

**This information has been summarised to act as a guide for those administering IV medications at SIVUH only.**

Drug	IV Injection Guidelines	IV Infusion Guidelines
<b>Abatacept</b> 250mg Brand: <i>Orencia</i> License no: EU/1/07/389/1-3		See Intranet: Departments > Pharmacy > Aseptic Services > Orencia®  <a href="http://www.sivuh.com/Departments/PharmacyMedicinesManagement/AsepticServices/Page1.html">http://www.sivuh.com/Departments/PharmacyMedicinesManagement/AsepticServices/Page1.html</a>
<b>Acetazolamide</b> 500mg powder Brand: <i>Diamox</i> License no: PL 12762/0146 <b>Unlicensed</b>	Reconstitute each vial with 5ml of WFI. Give slowly over 3 to 5 minutes.  May cause venous irritation and tissue damage. Administer via a central venous access device where possible. If a central venous access device is unavailable, administer via a large peripheral vein. Reconstituting each vial with 10ml WFI may reduce injection pain.	
<b>Acetylcysteine</b> 2g/10ml Brand: <i>Parvolex</i> License no: PA1113/008/001		Administer by IV infusion preferably using Glucose 5% as the infusion fluid. Sodium Chloride 0.9% solution may be used if Glucose 5% is not suitable.  See package insert for information on dosing and infusion rates.
<b>Additrac N</b> 10ml ampoule Brand: <i>Additrac N</i> License no: PA2059/023/002		See Intranet: Departments > Pharmacy > Nutrition and Dietetics > DIET0002ORG Guideline on the provision of Parenteral Nutrition in adult patients in SIVUH  <a href="http://www.sivuh.com/Departments/PharmacyMedicinesManagement/Administration/NutritionandDietetics/">http://www.sivuh.com/Departments/PharmacyMedicinesManagement/Administration/NutritionandDietetics/</a>
<b>Adenosine</b> 3mg/ml Brand: <i>Adenocor</i> License no: PA0540/139/001	Use the pre-filled syringe where available.  Use ampoules undiluted. Administer via a rapid IV bolus over 2 seconds either directly into a central or a large peripheral vein (large bore cannula) or into an IV line. If given into an IV line, it should be injected as close to the cannulation site as possible, and followed by a rapid Sodium Chloride 0.9% flush.  Adenosine should only be used where facilities for cardiac monitoring and cardiorespiratory resuscitation equipment exist.	

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<b>Adrenaline</b> 1mg/ml (1:1,000) Brand: <i>Mercury</i> License no: PA0073/035/001	Use the pre filled syringe where available.  Dilute 1mg (1ml) ampoule to 10ml with WFI (i.e. use 9ml WFI). Mix well. Administer via a central venous access device if already in place, or into a large peripheral vein. IV injection administered via a peripheral vein should be followed by a 20ml flush of Sodium Chloride 0.9% to aid entry into the central circulation.	Adrenaline ampoules are compatible with Sodium Chloride 0.9% or Glucose 5%.  For continuous IV infusion prepare a solution containing: <ul style="list-style-type: none"> <li>• 3mg in 50ml, this contains 60microgram/ml</li> </ul> OR <ul style="list-style-type: none"> <li>• 6mg in 50ml, this contains 120microgram/ml</li> </ul> Administer at a suitable rate and titrate to response.
<b>Alteplase 2mg</b> Brand: <i>Actilyse Cathflo</i> License no: N/A <b>Unlicensed</b>	Add 2.2ml WFI to each 2mg vial.  For catheters with a lumen volume of >2ml the reconstituted solution can be further diluted with sterile 0.9% Sodium Chloride to the desired volume (up to a minimal concentration of 0.2mg/ml), e.g. for a catheter with an internal volume of 2.5ml the total dose of Actilyse Cathflo would be 2mg in a volume of 2.5ml. Instill in the dysfunctional central venous access device for 30 mins then follow the instructions of the product literature.	
<b>Alteplase</b> 10mg vial 50mg vial Brand: <i>Actilyse</i> License no: PA0775/011/001 (10mg) PA0775/011/003 (50mg)	May be administered as an IV bolus over 1-2 minutes.	Dissolve with WFI to obtain either a final concentration of 1 mg/ml or 2 mg/ml: <ul style="list-style-type: none"> <li>• 10mls WFI to 10mg amp = 1mg/ml</li> <li>• 5mls WFI to 10mg amp = 2mg/ml</li> <li>• 50mls WFI to 50mg amp = 1mg/ml</li> <li>• 25mls WFI to 50mg amp = 2mg/ml</li> </ul> May be diluted further with sterile Sodium Chloride 0.9% up to a minimal concentration of 0.2 mg/ml. See package insert for further information and specific detail.
<b>Aminophylline</b> 250mg/10ml Brand: <i>Mercury</i> License no: PA0073/099/001	Slow IV injection should only be used for loading doses at a rate not exceeding 25mg/min. Typically given over 20-30 minutes.  Dilute in 100ml Sodium Chloride 0.9% or Glucose 5%. May be given undiluted in fluid restricted patients, ideally via central line.	Give maintenance doses by IV infusion. Dilute with appropriate volume of Sodium Chloride 0.9% or Glucose 5% to give a concentration of 1mg/ml.  See SPC for information on rate of infusion which is dependant on dose and weight of patient.

