5 minutes	Can be diluted with NS	**Incompatible**: calcium gluconate, doxapram Will precipitate at pH below 4.5-5 pH: 8-11	Extravasation: May cause tissue damage Flush: NS
Frusemide (Furosemide)	IV bolus	Maximum rate 4mg/minute	Can be diluted with NS	**Refer to Y-Site Compatibility Chart** **Compatible**: atropine, bumetanide, digoxin, meropenem. **Incompatible**: amphotericin, bleomycin, dobutamine, ciprofloxacin, doxapram, droperidol, enoximone, pethidine, gentamicin, milrinone, pH: 8.7-9.3	**Monitor**: BP, HR, fluid balance. Rapid administration may damage hearing Extravasation: May cause tissue damage Flush: NS Sodium content: 0.7mmol for 50mg/5ml, 0.3mmol for 20mg/2ml
	Continuous or Intermittent Infusion with pump		Dilute with NS, usually 1mg/ml. Can be given undiluted. If G is used it is liable to precipitate, discard if cloudy or precipitate develops.		
Fusidic acid	See sodium fusidate				

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DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Gamma Globulin (Normal Immunoglobulin)	Infusion via pump	Dose: **Refer to Summary of Product Characteristics for each product.** Titrate rate as below:	Reconstitute with solvent provided (NS) and use immediately. Do not shake the solution. Give undiluted Already in solution	Do not administer with any other drugs or fluids and administer via a dedicated line	**Monitor**: BP, HR, RR, anaphylaxis. Delayed reactions may occur 30-60 mins after start of infusion e.g. headache, nausea, pyrexia, treat symptomatically Flush: NS
	Sandoglobulin® Patients being treated with Sandoglobulin for the first time should be given a 3% infusion at an initial rate of 0.5 to 1.0ml/min. If no adverse reactions occur within the first 15 minutes, the rate may be gradually increased to a maximum of 2.5ml/min. In patients receiving Sandoglobulin regularly and tolerating it well, higher concentrations (up to a maximum of 12%) may be used, but the infusion should always start at a low rate and close monitoring of the patient is required when the rate is gradually increased.		Use NS diluent provided. Can dilute is G if essential. Refer to package insert for full directions on reconstitution and administration.	As above.	
	Vigam Liquid® 0.01 - 0.02ml/kg/min for 30 minutes, increased gradually to 0.04ml/kg/min if tolerated. Maximum rate 3ml/minute for the remainder of the infusion as tolerated.		Ready diluted solution. No further dilution required.	As above.	Administer using the recommended infusion set (Codan set with a 15 micron filter). Store in Fridge.
	Flebogamma® Infuse at a rate of 0.01-0.02 ml/kg bodyweight per minute for the first thirty minutes. If the patient does not experience any discomfort the rate may be increased up to 0.07 ml/kg per minute and if tolerated subsequent infusions to the same patient may be at the higher rate. If adverse effects occur the rate should be reduced or the infusion interrupted until the symptoms subside. The infusion may then be resumed at a rate, which is tolerated by the patient.		Ready diluted solution. No further dilution required.	As above.	

DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Gelofusine	Intermittent or Continuous Infusion	Acute blood loss or hypovolaemia: 500ml can be given in 5-10 minutes, usually 100-200ml boluses given		**Refer to Y-Site Compatibility Chart** pH: 7.4	**Monitor**: Severe anaphylactic reactions may occur Sodium content: 77mmol/500ml
Gentamicin	Intermittent Infusion	30 minutes Dose: 3-5mg/kg once daily depending on renal function	Dilute with 50 mls NS or G	**Compatible**: aciclovir, amiodarone, atracurium, aztreonam, insulin, meropenem, midazolam, Metronidazole **Incompatible**: amphotericin, erythromycin, frusemide, heparin, penicillins, propofol, trimethoprim pH: 3-5	**Monitor**: Give dose at 12 noon and take plasma levels at 6am with regular ITU bloods. Desired level is less than 1mg/l (1mcg/ml) indicating adequate clearance. If level is 1-2mcg/ml seek advice from pharmacist/doctor as level may be acceptable. Rapid bolus of large doses may cause neuromuscular blockade. Extravasation: May cause tissue damage Flush: NS Sodium content: negligible
Glucagon	IV bolus	3-5 minutes	Reconstitute with 1ml of W to give 1mg/ml (Accompanying diluent contains preservative - avoid use if giving repeat doses)	pH: 2.5-3	1 unit (iu) = 1 mg Infusion is used for cardiogenic shock following beta-blocker overdose **Monitor**: BP, hypotension, blood glucose, serum calcium and potassium; allergic reactions. Extravasation: May cause tissue damage Flush: NS. Protect container from light and store between 2°C and 8°C. Packs carried for use may be kept at room temperature (maximum 25°C) for up to 18 months provided that the expiry date is not exceeded.
	Infusion via pump	5-10mg stat then 1-10mg/hour (for beta blocker overdose)	Reconstitute with W then dilute in G		
Glucose 5-10%	IV bolus		Glucose infusions can be diluted with W if the concentration required is unavailable	pH: Glucose 5% 4-4.2 Glucose concentrations > 5% pH 4-6 (average 4)	G 5% is isotonic with blood and can be infused through a peripheral line. If G 10% is administered peripherally use a large vein and preferably alter the injection site daily. Concentrations greater than 20% should be infused through a central line to prevent venous irritation and thrombophlebitis **Monitor**: Hyperglycaemia. Infusing too quickly may cause local pain and venous irritation. Extravasation: May cause tissue damage
	Continuous or Intermittent Infusion				
Glucose 20-50%	Continuous or Intermittent Infusion via **central line**				
	IV bolus peripherally into large vein. **Emergency use only.**	When administered rapidly for hypoglycaemia give over 1-2 minutes			

DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Glyceryl trinitrate	Continuous or Intermittent Infusion with pump	10-200 micrograms/minute titrated to effect	Provided ready diluted. May be diluted in NS or G.	**Refer to Y-Site Compatibility Chart** **Incompatible**: alteplase, hydralazine pH: 3.5-6.5	Glyceryl trinitrate is significantly absorbed by PVC and giving set, do not add to minibags, titrate to effect. **Monitor**: BP, HR tachycardia and paradoxical bradycardia, restlessness, muscle twitching. Replace giving set - do not flush
Glycopyrronium	IV bolus	200 microgram (0.2 mg) or fraction of over 1 to 2 minutes up to a maximum 400 micrograms. Dose may be repeated as necessary.	May be diluted with NS or G	**Compatible**: fentanyl, midazolam, lorazepam morphine, neostigmine, pethidine **Incompatible**: diazepam, thiopentone, pentazocine, phenobarbitone, alkaline drugs pH: 2.3-4.3	**Monitor**: Arrhythmias, HR Extravasation: May cause tissue damage Flush: NS or G Sodium content: 0.15mmol/1ml
Haloperidol	IV bolus	3-5 minutes. Maximum 5mg/minute	Can be diluted with NS (maximum concentration 500micrograms/ml)	**Compatible**: diamorphine, G **Incompatible**: Fluconazole, heparin, phenytoin, tazocin, sodium nitroprusside, NS if concentration exceeds 1mg/1ml pH: 3-3.8	Use infusion within 8 hours. Protect infusion from light. **Monitor:** BP, HR, RR, rapid administration may cause severe hypotension and tachycardia. Extrapyramidal symptoms. Very rarely laryngeal or pharyngeal spasm. May cause paradoxical lowering of BP with adrenaline. Extravasation: May cause tissue damage Flush: NS Sodium content: Negligible
	Infusion via pump	3-25mg/hour	Dilute with NS or G to a suggested volume of 50mg in 100ml (concentrations greater than 500micrograms/ml will precipitate)		
Heparin	Continuous Infusion via pump	To maintain APTT 1.5 to 2.5 times control (Suggested dose 80units/kg load followed by 18 units/kg per hour. Take APTT 6 hours after initiation or dose change)	Dilute required dose with NS. Usually 24,000 units in 48mls (500 units/ml)	**Refer to Y-Site Compatibility Chart** **Compatible**: aciclovir, amphotericin, atropine, benzylpenicillin, calcium gluconate, ceftazidime, cefotaxime, digoxin, edrophonium, isoprenaline, meropenem, streptokinase, suxamethonium, tranexamic acid **Incompatible**: Most other drugs including antibiotics, some antihistamines, phenothiazines, alteplase, erythromycin, gentamicin, phenytoin, ciprofloxacin, cytarabine, daunorubicin, doxorubicin, droperidol, epirubicin. pH: 5-8	**Monitor**: possible skin necrosis Flush: NS
	For CVVHD continuous via pump	Run at 1-4 mls per hour (250 units/ml) into blood going into filter to maintain ACT 140 to 160	5000 units in 20mls NS		

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DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Hydralazine	Intermittent Infusion via pump	Hypertension with renal complications and hypertensive crisis. 5-10mg over 3-5 minutes If necessary a repeat injection can be given after an interval of 20-30 minutes	Reconstitute a 20mg ampoule with 1ml W. This should then be further diluted with 10ml NS before administration. The injection must be given immediately and any remainder discarded.	**Compatible**: dobutamine, heparin, Potassium chloride **Incompatible**: G, aminophylline, Furosemide, GTN, hydrocortisone, sulphonamides G infusion solutions are NOT compatible, because contact between hydralazine and glucose causes hydralazine to be rapidly broken down. pH: 3.5-5	**Monitor**: Tachycardia, hypotension, BP and HR Extravasation: May cause tissue damage Flush: NS Sodium content: nil
	Continuous Infusion via pump	Hypertension with renal complications and hypertensive crisis. Initial dose: 200-300 micrograms/minute Maintenance: 50-150 micrograms/minute (3-9 mg/hour)	Reconstitute 20mg as above and give in 500ml NS. Suggested minimum dilution (unlicensed): Reconstitute 2 ampoules with 1ml of W each and further dilute with NS to 40mls to make a concentration of 40mg/40ml NS		
Hydrocortisone sodium succinate	IV bolus	Minimum 3-10 minutes	Reconstitute with 2ml W. Can be diluted with NS or G	**Refer to Y-Site Compatibility Chart** **Compatible**: chloramphenicol, desferrioxamine, daunorubicin, edrophonium **Incompatible**: ciprofloxacin, dacarbazine, hydralazine. pH: 7-8	**Monitor**: BP, HR, RR, hypotension, cyanosis, cardiac arrest, perianal itch. Flush: NS or G Sodium content: 0.5mmol/100mg
	Continuous or intermittent Infusion		Reconstitute as above then dilute to a maximum concentration of 2mg/ml with NS or G (100mg in 50ml)		
Hyoscine butylbromide	IV bolus	3-5 minutes	Can be diluted with G or NS	**Compatible**: diamorphine, morphine, pethidine pH: 3.7-5.5	**Monitor**: HR, tachycardia. Extravasation: May cause tissue damage Flush: NS or G Sodium content: 0.4mmol/1ml
Hyoscine hydrobromide	IV bolus		Can be diluted with W	pH: 3.5-6.5	**Monitor**: HR, RR, temperature and sedation level. Bradycardia can occur following low doses. Drowsiness leading to coma (CNS stimulation may precede CNS depression). Toxic doses can cause hyperpyrexia, respiratory depression or rapid respiration. Flush: NS Sodium content: Negligible

DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Iloprost	Infusion via a syringe pump	0.5-2 nanograms/minute. Increase dose in increments of 0.5 nanograms/kg/minute every 20-30 minutes to deliver a dose of 0.1 mg	Dilute each ampoule with 50ml NS or G	Do not infuse with any other drugs or infusion fluids pH: 8.3	Regime in use : An infusion for 6 hours each day for 5 days. A licenced product will soon be available, however remains unlicenced at present. **Monitor**: BP, HR. Stop infusion if side effects occur such as drop in BP, tachycardia, nausea and vomiting. Wait one hour and recommence at half previous rate. Flush: NS or G Sodium content: 0.15 mmol/ampoule
Imipenem - Cilastin	Intermittent infusion	250mg - 500mg over 20 - 30 minutes or 1g over 40 - 60 minutes	Dissolve 500mg vial with 100ml NS, D or DS to produce a 5mg/ml solution. Shake to produce a yellow or colourless solution. Monovial preparation contains a built in transfer needle to allow constitution directly into IV bag. Unlicensed practice in fluid restricted patients: add 500mg to 50ml NS. Mix and add a further 10ml NS if not fully dissolved. Examine.	Do not use Hartman's as a diluent in reconstitution but may mix at a Y-site. Inactivated in acid and alkaline pH **Compatible**: insulin, propofol **Incompatible:** sodium bicarbonate, midazolam pH: 6.5 - 7.5	Slow rate if nausea develops. **Monitor**: allergic reactions: erythema, pain and thrombophlebitis. Sodium content: 1.7mmol per 500mg vial Flush: NS
Insulin Soluble / neutral **(Actrapid)**	IV bolus	3-5 minutes		**Refer to Y-Site Compatibility Chart** **Compatible**: metoclopramide **Incompatible**: phenytoin, sodium bicarbonate, sulphonamides, thiopentone pH: neutral	Loss of drug onto bag, plastic syringe or giving set may occur. Change syringe every 24 hours.
	Continuous Infusion via pump	Titrate to effect	Dilute with NS to 1unit/ml in a syringe. (50 units in 50ml)		Insulin is stable in G if the pH of G is above 5.5 (higher than standard G pH) **Monitor**: Hypoglycaemia and blood glucose, sodium, potassium and blood pH, ketone in urine. Flush: NS or G
Isoniazid	IV bolus	3-5 minutes	Preferably administer undiluted. If necessary can be diluted with 10-20ml W, but must be administered immediately.	**Incompatible**: G pH: 5-5.6	**Monitor**: Rarely convulsions and psychotic reactions. Can cause peripheral neuropathy (preventable with pyridoxine) Flush: NS

DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Ketamine	IV bolus must be given under supervision of a doctor	Minimum 60 seconds		**Compatible**: midazolam, morphine, propofol **Incompatible**: barbiturates, doxapram pH: 3.5-5.5	**Monitor**: BP, HR, RR, emergence delirium. Temporary elevation of blood pressure and heart rate frequently occur. Also arrhythmias, laryngospasm, respiratory depression and hypotension. Tonic and clonic movements resembling seizures may occur. Extravasation: May cause tissue damage Flush: NS or G Sodium content: Negligible
	Continuous infusion via a pump	Titrate to effect	Dilute to 1mg/ml with G or NS. Concentrations of 10mg/ml and 50mg/ml have been administered in fluid restricted patients (unlicensed practice)		
Labetolol	IV bolus under supervision of a doctor	Usual maximum rate 2mg/minute Dose: 50mg can be given over 1 minute and may be repeated if necessary after 5 minutes to a maximum of 200mg. After bolus injection, the maximum effect usually occurs within five minutes and the effective duration of action is usually about six hours but may be as long as eighteen hours.		**Compatible**: dobutamine, dopamine, midazolam, morphine, potassium chloride **Incompatible**: sodium bicarbonate pH: 3-4	Excessive bradycardia can be countered with IV atropine 0.6-2.4mg in 0.6mg doses. Glucagon IV may be given to treat overdose. **Monitor**: ECG, BP, bradycardia and hypotension. Bronchospasm and asthma. Extravasation: May cause tissue damage
	Continuous or intermittent infusion via pump	Maximum rate 50mg/minute.	Usually dilute to 1mg/ml with NS or G. May give as 200mg in 50ml with NS (4mg/ml), has been given undiluted		Flush: NS Sodium content: Negligible

DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Levosimendan	Continuous Infusion for 24 hours (based on LIDO[1] Study)	Loading Dose (usually omitted): 6-12 microgram/kg over 10 minutes* (6micrograms/kg with concomitant vasoactive/ inotropic agents) Continuous Infusion: Start at 0.1 micrograms/kg/min and monitor BP & HR for 30 minutes. If not tolerated reduce rate to 0.05 micrograms/kg/min. If tolerated increase infusion gradually to target rate of 0.2micrograms/kg/min	Two strengths of solution can be prepared: **1. 25mcg/ml** Mix one vial of levosimendan (12.5mg) with 500ml G **2. 50mcg/ml** Mix one vial of levosimendan (12.5mg) with 250ml G	No pharmacokinetic interactions have been observed with patients receiving digoxin and levosimendan. Levosimendan can be used in patients receiving beta-blocking agents without loss of efficacy. Co-administration of isosorbide mononitrate and levosimendan in healthy individuals resulted in significant potentiation of the orthostatic hypotensive resonse. No potentiation of the decrease in blood pressure after concomitant administration of nitrates and levosimendan was found in patients. Do not add to any other drugs or fluids.	*Due to hypotension and tachycardia patients often do not tolerate loading dose. Other side effects: headache, extrasystoles, atrial fibrillation, tachycardia and myocardial ischaemia. Currently unlicensed in the UK. Haemodynamic effects persist for at least 24 hours and may be seen up to 9 days after discontinuation of a 24 hour infusion. Approximately 5% of levosimendan is metabolised to an active compound OR-1896, which has a half life of 75-80 hours. Store in fridge. More information in Pharmacy Information File on ITU [1]Follath et al. Efficacy and safety of intravenous levosimendan compared with dobutamine in severe low-output heart failure (the LIDO study): a randomised double-blind trial. *Lancet* 2002; 360: 196-202.
	Intermittent Infusion for 6 hours (based on RUSSLAN[2] Study)	Loading Dose (usually omitted): 12-24 microgram/kg over 10 minutes* 0.1-0.2mcg/kg/min for 6 hours.			[2]Nieminem M.S et al. Randomised study on safety and effectiveness of levosimendan in patients with left ventricular failure after an acute myocardial infarction (RUSSLAN). Abstract available from www.orionpharma.com

DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Lignocaine (Lidocaine)	IV bolus for initial loading under supervision of a doctor	100mg as bolus over a few minutes (50mg in some cases see BNF)		**Compatible**: alteplase, amiodarone, cimetidine, digoxin, dopamine, dobutamine, heparin, propofol, sodium nitroprusside, streptokinase **Incompatible**: adrenaline pH: 3.5-6 (pre-mixed solution)	Concentrations up to 8mg in 1ml have been used by infusion **Monitor**: BP, HR, rapid administration may produce dizziness, paraethesia and drowsiness. Hypotension, bradycardia and tachycardia leading to arrest: ECG monitoring required CNS and peripheral reactions are dose related Extravasation: May cause tissue damage Flush: NS
	Continuous or Intermittent Infusion via pump	Maximum 4mg/minute for 30 minutes, 2mg/minute for 2 hours, then 1mg/minute. Reduce concentration further if infusion continues beyond 24 hours.	Dilute with NS or G to concentration of 0.1-0.4% (1 to 4mg/ml) or use ready prepared 2mg per ml preparation.		
Linezolid	Intermittent infusion	30 – 120 minutes	2mg/ml ready diluted bags (600mg in 300ml)	**Incompatible**: amphoteracin B, chlorpromazine, co-trimoxazole, diazepam, erythromycin, pentamidine, phenytoin, ceftriaxone.	Flush: G, NS Sodium content: 114mg per bag Do not add any drugs or fluids to the premade bags.
Liothyronine (Tri-iodothyronine sodium / T3)	IV bolus	3-5 minutes	Reconstitute with 1-2ml W	pH: 11	**Monitor**: BP, HR, ECG, arrhythmia, tachycardia, palpitations and cramp in skeletal muscle. Extravasation: May cause tissue damage Flush: NS Sodium content: 1.49mmol/1g
Lorazepam	IV bolus	Usually 3-5 minutes, maximum rate 2mg/minute	Can be diluted 1:1 with NS or W	**Compatible:** dobutamine, dopamine, frusemide, heparin, morphine **Incompatible**: buprenorphine, ondansetron pH: Non-aqueous solution therefore no pH	Avoid injecting into small veins **Monitor**: BP, RR, rapid administration increases risk of respiratory depression and hypotension. Flush: NS

DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Magnesium sulphate	IV bolus for small doses (4-8 mmols)	3-5 minutes, maximum rate 150mg/minute (0.6mmol/minute)	Dilute to a maximum concentration of 200mg/ml (0.8mmol/ml) with NS or G	**Refer to Y-Site Compatibility Chart** **Compatible**: amphoteracin **Incompatible**: alkalis, clindamycin, phosphates, sulphates pH: 5.5-7	Magnesium sulphate 50% injection contains 1g (4mmol) magnesium in 2ml **Monitor**: BP, RR, rapid administration may cause flushing and hypotension. ECG, magnesium plasma levels and fluid monitoring is recommended. Extravasation: May cause tissue damage Flush: NS
	Intermittent or Continuous Infusion via pump	Usual rate 20 mmol over 4 hours.	**Central**: usually 20-40 mmol in 50ml NS or G Peripheral line dilute each 1g (4mmol magnesium) in a minimum of 10-50ml NS or G.		
Mannitol	Infusion via pump	50-200g/24 hours Single dose usually over 30-90 minutes.	Provided as ready prepared infusions 10% or 20%, 500ml	**Compatible:** Propofol **Incompatible**: Strongly alkaline or acidic solutions, Potassium chloride pH: 4.5-7	Preferably administer via a central venous catheter. Infusions may crystallise at low temperatures, redissolve by warming **Monitor**: BP, HR, nausea, vomiting, headache, chills, fever, tachycardia, chest pain, hypo or hypertension, fluid balance and urine output. Extravasation: May cause tissue damage Flush: G
Meropenem	IV bolus	5 minutes	Reconstitute each 500mg with 10ml W or NS to give 50mg/ml	Do not mix with or ad to any other drugs or fluids. pH: 7.3-8.3	**Monitor**: Anaphylaxis, CNS toxicity Flush: NS Sodium content: 3.9 mmol/gram
	Intermittent Infusion	30 minutes	Reconstitute as above and then dilute with 50-100ml NS or G		
Methylene blue 1% (Methylthioniu m chloride)	IV bolus	1-2 mg/kg over 5 minutes Used for methaemoglobinaemia NO poisoning and treatment of septic shock (for low SVR)	Usually given undiluted		Unlicensed use. Not effective for methaemoglobinaemia in patients with glucose-6-phosphate dehydrogenase deficiency, may be harmful in these patients leading to increased haemolytic anaemia. **Monitor**: Large doses may cause methaemoglobinaemia. Will impart blue colour to urine and skin which hinders diagnosis of cyanosis. BP, HR, RR, nausea, vomiting, sweating, chest pain, dizziness, dyspnoea and hypertension, haemolysis and methaemoglobinaemia
	Intermittent infusion	For current regimen in septic shock, please see ICU drug Information folder.	Dilute in NS to make a 5mg/ml solution i.e. 250mg (25ml of a 1% solution) in 50ml. More dilute solutions may also be used.		

DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Methyl-prednisolone sodium succinate	IV bolus doses up to 250mg	Slowly over minimum 5 minutes	Reconstitute with diluent provided	**Compatible**: Dopamine, heparin, midazolam, morphine **Incompatible**: aminophylline, calcium, ciprofloxacin, insulin, pethidine, ondansetron, penicillin, Potassium chloride, propofol pH: 7.4-8	Use infusion within 6 hours **Monitor**: Bradycardia and rarely anaphylaxis. If administered too quickly cardiac arrhythmias circulatory collapse and cardiac arrest may occur Flush: NS or G Sodium content: 2mmol/g
	Intermittent Infusion doses over 250mg	Minimum 30 minutes. Usually 60 minutes	Reconstitute as above then dilute with NS or G to 50-100mls		
Metoclopramide	IV bolus	3-5 minutes	Can be diluted with NS (usually 10-20ml)	**Compatible**: aminophylline, droperidol, heparin, insulin	**Monitor**: Dystonic reactions, particularly in children and young women. Too rapid administration will cause anxiety, restlessness then drowsiness. Flush: NS or G Sodium content: 10mg/2ml = 0.26 mmol
	Intermittent infusion via pump		Dilute 20mg in 20ml G or NS	Can be mixed with some cytotoxic agents and opiates, see data sheet **Incompatible**: propofol pH: 3-5	
Metoprolol	Intermittent infusion via pump	1-2 mg/minute Dose: 5mg, repeated after 5 minutes if necessary to total dose of 10-15mg	Ready diluted but may be further diluted in NS	**Compatible**: morphine pH: 5.5-7.5	Excessive bradycardia may be countered with IV atropine 0.6-2.4mg in 0.6mg doses Glucagon IV may be given to treat over dose. **Monitor**: BP, HR, bradycardia, hypotension, cardiac arrhythmias, extreme caution in patients with SBP <100mmHg or HR < 40 or PQ time > 0.26 seconds. Sodium content: 0.8 mmol/5mg
Metronidazole	Intermittent infusion	25mg/minute (20-30 minutes for 500mg)	Provided ready diluted, may be further diluted with NS or G	Cefotaxime and ceftazidime can mixed into an infusion of metronidazole. **Compatible**: amikacin, amiodarone, amoxycillin, ceftazidime, dopamine, gentamicin, heparin, meropenem, Potassium chloride **Incompatible**: aztreonam, trimethoprim, G10%. pH: 5-7	Flush: NS, G Sodium content: 13.5 mmol/500mg

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DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Midazolam	IV bolus	30 seconds minimum. Usually over 2 minutes at intervals of at least 2 minutes	May be diluted in NS or G	**Refer to Y-Site Compatibility Chart** **Compatible**: atropine, droperidol, fentanyl, glycopyrronium, hyoscine, ketamine, pancuronium, pethidine, **Incompatible**: compound sodium lactate solution, ranitidine pH: 3	Sedating agent, patient requires maintenance of airway **Monitor**: BP, HR, RR, respiratory depression and arrest have occurred when doses were given too rapidly. Extravasation: May cause tissue damage Flush: NS
	Continuous infusion following initial loading dose over 5 minutes, via pump		Use ready diluted 2mg/ml or dilute in NS or G		
Milrinone	Continuous infusion following initial loading dose over 10 minutes via pump.		Add 40ml NS or G to 10ml ampoule to produce a 200mcg/ml solution. More dilute solution can be made if required.	**Compatible:** adrenaline, dobutamine, dopamine, insulin, midazolam, morphine, noradrenaline, propofol **Incompatible:** bumetanide, frusemide, sodium bicarbonate. pH 3.2 - 4.0	Monitor: BP, HR, ECG, supraventricular and ventricular arrhythmias, hypotension.
Morphine	IV bolus	Usually 5 minutes. In acute pain a maximum of 1ml of solution can be given over 30 seconds	Can be diluted with NS or G	**Refer to Y-Site Compatibility Chart** **Compatible**: atenolol, bumetanide, digoxin, droperidol, glycopyrronium, hyoscine butylbromide, ketamine, propranolol, suxamethonium, vancomycin, verapamil, meropenem **Incompatible**: alkaline solutions, phenytoin, sodium bicarbonate, thiopentone pH: 2.5-4.5	Sedating agent, patient requires maintenance of airway **Monitor**: BP, HR, RR, respiratory depression, apnoea, hypotension, peripheral circulatory collapse, chest wall rigidity, cardiac arrest and anaphylactic shock. Extravasation: May cause tissue damage Flush: NS or G Sodium content: Negligible
	Continuous or Intermittent Infusion via pump		Usually dilute 1mg/ml in NS or G		
	PCA	Refer to PCA Protocol	1mg/ml NS 50ml PFS		

