

DILUTION PROTOCOL

1ST EDITION
2017



JABATAN KESIHATAN NEGERI SELANGOR

DILUTION PROTOCOL

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PREPARED BY:



Jabatan Kesihatan Negeri Selangor
Kementerian Kesihatan Malaysia

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All information given is valid at the time of publication and will be updated regularly and is subject to change without prior notice obligation. The Government of Malaysia is not liable for any loss or damage caused by the usage of any information obtained from this guideline.

This guideline was designed to facilitate the administration of injectable medications to adult patients. However, it must be noted that this guideline only includes the dilution and method of administration for commonly used injectable medications in the ward and health clinics.

Information used to produce this guideline was based on the manufacturer's summary of product characteristic and other references such as Micromedex Healthcare Series Volume 154, Lexi-Comp's Drug Information Handbook and British National Formulary.

Although every effort has been made to ensure the information in this guideline are correct and accurate, it is advisable to use this guideline in conjunction with the package insert for the brand of injectable medication used.

The user of this guideline is assumed to possess the necessary knowledge, skill and competence to interpret the information in this document.

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PREFACE



Patient's safety is of utmost importance in the healthcare system. Therefore, correct dilution and administration of injectable medications are crucial to ensure patient's safety.

This guideline was prepared to facilitate the healthcare staffs in preparing the dilutions of drugs which are available in the Ministry of Health (MOH) drug lists. The availability of this guideline will assist in the expansion of quality clinical care pharmacy services throughout MOH facilities.

I would like to congratulate the editorial committee and external reviewers for their efforts and contributions in the development of this Dilution Protocol.

Thank you.

DR ROSHAYATI BINTI MOHAMAD SANI

Timbalan Pengarah Kesihatan Negeri (Farmasi)

Bahagian Perkhidmatan Farmasi

Jabatan Kesihatan Negeri Selangor

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ABBREVIATIONS

mcg	microgram
BW	body weight
D10	10% dextrose and water
D5	5% dextrose and water
g	Gram
HCl	hydrochloride
hr	Hour
HS	0.45% sodium chloride
HSD5	0.45% sodium chloride + 5% dextrose
IM	intramuscular
INJ	injection
IT	intrathecal
IU	international unit
IV	intravenous
KCl	potassium chloride
kg	kilogram
L	Liter
max	Maximum
mg	Milligram
min	Minute
ml	Milliliter
NS	0.9% sodium chloride
NSD5	0.9% sodium chloride + 5% dextrose
QSD5	0.18% sodium chloride + 5% dextrose
RT	room temperature
SC	subcutaneous
sec	Second
w/v	weight over volume
WFI	water for injection

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ABCIXIMAB

Brand Name & Strength

ReoPro® 2 mg/ml

Reconstitution

Not required

Further Dilution

IV infusion

- Dilute desired dose (ml) in 250 ml of diluent to give concentration 40 µg/ml ^[2]

Diluent

NS, D5 ^[1]

Administration & Infusion rate

IV bolus

- Administer undiluted over 1 min ^[1,2]

IV infusion

- Administer at a maximum rate of 10 mcg/min ^[2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	Use immediately	-

Remarks

- Upon administration, solution must be filtered using low protein binding 0.2/0.22/5.0 µm syringe filter. ^[1]

References

- Hospira. Abciximab (ReoPro®) Product Leaflet. Revised February 2006.
- McGraw Hill's IV Drug Handbook. (2009)

A

ACETAZOLAMIDE

Brand Name & Strength

Diamox® Sodium 500 mg

Reconstitution

Reconstitute 1 vial with at least 5 ml of WFI to provide a solution with concentration ≤ 100 mg/ml ^[1,2,3,4]

Further Dilution

IV infusion

- Dilute reconstituted solution with diluent to a final volume of 500 ml ^[2]

Diluent

NS, DS ^[2]

Administration & Infusion rate

Slow IV

- Administer over 3 min ^[3]

IV infusion

- Administer over 4 – 8 hr ^[2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	24 hr ^[1]
After dilution	-	-

Remarks

- Direct IV route is preferred as IM route is painful due to the alkaline pH of the solution. ^[1,3]
- The pH of parenteral acetazolamide is 9.1. Care should be taken during IV administration of alkaline preparations to avoid extravasation and possible development of skin necrosis. ^[1]
- Initial infusion rate should be no more than 0.25 mg/min (15 mg/hr); once patient tolerance to infusion is well established, may increase infusion rate in increments of 0.05 to 0.08 mg/min (3 – 5 mg/hr) with each subsequent infusion. ^[2]
- For patients weighing <30 kg, maximum infusion rate is 0.25 mg/min. ^[2]
- For patients weighing ≥ 30 kg, duration of therapy should be at least 1.5 hr. ^[2]
- Slow infusion rate if infusion reaction occurs. ^[2]

References

1. Mercury Pharmaceuticals Ltd, Acetazolamide (Diamox®) Product Leaflet. Revised date: 16 February 2004
2. McGraw Hill's IV Handbook. (2009)
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; (Version 3.0.2)
4. Intravenous Dilution Database. GlobalRPh. Available at: http://www.globalrph.com/index_dilution.htm

ACYCLOVIR

Brand Name & Strength

Zovirax® 250 mg/10 ml, Vaxcel Acyclovir 250 mg

Reconstitution

Reconstitute with 10 ml WFI or NS

Further Dilution

Dilute 250 – 500 mg with 100 ml of diluent ^[1] (concentration: 2.5 – 5 mg/ml)

Diluent

NS, Hartmann's Solution, Sodium Chloride 0.45% w/v and Glucose 4% w/v ^[1,2,4]

Administration & Infusion rate

IV infusion

- Administer over 1 hr ^[1,2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	12 hr ^[2,3] , 48 hr ^[4]	-
After dilution	24 hr ^[2,3] , 48 hr ^[4]	-

Remarks

- Do not give by IV bolus, IM or SC ^[2]
- Administer IV infusion at a constant rate over at least 1 hr using infusion pump or micro drip ^[2]
- Infusion concentration of 7 mg/ml or lower are recommended. Higher concentration of > 10 mg/ml increases the risk of phlebitis ^[2,3]
- Refrigerating reconstituted solutions may cause precipitation (which redissolves at RT) ^[2]

References

1. GlaxoSmithKline. Acyclovir (Zovirax®) Product leaflet. Revised date: 4 May 2005
2. McGraw-Hill's IV Drug Handbook
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; March 20, 2017
4. Kotra Pharma Sdn Bhd. Vaxcel® Acyclovir 250 mg I.V. for Infusion Product Leaflet.

A

ADENOSINE

A

Brand Name & Strength

Adenocor® 6 mg/2 ml injection

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IV bolus

- Administer over 2 seconds ^[1]
- If given into an IV line , it should be injected as proximally as possible, and followed by a rapid saline flush ^[1,2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	Use immediately	-

Remarks

- Administration should be carried out in a hospital setting with monitoring and cardio-respiratory resuscitation equipment available for immediate use if necessary.
- During administration, continuous ECG monitoring is necessary as life threatening arrhythmia might occur. ^[1]
- Drug is intended for peripheral IV bolus only. Do not administer through central line (may cause prolonged asystole). ^[2]

References

1. Sanofi. Adenosine (Adenocor®) Product leaflet. Revised date: July 2013
2. McGraw Hill's IV Handbook



ADRENALINE

A

Brand Name & Strength

CCM Adrenaline Injection 1 mg/ml

Reconstitution

Not required

Further Dilution

IV infusion

- Dilute 1 mg up to 250 ml diluent (concentration: 4 mcg/ml) ^[3]
- Single strength: Dilute 3 mg in 50 ml diluent (concentration: 60 mcg/ml) ^[3]
- Double strength: Dilute 6 mg in 50 ml diluent (concentration: 120 mcg/ml)

Diluent

NS, D5

Administration & Infusion rate

IM, SC

- Use undiluted

Slow IV

- Use undiluted. Administer 1 mg dose over at least 1 min ^[2]

IV infusion

- Bradycardia, hypotension / shock: Administer at 2 – 10 mcg/min or 0.1 - 0.5 mcg/kg/min (7 – 35 mcg/min) ^[3]
- Bronchodilation, anaphylaxis, hypersensitivity reaction: Administer at 1 mcg/min up to 10 mcg/min. ^[2]
Titrate up per response

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- CCM Adrenaline contains Sodium Metabisulphite that may cause serious allergic type reactions. ^[1]
- Rapidly denatured by oxidising agents and alkalis including sodium bicarbonate, halogens, nitrates, nitrites and salts of iron, copper and zinc ^[1]
- Incompatible with 5% Sodium Chloride ^[1]
- Central line required for IV infusion administration^[4]
- Stability of Adrenaline in 5% dextrose injection decreases when pH >5.5 ^[1]

References

1. Duopharma (M) Sdn. Bhd. Adrenaline (CCM Adrenaline) Product leaflet. Revised date: 8 July 2011
2. McGraw Hill's IV Handbook
3. Dilution Guide for High Alert Medication Pharmacy Service Division 2011
4. GlobalRph- http://globalrph.com/index_dilution_orig.htm

ALPROSTADIL

Brand Name & Strength

Prostin VR Pediatric 500 mcg/1 ml

Reconstitution

Not required

Further Dilution

See **Administration & Infusion rate**

Diluent

NS, D5

Administration & Infusion rate

Continuous IV infusion only (max concentration 20 mcg/ml)

Maximum rate: 0.4 mcg/kg/min ^[1]

Add 1 ampoule (500 mcg) Alprostadil to:	Approximate concentration of resulting solution (mcg/ml)	Infusion rate (ml/min/kg of body weight)
250 ml	2	0.05
100 ml	5	0.02
50 ml	10	0.01
25 ml	20	0.005

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	24 hr ^[1]	-

Remarks

- Undiluted solution may interact with sidewalls of volumetric infusion chambers causing changes in appearance of the chamber and creating a hazy solution.
- Avoid direct contact of undiluted solution the walls of volumetric infusion chamber by adding it into the intravenous infusion solution. ^[1,2]
- Administer through central line or through umbilical artery catheter placed at the ductal opening.

References

1. Pfizer. Alprostadil (Prostin VR Pediatric®) Product leaflet. Revised October 2008.
2. McGraw-Hill IV Drug Handbook

AMIKACIN

Brand Name & Strength

Apalin 100 mg/2 ml, 250 mg /2 ml & 500 mg/2 ml

Reconstitution

Not required

Further Dilution

IV infusion

- Dilute in 100 – 200 ml diluent (concentration: 0.25 – 5 mg/ml) ^[1]

Diluent

NS, D5, lactated Ringer's Solution ^[1]

Administration & Infusion rate

IM

- Administer into large muscle mass ^[3]

IV infusion

- Administer slowly over 30 – 60 min for children, adolescents and adults; 1 – 2 hr for infants ^[2,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	24 hr ^[1]	60 days ^[1]

Remarks

- Slow infusion may help to avoid neuromuscular blockade ^[1]
- Discard dark-coloured solutions ^[1]

References

- Duopharma (M) SDN BHD. Amikacin (Apalin) Product leaflet. Revised 16 January 2012
- McGraw Hill's IV Drug Handbook. (2009)
- Lexi-Comp, Inc. (Lexi-drugs®). Lexi-Comp, Inc (Version 3.0.2)

AMINOPHYLLINE

Brand Name & Strength

DBL Aminophylline Injection 250 mg/10 ml

Reconstitution

Not required

Further Dilution

Loading dose

- **IV infusion** ^[4]
 - Up to 250 mg: dilute in 50 ml diluent
 - 250 – 500 mg: dilute in 100 ml diluent

Maintenance dose

- **Continuous IV infusion** ^[4]
 - 250 – 500 mg in 500 ml diluent

Diluent

D5, NS ^[3]

Administration & Infusion rate

Loading dose

- **IV infusion** ^[4]
 - Administer over 20 – 30 min

Maintenance dose

- **Continuous IV infusion** ^[4]
 - Administer at a rate of 0.5 mg/kg/hr. Dose must be individualised based on patient characteristics, clinical response, and steady state theophylline concentration. Rate of administration not to exceed 20 – 25 mg/min ^[1,2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- IM administration not recommended ^[3]
- Obtain serum drug level 20 – 30 min after starting continuous infusion ^[2]
- Rapid administration may cause arrhythmia ^[2]
- In patients with cor pulmonale, cardiac decompensation, or hepatic dysfunction and in those taking drugs that markedly reduce theophylline clearance, do not exceed initial infusion rate of 21 mg/hr ^[2]

References

1. Hameln Pharmaceuticals. Aminophylline (DBL Aminophylline Injection) Product Leaflet. Revised 1 December 2012.
2. McGraw Hill's IV Drug Handbook
3. Lexi-Comp Online Database (Accessed 3 November 2016)
4. Globalrph



AMIODARONE

A

Brand Name & Strength

Cordarone 150 mg/3 ml

Reconstitution

Not required

Further Dilution

Minimum concentration: 300 mg/500 ml ^[5]

Arrhythmias ^[1]

- Loading dose: 5 mg/kg (150 mg – 300 mg) in 100 ml diluent ^[1,2].
- Maintenance dose: 10 – 20 mg/kg/day (max: 1.2 g) in 250^[1] – 500 ^[3,4] ml diluent

Ventricular fibrillation or pulseless ventricular tachycardia ^[1]

- Loading dose: 5 mg/kg (300 mg) diluted in 20 ml diluent. Add 2.5 mg/kg (150 mg) if necessary,
- Followed by 900 mg in 500 ml over 24 hr

Diluent

D5 ^[1]

Administration & Infusion rate

Arrhythmias^[5]

- Loading dose: Administer by **IV infusion** over 20 min to 2 hr ^[5]
- Maintenance dose: Administer over 24 hr.