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<b>Amiodarone</b> 150mg/3ml Brand: <i>Cordarone X</i> License no: PA0540/142/003	Use the prefilled syringe where available.  <b>If unavailable in an emergency:</b> dilute 150-300mg in 10-20ml Glucose 5%. Give as a slow IV injection over a minimum of 3 minutes. <b>This should not be repeated for at least 15 minutes.</b> Patient should be closely monitored, i.e. in an ICU setting. Flush with 5% Glucose.  <b>Amiodarone is incompatible with Sodium Chloride 0.9%</b>	<b>Intermittent infusion:</b> dilute dose in 250ml Glucose 5% and give over a period of 20 minutes to 2 hours. <b>Continuous infusion:</b> dilute dose in 500ml Glucose 5% and give over 24 hours, the rate of infusion being adjusted on the basis of clinical response.  <b>Amiodarone is incompatible with Sodium Chloride 0.9%</b>
<b>Atenolol</b> 5mg/10ml Brand: <i>Tenormin</i> License no: PL 17901/0050 <b>Unlicensed</b>	Can be used undiluted. Give as a slow IV injection (1mg/min).	Administer in either Sodium Chloride 0.9% or Glucose 5% over a minimum of 20 minutes.
<b>Atropine</b> 600mcg/ml Brand: <i>Martindale</i> License no: PL 01883/6169R	Use the 0.5mg/5ml prefilled syringes where available.  Ampoules can be used undiluted. Give as a rapid IV injection. <b>May cause paradoxical bradycardia if given by slow IV injection.</b> <b>In emergency situations:</b> if using a peripheral line, give the injection rapidly and flush with 20mls of Sodium Chloride 0.9%.	
<b>Calcium Chloride</b> 10mmol/10ml Brand: <i>Martindale</i> License no: PL 01883/6174R <b>Unlicensed</b>	Initial dose can be given by slow IV injection at a rate not exceeding 1 millimole/min (up to 10 millimoles).	Calcium gluconate salt preferred (see below). Contact pharmacy if further information required.
<b>Calcium Gluconate</b> 2.2mmol/10ml (10%) Brand: <i>Hameln</i> License no: PL 01502/0038 <b>Unlicensed</b>	Can be given undiluted as a slow IV push. Give at rate of 2ml (0.45 mmol Calcium)/min.  Monitoring should include heart rate or ECG.	<b>Intermittent infusion:</b> dilute 10ml (1 ampoule) of 10% calcium gluconate with 100ml of Sodium Chloride 0.9% or Glucose 5% and infuse over at least 20 minutes (consider giving more slowly i.e. over 2 hours). <b>Continuous infusion:</b> dilute 100ml (10 ampoules) with 900ml Sodium Chloride 0.9% or Glucose 5%. Start the infusion at an initial rate of 50ml/hour and adjust according to response.

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<b>Chlorphenamine</b> 10mg/ml Brand: <i>Kyowa Kirin</i> License no: PA2288/001/002	Give as a slow IV injection over at least 1 minute. Use undiluted or dilute with Sodium Chloride 0.9% to facilitate administration. Dilute 1ml (10mg) to 10ml with Sodium Chloride 0.9%.	
<b>Clonidine</b> 150mcg/ml Brand: <i>Catapres</i> License no: PA2256/002/001	Can be used undiluted. Give as a slow IV injection over 10-15 minutes.	Dilute in Glucose 5% or Sodium Chloride 0.9% and infused over 10-15 minutes.
<b>Cyclizine</b> 50mg/ml Brand: <i>Valoid</i> License no: PA1142/001/001	Give as a slow IV injection over at least 3 minutes. Can use undiluted.  To prevent injection site reactions dilute with 10ml WFI and give by slow IV injection over 3 to 5 minutes.	Not licensed for administration as an infusion.
<b>Desferoxamine</b> 500mg Brand: <i>Desferal</i> License no: PA0896/008/001		Reconstitute each 500mg vial with 5ml WFI. Further dilute with 100ml Sodium Chloride 0.9% or Glucose 5% (volume not critical).  See SPC for information on rate of infusion which is dependant on dose and weight of patient.
<b>Desmopressin</b> 4mcg/ml Brand: <i>DDAVP</i> License no: PA1009/001/002	<b>For treatment of cranial diabetes insipidus</b> the injection may be used when the intranasal or oral administration is considered unsuitable. Administer slowly over 3-5 minutes. <b>Bolus intravenous injection may only be used for this indication</b> , subcutaneous and intramuscular routes may be used similarly. See SPC for further information.	Dilute in 50ml Sodium Chloride 0.9% and give over 20 minutes.  <b>Residual volume in infusion line must be flushed through at the same rate to avoid significant under-dosing.</b>
<b>Dexamethasone</b> 8mg/2ml Brand: <i>Pinewood, KRKA</i> License no: PA0281/237/002 (Pinewood) PA1347/091/001 (KRKA)	<b>Pinewood:</b> Rapid IV injection of large doses may cause cardiovascular collapse, therefore give slowly over a period of several minutes.  <b>KRKA:</b> Give as a slow IV injection over 2-3 minutes.	Dilute in 100ml Sodium Chloride 0.9% or Glucose 5% and administer over 15-20 minutes.  Administer over 20-30 minutes if underlying cardiac pathology. See Renal Drug Handbook 4th Ed for more details.