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DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Naloxone	IV bolus		Can be diluted with W immediately before use	**Compatible**: heparin, propofol, verapamil **Incompatible**: alkaline solutions and solutions containing bisulphite or metabisulphite pH: 3-4.5	Use infusion within 12 hours Duration of action of most opioids will outlast that of an IV bolus of naloxone, repeat IV bolus doses or an IV infusion may be necessary **Monitor**: BP, HR, RR, hypotension, hypertension, ventricular tachycardia and fibrillation. Precipitation of acute withdrawal syndrome Extravasation: May cause tissue damage Flush: NS or G
	Intermittent or Continuous Infusion via pump	According to response	Dilute with G or NS to 4 micrograms/ml 1.2mg diluted to 50ml with NS (24micrograms in 1ml) administered via pump has been used		
Nimodipine	Infusion via pump	500micrograms - 2mg/hour (2.5-10mls/hour)	Provided ready diluted	pH: 6-7.5	Must be administered via a central catheter, using an infusion pump, through a Y-site connector into an infusion of NS or G, albumin 4.5%, dextran 40 or mannitol 10% running at 40ml/hour. Incompatible with PVC, use polyethylene or polypropylene apparatus. Protect infusion set from light. **Monitor**: hypotension, BP, tachycardia or bradycardia, HR. Flush: NS or G
Nitroprusside	See sodium nitroprusside				
Noradrenaline (Norepinephrine)	Intermittent or Continuous Infusion via central line with pump	Adjust rate according to response	2mg - 16mg in 50ml G (or NS). pH of diluent should be below 6. Use of NS as diluent results in loss of potency.	**Refer to Y-Site Compatibility Chart** **Compatible**: calcium salts, cimetidine. **Incompatible**: chlorpheniramine, sodium bicarbonate, thiopentone pH: 3-4.5	Strengths above 16mg in 50ml only for exceptional circumstances or if requested by a doctor. Discard infusion if brown colour develops. 1:1000 solution contains 1mg noradrenaline base/1ml. Noradrenaline base 1mg/1ml = noradrenaline acid tartrate 2mg/1ml. **Monitor**: BP, HR, ECG, hypertension, bradycardia, arrhythmia. Full haemodynamic monitoring required. Extravasation: May cause tissue damage Flush: G or NS

DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Octreotide	IV bolus	3-5 minutes	Dilute each 1ml octreotide with minimum 1ml and a maximum of 9ml NS	**Incompatible**: do not infuse with any other drug including G and insulin pH 3.9 - 4.5	Subcutaneous administration is the preferred method of administration, rotate site. Use infusion within 8 hours. **Monitor**: BP, HR, bradycardia, hypotension, facial flushing, transient hyper or hypoglycaemia
	Infusion via pump	50 micrograms per hour	Bleeding oesophageal varices: 500micrograms to 50ml with NS		
Omeprazole	High dose omeprazole in bleeding ulcers: 80mg administered over 1 hour followed by a continuous infusion of 8mg/hr for 72 hours	Administer continuous infusion as series of 80mg in 200ml NS over 10 hours (20ml/hr) for 72 hours. (Last bag will only run for 2 hours, therefore add 40mg to 100ml NS).	Remove and discard 50ml from 250ml bag of NS. Reconstitute 2 x 40mg vial with 5ml of remaining 200ml NS bag. Add 2 x 40mg vials to 200ml NS.		**See protocol and administration record sheet** (supplied with drug by pharmacy). **To be started only on recommendation of gastroenterologist** An infusion bag will need to be prepared every 10 hours as there is no stability data beyond 12 hours. Patients scoped and thought to be at high risk of re-bleeding (either because of age, co-morbidity or OGD findings) or planned for OGD the following day but thought to be at high risk for similar reasons. The regime is that used in the NEJM article, 80mg stat, followed by 8mg/hour for 72 hours. According to current evidence, there is no rationale for prescribing a stat dose of IV omeprazole. Either patients are felt to be at high risk of or from a further GI bleed, in which case they should receive the infusion, or not, in which case they could receive either an oral PPI or intravenous ranitidine.
Ondansetron	IV bolus	3-5 minutes	Can be diluted with NS or G	**Compatible**: concentration dependent see data sheet, amphotericin, carboplatin, ceftazidime, cisplatin, cyclophosphamide, dexamethasone, doxorubicin, etoposide, fluorouracil, mannitol 10%, Potassium chloride. **Incompatible**: alkaline drugs, lorazepam pH: 3.3-4	**Monitor**: BP, HR hypersensitivity reactions, bradycardia, hypotension, arrhythmias, fits and involuntary movements Extravasation: May cause tissue damage Flush: NS Sodium content: 0.16mmol/1ml
Pabrinex IV High potency	See vitamins B and C				

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DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Pancuronium	IV bolus preferably through tubing of flowing NS or G infusion Infusion via pump		Can be diluted with G or NS	**Compatible**: aminophylline, cimetidine, dopamine, dobutamine, heparin, propofol, midazolam, sodium nitroprusside, verapamil **Incompatible**: etomidate, diazepam, phenobarbitone pH: 4	Paralysing agent, patient requires assisted ventilation **Monitor**: BP, HR, Tachycardia and rise in arterial pressure and cardiac output. Extravasation: May cause tissue damage Flush: NS or G
Paracetamol	Intermittent infusion	15-minutes	Ready diluted.	PERFALGAN should not be mixed with other medicinal products.	Restricted use: as alternative to rectal paracetamol for short-term treatment of post-operative pain as an opioid sparing agent. Use with caution in hepatocellular/ severe renal insufficiency, dehydration. **Monitor:** hypotension, ↑liver enzymes, hypersensitivity, (thrombocyto-/ leuco-/ neutropenia) Sodium content: 3.923mg (=0.065mmol)/100ml vial
Parenteral nutrition	Continuous Infusion via pump	24 hours		Do not infuse with any other drug	Requires a dedicated line for TPN only, no other drugs or infusions to be given through TPN designated line. See guidelines for parenteral nutrition Extravasation: May cause tissue damage
Pethidine	IV bolus	3-5 minutes	Can be diluted with W, NS or G	**Compatible**: atenolol, bumetanide, dobutamine, glycopyrronium, hyoscine butylbromide, midazolam, propranolol, promazine **Incompatible**: aminophylline, barbiturates, frusemide, heparin, phenytoin pH: 3-5.5	Continuous Infusion is unlicensed use. **Monitor**: BP, HR, RR, respiratory depression, hypotension, sedation, anaphylaxis, nausea and vomiting. Maintain airway. Flush: NS or G Sodium content: nil
Phenobarbitone (Phenobarbital)	IV bolus Continuous Infusion via pump	Maximum rate: 60mg/minute (100mg/minute for status epilepticus)	Dilute to 10 times its own volume with W i.e. Dilute 60mg in 1ml to 60mg in 10ml W, or 200mg in 1ml to 200mg in 10ml W It may also be diluted to 10mg/ml solutions in NS	**Incompatible**: acidic solutions including chlorpromazine, pancuronium, pethidine, vancomycin pH: 10-11	Use only freshly prepared injection. **Monitor**: BP, HR, RR, sedation, hypotension, tachycardia, respiratory depression, provide maintenance of airway. Extravasation: May cause local tissue damage Flush: NS Sodium content: 0.79mmol/200mg