Ventricular fibrillation or pulseless ventricular tachycardia ^[5]

- Loading dose: Administer by **IV bolus** ^[5]
- Followed by **IV infusion** over 24 hr.

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	Use immediately ^[1,3]	-

Remarks

- Drug levels above 3 mg/ml in D5 has been linked to high incidence of peripheral vein phlebitis; levels of 2.5 mg/ml or lower are less irritating. Therefore, for infusions longer than 1 hour, do not exceed concentrations of more than 2 mg/ml, unless using central venous catheter. ^[2]

References

1. Sanofi Winthrop. Amiodarone (Cordarone 150mg/3ml) Product Leaflet.
2. McGraw-Hill's IV Drug Handbook
3. Dilution Guide for High Alert Medication 2011 by Pharmaceutical Services Division, Malaysia
4. WebMD, LLC. Medscape (Version 5.6.1)
5. British National Formulary

AMOXICILLIN-CLAVULANATE

Brand Name & Strength

Co-Amoxiclav 1.2 g (Amoxicillin 1000 mg & Potassium Clavulanate 200 mg)

Reconstitution

Reconstitute 1.2 g vial with 20 ml WFI to get a final volume of 20.9 ml ^[1]

Further Dilution

IV infusion

- Dilute 1 vial (1.2 g) in 100 ml diluent

Diluent

NS, WFI

Administration & Infusion rate

Slow IV

- Administer over 3 – 4 min ^[1]

IV infusion

- Administer over 30 – 40 min (complete within 4 hr of reconstitution) ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	20 min ^[1]	-
After dilution	4 hr ^[1]	-

Remarks

- Solutions should be made up to full infusion volume immediately after reconstitution ^[1]

References

1. Karnataka antibiotics & Pharmaceuticals Limited, Amoxicillin and Potassium Clavulanate (Co-Amoxiclav) Product leaflet. Revised date: 5 Aug 2010

AMPHOTERICIN B LIPID COMPLEX

Brand Name & Strength

Ampholip 50 mg/10 ml

Reconstitution

Not required

Further Dilution

Dilute 1 vial (50 mg) with 40 ml of diluent (concentration: 1 mg/ml). [2,3,4]
 In fluid restricted, pediatric and cardiovascular patient, 2 mg/ml may be used. [1,2,4]

Diluent

D5 [1]

Administration & Infusion rate

IV infusion

- Administer at a rate of 2.5 mg/kg/hr [1,3,4]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	6 hr [2,3,4]	48 hr [2,3]

Remarks

- Test dose: 1 mg infused intravenously over 15 min [1]
- For patients who experience infusion-related immediate reactions, premedicate with an NSAID ± Diphenhydramine or Hydrocortisone. [3]
- If the infusion time exceeds 2 hours, mix the contents by shaking the infusion bag every 2 hours. [1,3, 4]
- Do not dilute with NS or mix with other drugs or electrolytes. [1,2,4]
- Do not use an in-line filter during administration. [1,3,4]
- IV line should be flushed with D5. [1,2,4]

References

- Bharat Serums and vaccines limited. Amphotericin B Lipid Complex Injection IV (Ampholip) Product Leaflet. Revised date: 11th December 2008.
- McGraw Hill's IV Handbook.(2009)
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; (Version 3.0.2)
- Truven Health Analytics. Micromedex (Version 1.77)

AMPHOTERICIN B SODIUM DEOXYCHOLATE

Brand Name & Strength

Amphotret 50 mg

Reconstitution

Reconstitute vial with 10 ml WFI ^[1]

Further Dilution

Dilute reconstituted solution with diluent to a concentration 0.1 mg/ml ^[1] (50 mg vial in 500 ml D5)

Diluent

D5

Administration & Infusion rate

IV infusion

- Administer over 2 – 6 hr ^[1,2] ; 4 – 6 hr ^[3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	7 days ^[1]
After dilution	-	-

Remarks

- Solution should be protected from light during administration ^[1] whenever possible. However, short-term exposure (< 24 hr) to light during IV infusion does **not** appreciably affect potency. ^[3]
- Test dose: 1 mg in 20 ml D5 administered over 20 – 30 min may be preferred. Patient's temperature, pulse, respiration & BP should be recorded every 30 min for 2-4 hr ^[1]
- Final concentration should not exceed 0.1 mg/ml for peripheral infusion or 0.25 mg/ml for central infusion. ^[3]
- An in-line filter (pore size no less than 1 micron) may be used. ^[2,4]
- Incompatible with NS ^[2,4] - flush existing IV line with D5 or use separate line. ^[2, 4]
- Rapid infusion may cause hypotension, hypokalemia, arrhythmia and shock. ^[3,4]
- Monitor for signs & symptoms of infusion-related reactions (fever, chills, hypotension, GI symptoms, breathing difficulties & headache) ^[2,3]
- For patients who experience infusion-related immediate reactions, premedication can be considered. Premedication 30-60 min prior to drug administration: NSAID and/or diphenhydramine OR Paracetamol with diphenhydramine OR hydrocortisone. ^[3]

References

- Bharat Serums and Vaccines Limited. Amphotericin B for Injection U.S.P. (Amphotret) Product Leaflet
- McGraw Hill Handbook 2009
- Lexicomp App Ver2.3.3
- BNF children 2014-2015

AMPICILLIN

Brand Name & Strength

Standacillin® Injection 500 mg

Reconstitution

Reconstitute 1 vial with 5 ml of WFI

Further Dilution

IV infusion

- Dilute the reconstituted solution to any amount of diluent ^[1]
- Dilute 500 – 1000 mg in 50 ml diluent or 2000 mg in 100 ml diluent (max concentration: 30 mg/ml) ^[3]

Diluent

NS ^[1,2]

Administration & Infusion rate

IM

- Administer the reconstituted solution through IM ^[1] into large muscle mass. ^[3]

Slow IV

- Administer the reconstituted solution over 3 – 5 min (250 – 500 mg) or over 10 – 15 min (1 – 2 g). Do not exceed 100 mg/min. ^[2]

IV infusion

- Administer over 15 – 30 min ^[2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	Use immediately Discard unused portion	-
After dilution	-	-

Remarks

- Be aware that too-rapid infusion may cause seizures. ^[2]
- Adjust rate of infusion so that the total dose is administered before admixture stability expires. ^[3]
- Maximum concentration for infusion should not exceed 30 mg/ml due to concentration – dependent stability restrictions. ^[3]

References

1. Sandoz. Standacillin Product leaflet.
2. McGraw-Hill's I.V. Drug Handbook. (2009)
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

AMPICILLIN-SULBACTAM

A

Brand Name & Strength

Sulbacin 1.5 g

Reconstitution

IV

- Reconstitute with 3.2 ml WFI ^[1]

IM

- Reconstitute with 3.2 ml WFI or 0.5% Lignocaine HCl ^[1]

Further Dilution

IV infusion

- Dilute with 50 – 100 ml diluent to give a concentration of 15 – 30 mg/ml ^[1]

Diluent

NS ^[1]

Administration & Infusion rate

IV slow bolus

- Administer over 3 min ^[1]

IV Infusion

- Administer over 15 – 30 min ^[1]

IM

- Administer deep into large muscle mass ^[3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	8 hr ^[1]	72 hr ^[1]
After dilution	-	-

For IV: Use within 8 hr after preparation ^[3]

For IM: Use within 1 hr after preparation ^[3]

Remarks

-

References

1. Karnataka Antibiotics & Pharmaceutical Ltd. Ampicillin & Sulbactam Powder for Injection 1.5g (Sulbacin®) product leaflet. Revised date: 06/2006
2. McGraw-Hill IV Drug Handbook
3. WebMD, LLC. (2016). Medscape (Version 5.6.1)

ANIDULAFUNGIN

Brand Name & Strength

Eraxis 100 mg

Reconstitution

Reconstitute vial with 30 ml WFI to provide a concentration of 3.33 mg/ml ^[1]

Further Dilution

Dilute reconstituted solution (100 mg) with 100 ml diluent to a final infusion volume of 130 ml (concentration 0.77 mg/ml) ^[1]

Diluent

NS, D5 ^[1,2,3]

Administration & Infusion rate

IV infusion

- **100 mg:** administer over minimum of 90 min ^[1,2]
- **200 mg:** administer over minimum of 180 min ^[1,2]
- Rate of infusion should not exceed 1.1 mg/min ^[1,2,3] (1.4 ml/min or 84 ml/hr) ^[3]

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	24 hr ^[1]	-
After dilution	48 hr ^[1]	-

Remarks

- Do not give as IV bolus. ^[2]

References

1. Pfizer. Anidulafungin (Eraxis) Product Leaflet.
2. McGraw Hill's IV Drug Handbook. (2009)
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

ANTI THYMOCYTE IMMUNOGLOBULIN (EQUINE)

Brand Name & Strength

Atgam 250 mg/5 ml

Reconstitution

Not required

Further Dilution

Dilute with diluent to a maximum concentration of 4 mg/ml ^[1,3]

Diluent

NS, QSD5, HSD5 ^[1,3]

Administration & Infusion rate

IV infusion

- Administer over at least 4 hr ^[1,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	24 hr ^[1]

Remarks

- Test dose: A skin test might be needed prior to administration of the initial dose. ^[3]
- Dilute Atgam for intravenous infusion in an inverted bottle of sterile vehicle so the undiluted Atgam does not contact the air inside. ^[1,3]
- Atgam (diluted or undiluted) should not be shaken because excessive foaming and/or denaturation of the protein may occur. Gently rotate or swirl to mix. ^[1,3]
- Do not dilute with D5, low salt concentrations may result in precipitation. ^[1,3]
- Allow infusion solution to reach room temperature prior to administration. ^[1,3] Infusion solution must be completed within 24 hours of preparation. ^[3]
- An in-line filter (pore size 0.2 to 1.0 micron) should be used during infusion to prevent the administration of any insoluble material that may develop in the product during storage. ^[1]
- May cause vein irritation (chemical phlebitis) if administered peripherally, high flow veins are preferred to reduce phlebitis and thrombosis. ^[1,3]

References

1. Pharmacia & Upjohn Company. Antithymocyte Globulin (Atgam) Product Leaflet. Revised date January 2003
2. McGraw Hill's IV Drug Handbook. (2009)
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

ANTI THYMOCYTE IMMUNOGLOBULIN (RABBIT)

Brand Name & Strength

Thymoglobuline® 25 mg

Reconstitution

Reconstitute with 5 ml WFI (Concentration: 5 mg/ml) ^[1,3]

Further Dilution

Dilute the reconstituted solution to a total infusion volume of 50 – 500 ml ^[1,2,3]

Diluent

NS, D5 ^[1,2,3]

Administration & Infusion rate

IV infusion

- Administer over at least 6 hr for first infusion, and at least 4 hr for subsequent infusion ^[1,2,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	24 hr ^[1]
After dilution	-	24 hr ^[1]

Remarks

- To avoid inadvertent administration of particulate matter from reconstitution, it is recommended to administered through a 0.22µm in-line filter ^[1,2]
- Product contain rabbit protein, hence advisable to determine whether the patient is allergic ^[1]
- Infuse slowly into a high flow vein ^[1,2]

References

- Genzyme Polyclonals S.A.S. Thymoglobuline® 5mg/ml Product leaflet. Revised date: 28 April 2012
- McGraw-Hill's IV Drug Handbook. (2009)
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.1)

ANTIHEMOPHILIC FACTOR

Brand Name & Strength

Koate®-DVI

Reconstitution

Reconstitute with provided solvent by vacuum transfer (as directed in the product leaflet)^[1]

Further Dilution

Not required ^[1]

Diluent

Not required

Administration & Infusion rate

IV

- Administer over 5 – 10 min ^[1,2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	3 hr ^[1]	Do not refrigerate ^[1]
After dilution	-	-

Remarks

- Administer only by IV route ^[1]
- Filter needle should be used prior to administering ^[1]
- Product is made from human plasma and may contain infectious agents such as viruses ^[1]

References

1. Grifols Therapeutics Inc. Antihemophilic Factor (Koate-DVI) Product Leaflet. Revised date: August 2012
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
3. Truven Health Analytics. Micromedex (Version 1.77)

ARTESUNATE

Brand Name & Strength

Artesun 60 mg

Reconstitution

Reconstitute with provided solvent (5% sodium bicarbonate solution) ^[1,2]