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<b>Dexketoprofen</b> 50mg/2ml Brand: <i>Keral</i> License no: PA0865/002/003	Use undiluted.  If necessary 50mg (2ml) can be administered as a slow IV bolus over at least 15 seconds. Should only be short-term use and no longer than 2 days.  (Can also be administered via the IM route – see product information)	Dilute in 50-100ml Sodium Chloride 0.9% or Glucose 5%. Administer as a slow IV infusion over 10-30 minutes. Protect from light.
<b>Diazepam</b> 10mg/2ml Brand: <i>Hameln</i> License no: PL01502/0025	Use undiluted. Give as a slow IV injection, max rate 1ml/min, into a large vein of the antecubital fossa.  IV injection may be associated with local reactions and thrombophlebitis and venous thrombosis may occur.	Dilute with 0.9% Sodium Chloride or Glucose 5%.  Add ≤40mg diazepam to 500ml infusion solution (i.e. a maximum concentration of 80 micrograms diazepam /ml).
<b>Diclofenac</b> 75mg/3ml Brand: <i>Diclac</i> License no: PA0711/009/010	<b>Do NOT administer as IV injection.</b>	Dilute one ampoule in 100-500 ml Sodium Chloride 0.9% or Glucose 5%. Administer over at least 30 minutes.  Buffer the Sodium Chloride 0.9% or Glucose 5% with Sodium Bicarbonate injectable solution (0.5ml of 8.4% or 1ml of 4.2% or a corresponding volume of a different concentration), before adding the Diclac ampoule.
<b>Digoxin</b> 500mcg/2ml Brand: <i>Lanoxin</i> License no: PA1691/001/001	IV infusion is preferred but if essential may be administered as follows: <ul style="list-style-type: none"> <li>• Use 500mcg/2ml injection undiluted and give as a slow IV injection over at least 5 minutes.</li> <li>• Slow IV Injection is advised to reduce the risk of vasoconstriction producing hypertension and/or reduced coronary flow.</li> <li>• Can be diluted: dilute with at least 4 times the volume of infusion fluid to prevent precipitation i.e. add 2ml of digoxin to at least 6ml of infusion fluid (Glucose 5% or Sodium Chloride 0.9%), administer over 10-20 minutes.</li> </ul>	Dilute in Sodium Chloride 0.9% or Glucose 5% at a ratio of 1 to 250 (i.e. one 2ml ampoule containing 500 micrograms added to 500 ml of infusion solution)  Administer the total loading dose in divided doses, with approximately half of the total dose given as the first dose and further fractions of the total dose given at intervals of four to eight hours. Give each dose over 10-20 minutes. An assessment of clinical response should be performed before giving each additional dose.

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<b>Dobutamine</b> 12.5mg/ml Brand: <i>Mercury</i> License no: PA0073/137/001	Administer by IV infusion only.	Dilute with Sodium Chloride 0.9% or Glucose 5%.  See SPC for rate instructions and further information on dilution dependent on dose etc.
<b>Dopamine</b> 200mg/5ml Brand: <i>Pfizer</i> License no: PA0822/202/001	Administer by IV infusion only.	Dilute with Sodium Chloride 0.9% or Glucose 5%. <ul style="list-style-type: none"> <li>Add 5ml of Dopamine to 250ml of diluent to achieve a final concentration of 800microgram/ml</li> <li>OR</li> <li>Add 5ml of Dopamine to 500ml of diluent to achieve a final concentration of 400microgram/ml.</li> </ul> Infuse at a rate of 2.5microgram/kg/min (or 5microgram/kg/min in severe cases). Increase as needed in 5-10 microgram/kg/min increments up to 20-50 microgram/kg/min. See SPC for further information.
<b>Ephedrine</b> 30mg/ml Brand: <i>Ethypharm</i> License no: PA0549/027/001	Use undiluted. Administer via slow IV injection	
<b>Esmolol</b> 100mg/10ml Brand: <i>Brevibloc</i> License no: PA2299/021/001	Ready-to-use solution. See SPC for full information and rates of infusion.	Ready-to-use solution. See SPC for full information and rates of infusion.
<b>Esomeprazole</b> 40mg Brand: <i>Nexium</i> License no: PA2242/013/004	Reconstitute the vial with 5mls Sodium Chloride 0.9%. Give over at least 3 minutes.	<ul style="list-style-type: none"> <li><b>40mg infusion:</b> dissolve the content of one 40mg vial in up to 100ml Sodium Chloride 0.9% for IV use. Give over 30 minutes.</li> <li><b>80mg bolus dose:</b> 2 x 40mg vials in up to 100ml Sodium Chloride 0.9%. Give over 30 minutes.</li> </ul> <b>8mg/hr infusion:</b> see Intranet: Departments > Pharmacy > Administration > Procedure to prepare esomeprazole solution for infusion <a href="http://www.sivuh.com/Departments/PharmacyMedicinesManagement/Administration/Page1.html">http://www.sivuh.com/Departments/PharmacyMedicinesManagement/Administration/Page1.html</a>