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DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Phenytoin	IV bolus into a large vein	Slowly, maximum rate 50mg/minute	Give undiluted	**Incompatible**: do not infuse with any other drugs including ciprofloxacin, clindamycin, G, heparin, intralipid, dobutamine, Potassium chloride, insulin, morphine, pethidine pH: 12	Use infusion within 1 hour of preparation. Do not use if hazy or contains precipitate. **Monitor**: BP, ECG, HR, arrhythmias, hypotension, respiratory depression. Extravasation: May cause tissue damage Flush: NS Sodium content: 0.91 mmol/250mg
	Intermittent Infusion into a large vein		May give undiluted via central line or dilute in 50-100ml NS to a final concentration not exceeding 10mg/ml and use an in-line 0.5 micron filter		
Phosphate (Addiphos)	Intermittent Infusion via central line with pump	Maximum rate 10 mmol/hour	Dilute 40 mmol to 40mls in NS or G	Avoid infusion with other drugs	**Contains 2mmol phosphate, 1.5mmol potassium & 1.5 mmol sodium per ml of injection.** **Monitor**: HR & ECG due to potassium content. Flush: NS
	Intermittent infusion via a peripheral line	0.2mmol phosphate/kg/hour, but at a rate not exceeding 40mmol phosphate over 4 hours.	40mmols in 500mls NS or G		
Phytomenadione (Konakion MM / Vitamin K)	IV bolus	Minimum 3-5 minutes	Ready diluted	**Compatible**: hydrocortisone sodium succinate, Potassium chloride pH: 3.5-7	55ml = contents of 50ml Minibag (has 5mls over fill). Use freshly prepared infusion. **Monitor**: risk of anaphylaxis with rapid IV administration Flush: G
	Intermittent Infusion	20-30 minutes	Dilute each 10mg with 55ml G before administration		
Piperacillin	IV bolus	3-5 minutes	Reconstitute each 4gm with 20 ml W	**Compatible**: aciclovir, bumetanide, ciprofloxacin, flucloxacillin, hydrocortisone, heparin, Potassium chloride **Incompatible**: aminoglycosides, amphotericin, metronidazole pH: 5.5-7.2	**Monitor**: Thrombophlebitis, anaphylaxis Flush: NS Sodium content: 1.85 mmol/1g
	Intermittent Infusion	20-40 minutes	Reconstitute as above then dilute with at least 50ml NS or G		

DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Piperacillin and tazobactam	See Tazocin				
Potassium chloride	Continuous Infusion via central line with pump and ECG monitoring	Usually 10 mmol/hour Suggested maximum rate 20 mmol/hour	Use 40mmol in 40ml pre-made syringes, if these are unavailable use 2 mmol/ml injection.	**Refer to Y-Site Compatibility Chart** **Compatible**: atropine, clindamycin, ceftazidime, digoxin, doxapram, edrophonium, albumin 4.5%, labetolol, hydralazine, oxytocin, propranolol, suxamethonium **Incompatible**: amoxycillin, amphotericin, diazepam, mannitol, phenytoin pH: 4-8	**See protocol for "Potassium by Central Line Administration"** **If switching from central to peripheral administration ensure a ready diluted bag is used. Several incidents have been reported of patients receiving concentrated potassium peripherally.** cause arrhythmia. Consider using pre-mixed bags. Do not administer more than 40mmol potassium/hour. **Monitor**: HR, ECG, serious arrhythmias. Pain and phlebitis. Extravasation: will cause tissue damage Flush: NS
	Continuous Infusion via peripheral line	Usual maximum 10 mmol/hour	Ready prepared infusion bags of 20-40mmol/l are available.		

DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Procyclidine	IV bolus	3-5 minutes	Dilution not recommended	pH: 3.9-4.5	Agitation, restlessness and confusion are symptoms of overdose.
Propofol	Continuous Infusion with pump	Titrate to sedation score	Use undiluted	**Refer to Y-Site Compatibility Chart** **Compatible**: atropine, fentanyl, pancuronium, suxamethonium, **Incompatible**: atracurium pH: 7-7.1	Patient requires maintenance of airway. Syringes and bottles are for single use only. High risk of bacterial growth once opened. Expiry: 12 hours (bottle/pump), 6 hours (syringe). Change giving sets. Can cause stinging when given peripherally, give centrally wherever possible esp. continuous infusions **Monitor**: BP, RR, hypotension, respiratory depression, apnoea. Flush: NS
	IV bolus under supervision of a doctor		Use undiluted		
Propranolol	IV bolus under supervision of a doctor	1mg over 1 minute, repeat at 2 minute intervals to a maximum of 3mg. Not to be repeated for at least 4 hours	Each 1mg can be diluted with 10mls of NS or G	**Compatible**: dobutamine, heparin, morphine, pethidine, Potassium chloride **Incompatible**: decomposes rapidly at alkaline pH pH: 3	Excessive bradycardia may be countered with atropine IV 0.6-2.4mg in 0.6mg doses. Glucagon IV may be given to treat overdose. **Monitor**: ECG, BP, HR bradycardia, hypotension, bradyarrhythmia, bronchospasm. Extravasation: May cause tissue damage Flush: NS Sodium content: nil
Protamine sulphate	IV bolus	Maximum 50mg in 10 minutes	Can be diluted with NS	pH: 2.5-3.5	**Monitor**: APTT, coagulation tests. Rapid administration may cause hypotension, bradycardia and dyspnoea. Risk of anaphylaxis especially in vasectomised males and those allergic to fish. Extravasation; May cause tissue damage Flush: NS

DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Ranitidine	IV bolus	3-5 minutes	Dilute each 50mg with a minimum of 20 mls NS or G	**Compatible**: aciclovir, amikacin, atropine, dopamine, dobutamine, sodium bicarbonate, heparin **Incompatible**: amphotericin, methotrimeprazine, midazolam pH 6.7-7.3	**Monitor**: Rapid administration may occasionally cause bradycardia Flush: NS or G Sodium content: 0.12 mmol/2ml
Rifampicin	Intermittent Infusion	Peripheral line: 2-3 hours	Reconstitute with diluent provided then dilute to a maximum concentration of 600mg in 500ml G (or NS)	Do not infuse with any other drugs pH: Rimactane 8-8.8 Rifidin 4.5-6.5	NS may be used as a diluent, but will slightly decrease stability of the solution Discard infusion after 6 hours **Monitor**: May colour the urine, sputum and tears orange-red. Soft contact lens may be permanently discoloured. Pain at infusion site. Flush: NS Sodium content: less than 0.5mmol/600mg
		Central line: 30 minutes	Reconstitute with diluent provided then dilute in 100mls G (or NS), use immediately and give over 30 minutes		
Salbutamol	IV bolus under supervision of a doctor	3-5 minutes	Dilute to 50 micrograms/ml with W, NS or G	**Incompatible**: aminophylline pH: 3.5 **Refer to Y-Site Compatibility Chart**	**Monitor**: BP, HR, ECG, arrhythmia, tachycardia, tremor. Rarely hypersensitivity reactions including urticaria, bronchospasm and hypotension. Extravasation: May cause tissue damage Flush NS or G Sodium content: 0.15mmol/ml Infusion rates providing 3 to 20 micrograms salbutamol/minute (0.3 to 2ml/minute of the above infusion solution) are usually adequate. Higher doses have been used with success in patients with respiratory failure.
	Continuous Infusion with pump		Severe Bronchospasm: Dilute to 10microgram/ml (5ml of 5mg/5ml added to 495ml) with G or NS. May use 50 micrograms/ml in NS or G in syringe pump.		

DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Sodium Bicarbonate	IV bolus		Supplied as ready prepared infusions.	**Compatible**: amphotericin, fluconazole, ranitidine **Incompatible**: amiodarone, dobutamine, dopamine, dopexamine, doxapram, insulin, labetolol, morphine, noradrenaline, solutions containing calcium, magnesium or phosphate pH: 7-8.5	1.5% sodium bicarbonate is isotonic. Solutions more concentrated than this must be given via a central line. Extravasation: May cause tissue damage Flush: NS or G
	Intermittent or Continuous Infusion		Can be diluted with NS or G		
Sodium chloride	Continuous or Intermittent Infusion		Supplied as ready prepared solutions	pH: 4.5-7	Concentrations over 1.8% should be given via a central line **Monitor**: Vein irritation with concentrated solutions Sodium content: 0.9% injection = 150mmol/1
	IV bolus		Can be diluted with NS or G		
Sodium fusidate	Intermittent Infusion via central line	2 hours	Reconstitute with 10ml buffered diluent provided then dilute 500mg in at least 250ml NS or G (100mls NS has been used)	**Incompatible**: G infusions of 20% or more Precipitation may occur with solutions of pH less than 7.4 pH: 7.4-7.6 after reconstitution with buffer	NS preferred as diluent, G may be used but discard infusion if opalescent **Monitor**: Pain at injection site. Rapid infusion may cause venospasm, haemolysis of erythrocytes and thrombophlebitis Flush: NS Sodium & phosphate content: When reconstituted with 10ml buffered diluent contains 3.1 mmol sodium and 1.1 mmol phosphate
	Intermittent Infusion via wide bore peripheral vein	6 hours	Reconstitute with diluent and then dilute 500mg in at least 500ml NS or G		

DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Sodium nitroprusside	Continuous Infusion with a pump	Gradually titrate to effect	Reconstitute with 2ml G provided then further dilute with G to a maximum concentration of 200micrograms/ml (50mg in 250mls). 1mg/ml via central line has been used.	**Compatible**: Do not give with any other infusion, including NS pH: 3.5-6	Protect infusion and giving set form light. Discontinue infusion gradually over 10-30 minutes **Monitor**: HR & BP. Precipitous decreases in BP, intra-arterial blood pressure monitoring necessary. Cyanide intoxication on prolonged or high dose administration (air hunger, bright red venous blood, confusion) or methaemoglobinaemia (chocolate brown blood & impaired oxygen delivery) do not use for more than 3 days or at rate greater than 10mcg/kg/min. Extravasation: May cause tissue damage Do not flush - replace giving set Sodium content: 0.34 mmol/50mg The freshly prepared infusion solution has a very faint brownish tint; if it is highly coloured it should be discarded. Discard any solution remaining after 24 hours.
Sodium valproate	IV bolus	3 - 5 minutes	Add solvent (4ml) provided to vial to produce a 95mg/ml solution.	pH 6.8 - 8.5	Monitor: nausea, ataxia, tremor. Sodium content 2.4mmol per vial Flush: NS, G
	Continuous or intermittent infusion		Further dilute in NS, G, to a convenient volume eg. 50 - 100ml if required		
Sotalol	Slow IV Bolus	Over 10 minutes for the management of acute arrhythmias, 20-120mg with ECG monitoring, repeated if necessary with 6 hour intervals between injections. Monitor QT interval before start of treatment and whenever dose is increased	Further dilute in G or NS to achieve a final concentration of 0.01-2mg/ml	pH 4.3-5.2	**Monitor**: ECG, HR & BP. Approximately 0.5mmol/ampoule Protect from light The CSM states that the use of sotalol should be limited to the treatment of ventricular arrhythmias or prophylaxis of supraventricular arrhythmias. It should no longer be used for angina, hypertension, thryotoxicosis or for secondary prevention after myocardial infarction
	Continuous or Intermittent Infusion	For substitution in place of oral therapy, infusion of between 0.2 and 0.5 mg/kg/hour should be used with the total daily dose not exceeding 640 mg			

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DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Streptokinase	Intermittent or Continuous Infusion with a pump	Usually over 1 hour	Add diluent slowly direct to sides of vial, roll & tilt gently do not shake. Kabikinase: reconstitute 1500,000 unit vials with 10ml W then dilute in 100mls NS or G. Streptase: reconstitute with 5ml NS. Further dilute slowly with 50-200ml NS or G	**Compatible**: dobutamine, dopamine, flecainide, lignocaine, heparin sodium pH: 6.8-7.5	Avoid shaking vial or foaming drug by injecting rapidly into vial. Discard infusion after 12 hours **Monitor**: BP, ECG, hypotension and arrhythmia. Fever, chills, major allergic reactions and haemorrhage. Flush: NS
Synercid	(See dalfopristin - quinupristin)				
Synacthen®	(See tetracosactide)				
Tazocin (piperacillin and tazobactam)	IV bolus	3-5 minutes	Reconstitute 4.5gm with 20ml W or NS	**Compatible**: Potassium chloride **Incompatible**: amphotericin pH 5-7	**Monitor**: anaphylaxis, thrombophlebitis Flush: NS
	Intermittent Infusion	30 minutes	Reconstitute as above and then dilute in 50 - 100ml NS or G		
Teicoplanin	IV bolus	3-5 minutes	Reconstitute slowly with W provided. Can be diluted with e.g. 50-100ml NS or G	pH: 7.5	**Monitor**: Hypersensitivity reactions. Flush: NS Sodium content: less than 0.5mmol/vial
	Intermittent Infusion	30 minutes			
Terlipressin	IV bolus	3-5 minutes	Reconstitute with diluent provided (pH 4 adjusted NS)	pH: 3-4	Use reconstituted injection immediately. **Monitor**: BP, HR, fluid balance Flush: NS

DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Tetracosactide (Synacthen®)	IV bolus	2 –3 minutes	250mcg in 1ml given undiluted	pH: 3.8 – 4.5	Flush: NS Store in the fridge
Thiopentone sodium (Thiopental)	IV bolus under supervision of a doctor	Each 25 mg (or fraction of 25mg) over 1 minute Convulsions dose: 75-125mg, up to 250mg may be required, give only enough to stop fitting. Maintenance dose if necessary: 25-200mg/hour	500mg reconstituted in at least 20ml W (25mg/ml). May further dilute each 500mg in 125-250ml in NS or G.	**Incompatible:** Acid solutions, aminoglycosides, aminophylline, calcium salts, cephalosporins, insulin, magnesium, noradrenaline pH 10-11	**Monitor:** RR, HR, BP, maintain patent airway, ensure patient has respiratory support available Extravasation: Will cause necrosis Flush: NS or G
Tranexamic acid	IV bolus	5-10 minutes	Can be diluted with NS or G	**Compatible**: heparin pH: 6.5-7.5	**Monitor**: BP, Rapid injection may cause dizziness or hypotension Flush: NS or G
	Continuous Infusion	25-50mg/kg/24 hours			
Trimethoprim (IV DISCONTINUED)					

DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Vancomycin	Intermittent Infusion preferably with pump	60 minutes Doses over 500mg, 10mg/minute	Central: Reconstitute 1g with 20mls W then dilute with a minimum of 100ml NS or G. Peripheral: administration preferred volume of diluent for 1g is 250mls	**Refer to Y-Site Compatibility Chart** **Compatible**: aciclovir, amiodarone, cimetidine, G10%, meropenem, morphine **Incompatible**: amoxicillin, aztreonam, ceftazidime, dexamethasone, foscarnet, phenobarbitone, phenytoin pH: 2.8-4.5	**Monitor**: BP, HR, RR, anaphylactic reactions, including hypotension, wheezing, dyspnea, urticaria or pruritus. Rapid infusion may cause flushing of the upper body (red neck) or pain and muscle spasm of chest and back. Extravasation: May cause tissue damage Flush: NS or G Continuous infusions – see protocol page
	Continuous infusion		Reconstitute as above then central line administration: Add 1g to 100ml NS or G. Peripheral line administration: Add 1g to 250ml NS or G and run at a rate according to protocol to keep levels within 15-25mcg/ml		
Vasopressin	Intermittent Infusion	Minimum 15 minutes	Dilute with G or NS to a maximum concentration of 1unit/ml	pH: 2.5-4.5	**Monitor**: BP, HR, urine output. Flush: G
	Continuous infusion				
Vecuronium (Norcuron®)	IV bolus under supervision of a doctor		Addition of 5ml water for injections results in an isotonic solution of pH 4 containing 2 mg vecuronium bromide per ml. (2 mg/ml).	**Refer to Y-Site Compatibility Chart** **Compatible**: fentanyl, pancuronium. **Incompatible**: thiopentone and	Paralysing agent - patient requires ventilatory support **Monitor**: BP, HR, RR, hypersensitivity and anaphylactic reactions. Side effects occur with overdose: prolonged paralysis, mechanical ventilation required until full recovery of muscle function. Flush: NS or G
	Infusion via a pump	0.8 to 1.4 micrograms/kg/hour titrated according to response.	10 mg may be reconstituted with up to 10 ml G or NS	other alkaline drugs pH: 4	

DRUG	METHOD	ADMINISTER OVER	DILUTION & DILUENT	Y-SITE COMPATIBILITY & pH	MONITORING, ADVERSE EFFECTS & COMMENTS
Verapamil	Slow IV bolus under supervision of a doctor	5-10 mg by slow intravenous injection over a period of 2 minutes. If necessary, *e.g.* in paroxysmal tachycardia, a further 5 mg may be given after 5 to 10 minutes.	Can be dilute with NS or G	**Compatible**: digoxin, heparin saline, morphine, naloxone, phentolamine, pancuronium pH: 4-6.5 **Incompatible:** Alkaline solutions	**Monitor**: ECG, HR, BP, bradycardia, transient hypotension, Flush: NS Sodium content: 0.3 mmol/ampoule ***Elderly*:** The dosage should be administered over 3 minutes to minimise the risk of adverse effects. ***Dosage in impaired liver and renal function*:** Significant hepatic and renal impairment should not increase the effects of a single intravenous dose but may prolong its duration of action.
Vitamins B and C (Pabrinex IV high potency)	Intermittent Infusion	Minimum 10 minutes if undiluted, 15 minutes if diluted.	May give undiluted or dilute with 50-100mls NS or G and give over 15-30 minutes	pH: 6-6.2	***Monitor***: BP, HR, may cause serious allergic reaction including anaphylaxis: Repeated injections of preparations containing high concentrations of vitamin B_1 (thiamine) may give rise to anaphylactic shock. Mild allergic reactions such as sneezing or mild asthma are warning signs that further injections may give rise to anaphylactic shock. Facilities for treating anaphylactic reactions should be available whenever Pabrinex Intravenous High Potency is administered. Use infusion within 7 hours NS is preferred diluent in alcoholic patients; glucose can precipitate or worsen Wernicke's disease. Flush: NS

APPENDIX 1 - ANTICOAGULATION IN RENAL REPLACEMENT THERAPY

DRUG	METHOD	AMINISTRATION RATE	DILUTION	COMPATIBILITY	MONITORING & ADVERSE EFFECTS
Dalteparin	Continuous Infusion into blood in CVVHD circuit with pump	Loading Dose: 5-10 units/kg Maintenance Dose: 4-5 units/kg/hour Round dose to nearest 100 units	10,000 units to 50ml in NS (200 units/ml)		For use in patients with low platelet count or intolerant of unfractionated heparin Cannot be monitored by ACT or APTT, anti-factor Xa can be measured by haematology (requires prior arrangement) level should be 0.2 to 0.4 anti Xa unit/ml. Flush: NS
Epoprostenol (Prosta-cycline)	Continuous Infusion with a pump	During CVVHD to protect filter in patients with low platelet count or heparin intolerance. Given at a rate of 5 nanograms/kg/min into the blood supplying the dialyser. Attach the 5 micron filter supplied between syringe and administration line.	Reconstitute using the diluent provided to give a concentrate of 10,000 nanograms per ml (10mcg/ml). Withdraw 25ml into 50ml syringe and dilute to 50ml with NS or use undiluted (stable for 12 hours at room temperature). Keep remaining 25ml of concentrate in fridge to be used within 24 hours (Use IV label to sign, time and date vial).	**Incompatible**: do not infuse with any other drugs including G pH: (of diluent) 10.5	Reconstituted concentrate stable for 72 hours in refrigerator. Discard any infusion kept at room temperature after 12 hours. **Monitor**: BP, HR, tachycardia, bradycardia, hypotension. Extravasation: May cause tissue damage. Do not flush - replace giving set Sodium content: 2.5 mmol/reconstituted vial
Heparin	Continuous Infusion into blood in CVVHD circuit with pump	To maintain ACT 140 - 160. Start at 2mls/hour (500 units/hour) and check ACT after ½ hour.	20 000 units in 50mls NS	**Compatible**: See chart and individual drugs pH: 5-8	Flush: NS