Further Dilution

	IV	IM
Bicarbonate solution	1 ml	1 ml
Saline solution	5 ml	2 ml
Total volume	6 ml	3 ml
Artesunate 60mg solution concentration	10 mg/ml	20 mg/ml

Diluent

D5, NS ^[1]

Administration & Infusion rate

IM ^[1,2]

Slow IV ^[1,2]

- Administer at a rate of 3 – 4 ml/min ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	Use immediately ^[1]	-
After dilution	Use immediately ^[1]	-

Remarks

- Do not use in intravenous drip ^[1]
- If solution appears cloudy or sediment occurs, it should not be used ^[1]

References

- Guilin Pharmaceutical Co. Ltd. Artesunate Powder for Injection 60 mg Product Leaflet.
- Lexicomp Edition 21



ATRACURIUM

A

Brand Name & Strength

Atralex 25 mg/2.5 ml & 50 mg/5 ml

Reconstitution

Not required

Further Dilution

IV infusion

- Dilute in diluent to obtain a concentration of ≥ 0.5 mg/ml ^[1]

Diluent

NS, D5

Administration & Infusion rate

IV bolus

- Administer undiluted ^[4]

IV infusion

- Administer at a rate of 0.3 – 0.6 mg/kg/hr ^[1,3]

Storage & Stability

	RT (<30 °C)	Fridge (2-8 °C)
After reconstitution	-	-
After dilution	24 hr (NS), 8 hr (D5) ^[1]	-

Remarks

- Atracurium is a hypotonic solution and must not be administered into the infusion line of a blood transfusion ^[1]
- Atracurium has acid pH, thus should not be mixed with alkaline solutions (e.g.: barbiturate solutions) ^[1,3]
- When injecting a small vein, it is important to flush with saline before and after ^[1]
- Do not use lactated Ringer's Solution because of increased risk of spontaneous degradation ^[3]
- Not to give by IM ^[3]

References

- Duopharm(M) S/B. Atracurium (Atralex Injection) Product Leaflet. Revised date: 8 Jan 2013
- Drug Information Handbook 23rd Edition
- McGraw-Hill's IV Drug Handbook 2009
- Medscape. Atracurium – Tracurium®

ATROPINE

A

Brand Name & Strength

Acipan 1 mg/ml

Reconstitution

Not required

Further Dilution

Continuous IV infusion

- Dilute 8 mg in 100 ml diluent^[3]

Diluent

NS^[3]

Administration & Infusion rate

SC, IM, Slow IV

Continuous IV infusion (for organophosphate poisoning)

- Administer at a rate of 0.02 – 0.08 mg/kg/hr (0.25 - 1 ml/kg/hr)^[3]

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	-	-
After dilution	Use immediately	-

Remarks

- Not to be added to any IV infusion solutions for administration
- Monitor closely for sign and symptoms of anaphylaxis
- Protect from light

References

- Duopharma (M) SDN BHD. Atropine Sulphate (Acipan) Product leaflet. Revised 30 August 2008.
- Mc Graw Hill's IV Drug Handbook
- Sarawak Handbook of Medical Emergencies, 3rd Edition (2011)

AZITHROMYCIN

Brand Name & Strength

Azee 500 mg

Reconstitution

Reconstitute with pre-packed diluent ^[1] or reconstitute 500 mg vial with 4.8 ml WFI to yield 100 mg/ml ^[2]

Further Dilution

Dilute reconstituted solution with 250 ml diluent (2 mg/ml) or 500 ml diluent (1 mg/ml)

Diluent

NS, D5 or lactated Ringer's solution ^[2]

Administration & Infusion rate

IV infusion

- 500 ml (concentration: 1mg/ml): Administer over 3 hr
- 250 ml (concentration: 2 mg/ml): Administer over 1 hr

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	24 hr ^[1]	
After dilution	24 hr ^[2]	7 days ^[2]

Remarks

- Should not be given as bolus or IM injection^[1,2]
- Do not mix with or infuse through the same IV line as other additives or drugs ^[2]
- For IV infusion should be infused over not less than 60 min ^[2]

References

1. Cipla Ltd. Azithromycin (Azee) Product leaflet. Revised date: Nov 2011
2. McGraw Hill's IV Drug Handbook

BASILIXIMAB

B

Brand Name & Strength

Simulect® 20 mg

Reconstitution

Reconstitute with 5 ml of WFI ^[1,3]

Further Dilution

IV infusion

- Dilute to a volume of 50 ml of diluent ^[1,3]

Diluent

NS, D5 ^[1,2]

Administration & Infusion rate

IV bolus ^[1,2,3]

IV infusion

- Administer over 20 – 30 minutes ^[1,2,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	4 hr ^[1,3]	24 hr ^[1,3]
After dilution	-	-

Remarks

- Given via central or peripheral IV route only^[2]
- Do not infuse with other drugs simultaneously in the same IV line ^[2]
- Bolus dosing is associated with nausea, vomiting and local pain on the injection site ^[3]
- When mixing the solution, gently invert the bag in order to avoid foaming; DO NOT SHAKE.

References

1. Novartis. Basiliximab product leaflet. Revision date July 2014.
2. McGraw-Hill's IV Drug Handbook. (2009).
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

BELIMUMAB

Brand Name & Strength

Benlysta[®] 80 mg/ml (120 mg/vial or 400 mg/vial)

Reconstitution

	Volume of WFI ^[1]	Concentration (mg/ml) ^[1]
120 mg	1.5 ml	80
400 mg	4.8 ml	80

- Allow the powder vial to stand at room temperature for 10 – 15 min ^[1,2]
- During reconstitution, gently swirls the vial for 60 seconds every 5 min until the powder is dissolved. Reconstitution is typically complete within 10 – 15 min, or up to 30 min. ^[1,2]

Further Dilution

Dilute to 250 ml diluent ^[1,2]

Diluent

NS ^[1,2]

Administration & Infusion rate

IV infusion

- Administer over 1 hour ^[1,2,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	8 hr ^[1]	8 hr ^[1]

Remarks

- Must not administered as IV push or bolus ^[1]
- D5 is incompatible and should not be used ^[1]
- Protect from sun light. Should not infused concomitantly with other agents ^[1]
- Premedicating with antihistamine and antipyretic can be considered as prophylaxis against hypersensitivity or infusion reactions. ^[1,3]

References

1. GSK. Belimumab (Benlysta[®]) Product Leaflet. Revised date: 15 Mac 2012.
2. Truven Health Analytics. Micromedex (Version 1.77)
3. Lexi-Comp, Inc. (Lexi-Drugs[®]). Lexi-Comp, Inc (Version 3.0.2)

BENZATHINE PENICILLIN

Brand Name & Strength

Sterile Penicillin G Benzathine USP 2.4 MIU (1.8 g)

Reconstitution

Reconstitute with 8 ml of WFI

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IM only

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	Use immediately	-
After dilution	-	-

Remarks

- Observe patient in 30 min of administration for any allergy reactions developed
- Not for intravenous, intrathecal and subcutaneous injection.
- In infants and small children, not to be injected into the upper outer quadrant of the buttock to avoid sciatic nerve damage.

References

1. Karnataka Antibiotics & Pharmaceuticals Limited. Benzathine Penicillin (Sterile Penicillin G Benzathine USP 2.4 MIU) Product leaflet. Revised 13th July 2009.

BENZYL PENICILLIN

Brand Name & Strength

Benzyl Penicillin for Injection BP 1 MIU (600 mg) and 5 MIU (3 g)

Reconstitution

- Reconstitute 1 MIU vial with 2 ml or more WFI immediately before use ^[1]
- Reconstitute 5 MIU vial with 10 ml or more WFI immediately before use ^[1]

Further Dilution

IV infusion

- Further dilute in 50 – 100 ml diluent ^[2]

Continuous IV infusion

- Further dilute in 1000 – 2000 ml diluent ^[2]

Diluent

NS, D5 ^[2]

Administration & Infusion rate

IM

- At upper outer quadrant of the buttock ^[3]

IV infusion

- Administer over 30 min – 1 hr ^[4] or 1 – 2 hr ^[2]

Continuous IV infusion

- Administer over 24 hr ^[2]
- Preferred for administration of large doses

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	2 days ^[1]	6 days ^[1]
After dilution	-	-

Remarks

- Too rapid infusion may cause electrolyte imbalance or seizures ^[2]
- Do not use plastic containers in series connections as it could result in air embolism due to residual air being drawn from primary container before administration of fluid from secondary ends ^[2]

References

1. Karnataka Antibiotics & Pharmaceuticals. Benzylpenicillin (Benzyl Penicillin for Injection BP) Product Leaflet. Revised 11 August 2008.
2. McGraw Hill's IV Drug Handbook
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; November 2, 2016
4. BNF 70th Ed. Sept 2015 – Mar 2016

BERACTANT INTRATRACHEAL SUSPENSION

Brand Name & Strength

Survanta 200 mg phospholipids/8 ml

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IT administration only ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Single use only once opened ^[1]
- Before administration, Survanta® should be warmed by standing in room temperature for at least 20 min or warmed in the hand for at least 8 min. ^[1]
- Artificial warming methods should not be used. Unopened, unused vials of Survanta® that have been warmed to room temperature may be returned to the refrigerator within 8 hr of warming and stored for future use. ^[1]
- Drug should not be warmed and returned to the refrigerator more than once. ^[2]

References

1. Abbvie. Beractant Intrathecal Suspension (Survanta®) Product Leaflet. Revised Nov 2012.
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; November 3, 2016



BORTEZOMIB

B

Brand Name & Strength

Bortezomib 1 mg/5 ml, Bortezomib 3.5 mg/10 ml

Reconstitution

IV bolus (maximum concentration 1 mg/ml) ^[1,2,3]

- Bortezomib 1 mg/5 ml: reconstitute with 1 ml NS^[1]
- Bortezomib 3.5 mg/10 ml: reconstitute with 3.5 ml NS^[1]

SC (maximum concentration 2.5 mg/ml) ^[1,2,3]

- Reconstitute each 3.5 mg vial with 1.4 ml NS

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IV bolus

- Administer over 3 to 5 seconds ^[1]

SC

- Administer into the thigh or abdomen (right or left). Injection sites should be rotated for each successive injections ^[1,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	8 hr ^[1]	-
After dilution	3 days (at 1 mg/ml) ^[3]	5 days (at 1 mg/ml) ^[3]

Remarks

- Do not administer via other route. Death have been reported with intrathecal administration ^[1]
- Bortezomib is an antineoplastic. Caution should be used during handling and preparation ^[1]
- The reconstituted concentrations for IV and SC administrations are different; use caution when calculating the volume for each dose. ^[1,2]
- If local injection site reactions occur following Bortezomib injection subcutaneously, a less concentrated solution (1 mg/ml instead of 2.5 mg/ml) may be administered subcutaneously, or change to IV injection. ^[1,3]

References

1. Aquitaine Pharm Int. Bortezomib (**VALCADE**[®]) Product Leaflet. Revision date: 23 January 2012
2. McGraw Hill's IV Drug Handbook. (2009)
3. Lexi-Comp, Inc. (Lexi-Drugs[®]). Lexi-Comp, Inc (Version 3.0.2)

BROMHEXINE

B

Brand Name & Strength

Mucorex Injection 4 mg/2 ml

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IV bolus

- Administer over 2 – 3 min ^[1]

IM

- Can be given IM (deep) ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

-

References

1. Duopharma: Bromhexine Hydrochloride Inj. (Mucorex) Product Leaflet. Revised date: 17 January 2004.

BUMETANIDE

Brand Name & Strength

Burinex 2 mg/4 ml

Reconstitution

Not required

Further Dilution

IV infusion, Continuous IV infusion

- Dilute 2 – 5 mg in 500 ml of diluent ^[1]

Diluent

D5, NS, lactated Ringer's solution ^[2]

Administration & Infusion rate

Slow IV, IM

- Administer 1 – 2 mg slowly over 1 – 2 min ^[1,2,3]

IV infusion

- Administer over 30 – 60 min ^[1]

Continuous IV infusion

- Administer at a rate of 0.5 – 2 mg/hr ^[3]

Storage & Stability

	RT (<30 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	24 hr ^[2,3]	-

Remarks

- Light sensitive: discoloration may occur when exposed to light ^[3]

References

1. CENEXI Leo Pharma A/S (Burinex[®]) product leaflet. Revised date: February 2015
2. McGraw Hill's IV Drug Handbook. (2009)
3. Lexi-Comp, Inc. (Lexi-Drugs[®]). Lexi-Comp, Inc (Version 3.0.2)



BUPIVACAINE 0.5 % + ADRENALINE

B

Brand Name & Strength

Marcaine Adrenaline 0.5% 100 mg/20 ml

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

Slow IV

- Administer slowly at 25 – 50 mg/min ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Do not reuse once opened ^[1]

References

- Product Leaflet [MARCAINE: AstraZeneca July 2014]



BUPIVACAINE HEAVY

B

Brand Name & Strength

Bupitroy Heavy 0.5 % w/v (20 mg/4 ml), Marcaine Spinal Heavy 0.5 % w/v (20 mg/4 ml)

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IT ^[1,2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Use immediately after opening the ampoule. ^[1]

References

1. AstraZeneca. Bupivacaine (Marcaine® Spinal heavy 5 mg/ml, solution for injection) Product Leaflet. Revised date : Jan 2009
2. Troikaa Pharmaceuticals Ltd. Bupitroy Heavy Product Leaflet. Revised date : November 2013

BUPIVACAINE HCL PLAIN



B

Brand Name & Strength

Pivakan 0.5% w/v (100 mg/20 ml), Marcain (100 mg/20 ml)

Reconstitution

Not required

Further Dilution

Not required

Diluent

NS^[3]

Administration & Infusion rate

Spinal anaesthesia for surgery

- 2 – 4 ml injected into interspace^[1]

Postoperative analgesia

- Intermittent epidural: Infuse 4 – 8 ml at rate of 1 – 2 ml/hr^[1]
- Continuous epidural: Dilute Pivakan 0.5% Plain to 0.125% and infuse at rate of 15 ml/hr^[1]

Analgesia in labour

- 6 – 12 ml for moderate or complete block^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- For single use only and discard any remaining portion^[1]

References

1. Product Leaflet. AstraZeneca. Bupivacaine (Marcaine® Spinal heavy 5 mg/L, solution for injection) Product Leaflet. Revised date : Jan 2009
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; November 2, 2016
3. N Huda et al. Role Of High Dose Epidural Methylprednisolone In Lumbar Canal Stenosis: A Prospective, Randomized Control Study. The Internet Journal of Pain, Symptom Control and Palliative Care. Vol 8 (1). Available from: <http://ispub.com/IJPSP/8/1/7582>.