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<b>Ferric Carboxymaltose</b> 50mg/ml Brand: <i>Ferinject</i> License no: PA0949/004/001	Administer by IV injection using undiluted solution. IV infusion preferred. <ul style="list-style-type: none"> <li>For doses between 200mg and 500mg administer over 5 minutes.</li> <li>For doses of between 500mg and 1000mg administer over 15 minutes.</li> </ul> <p>A clinical check must be completed by a pharmacist before Ferinject can be administered. Contact pharmacy for more details.</p>	<ul style="list-style-type: none"> <li>For doses between 200mg and 500mg add to 100ml Sodium Chloride 0.9% and administer over 6 minutes.</li> <li>For doses of between 500mg and 1000mg add to 250ml Sodium Chloride 0.9% and administer over 15minutes.</li> </ul> <p>A clinical check must be completed by a pharmacist before Ferinject can be administered. Contact pharmacy for more details.</p>
<b>Flecainide</b> 10mg/ml Brand: <i>Tambocor</i> License no: PA2010/026/001	Can use undiluted or dilute with Glucose 5%. Administer as a slow IV injection over at least 10 minutes (max bolus dose 150mg).  Continuous ECG monitoring is required.  Stop injection when there is control of the arrhythmia. Consider giving over 30mins to patients with a history of cardiac failure or those with sustained ventricular tachycardia.	Dilute with Glucose 5%. See SPC for information on rate of infusion.  Continuous ECG monitoring is required.
<b>Flumazenil</b> 500mcg/5ml Brand: <i>Anexate</i> License no: PA1868/002/001	Use undiluted. Administer slowly over 15 seconds.  Can also dilute with Sodium Chloride 0.9% or Glucose 5%.  Should be administered IV by an anaesthetist or doctor with experience in anaesthesiology and in a unit having the appropriate facilities available.	Dilute with Sodium Chloride 0.9% or Glucose 5%. Give at rate of 100–400 micrograms/hour. The dosage and rate of infusion should be individually adjusted to achieve the desired level of sedation.
<b>Furosemide</b> 20mg/2ml Brand: <i>Mercury, Lasix</i> License no: PA0073/059/004 (Mercury) PA0540/052/002 (Lasix)	Use undiluted. Max 50mg via bolus injection. Give as a slow IV injection at a max rate of 4mg/minute.	Dilute in Sodium Chloride 0.9% to any suitable volume. Give at a max rate of 4mg/minute.

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<b>Glyceryl Trinitrate</b> 5mg/ml Brand: <i>Pfizer</i> License no: PA0822/204/001	<b>Do not give by bolus injection.</b>	Dilute with Sodium Chloride 0.9% and Glucose 5%.  To obtain an admixture at a concentration of 100 micrograms/ml add 10ml (50mg) to 490ml Sodium Chloride 0.9% or Glucose 5% to give a final volume of 500ml.  Compatible with glass infusion bottles and rigid infusion packs made of polyethylene. <b>Incompatible with polyvinylchloride (PVC). Avoid contact with polyvinylchloride bags. Polyurethane also induces a loss of the active ingredient.</b>  See SPC for more detail.
<b>Granisetron</b> 1mg/ml Brand: <i>Kytril</i> License no: PA22657/003/001	Dilute 1mg to 5ml with Sodium Chloride 0.9%. Give as a slow IV injection over 30 seconds.	Dilute to 50mls with Sodium Chloride 0.9% or Glucose 5%.  Administer as a 5 minute infusion.
<b>Haloperidol</b> 5mg/ml Brand: <i>Serenace</i> License no: N/A <b>Unlicensed</b>	Use undiluted. Give as a slow IV injection.  Give in a critical care setting with continuous ECG monitoring.	
<b>Heparin</b> 1000 units/ml (5ml) Brand: <i>Wockhardt</i> License no: PA1339/9/6	Administration by IV infusion is preferred as the effects of heparin are short-lived.  The IV injection volume should not exceed 15ml. Use for loading doses and bolus doses only. Administer undiluted over at least 3 minutes	<b>Continuous IV infusion:</b> dilute with Sodium chloride 0.9% or Glucose 5% to produce a final volume of 100units/ml. E.g.: add 25ml of 1000 units/ml (25,000 units) to 225ml of diluent.  Invert bag six times to ensure adequate mixing.  Follow dosing and treatment regimen specific for patient
<b>Heparin</b> 10 units/ml (5ml) Brand: <i>Wockhardt</i> License no: PA1339/10/1	Only for cleaning indwelling cannulas. Not for systemic use.	



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<b>Human Normal Immunoglobulin</b> 100mg/ml Brand: <i>Kiovig</i> License no: EU/1/05/329/003 (5g) EU/1/05/329/004 (10g) EU/1/05/329/005 (20g) EU/1/05/329/006 (30g)		Use undiluted at initial rate of 0.5ml/kg/hour for 30 minutes. Rate may gradually be increased to a maximum of 6ml/kg/hour.  If dilution prior to infusion is required, dilute with Glucose 5% to a final concentration of 50mg/ml. To obtain this concentration, dilute <i>Kiovig</i> with an equal volume of the Glucose 5% solution.  It is recommended that during dilution the risk of microbial contamination is minimised.
<b>Hydralazine</b> 20mg Brand: <i>Amdipharm</i> License no: PL20072/0230 <b>Unlicensed</b>	Reconstitute each ampoule with 1ml WFI. Once reconstituted dilute further with 10ml Sodium Chloride 0.9% and administer as a slow IV injection.	<b>Continuous infusion:</b> Dilute with 500ml Sodium Chloride 0.9%. Begin with a flow rate of 200-300 micrograms/min. Maintenance flow rates must be determined individually and are usually within the range 50-150 micrograms/min.
<b>Hydrocortisone</b> 100mg Brand: <i>Solu-Cortef</i> License no: PA0822/137/001	Add 2ml WFI to 100mg vial, shake, and withdraw for use. Give as a slow IV injection over 1-10 minutes.	Add the reconstituted solution to at least 100ml (up to a max 1,000 ml) of Sodium Chloride 0.9% or Glucose 5%. Administer over 20-30 minutes.
<b>Hyoscine Butylbromide</b> 20mg/ml Brand: <i>Buscopan</i> License no: PA23180/016/001	Give as a slow IV injection over 3 to 5 minutes. <b>Rapid administration may cause a marked drop in blood pressure.</b>  Use undiluted or dilute to a convenient volume with Sodium Chloride 0.9% or Glucose 5% to facilitate slow administration.	
<b>Ibuprofen</b> 4mg/ml Brand: <i>B Braun</i> License no: PA0736/041/001		Already in solution. Administer as an IV infusion over 30 minutes.

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<b>Idarucizumab</b> 2.5g/50ml Brand: <i>Praxbind</i> License no: EU/1/15/1056/001	Administer 5g (2 vials of 2.5g/50ml) undiluted as two consecutive IV boluses over 5 to 10 minutes each. Flush the line pre and post with Sodium Chloride 0.9%. No other infusion should be administered in parallel via the same intravenous access.	
<b>Infliximab</b> 100mg Brand: <i>Inflectra</i> License no: EU/1/13/854/001-005		See Intranet: Departments > Pharmacy > Aseptic Services > Inflectra®  <a href="http://www.sivuh.com/Departments/PharmacyMedicinesManagement/AsepticServices/Page1.html">http://www.sivuh.com/Departments/PharmacyMedicinesManagement/AsepticServices/Page1.html</a>
<b>Isosorbide dinitrate</b> 10mg/10ml Brand: <i>Isoket</i> License no: PA2118/003/001	<p><b>Must be diluted prior to use.</b> Dilute with an equal volume of Sodium Chloride 0.9% or Glucose 5%.</p> <p>Never inject the diluted solution directly in the form of a bolus except via the intra-coronary route prior to balloon inflation.</p>	<p><b>Continuous infusion:</b> dilute 25mg with 25ml of Sodium Chloride 0.9% or Glucose 5% and administer at a rate adjusted according to response.</p> <p>If patient is fluid restricted see SPC on guidance for administration in reduced fluid intake.</p>
<b>Labetalol</b> 100mg/20ml Brand: <i>Trandate</i> License no: PA1638/006/001	<p><b>Emergency use only.</b> If essential to reduce blood pressure quickly, (e.g. in hypertensive encephalopathy), give by IV injection over a period of at least one minute. A 50mg dose should be used. May be repeated at 5 minute intervals to a max total dose of 200mg.</p> <p>See SPC for further information on dosing.</p>	<p>Dilute the contents of two ampoules (200mg) to 200ml with Glucose 5% to a concentration of 1mg/ml.</p> <p><b>For hypertension:</b> infuse the prescribed dose at a rate of 2mg/min until a satisfactory response is achieved. Use a rate controlled infusion pump. Avoid upright position during and for 3 hours after IV administration.</p> <p>See SPC for further information on dosing and use in other indications.</p>
<b>Lacosamide</b> 10mg/ml Brand: <i>Vimpat</i> License no: EU/1/08/470/16		<p>Administer IV without further dilution. Give over a period of 15-60 minutes. For doses ≥200mg give over at least 30 minutes. See SPC for detail on dosing.</p> <p>May be further diluted with Sodium chloride 0.9% or Glucose 5%.</p>
<b>Levetiracetam</b> 100mg/ml Brand: <i>Keppra</i> License no: EU/1/00/146/033		Dilute in at least 100ml of Sodium Chloride 0.9% or Glucose 5% and administer over 15 minutes.

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<b>Levomepromazine</b> 25mg/ml Brand: <i>Nozinan</i> License no: PA0540/115/001	Dilute with an equal volume of Sodium Chloride 0.9% before use. Give slowly over 3 to 5 minutes.	
<b>Lidocaine</b> 1% Brand: <i>BBraun</i> License no: PA0179/037/001	Bolus IV injections for use in pain management should only be carried out by personnel adequately skilled in the respective anaesthetic technique.	Continuous IV infusion for use in pain management should only be carried out by personnel adequately skilled in the respective anaesthetic technique.
<b>Lidocaine</b> 2% Brand: <i>BBraun</i> License no: PA0179/037/004	<p><b>For anti-arrhythmic therapy:</b> use undiluted for loading dose at a rate of 25 to 50 mg per minute. Flush immediately with 20ml Sodium Chloride 0.9%.</p> <p>If the therapeutic effect of the first dose is insufficient within the first 5 to 10 minutes, repeat the initial dose once or twice up to a maximum dose of 200-300mg in 1 hour.</p>	<p><b>For anti-arrhythmic therapy:</b> for maintenance infusion add 1000mg (corresponding to 50ml of Lidocaine 2%) to 500ml Glucose 5% or Sodium Chloride 0.9%. Infuse at a rate of 1-4 mg/minutes depending on stage of treatment. Constant ECG monitoring is recommended during therapy.</p> <p>See SPC for more details.</p>
<b>Lorazepam</b> 4mg/ml Brand: <i>Macure</i> License no: PA23199/002/001	<p>Dilute required volume with an equal volume of Sodium Chloride 0.9% or Glucose 5%. The injection rate should not exceed 2mg/minute.</p> <p><b>Directions for use:</b></p> <ul style="list-style-type: none"> <li>• Extract the desired amount of Lorazepam into the syringe.</li> <li>• Slowly suck the desired volume of diluent.</li> <li>• Retract the piston slightly to provide an additional mixing space.</li> <li>• Immediately mix the contents by repeatedly twisting the syringe until a homogeneous solution has formed.</li> <li>• Do not shake vigorously as this will cause air bubbles.</li> </ul>	