CAFFEINE CITRATE

Brand Name & Strength

Cafnea™ Injection 40 mg/2 ml (equivalent to caffeine 20 mg/2 ml)

Reconstitution

Not required

Further Dilution

Undiluted or dilute with diluent to a concentration of 10 mg/ml [2,3,4]

Diluent

D5 [2,3]

Administration & Infusion rate

IV infusion (by syringe infusion pump) [1,2,3]

- Loading dose: Administer over 30 min
- Maintenance dose: Administer over 10 min

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	-	-
After dilution	24 hr [2]	-

Remarks

- Stable for 24 hours at room temperature when combined with:
 - D5;
 - Intralipid® 20% IV fat emulsion;
 - Aminosyn® 8.5% crystalline amino acid solution;
 - Dopamine hydrochloride injection 40 mg/ml diluted to 0.6 mg/ml with D5;
 - Calcium gluconate injection 10% (0.465 mEq/ml Ca²⁺);
 - Heparin sodium injection 1,000 units/ml diluted to 1 unit/ml with D5;
 - Fentanyl citrate injection 50 mcg/ml diluted to 10 mcg/ml with D5 [2]

References

1. Phebra. Caffeine citrate (Cafnea) Product leaflet. Revised date: 13th June 2013
2. Mcgraw Hill's IV Handbook. (2009)
3. Truven Health Analytics. Micromedex (Version 1.77)
4. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; November 2, 2016

CALCITRIOL

C

Brand Name & Strength

Bonky 1 mcg

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IV bolus

- Use undiluted through catheter at the end of haemodialysis ^[1,2,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Discard unused portion ^[2]

References

1. Yuyu Inc. Calcitriol (Bonky®) product leaflet. Revised date: -
2. McGraw-Hill's IV Drug Handbook
3. WebMD, LLC. (2016). Medscape (Version 5.6.1)



CALCIUM GLUCONATE 10%

Brand Name & Strength

Calcium Gluconate 10%

Reconstitution

Not required ^[1]

Further Dilution

IV infusion ^[1,2,3]

- Dilute 1 – 2 g (10 – 20 ml) with 100 ml of diluent

Diluent

NS, D5 ^[1,2,3]

Administration & Infusion rate

IM

Can be given deep IM (preferably in gluteal region) ^[1]

IV bolus

- Administer at a rate not exceeding 1.5 ml/min ^[2,3]
- Administer 10 ml of IV calcium gluconate 10% over 2 – 5 min for severe hyperkalemia ^[4]
- Administer 10 – 20ml of IV calcium gluconate 10% over 10 min for acute symptomatic hypocalcemia ^[4]

IV infusion

- Administer at rate not exceeding 50 mg/min ^[1]

Storage & Stability

	RT (<30 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	Use immediately ^[1]	24 hr ^[1]

Remarks

- Because of risk of local irritation, IM injection should only be given if IV Injection is not possible. IM injection should not be given to children ^[1]
- After dilution, physical in-use stability has been demonstrated for 48 hours when stored at room temperature. But from a microbiological point of view, the diluted product should be used immediately. ^[1]

References

1. B. Braun: Calcium Gluconate 10% Product leaflet. Revision date: November 2005
2. McGraw-Hill’s IV Drug Handbook, 2009
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; March 20, 2017
4. Sarawak handbook 3rd edition

CARBETOCIN

Brand Name & Strength

Duratocin® 100 mcg/ml Injection

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

Slow IV

- Administer slowly over 1 min ^[1,2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Must be used immediately once ampoule is opened. ^[1]
- Administer only when delivery of the infant has been completed by caesarean section under epidural or spinal anaesthesia. ^[1]
- Can be administered either before or after delivery of the placenta. ^[1]

References

1. Ferring GmbH. Carbetocin (Duratocin ®) Product Leaflet. Version: Nov 2013
2. British National Formulary 70th Edition

CARBOPROST TROMETHAMINE

Brand Name & Strength

Hemabate® 250 mcg/ml

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IM only ^[1,2,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Administer with a tuberculin syringe. ^[1,3]
- The total dose should not exceed 2 mg (8 doses) for post partum uterine bleeding. ^[1,2,3]

References

1. Pfizer. Carboprost tromethamine (Hemabate®) Product Leaflet. Revised date: February 2014.
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; March 20, 2017
3. Truven Health Analytics. Micromedex (Version 1.77)

CASPOFUNGIN ACETATE

Brand Name & Strength

Candidas® 50 mg & 70 mg

Reconstitution

Reconstitute 50 mg vial with 10.5 ml of NS or WFI (5.2 mg/ml) ^[1]

Reconstitute 70 mg vial with 10.5 ml of NS or WFI (7.2 mg/ml) ^[1]

Further Dilution

IV infusion

- **50 mg:** Dilute reconstituted solution in a 100 ml intravenous bag or bottle ^[1]
- **70 mg:** Dilute reconstituted solution into two separate 100 ml intravenous bags or bottles (5 ml of reconstituted solution in each bag/bottle) ^[1]
- Pediatric patients (≥ 12 months old): Dilute reconstituted solution in a 250 ml intravenous bag or bottle not exceeding a final concentration of 0.5 mg/ml ^[1]

Diluent

NS, lactated Ringer's solution ^[1,3] or ½NS (for pediatric patients) ^[1]

Administration & Infusion rate

IV infusion

- Administer slowly over 1 hr ^[1,3]
- For a 70 mg dose, administer each of the bags or bottles sequentially over 30 min ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	24 hr ^[1]	-
After dilution	24 hr ^[1,3]	48 hr ^[1,3]

Remarks

- Do not use any diluents containing dextrose (α-D-glucose) ^[1,3]
- Do not mix or co-infuse with any other medications ^[1]

References

1. Merck Sharp & Dohme Corp. Caspofungin Acetate 50 mg & 70 mg (Candidas® for Injection) Product Leaflet. Revised: September 2014.
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
3. McGraw Hill's IV Drug Handbook. (2009)

CEFAZOLIN

Brand Name & Strength

Cefazolin Sandoz® 1 g

Reconstitution

Slow IV, IV infusion

- Reconstitute with 4 ml of WFI or NS ^[1]

Further Dilution

IV infusion

- Dilute in 50 – 100 ml diluent ^[1,2]

Diluent

NS, WFI, D5, D5LR, QSD5, HSD5, NSD5, D10 ^[1,2]

Administration & Infusion rate

IM

Slow IV

- Administer over 3 – 5 min ^[1,2]

IV infusion

- Administer doses > 1 g over 20 – 30 min ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	Use immediately ^[1]	-
After dilution	Use immediately ^[1]	-

Remarks

- Do not mix in same infusion with Aminoglycoside (might inactivate both drugs) ^[3]

References

1. Novartis. Cefazolin (Cefazolin Sandoz) Product Information Leaflet.
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; March 20, 2017
3. McGraw-Hill's IV Drug handbook. (2009).

CEFEPIME

Brand Name & Strength

Forpar 1 g

Reconstitution

IV infusion

- Reconstitute with provided solvent

Further Dilution

IV infusion

- Dilute in 50 or 100 ml of diluent (final concentration: 1 – 40 mg/ml). ^[1]

Diluent

NS, D5, D10, lactated Ringer's solution ^[1,4]

Administration & Infusion rate

IV infusion

- Administer over 30 min ^[1,2,4]

IM

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	24 hr ^[1,3]	7 days ^[1,3]
After dilution	24 hr ^[1,3]	7 days ^[1,3]

Remarks

- Drug is compatible at concentration of 1 – 40 mg/ml when mixed with diluents ^[1,2]
- Do not mix with Ampicillin, Metronidazole, Aminoglycosides or Aminophylline ^[2]

References

1. Cipla Ltd. Cefepime 1 g Injection Product Leaflet. Revised date: April 2015
2. Mc Graw Hill's IV Handbook. (2009)
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; March 20, 2017
4. Truven Health Analytics. Micromedex (Version 1.77)

CEFOPERAZONE

Brand Name & Strength

Bicafar 500 mg, 1000 mg, 2000 mg

Reconstitution

Reconstitute with 5 ml of D5, NS, D10, WFI ^[1]

Further Dilution

Slow IV

- Dilute reconstituted solution with 20 – 100 ml diluent ^[1]

IV Infusion

- Dilute the reconstituted solution with 20 – 100 ml diluent ^[1]

IM

- WFI should be used when preparing Cefoperazone. However, when concentration of more than 250 mg/ml a lidocaine solution should be used ^[1]

Vial (g)	Final Concentration (mg/ml)	Step 1: Volume of WFI (ml)	Step 2: Volume of 2% Lidocaine (ml)
0.5	250	1.3	0.4
	333	0.9	0.3
1	250	2.6	0.9
	333	1.8	0.6
2	250	5.2	1.8
	333	3.7	1.2

Diluent

NS, D5, D10, lactated Ringer's solution ^[1]

Administration & Infusion rate

IV Infusion

- Administer over 15 min – 1 hr ^[1]

Slow IV

- Administer over 3 – 5 min ^[1]

IM ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	24 hr ^[1]	5 days ^[1]
After dilution	-	-

Remarks

- Cefoperazone is incompatible with aminoglycosides, perphenazine or pethidine hydrochloride ^[1]
- When given by IM, inject into large muscle mass of gluteus maximum or anterior thigh ^[1]

References

1. Duopharma. Cefoperazone (Bicafar) Product Leaflet. Revised date: 14 Aug 2012
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; March 20, 2017
3. McGraw-Hill's IV Drug Handbook (2009)

CEFOPERAZONE-SULBACTAM

Brand Name & Strength

Cefobactam 1 g

Reconstitution

Reconstitute with 3.4 ml WFI, D5 or NS ^[1]

Further Dilution

IM

- Dilute with Lidocaine HCl 2% to yield solutions containing up to 250 mg Cefoperazone and 125 mg Sulbactam/ml in approximately a 0.5% Lidocaine HCl solution ^[1]

IV infusion

- Dilute to 20 ml with the same diluent (maximum concentration: 125 mg sulbactam/ml) ^[1]

Diluent

WFI, D5, NS, lactated Ringer's solution^[1]

Administration & Infusion rate

IM

- Administer undiluted ^[1]

IV bolus

- Administer over at least 3 min ^[1]

IV infusion

- Administer over 15 – 60 min ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	24 hr ^[1]	-
After dilution	-	-

Remarks

-

References

- Kotra Pharma. Cefoperazone/Sulbactam 1 g (Cefobactam) Product Leaflet. Date revised:

CEFOTAXIME

Brand Name & Strength

Rekaxime 500 mg & 1000 mg Injection, Cefotaxime 1 g Injection

Reconstitution

Reconstitute 500 mg vial with 2 ml of WFI or 1000 mg vial with 4 ml of diluent ^[1,2]

Further Dilution

IV infusion

- Dilute in 40 – 100 ml diluent

Diluent

WFI, NS, D5 ^[1,2], D10 (for short infusion), NSD5 ^[1], HS, lactated Ringer's solution ^[3]

Administration & Infusion rate

IV bolus

- Administer over 3 – 5 min ^[1]

IV infusion

- Administer over 20 – 60 min ^[1]

IM

- Inject deep into the gluteus muscle ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	24 hr ^[1,3]	10 days (< 5 °C) ^[3]
After dilution	24 hr ^[4]	5 days ^[4]

Remarks

- Do not use diluents with pH above 7.5 (eg. Sodium Bicarbonate)^[1,2,3]
- Doses given over less than 1 min have caused life threatening arrhythmias^[3]
- If daily dose exceeds 2 g of cefotaxime, IV injection is to be preferred^[1]
- Incompatible with hetastarch sodium chloride^[1]

References

- Duopharma (M) Sdn Bhd. Cefotaxime (Rekaxime) Product leaflet. Revised date: 24 Feb 2011
- Pharmaniaga. Cefotaxime (Cefotaxime Injection) Product Leaflet.
- McGraw Hill's IV Handbook. (2009)
- Truven Health Analytics. Micromedex (Version 1.77)

CEFTAZIDIME

Brand Name & Strength

Cefatum Injection 1g, 2g

Reconstitution

Slow IV, IV infusion

- Reconstitute with 10 ml of WFI ^[1]

Further Dilution

IV infusion

- Dilute in 100 ml diluent

Diluent

NS, D5, Sodium Lactate Solution, Hartmann's Solution

Administration & Infusion rate

IM (doses up to 1 g)

- Administer undiluted ^[1]

Slow IV

- Administer over 3 – 5 min into large veins and rotate injection sites ^[1,2]

IV infusion

- Administer over 30 min ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	12 hr / 6 hr (in lignocaine)	7 days / 4 days (in lignocaine)
After dilution	12 hr (conc. up to 40 mg/ml)	7 days (conc. up to 40 mg/ml)

Remarks

- Must not be mixed with sodium bicarbonate solution ^[2]

References

1. Duopharma (M) Sdn Bhd. Ceftazidime 1g/2g (Cefatum Injection) Product leaflet. Revised date: June 2014.
2. Mc Graw Hill's IV Drug Handbook. (2009)

CEFTRIAZONE

Brand Name & Strength

Unocéf Injection 250 mg, 500 mg, 1000 mg

Reconstitution

IM

- WFI, NS, D5, Bacteriostatic water + 0.9% Benzyl alcohol, 1% Lidocaine solution (without Epinephrine) ^[1]

Vial dosage size	Amount of diluent to be added	
	250 mg/ml	350 mg/ml
250 mg	0.9 ml	-
500 mg	1.8 ml	1.0 ml
1000 mg	3.6 ml	2.1 ml

IV

- WFI, NS, D5, D10, NSD5, HSD5 ^[1]

Vial dosage size	Amount of diluent to be added
250 mg	2.4 ml
500 mg	4.8 ml
1000 mg	9.6 ml

Further Dilution

IV infusion

- Dilute to 50 – 100 ml with diluent ^[2]

Diluent

NS, D5 ^[3]

Administration & Infusion rate

IM

- Administer deep IM into large muscle mass ^[1]

IV infusion

- Administer over 30 min ^[1,2]

Storage & Stability

Intramuscular solution ^[1]

Diluent	Concentration (mg/ml)	RT (< 25 °C)	Fridge (2-8 °C)
SWFI	100	3 days	10 days
	250, 350	24 hr	3 days
NS	100	3 days	10 days
	250, 350	24 hr	3 days
D5	100	3 days	10 days
	250, 350	24 hr	3 days
Bacteriostatic water + 0.9 % Benzyl alcohol	100	24 hr	10 days
	250, 350	24 hr	3 days
1 % Lidocaine solution (without epinephrine)	100	24 hr	10 days
	250, 350	24 hr	3 days

Intravenous solution stored in glass or PVC containers ^[1]

Diluent	RT (< 25 °C)	Fridge (2-8 °C)
SWFI	3 days	10 days
NS	3 days	10 days
D5	3 days	10 days
D10	3 days	10 days
NSD5	3 days	Incompatible
HSD5	3 days	Incompatible

Remarks

- Do not use diluents containing calcium, such as Ringer's solution or Hartmann's solution, to reconstitute Ceftriaxone ^[2]

References

- Duopharma. Ceftriaxone (Unocel Injection) Product Leaflet. Revised 2 October 2013.
- Mc Graw Hill's IV Drug Handbook. (2009)
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; November 3, 2016

CEFUROXIME

C

Brand Name & Strength

Anikef 750 mg & 1500 mg

Reconstitution

IM

- Reconstitute 750 mg with 3 ml WFI ^[1]

IV

- Reconstitute 750 mg with 6 ml WFI ^[1]
- Reconstitute 1500 mg with 15 ml WFI ^[1]

Further Dilution

IV infusion

- Dilute reconstituted solution with 50 ml ^[1]

Diluent

WFI ^[1,2], D5, NS ^[2]

Administration & Infusion rate

IV bolus

- Administer over 3 – 5 min ^[1,2,3]

IV infusion

- Administer over 15 min to 1 hr ^[2]

IM (deep) ^[1,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	5 hr ^[1]	48 hr ^[1]
After dilution	24 hr ^[3]	7 days ^[3]

Remarks

- Incompatible with Sodium Bicarbonate injection ^[2]
- Incompatible with aminoglycosides ^[1]
- A dose of 1.5 g injected IM can be divided into 2 injection sites. ^[1]

References

1. Duopharma. Cefuroxime (Anikef) Product Leaflet. Revised 2 September 2013.
2. Mc Graw Hill's IV Drug Handbook. (2009).
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; November 3, 2016

CETRORELIX

Brand Name & Strength

Cetrotide® (Cetrorelix Acetate for Injection) 0.25 mg & 3 mg

Reconstitution

Reconstitute 0.25 mg with 1 ml of WFI ^[1]

Reconstitute 3 mg with 3 ml of WFI ^[1]

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

SC

- Administer in the lower abdominal area at least 1 inch away from the navel ^[1,2]; rotate injection site daily ^[2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

-

References

- Serono. Cetrorelix Acetate 0.25mg & 3mg (Cetrotide for Injection) Product leaflet. Revised: April 2008.
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

C

CHLORAMPHENICOL

Brand Name & Strength

Chloramphenicol Sodium Succinate Injection 1 g

Reconstitution

Reconstitute with 10 ml WFI ^[1,2]

Further Dilution

Not required ^[1,2]

Diluent

Not required

Administration & Infusion rate

IV bolus

- Administer over at least 1 min ^[1]

IM ^[2]

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Use immediately after preparation and unused portion should be discarded. ^[1]

References

1. Karnataka Antibiotics and Pharmaceuticals Ltd: Chloramphenicol Sodium Succinate Injection 1 g Product Leaflet. Revised date: June 2003
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

CHLORPHENIRAMINE

C

Brand Name & Strength

Primat 10 mg/ml (ampoule), Primat 100 mg/10 ml (vial)

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

SC, IM ^[1]

Slow IV

- Administer slowly over 1 minute ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- After opening (10 ml vial) stable up to 4 weeks if refrigerated ^[1]
- If rapid effect is desired, IV route is recommended. ^[1]

References

1. Duopharma (M) Sdn. Bhd. Chlorpheniramine Maleate (Pirimat™) Product Leaflet. Revised date : 24.10.2011

CHLORPROMAZINE

Brand Name & Strength

Largactil 25 mg/ml Injection

Reconstitution

Not required

Further Dilution

Slow IV

- Dilute to 1 mg/ml with diluent [2,3]

IV infusion

- Dilute 25 – 50 mg in 500 – 1000 ml diluent [1,2,3]

Diluent

NS [1]

Administration & Infusion rate

Slow IV

- Administer at 1 mg/min (adults) & 2 mg/min (children) [2,3]

IV infusion

- Slow infusion (max rate: 1 mg/min) [1,2,3]

Deep IM [1,2,3]

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Do not inject subcutaneously [1,2]
- IV infusion is recommended for intractable hiccups only [1,2,3]
- To reduce the risk of hypotension, patients receiving IV Chlorpromazine must remain lying down during and 30 minutes after the injection. [2,3]

References

- Sanofi Aventis Ltd. Chlorpromazine 25mg/ml Injection Online Product Leaflet. Revised Date:5th August 2016
- McGraw-Hill's IV Drug Handbook. (2009)
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

CICLOSPORIN

Brand Name & Strength

Sandimmun® 50 mg/ml

Reconstitution

Not required

Further Dilution

Dilute 1 vial in 20 – 100 ml diluent ^[1,2]

Diluent

NS, D5 ^[1,2]

Administration & Infusion rate

IV infusion

- Administer over 2 – 6 hours ^[1,2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	24 hr ^[1]	-

Remarks

-

References

1. Novartis Pharma AG, Basel, Switzerland. Cyclosporin (Sandimmun) Product leaflet. Revised date: August 2014.
2. Mc Graw Hill's IV Drug Handbook. (2009)

C

CIDOFOVIR

Brand Name & Strength

Cidofovir Injection 375 mg/5 ml

Reconstitution

Not required

Further Dilution

Dilute in 100 ml diluent ^[1,2,3,4]

Diluent

NS ^[1,2,3,4]

Administration & Infusion rate

IV infusion

- Administer over 1 hr ^[1,2,3,4]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	24 hr ^[1,2,3,4]

Remarks

- For intravenous administration only and must not be administered by intraocular injection.^[1]
- Administration of cidofovir injection must be accompanied by oral probenecid and intravenous saline prehydration.^[1,2,3,4]
- Due to mutagenic properties of cidofovir, adequate precautions including the use of appropriate safety equipment are recommended for the preparation, administration, and disposal of Cidofovir.^[1,4]
- Use of a standard infusion pump for administration is recommended.^[1,2]

References

- Emcure Pharmaceuticals Ltd. Cidofovir Injection Product Leaflet. Revised date: 10/13
- Mc Graw Hill's IV Handbook. (2009)
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
- Intravenous Dilution Database. GlobalRPh. Available at: http://www.globalrph.com/index_dilution.htm

C

CIPROFLOXACIN

Brand Name & Strength

Ificipro Injection 200 mg/100 ml

Reconstitution

Not required

Further Dilution

Not required

Diluent

NS, Ringer’s solution, lactated Ringer’s solution, D5, D10, QSD5, HSD5 ^[1,3]

Administration & Infusion rate

IV infusion

- Administer over 60 min ^[1,2,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Slow infusion into a large vein will minimize patient discomfort and reduce the risk of venous irritation. ^[1,3]
- Too rapid IV infusion increases risk of anaphylaxis and other adverse reactions. ^[1]
- The infused solution can be infused either directly or after mixing with other compatible infusion solutions. ^[1]
- Do not add other drugs or solutions to premixed containers. ^[1,2]

References

1. Unique Pharmaceutical Labs. Ciprofloxacin (Ificipro®) Product Leaflet.
2. Mcgraw Hill’s IV Drug handbook. (2009).
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; March 20, 2017

CLINDAMYCIN

C

Brand Name & Strength

Dalacin C 300 mg/2 ml

Reconstitution

Not required

Further Dilution

IV infusion

- **300 – 600 mg:** Dilute in 50 ml diluent ^[2]
- **900 mg:** Dilute in 50 – 100 ml diluent ^[2]
- **1200 mg:** Dilute in 100 ml diluent ^[2]
- Maximum final concentration: 18 mg/ml ^[2,3,4]

Diluent

NS, D5, lactated Ringer's solution ^[3]

Administration & Infusion rate

IV infusion

- Administer over at least 10 – 60 min. Max rate: 30 mg/min (do not exceed 1200 mg/hr). ^[2,3,4]

IM

- Deep IM, rotate sites ^[3]

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	-	-
After dilution	24 hr ^[2] 16 days (in NS or D5) ^[3]	32 days (in NS or D5) ^[3]

Remarks

- Single IM injections of greater than 600 mg are not recommended ^[3,4]
- IV administration should not be given undiluted nor as IV bolus ^[2,3]
- Too-rapid infusion may cause severe hypotension and cardiac arrest. ^[2]

References

1. Pfizer Manufacturing Belgium NV, Clindamycin (Dalacin C) Product Leaflet.
2. Mc Graw Hill's IV Handbook. (2009)
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
4. Intravenous Dilution Database. GlobalRPh. Available at: http://www.globalrph.com/index_dilution.htm

CLOSTRIDIUM BOTULINUM TOXIN TYPE A (ONABOTULINUM TOXIN A)

Brand Name & Strength

Botox 100 units

Reconstitution

Reconstitute with recommended volume of sterile preservative-free NS ^[1,2]

Diluent Added	Resulting dose in units per 0.1 ml*
1.0 ml	10.00 units
2.0 ml	5.00 units
4.0 ml	2.50 units
8.0 ml	1.25 units

*Choice of final concentration depends on indication

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IM, SC or intradermal depending on indication ^[1,2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	24 hr ^[1]
After dilution	-	-

Remarks

- Botox should only be given by physicians with the appropriate qualifications and experience in the treatment of patients. ^[1]

References

- Allergan Pharmaceuticals Ireland. Botulinum Toxin Type A (Botox) Product Leaflet. Revised date March 2012.
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

CLOSTRIDIUM BOTULINUM TOXIN TYPE A (ABOBOTULINUMTOXIN A)

C

Brand Name & Strength

Dysport 300 units & 500 units

Reconstitution

Reconstitute with recommended volume of NS:^[1,2]