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<b>Magnesium Sulphate</b> 50% w/v (1g/2ml) Brand: <i>Martindale</i> License no: PA0549/020/001	<p><b>To prevent further seizures associated with eclampsia:</b> Give as an IV loading dose. Dilute prior to use. See SPC for more details.</p>	<p>Dilute with Sodium Chloride 0.9% or Glucose 5% prior to administration. Maximum concentration for peripheral use is 5% (50mg/ml) (can use 10% (100mg/ml) if fluid restricted). Mix thoroughly, inverting the bag at least 5 times to avoid 'layering'.</p> <p>See Intranet: Departments &gt; Pharmacy &gt; Clinical Resources &gt; Electrolytes &gt; Magnesium: Guidance on the management of acute hypomagnesaemia in adults  <a href="http://www.sivuh.com/Departments/PharmacyMedicinesManagement/ClinicalResources/Electrolytes.html">http://www.sivuh.com/Departments/PharmacyMedicinesManagement/ClinicalResources/Electrolytes.html</a></p>
<b>Methylprednisolone</b> 125mg, 500mg, 1000mg Brand: <i>Solu-Medrone</i> License no: PA0822/136/002 (125mg) PA0822/136/003 (500mg) PA0822/136/004 (1000mg)	<p>Add contents of diluent (sterile water) to 125mg vial. Give doses &lt;250mg over at least 5 minutes by IV Injection.</p> <p>To prepare 125mg Act-O-Vial:</p> <ul style="list-style-type: none"> <li>• Press down on plastic activator to force solvent into the lower compartment.</li> <li>• Gently agitate to effect dissolution. Use solution immediately.</li> <li>• Remove plastic tab covering centre of stopper.</li> <li>• Sterilise top of stopper with a suitable germicide.</li> <li>• Insert needle squarely through centre of plunger-stopper until tip is just viable. Invert vial and withdraw dose.</li> </ul>	<p>Add contents of diluent (sterile water) to 125mg vial. Dilute 500mg and 1000mg with diluent provided.</p> <p>Infuse doses ≥250mg over at least 30 minutes in 50-100ml of Sodium Chloride 0.9% or Glucose 5%.</p>
<b>Metoclopramide</b> 10mg/2ml Brand: <i>Mercury</i> License no: PA0073/084/001	<p>Use undiluted. Give as a slow IV injection over at least 3 minutes.</p>	
<b>Metoprolol</b> 5mg/5ml Brand: <i>Betaloc</i> License no: PA1404/007/001	<p>Use undiluted. Dose and rate of administration determined by indication. Usually administered by slow IV injection.</p> <p>See SPC for further information.</p>	

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Drug	IV Injection Guidelines	IV Infusion Guidelines
<b>Midazolam</b> 1mg/ml, 10mg/2ml, 10mg/5ml Brand: <i>Accord, Hypnovel</i> License no: PA2315/063/001 (1mg/ml) PA2239/007/001 (10mg/2ml) PA2239/007/002 (10mg/5ml)	Use undiluted. Give as a slow IV injection at a rate of approximately 2mg/ml.	Compatible with 0.9% Sodium Chloride or 5% Glucose.  See SPC or package insert for further information.
<b>Naloxone</b> 400mcg/ml Brand: <i>Mercury</i> License no: PA0073/111/002	Use undiluted and give over a few seconds.	2mg (5 ampoules) can be added to 500ml Sodium Chloride 0.9% or Glucose 5% to give a 4 microgram/ml (or 0.004mg/ml) solution. Titrate rate in accordance with response.
<b>Noradrenaline</b> 1:1000 Brand: <i>Pfizer</i> License no: PA0822/219/001		Dilute 2ml with 48ml of Glucose 5% (or Glucose 5% with Sodium Chloride 0.9%) or dilute 20ml with 480ml of infusion fluid.  See SPC for infusion rate and further detail.
<b>Ondansetron</b> 4mg/2ml Brand: <i>Kalcex</i> License no: PA2165/013/001	Give doses ≤8mg undiluted. Give as a slow IV injection over not less than 30 seconds.	Dilute doses of 9-16mg in 50-100ml Sodium Chloride 0.9% or Glucose 5%. Give over at least 15 minutes.  <b>Continuous infusion:</b> administer at a rate of 1mg/hr for up to 24hrs.
<b>Pabrinex</b> I and II (1 pair) Brand: <i>Pabrinex IV</i> License no: PA2288/001/001	To be administered by drip infusion only.	1 pair of ampoules = No. 1 and No.2.  Draw up the contents of the required number of pairs into the same syringe, mix and add to 50-100ml of Sodium Chloride 0.9% or Glucose 5%. Infuse over 30 minutes.