Dysport Preparation	Diluent Added	Resulting dose concentration (Dysport units/0.1 ml)*
500 units/vial	1.0 ml	50.0
	2.5 ml	20.0
300 units/vial	0.6 ml	50.0
	1.5 ml	20.0

*Choice of final concentration depends on indication

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IM, SC or intradermal depending on indication ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	24 hr ^[1]
After dilution	-	-

Remarks

- Dysport should only be administered by appropriately trained physician. ^[1]
- Swirl gently to dissolve during reconstitution, do not shake. ^[2]
- The product may be stored for up to 24 hours at 2 – 8 °C following reconstitution. ^[1]

References

1. Ipsen Biopharm Limited. Clostridium Botulinum Type A (Dysport) Product Leaflet. Revised date 18 Feb 2012.
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

CLOXACILLIN

Brand Name & Strength

Cloxacillin Sodium 250mg & 500mg

Reconstitution

IM

- 250mg reconstitute with 1.9 ml WFI (to make 2.0 ml 125 mg/ml solution) ^[1]
- 500mg reconstitute with 1.7 ml WFI (to make 2.0 ml 250 mg/ml solution) ^[1]

IV

- 250mg reconstitute with 4.9 ml WFI (to make 5.0 ml 50 mg/ml solution) ^[1]
- 500mg reconstitute with 4.8 ml WFI (to make 5.0 ml 100 mg/ml solution) ^[1]

Further Dilution

IV infusion

- Dilute 1 vial to 125 – 250 ml diluent ^[1]

Continuous IV Infusion

- Dilute dose ≤ 500 mg with 250 ml diluent and dose > 500 mg with 500 ml diluent^[1]
- Maximum concentration 2 mg/ml ^[2]

Diluent

NS, D5 ^[1]

Administration & Infusion rate

IM ^[1]

Slow IV

- Administer the reconstituted solution over at least 3 – 5 min ^[1]

IV infusion

- Administer over 60 min ^[1]

Continuous IV infusion

- Administer over 6 – 12 hr ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	Use immediately ^[1]	-
After dilution	24 hr ^[1]	-

Remarks

-

References

1. Karnataka Antibiotics & Pharmaceuticals Ltd. Cloxacillin Sodium. [Rev 9th Feb 2015]

COBRA ANTIVENIN (PURIFIED)



C

Brand Name & Strength

Cobra Antivenin (Purified Equine Immunoglobulin)

Reconstitution

Reconstitute with provided solvent or 10 ml WFI ^[1]

Further Dilution

Dilute the reconstituted antivenom with 5 – 10 ml/kg of diluent for children or 250 – 500 ml diluent for adult ^[1]

Diluent

NS, D5

Administration & Infusion rate

IV infusion

- Initial dose is 100 ml (10 vials) for systemic envenoming
- Administer at 1 – 2 ml/min over 10 – 15 min. If no reaction, complete the infusion at a rate 5 – 10 ml/min less than 1 hr
- Subsequent dose can be given every 1 – 2 hr according to clinical signs and symptoms.

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Adults and children require the same dose of antivenin as adults. ^[1]

References

1. Queen Saovabha Memorial Institute. Cobra Antivenin (Purified). Revision date: April 2012
2. Snakebite Management Guide for Healthcare providers in Malaysia. Copyrights UKM 2014. Updated: May 2014

COLISTIMETHATE SODIUM (POLYMYXIN E)

Brand Name & Strength

Colomycin Injection 1 MIU/10 ml

Reconstitution

IV infusion

- Reconstitute 1 MIU with 2 ml WFI ^[1]

Further Dilution

IV infusion

- Dilute loading dose (9 – 12 MIU) with 100 ml diluent ^[3]
- Dilute maintenance dose with 10 – 50 ml diluent ^[1]

Diluent

NS, WFI ^[1]

Administration & Infusion rate

IV infusion

- Administer over 1 – 2 hr (for loading dose) ^[4]
- Administer over 30 min (for maintenance dose) ^[1]

Storage & Stability

	RT (20 – 25 °C)	Fridge (2-8 °C)
After reconstitution	Use immediately ^[1,2]	24 hr ^[1,2]
After dilution	-	-

Remarks

- Avoid concomitant use with aminoglycoside antibiotic (such as gentamicin, amikacin, netilmicin and tobramycin) as increased risk of nephrotoxicity ^[1]
- The ultrasonic nebulisers are preferred ^[1]

References

- Xellia Pharmaceutical APS. Colistimethate 1 Million IU Product Leaflet. Revised 10 September 2015
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; March 20, 2017
- COLISTIN: adult and paediatric guideline for South Africa, 2016
- Systemic Review of the Evidence for Rational Dosing of Colistin, March 2014. Vol. 104. No. 3.

CYANOCOBALAMIN

Brand Name & Strength

Cyanocobalamin 1000 mcg/ml Injection

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IM, SC ^[1,2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Should not be administered intravenously, although small amounts are sometimes included in Total Parenteral Nutrition. ^[1]

References

1. Pharmaniaga: Cyanocobalamin 1000mcg/ml Product leaflet. Revision Date: 29 July 2013
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; March 20, 2017

DANTROLENE

Brand Name & Strength

Dantrium 20 mg/70 ml

Reconstitution

Reconstitute with 60 ml of sterile WFI without a bacteriostatic agent ^[1,2,3]

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IV bolus ^[1,2,3]

- Administer therapeutic or emergency dose with rapid continuous IV push ^[3]
- Administer follow-up doses over at least 1 min (Ryanodex) or 1 hr (Dantrium, Revonto) ^[3]

Storage & Stability

	RT (15 – 30 °C)	Fridge (2 – 8 °C)
After reconstitution	6 hr ^[1,2,3]	-
After dilution	-	-

Remarks

- After reconstitution, protect from direct light ^[2]

References

1. JHP Pharmaceutical (Dantrium® Intravenous) Product leaflet. Revised date: 22 January 2009
2. McGraw-Hill's IV Drug Handbook. (2009)
3. Lexi-comp, Inc (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
4. Eagle Pharmaceutical (Ryanodex® Injectable Suspension for Intravenous Use) Product leaflet.

DEFERRIOXAMINE

Brand Name & Strength

Desferal® 500mg

Reconstitution

Route of administration	Strength 500mg		
	IM	IV	SC
Volume of WFI (ml) ^[2,3]	2	5	5
Final concentration (mg/ml) ^[2,3]	213	95	95

Further Dilution

IV infusion, Continuous IV infusion

- Dilute with 150 ml diluent ^[1]

Diluent

NS, D5, Ringer's solution, lactated Ringer's solution ^[1,3], peritoneal dialysis solutions such as Dianeal 137 Glucose 2.27%, Dianeal PD4 Glucose 2.27% and CAPD/DPCA 2 Glucose 1.5% ^[1]

Administration & Infusion rate

Chronic iron overload

- SC infusion**
 - Administer by portable infusion pump over 8 – 12 hr or 24 hr ^[1,2,3]
- IV infusion**
 - Administer over 8 – 12 hr, rate not to exceed 15 mg/kg/hr. May administer longer infusion times (24 hr) in patient with severe cardiac iron deposition. ^[2,3]
 - For patients not tolerating SC infusion
- IM**
 - When SC infusion is not feasible ^[1] but IV route is preferred ^[2]

Acute iron poisoning

- Continuous IV infusion**
 - Administer at a rate of 15 mg/kg/hr, reduce as soon as circumstances permit usually after 4 – 6 hr. (max total IV dose: 80 mg/kg/24hr)

Chronic aluminium overload in ESRF

- Slow IV infusion**

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	Use immediately ^[1]	-
After dilution	-	-

Remarks

- Do not administer concurrently with blood transfusion ^[2,3]
- IV route is preferred in patients with severe toxicity (ie, patients in shock)

References

1. Novartis. Desferrioxamine (Desferal®) Product Leaflet. Revised date: September 2005.
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; March 20, 2017
3. Truven Health Analytics. Micromedex (Version 1.77)
4. McGraw Hill's IV Drug handbook. (2009).

DESMOPRESSIN

Brand Name & Strength

Minirin[®] 4 mcg/ml

Reconstitution

Not required

Further Dilution

IV infusion (Hemophilia A and Von Willebrand disease (Type 1))

- Dilute solution in 10 ml (for children < 10 kg) or 50 ml (for children ≥ 10 kg and adult) ^[1,3]

Diluent

NS ^[2,3]

Administration & Infusion rate

IM

SC

IV bolus

- Administer over 1 min ^[3]

IV infusion (Haemophilia A and Von Willebrand disease (Type 1))

- Administer over 15 – 30 min ^[1,2,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	Use immediately ^[3]	-

Remarks

-

References

1. Ferring. Desmopressin (Minirin[®]) product leaflet. Revision date: July 2006
2. Lexi-Comp, Inc. (Lexi-Drugs[®]). Lexi-Comp, Inc; March 20, 2017
3. McGraw-Hill. IV Drug Handbook. (2009)

DEXAMETHASONE

Brand Name & Strength

Penatone 8 mg/2 ml

Reconstitution

Not required ^[1]

Further Dilution

IV infusion

- Dilute with 50 ml diluent or dilute to a concentration of 0.5 mg/ml ^[3]

Diluent

NS, D5 ^[1,2,3]

Administration & Infusion rate

Slow IV bolus

- Administer undiluted over less than 1 min ^[2]

IV infusion

- Administer over 5 – 15 min ^[2]

IM

- Administer undiluted ^[1,3]

Intra-articular, intralesional and soft tissue injection ^[1,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	24 hr ^[1,2]	-

Remarks

- In shock ^[1] and idiopathic thrombocytopenic purpura ^[2], use only the IV route.
- For neonate (especially in premature infant), use preservative free solution for further dilution ^[1,2,3]

References

- Duopharma Sdn. Bhd. Dexamethasone 4 mg/ml Injection Product Leaflet. Revised 11 May 2005
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; March 20, 2017
- Truven Health Analytics. Micromedex (Version 1.77)



DEXMEDETOMIDINE

D

Brand Name & Strength

Precedex 200 mcg/2 ml

Reconstitution

Not required

Further Dilution

Dilute 1 vial (2 ml) with 48 ml of diluent (concentration: 4 mcg/ml) ^[1,2,3]

Diluent

NS ^[1]

Administration & Infusion rate

IV infusion

- ICU Sedation**

- Initiation: administer at 1 mcg/kg over 10 min ^[1,2]
- Maintenance: administer at 0.2 – 0.7 mcg/kg/hr (0.05 – 0.18 ml/kg/hr) ^[1,2]

- Procedural Sedation**

- Initiation: administer at 0.5 – 1 mcg/kg/hr (0.13 – 0.25 ml/kg/hr) ^[1]
- Maintenance: administer at 0.2 – 1 mcg/kg/hr (0.05 – 0.25 ml/kg/hr) ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Do not infuse longer than 24 hr ^[1,3]
- Should not be co-administered with blood or plasma ^[1,3].

References

1. Hospira Inc. Precedex[®] Injection Product Leaflet
2. Lexi-Comp, Inc. (Lexi-Drugs[®]). Lexi-Comp, Inc; March 20, 2017
3. McGraw-Hill's IV Drug Handbook (2009)



DIAZEPAM

D

Brand Name & Strength

DBL® Diazepam 10 mg/2 ml Injection

Reconstitution

Not required

Further Dilution

Not required

Diluent

NS, D5 ^[1]

Administration & Infusion rate

Slow IV

- Administer at a rate not exceeding 5 mg/min (adults) or at least 3 min for each 0.25 mg/kg (children) ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Avoid administration by dilution or mixture with IV fluids or other drugs ^[2]
- Diazepam may precipitate out of IV solutions and adsorbs to the plastic of IV bags and tubing. Where the administration of diazepam by IV infusion is indicated, a minimum volume 250 ml of diluent should be used. Amount of Diazepam added should not exceed 20 mg ^[1]
- Do not use small veins such as those on the dorsum of the hand or wrist. Large lumen vessel is recommended such as antecubital vein. ^[2]

References

1. Hospira. Diazepam (DBL Diazepam) Product leaflet. Revised date: 9 May 2008
2. McGraw Hill's IV Drug Handbook. (2009)

DICLOFENAC

D

Brand Name & Strength

Dicloran Injection 25 mg/3 ml

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IM only

- Administer undiluted ^[1]
- Inject deep into the gluteus muscle ^[1]
- If more than one injection needed, inject into different sites with interval of a few hours ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	-	-
After dilution	Use immediately ^[1]	-

Remarks

- Not suitable for children use ^[1]

References

1. Unique Pharmaceuticals Laboratories. Diclofenac 75mg/3mL (Dicloran Injection) Product Leaflet. Revised date: February 2008.