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Drug	IV Injection Guidelines	IV Infusion Guidelines
<b>Pantoprazole</b> 40mg Brand: <i>Protium</i> License no: PA2229/010/003	Reconstitute with 10ml of Sodium Chloride 0.9%. Give as an IV injection over at least 2 minutes.	Reconstitute the 40mg vial with 10ml of Sodium Chloride 0.9%. Further dilute the reconstituted solution with 100ml Sodium Chloride 0.9% or Glucose 5%. Infuse over 15 minutes.
<b>Papaverine</b> 60mg/2ml Brand: <i>Martindale</i> License no: N/A <b>Unlicensed</b>	Administer by slow IV injection over 1-2 minutes.	
<b>Paracetamol</b> 1g/100ml Brand: <i>Accord</i> License no: PA2315/218/001		Use undiluted. Infuse over 15 minutes. <b>For patient's ≤10kg:</b> withdraw the appropriate volume from the vial and administer over 15 minutes. If the total volume is small this may be further diluted with Sodium Chloride 0.9% or Glucose 5% to a maximum dilution of one-tenth (1 volume Paracetamol into max 9 volumes diluent) for ease of administration over 15 minutes.
<b>Parecoxib</b> 40mg Brand: <i>Dynastat</i> License no: EU/1/02/209/005	Reconstitute 40mg vial with 2ml Sodium Chloride 0.9%. Give as a rapid IV bolus injection. Flush the line pre and post with Sodium Chloride 0.9%.	
<b>Phenobarbitone</b> 200mg/ml Brand: <i>Aspen, Martindale</i> License no: N/A <b>Unlicensed</b>		Dilute the required volume with 10 times its volume of WFI i.e. a 1:10 dilution with WFI. Administer at a rate of 50-100mg/min. Maximum rate of 100mg/min.
<b>Phenylephrine</b> 100mcg/ml Brand: <i>Aguettant</i> License no: PA1968/007/002	Use undiluted. An IV bolus dose should not exceed 100 micrograms. Administer over 3-5 minutes.	Use undiluted. The initial rate is 25-50 micrograms/min. Can be increased up to 100 micrograms/min or reduced according to response. See SPC for more details.

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Drug	IV Injection Guidelines	IV Infusion Guidelines
<b>Phenytoin</b> 250mg/5ml Brand: <i>Epanutin</i> License no: PA23055/003/006	<p>Because of the risk of local toxicity, give by slow IV injection directly into a large vein through a large-gauge needle or IV catheter. Each IV injection should be preceded and followed by an injection of sterile Sodium Chloride 0.9% through the same needle or catheter to avoid local venous irritation due to alkalinity of the solution.</p> <p>Can give as an IV bolus in intensive care setting with ECG and blood pressure monitoring. The max rate is 50mg/min.</p>	<p>Each IV infusion should be preceded and followed by an injection of sterile Sodium Chloride 0.9% through the same needle or catheter to avoid local venous irritation due to alkalinity of the solution.</p> <p>Dilute in 50-100 ml Sodium Chloride 0.9%. Final concentration must not exceed 10mg/ml (therefore doses &gt;1000mg must be diluted in 250ml). Administration should commence immediately after the mixture has been prepared and must be completed within one hour. The infusion mixture should not be refrigerated. Use an in-line filter (0.22-0.50 microns). ECG and blood pressure monitoring required.</p>
<b>Phytomenadione</b> 10mg/ml Brand: <i>Konakion</i> License no: PA2239/002/001	<p>Use undiluted. Give as a very slow IV injection over 3 to 5 minutes</p>	<p>Dilute with 50ml Glucose 5%. Infuse slowly over 15 to 30 minutes. Protect the infusion from light.</p>
<b>Potassium Chloride</b> Various products available		<p>See Intranet for further details: Departments &gt; Pharmacy &gt; Clinical Resources &gt; Electrolytes &gt; Potassium Chloride: Guidance on the administration of IV Potassium Chloride to Adult patients  <a href="http://www.sivuh.com/Departments/PharmacyMedicinesManagement/ClinicalResources/Electrolytes.html">http://www.sivuh.com/Departments/PharmacyMedicinesManagement/ClinicalResources/Electrolytes.html</a>            See also PPPG <b>PHARHIGHRISKMED0001ORG</b> for more details</p>
<b>Procyclidine</b> 10mg/2ml Brand: <i>Auden McKenzie</i> License no: PL20075/0706 <b>Unlicensed</b>	<p>Give the required dose undiluted as a slow IV injection over 3 - 5 minutes.</p>	
<b>Promethazine</b> 25mg/ml Brand: <i>Phenergan</i> License no: N/A <b>Unlicensed</b>	<p>Usually given IM. Avoid IV administration if possible.</p> <p><b>In an emergency:</b> Dilute the contents of one ampoule in 10ml WFI. Give as a slow IV injection at a max rate of 25mg/min. Maximum 100mg per course.</p>	