DIGOXIN

D

Brand Name & Strength

Lanoxin Injection 500 mcg/2 ml

Reconstitution

Not required

Further Dilution

IV infusion

- Dilute with a 4-fold or greater volume of diluent. Max concentration is 62.5 mcg/ml ^[3]
- Dilute 1 ampule (0.5 mg) in 50 ml diluent ^[3]

Diluent

NS, D5 ^[1]

Administration & Infusion rate

Slow IV

- Administer over 5 min or longer (undiluted) ^[2,3]

IV infusion

- Administer over 10 – 20 min ^[1,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	48 hr ^[1]	-

Remarks

- Dilution with less than 4 fold of volume of diluent could lead to precipitation of Digoxin ^[1]
- Rapid injection is not recommended as it may cause systemic and coronary arteriolar constriction ^[1,3]
- Intramuscular route is not recommended as it is painful and associated with muscle necrosis. ^[1,3]

References

1. Aspen. Digoxin (Lanoxin 500 mcg/2 ml) Product leaflet. Revised date: November 2011.
2. Mc Graw Hill's IV Drug Handbook. (2009)
3. Dilution Guide for High Alert Medications, Pharmaceutical Services Division, Malaysia.



DOBUTAMINE

D

Brand Name & Strength

Mobitil injection 250 mg/20 ml

Reconstitution

Not required

Further Dilution

Dilute to at least 50 ml diluent ^[2] (maximum concentration: 10 mg/ml) ^[4]

- Dilute 250 mg Dobutamine in 50 ml diluent (concentration: 5 mg/ml)
- Dilute 500 mg Dobutamine in 50 ml diluent (concentration: 10 mg/ml) ^[4]

Diluent

NS, D5, NSD5, HSD5, D10, D5 in lactated Ringer's ^[1,2]

Calculation

Eg. Doctor ordered IV Dobutamine 2.5 mcg/kg/min. Patient's weight is 70 kg. What is the infusion rate?

- Determine dose (mg/hr) =
$$\frac{\text{Dose (mcg/kg/min)} \times \text{BW (kg)} \times 60 \text{ min/hr}}{1000 \text{ mcg/mg}}$$

$$= \frac{2.5 \times 70 \times 60}{1000} = 10.5 \text{ mg/hr}$$
- Determine concentration (mg/ml) = 5 mg/ml (if dilute 250 mg in 50 ml diluent)
- Calculate infusion rate (ml/hr) =
$$\frac{\text{Dose (mg/hr)}}{\text{Concentration (mg/ml)}} = \frac{10.5}{5} = 2.1 \text{ ml/hr}$$

Administration & Infusion rate

Continuous IV infusion ^[1,2]

- Dose: 2.5 – 10 mcg/kg/min; frequently doses up to 20 mcg/kg/min (max: 40 mcg/kg/min) ^[1,2,3]
- Rate of infusion: As per calculation above

Storage & Stability

	RT (<30 °C)	Fridge (2-8 °C)
After reconstitution	-	-
After dilution	24 hr ^[1,2]	-

Remarks

- Incompatible with sodium bicarbonate injection or any other strongly alkaline solutions. ^[1,2]
- Solution may exhibit pink colour (if present, will increase with time). The colour change is due to slight oxidation of drug but there is no significant loss of potency. ^[1,2]

References

1. Duopharma. Dobutamine (Mobitil Injection) Product Leaflet. Revised 10 July 2012.
2. McGraw Hill IV Drug Handbook. (2009)
3. Dilution Guide for High Alert Medication 2011 by Pharmaceutical Services Division, Malaysia
4. UKCPA: Minimum Infusion Volumes for Fluid Restricted Critically Ill Patients 4th Edition (v4.4) December 2012



DOPAMINE

D

Brand Name & Strength

Loxin Injection 200 mg/5 ml

Reconstitution

Not required

Further Dilution

Dilute to 250 – 500 ml diluent, to give final concentration as such: ^[1]

- 250 ml dilution: 800 mcg/ml of Dopamine (0.8 mg/ml)
- 500 ml dilution: 400 mcg/ml of Dopamine (0.4 mg/ml)

Minimal dilution: ^[4]

- Single strength: Dilute 200 mg with 50 ml of NS or D5 (4 mg/ml)
- Double strength: Dilute 400 mg with 50 ml of NS or D5 (8 mg/ml)
- For patients with fluid retention: Dilute 200 mg in 50 ml (concentration: 4 mg/ml) ^[3]

Diluent

NS, D5, NSD5, HSD5, lactated Ringer's solution, sodium lactate solution (1/6 molar) ^[1,2,3]

Calculation

Eg. Doctor ordered IV Dopamine 5 mcg/kg/min. Patient's weight is 60 kg. What is the infusion rate?

1. Determine dose (mg/hr) =
$$\frac{\text{Dose (mcg/kg/min)} \times \text{BW (kg)} \times 60 \text{ min/hr}}{1000 \text{ mcg/mg}}$$

$$= \frac{5 \times 60 \times 60}{1000} = 18 \text{ mg/hr}$$
2. Determine concentration (mg/ml) = 4 mg/ml (if single strength dilution is used)
3. Calculate infusion rate (ml/hr) =
$$\frac{\text{Dose (mg/hr)}}{\text{Concentration (mg/ml)}} = \frac{18}{4} = 4.5 \text{ ml/hr}$$

Administration & Infusion rate

Continuous IV infusion

- Dose: 2.5 mcg/kg/min; max dose 20 mcg/kg/min
- Rate of infusion: As per calculation above

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	24 hr ^[1,2,3]	-

Remarks

- Administer into central line ^[3]
- Incompatible with sodium bicarbonate or other alkaline solutions as this inactivates drug ^[2,3]
- Loading dose or bolus injection are not recommended ^[3]

References

1. Duopharma. Dopamine (Loxin Injection 200 mg/5 ml) Product Leaflet.
2. McGraw Hill IV Drug Handbook. (2009)
3. Dilution Guide for High Alert Medication 2011 by Pharmaceutical Services Division, Malaysia.
4. UKCPA: Minimum Infusion Volumes for Fluid Restricted Critically Ill Patients 4th Edition (v4.4) December 2012

DORIPENEM

Brand Name & Strength

Doribax® 500 mg

Reconstitution

Reconstitute with 10 ml NS or WFI [1,3]

Further Dilution

IV infusion

- Dilute with 100 ml diluent [1,2,3] (Final concentration: 4.5 mg/ml [3])

Diluent

NS, D5 [1,2,3]

Administration & Infusion rate

Infection	Infusion time
Nosocomial pneumonia	1 hr [1,2,3] or 4 hr [1,2]
Complicated intra-abdominal infection	1 hr [1,2,3]
Complicated UTI, including pyelonephritis	1 hr [1,2,3]

Storage & Stability

	RT (<30 °C)	Fridge (2 – 8 °C)
After reconstitution	1 hr [1,3]	1 hr [1,3]
After dilution	4 hr (D5) or 12 hr (NS) [1,3]	24 hr (D5) or 72 hr (NS) [1,3]

Remarks

- Reconstituted solution is not for direct injection [3]
- Use of 4-hour infusion has been studied in the treatment of VAP [1,2]
- Infusions prepared in D5 should be used for infusion durations greater than one hour [1]
- To prepare a **dose of 250 mg** using a 500 mg vial: reconstitute and dilute as above, but remove and discard 55mL from the infusion bag. [1,2,3]

References

- Shionogi. Doripenem (Doribax) product leaflet. Revision date 19 November 2009.
- Lexi-comp, Inc (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
- Intravenous Dilution Database. GlobalRPh. Available at http://www.globalrph.com/index_dilution.htm

DROTRECUGIN ALFA

Brand Name & Strength

Xigris® 5mg

Reconstitution

	Volume of WFI (ml) ^[1,2,3]	Concentration (mg/ml) ^[1,2,3]
5 mg	2.5	2
20 mg	10	2

Further Dilution

IV infusion

- Infusion pump: Dilute to final concentration of 0.1 – 0.2 mg/ml ^[1,3]
- Syringe pump: Dilute to final concentration of 0.1 – 1 mg/ml ^[1,3]

Diluent

NS ^[1,2,3]

Administration & Infusion rate

IV infusion

- Administer at 24 mcg/kg/hr for a total of 96 hr; stop infusion immediately if bleeding identified ^[1,2,3]
- The maximum duration of infusion from one preparation step is 12 hr. Multiple infusion periods will be needed to cover entire 96 hr ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	3 hr ^[1,2]	-
After dilution	12 hr ^[1,3]	12 hr ^[1,3]

Remarks

-

References

1. Eli Lilly. Drotrecogin alfa (Xigris®) Product Leaflet. Revised date: 2001.
2. McGraw Hill's IV Drug Handbook. (2009)
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

DIPHTERIA, TETANUS, ACELLULAR PERTUSSIS INACTIVATED POLIO VIRUS, HAEMOPHILUS INFLUENZA TYPE B VACCINE

Brand Name & Strength

Pentaxim

Reconstitution

Reconstitute with solution provided ^[1]

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IM

- Administer preferably in the anterolateral aspect of the thigh ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Store vaccine in refrigerator (2 – 8 °C). ^[1]
- After reconstitution, shake until complete dissolution of the powder. Administer immediately after reconstitution. ^[1]

References

1. Sanofi Pasteur Ltd: Pentaxim (Diphtheria, Tetanus, Acellular Pertussis, Inactivated Polio Virus, Haemophilus Influenza Type B Vaccine) Product Leaflet. Revised Date: March 2011.

ENOXAPARIN

Brand Name & Strength

Clexane 2000 IU/0.2 ml, 4000 IU/0.4 ml, 6000 IU/0.6 ml prefilled syringe

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

SC ^[1]

For STEMI:

- (< 75 years): administer as 30 mg **IV bolus** then **SC 1 mg/kg BD** ^[2,3,4]
- (≥ 75 years): no bolus, administer **SC 0.75 mg/kg BD** ^[3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Not for IM injection ^[1]
- For IV bolus, administer through existing IV line. Flush IV line with NS or D5 before and after IV bolus administration to clear port of drug. ^[2,3]

References

1. Sanofi Aventis. Enoxaparin (Clexane™) Product Leaflet. Revised date : Feb 2012
2. McGraw Hill's IV Drug handbook. (2009).
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; March 20, 2017
4. CPG STEMI 2014 3rd edition



EPHEDRINE

E

Brand Name & Strength

CCMD Ephedrine HCl 30 mg/ml

Reconstitution

Not required

Further Dilution

Slow IV

- Dilute to a concentration of 5 or 10 mg/ml ^[2]

Diluent

NS, D5

Administration & Infusion rate

IM, SC, Slow IV ^[1,2,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Care should be taken to avoid extravasation, may result in tissue necrosis and sloughing ^[1]

References

- Duopharma (M) Sdn Bhd. Ephedrine Hydrochloride (CCMD Ephedrine HCL) product leaflet. Revised date: 19/06/2013
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
- WebMD, LLC. Medscape (Version 5.6.1)

ERTAPENEM

E

Brand Name & Strength

Invanz 1 g

Reconstitution

- IV**
- Reconstitute 1 vial with 10 ml WFI, NS or Bacteriostatic WFI [1,2]
- IM**
- Reconstitute 1 vial with 3.2 ml of 1.0% or 2.0% Lidocaine HCl injection (without epinephrine) [1]

Further Dilution

- IV infusion**
- Dilute reconstituted vial to 50 ml of diluent [1,2]

Diluent

NS [1,2]

Administration & Infusion rate

- IV infusion**
- Administer over 30 min and complete the infusion within 6 hr of reconstitution [1,2]
- IM**
- Administer by deep IM into large muscle mass (e.g. gluteal muscle) [3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	IV: used within 6 hr [1,2,4] IM: used within 1 hr [1,4]	24 hr and used within 4 hr after removal from refrigeration [1,2]
After dilution	-	-

Remarks

- Do not use diluent containing dextrose [1,2]

References

- Laboratories Merck Sharp & Dohme Pharmaceutical Co. Ltd Ertapenem (INVANZ®) product leaflet. Revised date: 10/2014
- McGraw Hill's IV Drug Handbook. (2009)

ERYTHROMYCIN LACTOBIONATE

Brand Name & Strength

Erythromycin Lactobionate Injection 500 mg

Reconstitution

Reconstitute with 10 ml WFI (concentration: 50 mg/ml) ^[1-3]

Further Dilution

Dilute reconstituted solution with diluent to a final concentration of 1 – 5 mg/ml ^[1,2,3]

Diluent

NS, D5 ^[1]

Administration & Infusion rate

IV infusion

- Administer over 20 – 60 min ^[1,2,3]

Continuous IV infusion

- Administer daily dose over 6 – 24 hr ^[1,2,4]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	24 hr ^[2,3]	2 weeks ^[2,3]
After dilution	8 hr ^[2,3,4]	-

Remarks

- Do not administer IV push or bolus ^[1]
- Rapid infusion is more likely to be associated with arrhythmias or hypotension ^[1]
- Erythromycin should not be reconstituted with inorganic salt solution. Use only WFI ^[1]

References

- Fisiopharma S.r.L: Erythromycin Lactobionate 500mg Product leaflet. Revision date: November 2008
- McGraw Hill's IV Drug Handbook. (2009)
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
- Truven Health Analytics. Micromedex (Version 1.77)

ESMOLOL

E

Brand Name & Strength

Esocard 100 mg/10 ml

Reconstitution

Not required ^[1,3,4,5]

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IV only ^[1,2,3,4,5]