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Drug	IV Injection Guidelines	IV Infusion Guidelines
<b>Protamine</b> 1400 units/ml (10mg/ml) Brand: <i>Leo Pharma</i> License no: PA1025/002/001	Administer as a slow IV injection over 10 minutes. The largest single injection (bolus dose) should not exceed 5ml (7000 units/50mg protamine sulphate). Dose should be guided by blood coagulation studies.	Can be administered as a constant, slow intravenous infusion diluted in Sodium Chloride 0.9%. Maximum rate 5mg/min
<b>Salbutamol</b> 500mcg/ml Brand: <i>Ventolin</i> License no: PA1077/049/001	500mcg (1ml) may be diluted to 10ml with WFI. 5ml of the diluted preparation (250mcg per 5ml) may be administered by slow IV injection over 3 to 5 minutes.	A suitable solution for infusion may be prepared by diluting 5mg of Ventolin Concentrate Solution for Intravenous Infusion to 500ml of Sodium Chloride 0.9% or Glucose 5%. Infusion rates of 3 to 20 micrograms per minute (0.3 to 2ml/minute) are generally adequate but in patients with respiratory failure, higher dosage has been used with success.
<b>Sodium Valproate</b> 400mg Brand: <i>Epilim</i> License no: PA0540/150/013	Reconstitute with diluent provided (4ml). Final concentration 95mg/ml. Give appropriate dose as a slow IV injection over 3-5 minutes.	After reconstitution, dilute with at least 50ml Sodium Chloride 0.9% or Glucose 5% and give over 60 minutes at a rate $\leq 20$ mg/min.
<b>Solivito</b> 10ml Brand: <i>Solivito N</i> License no: PA2059/064/001		See Intranet: Departments > Pharmacy > Nutrition and Dietetics > DIET0002ORG Guideline on the provision of Parenteral Nutrition in adult patients in SIVUH  <a href="http://www.sivuh.com/Departments/PharmacyMedicinesManagement/Administration/NutritionandDietetics/">http://www.sivuh.com/Departments/PharmacyMedicinesManagement/Administration/NutritionandDietetics/</a>
<b>Terlipressin</b> 1mg Brand: <i>Glypressin</i> License no: PA1009/004/001	Reconstitute using the solvent provided. Give by slow IV injection into a large vein over 3-5 minutes <b>(N.B. very acidic - will cause tissue damage if extravasates - administer via a central access device where possible monitor the injection site closely)</b>	
<b>Tetracosactide</b> 250mcg/ml Brand: <i>Synacthen</i> License no: PA2206/002/001	Intended for administration for diagnostic purposes only as a single IM or IV dose.  Give by slow IV injection administered over 2 minutes.	



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Drug	IV Injection Guidelines	IV Infusion Guidelines
<b>Tocilizumab</b> 80mg/4ml, 200mg/10ml, 400mg/20ml Brand: <i>RoActemra</i> License no: EU/1/08/492/001-006		See Intranet: Departments > Pharmacy > Aseptic Services > <a href="http://www.sivuh.com/Departments/PharmacyMedicinesManagement/AsepticServices/Page1.html">RoActemra®</a>  <a href="http://www.sivuh.com/Departments/PharmacyMedicinesManagement/AsepticServices/Page1.html">http://www.sivuh.com/Departments/PharmacyMedicinesManagement/AsepticServices/Page1.html</a>
<b>Tramadol</b> 100mg/2ml Brand: <i>Tradol</i> License no: PA0711/029/003	Use undiluted. Give as a slow IV injection over 2-3 minutes.	If required dilute with Sodium Chloride 0.9% or Glucose 5%.
<b>Tranexamic Acid</b> 500mg/5ml Brand: <i>Cyklokapron</i> License no: PA0822/117/001	Can use undiluted. Give as a slow IV injection. Administer at a maximum rate of 1ml (100mg)/min.	Dilute dose to a convenient volume of Sodium Chloride 0.9% or Glucose 5%, e.g. 100ml. Mix well.  Give loading dose over 10 minutes followed by an infusion administered over 8 hours.  <b>This is used for the unlicensed indication of significant haemorrhage following trauma.</b>
<b>Verapamil</b> 5mg/2ml Brand: <i>Isoptin</i> License no: PA2010/003/004	Use undiluted. Give slowly. Administer over at least 2 minutes (3 minutes in the elderly).  Keep the patient under constant observation with ECG and blood pressure monitoring.	Can be diluted with Sodium Chloride 0.9% or Glucose 5%.  See SPC for full information as dose and rate of infusion can vary for indication and patients being treated.
<b>Vitlipid</b> 10ml Brand: <i>Vitlipid</i> License no: PA2059/067/001		See Intranet: Departments > Pharmacy > Nutrition and Dietetics > DIET0002ORG Guideline on the provision of Parenteral Nutrition in adult patients in SIVUH  <a href="http://www.sivuh.com/Departments/PharmacyMedicinesManagement/Administration/NutritionandDietetics/">http://www.sivuh.com/Departments/PharmacyMedicinesManagement/Administration/NutritionandDietetics/</a>

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<b>Zoledronic Acid</b> 4mg/100ml Brand: <i>Zerlinda</i> License no: PA1986/119/001		Give as a single IV infusion over $\geq 15$ minutes.  If patient has impaired renal function, see SPC for appropriate dilution in Sodium Chloride 0.9% or Glucose 5%.  A pharmacist must complete a clinical check before Zerlinda can be administered for the treatment of osteoporosis. Contact pharmacy for more details.