- **Supraventricular tachycardia:** Infuse loading dose (500 mcg/kg/min) over 1 min followed by a 4 min maintenance infusion of required dose (50 mcg/kg/min) (max dose: 200 mcg/kg/min for 24 – 48 hr) ^[1,2]
- **Sinus tachycardia or hypertension:** Initially, administer 80 mg (1 mg/kg) by IV bolus over 30 sec; then if needed, 150 mcg/kg/min by IV infusion to a maximum of 300 mcg/kg/min ^[1,2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	24 hr ^[1,2,3,4]	24 hr ^[1,2,3,4]

Remarks

- Incompatible: NaHCO₃ (5%) ^[1,5]
- Avoid infusions (concentration > 10mg/ml) into small veins or use of butterfly catheters (cause thrombophlebitis) ^[3]
- Do not stop abruptly, possibility of withdrawal effect ^[5]
- Intended for short-term use, not longer than 48 hours ^[5]

References

1. Samarth. Esmolol 10 mg/ml Product Leaflet. Revised November 2010
2. McGraw Hill's IV Drug Handbook. (2009)
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
4. Truven Health Analytics. Micromedex (Version 1.77)
5. WebMD, LLC. Medscape (Version 5.6.1)

ESOMEPRAZOLE

Brand Name & Strength

Nexium 40 mg

Reconstitution

Reconstitute with 5 ml of diluent ^[1,3]

Further Dilution

IV infusion, Continuous IV infusion

- Dilute reconstituted solution (1 or 2 vials) with 100 ml of diluent ^[1,3]

Diluent

NS, D5, Ringer's Solution ^[1,3]

Administration & Infusion rate

IV bolus

- Administer over 3 min ^[1,3]

IV infusion

- Administer over 10 – 30 min ^[1,3]

Continuous IV infusion

- Administer at 8 mg/hr ^[1,3]

Storage & Stability

	RT (<30 °C)	Fridge (2-8 °C)
After reconstitution	12 hr (NS or Ringer's), 6 hr (D5) ^[1,3]	-
After dilution	-	-

Remarks

- The reconstituted solution for infusion is clear and colourless to very slightly yellow. Do not use if the solution is not clear ^[1]

References

1. AstraZeneca. Esomeprazole (Nexium) Product Leaflet. Revised date: January 2014
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
3. McGraw Hill's IV Drug Handbook. (2009)



ETOMIDATE

E

Brand Name & Strength

Etomidate® Lipuro 20 mg/10 ml

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

Slow IV

- Administer slowly over 30^[1] – 60 sec^[2,3] and in fractions if necessary^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Avoid intra-arterial injection (causes necrosis). Paravenous injection causes strong pain.^[1]
- In patients with manifest epilepsy or with an increased tendency to convulsions, Etomidate should be injected quickly, i.e. within a few seconds, in order to avoid too slow diffusion of Etomidate into the brain.^[1]
- Premedication should be given in order to avoid occurrence of myocloni. Benzodiazepines such as Diazepam may be injected intramuscularly about 1 hour or IV 10 min prior to administration of Etomidate.^[1]
- Solution is highly irritating, avoid administration into small veins.^[2,3]
- Too rapid administration may cause hypotension.^[2]
- Monitor infusion site closely for potential vein irritation.^[2]

References

- B.Braun. Etomidate (Etomidate®Lipuro) Product Leaflet. Revised date : 04.2003
- McGraw Hill's IV Drug Handbook. (2009)
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

FENTANYL



F

Brand Name & Strength

Talgesil Injection 0.1 mg/2 ml

Reconstitution

Not required

Further Dilution

Slow IV

- Dilute with 5 ml of diluent

Diluent

NS, WFI ^[1]

Administration & Infusion rate

IM

- Administer undiluted ^[1]

Slow IV

- Administer over 3 – 5 min ^[2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	Use immediately ^[1]	-

Remarks

- Rapid infusion may cause severe respiratory distress and apnoea ^[1]

References

- Duopharma. Fentanyl (Talgesil Injection 0.1 mg/2 ml) Product Leaflet.
- McGraw Hill's IV Drug Handbook. (2009)

FILGRASTIM

F

Brand Name & Strength

Neupogen 300 mcg/1 ml (vial), Neupogen 300 mcg/0.5 ml (prefilled syringe)

Reconstitution

Not required

Further Dilution

IV infusion, Continuous IV infusion

- Dilute with diluent to a final concentration of ≥ 5 mcg/ml

Diluent

D5 ^[1,3]

Administration & Infusion rate

SC

- Administer undiluted ^[1]

IV infusion

- Administer over 15 – 30 min ^[1,3]

Continuous IV infusion

- Administer over 4 – 24 hr ^[2,3]

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	-	-
After dilution	Use immediately ^[1]	24 hours ^[1]

Remarks

- Avoid vigorous shaking ^[2]
- Do not use pre-filled syringe for IV preparation ^[3]
- Dilute in normal saline may cause precipitation ^[2,3]
- For patients treated with Neupogen diluted to concentration below 15 mcg/ml, human albumin should be added to a final concentration of 2 mg/ml
 - Example: In a final injection volume of 20 ml, total dose of Neupogen less than 300 mcg should be given with 0.2 ml of 20% human albumin

References

- Roche. Filgrastim (Neupogen) Product Leaflet. Revised date: July 2014.
- McGraw Hill's IV Drug Handbook. (2009)
- Lexi-comp, Inc (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

FLUCONAZOLE

Brand Name & Strength

Flucan 100 mg/50 ml

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IV infusion

- Administer over 1 – 2 hr ^[3] (maximum rate: 200 mg/hr) ^[2,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Do not freeze IV infusion ^[1]

References

- Pfizer. Fluconazole (Diflucan) Product Leaflet. Revised April 2014.
- McGraw Hill's IV Drug Handbook. (2009)
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

FLUMAZENIL

F

Brand Name & Strength

Flumazenil-hameln 0.5 mg/5 ml injection

Reconstitution

Not required

Further Dilution

IV infusion

- Dilute 10 – 50 ml Flumazenil in 500 ml diluent (concentration: 2 – 10 mcg/ml) ^[1,2]

Diluent

NS, D5, lactated Ringer's solution ^[1]

Administration & Infusion rate

IV bolus

- Administer undiluted over large vein through free-flowing IV solution over 15 – 30 sec. ^[1,3]
 (15 sec for reversal of conscious sedation and general anaesthesia and 30 sec for benzodiazepine overdose) ^[4]

IV infusion

- Rate of infusion: 0.1 – 0.4 mg/hr ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	24 hr ^[1]	24 hr ^[1]

Remarks

- If symptoms of overstimulation arise during the use of Flumazenil, then Diazepam or Midazolam may be administered by slow intravenous injection ^[1]
- Rapid injection of high doses (> 1 mg) of Flumazenil should be avoided in patients receiving chronic treatment with benzodiazepines as this may cause withdrawal symptoms ^[1]

References

- Hameln Pharmaceuticals. Flumazenil (Flumazenil-hameln) Product Leaflet. Revised November 2009.
- McGraw Hill's IV Drug Handbook. (2009)
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
- Drug Information Handbook, 23rd Edition

FLUORESCEIN

Brand Name & Strength

Fluorescite® 10% (500 mg/5 ml) Injection

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IV bolus

- Administer rapidly (1 ml/sec) into the antecubital vein ^[1,2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Avoid extravasation during injection as the high pH of fluorescein solution can result in severe local tissue damage. ^[1]

References

- Alcon Laboratories, Inc. Fluorescein (Fluorescite®) Product Leaflet. Version May 2014.
- Lexi-comp, Inc (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
- Truven Health Analytics. Micromedex (Micromedex 1.77)

FLUPENTIXOL

Brand Name & Strength

Fluxanol Depot 20 mg/ml (1 ml, 2ml and 10 ml ampoules) & 100 mg/ml (1 ml and 5 ml ampoules)

Reconstitution

Not required ^[1]

Further Dilution

Not required ^[1]

Diluent

Not required ^[1]

Administration & Infusion rate

IM only

- Into upper outer quadrant of buttock ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- If volumes larger than 2 – 3 ml of the 20 mg/ml solution are required, the more concentrated solution (Fluxanol 100 mg/ml) should be preferred ^[1]

References

1. H. Lundabeck A/S: Flupentixol (Fluxanol Depot) Product Leaflet. Revised Date: -

FLUPHENAZINE DECANOATE

Brand Name & Strength

Monasan Injection 25 mg/ml

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IM ^[1, 4]

SC ^[2, 3, 4]

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Only the decanoate formulation may be administered subcutaneously. ^[2]

References

1. Duopharma (M) Sdn Bhd. Fluphenazine Decanoate. Monasan Injection Product Leaflet; Revised date: NA
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
3. Truven Health Analytics. Micromedex (Version 1.77)
4. WebMD, LLC. Medscape (Version 5.6.1)



FONDAPARINUX

F

Brand Name & Strength

Arixtra 2.5 mg/0.5 ml & 7.5 mg/0.6 ml Prefilled Syringe

Reconstitution

Not required

Further Dilution

IV infusion (for STEMI only)

- Dilute with 25 – 50 ml diluent ^[1]

Diluent

NS

Administration & Infusion rate

SC ^[1]

IV infusion (for STEMI only)

- Administer over 2 min ^[1]

IV bolus (for STEMI only)

- Initial dose IV push 2.5 mg, followed by SC 2.5 mg OD ^[3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	Use immediately Discard unused portion	-
After dilution	-	-

Remarks

- Flush tubing with NS after infusion to ensure complete administration ^[1]
- Not for IM administration ^[1]

References

- Aspen 2014. Fondaparinux. Arixtra™ Product Leaflet.
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
- CPG STEMI 3rd Edition 2014

FOSCARNET



F

Brand Name & Strength

Foscavir® 24 mg/ml

Reconstitution

Not required ^[1,2]

Further Dilution

No further dilution required (for central line administration) ^[2]

Dilute to a final concentration not exceeding 12 mg/ml (for peripheral line administration) ^[2]

Diluent

NS, D5 ^[2]

Administration & Infusion rate

IV infusion

- Administer using an infusion pump at a rate not exceeding 1 mg/kg/min ^[2]
- For induction infusion, to administer over at least 1 hr ^[3]
- For maintenance infusion, to administer over at least 2 hr ^[3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	24 hr ^[2]	-

Remarks

- Incompatible with dextrose 30 %, IV solutions containing calcium, magnesium, vancomycin and TPN ^[2]
- Do not give by rapid IV infusion or bolus injection ^[3]

References

1. Clinigen Healthcare Ltd. Foscarnet 24 mg/ml (Foscavir^R Solution for Infusion) Product leaflet. Revised: January 2014.
2. Lexi-comp, Inc (Lexi-Drugs[®]). Lexi-Comp, Inc (Version 3.0.2)
3. McGraw-Hill's IV Drug Handbook. (2009)

FRUSEMIDE

F

Brand Name & Strength

Akoset 20 mg/2 ml, Fusix 20 mg/2 ml

Reconstitution

Not required

Further Dilution

IV infusion

- Use undiluted or dilute in diluent to a concentration of 1 mg/ml ^[4] (maximum 10 mg/ml) ^[5]

Diluent

NS, D5, lactated Ringer's solution (high dose infusion) ^[2,4]

Administration & Infusion rate

IM ^[4,6]

Slow IV

- Administer at a rate of 20 – 40 mg/min ^[5], can be given slowly over 1 – 2 min ^[1,2,3,4]

IV infusion

- Administer at maximum rate of 4 mg/min ^[4,7]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	24 hr ^[3,5]	-

Remarks

- In children, for short term intermittent infusion max rate of 0.5 mg/kg/min, titrated to effect ^[3,4]
- Do not mix with highly acidic solutions (pH below 5.5) ^[2,7]

References

- Duopharma (M) Sdn Bhd Frusemide (Akoset®) Product Leaflet. Revised date: -
- McGraw Hill's IV Drug Handbook. (2009)
- WebMD, LLC. Medscape (Version 5.6.1)
- Truven Health Analytics. Micromedex (Version 1.77)
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; March 20, 2017
- SM Pharmaceuticals Sdn. Bhd. Frusemide (Fusix Injection®) Product Leaflet. Revised date: 27 December 2017
- British National Formulary 70th Edition

GANCICLOVIR SODIUM

Brand Name & Strength

Cymevene® 500 mg

Reconstitution

Reconstitute 1 vial with 10 ml WFI [1,3]

Further Dilution

Dilute reconstituted solution with 100 ml of diluent (max concentration: 10 mg/ml) [4]

Diluent

NS, D5, Ringer's, lactated Ringer's solution [1,3]

Administration & Infusion rate

IV infusion

- Administer over at least 1 hr [2,3] at a concentration of not greater than 10 mg/ml [1,2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	12 hr [1]	-
After dilution	24 hr [1,3]	-

Remarks

- Should not be mixed with other IV products [1]
- Do not administer by rapid IV, bolus IV, IM or SC injection [1,3]
- Too rapid infusion can cause increased toxicity and excessive plasma levels [2]
- Flush line well with NS before and after administration [2]

References

- Roche. Ganciclovir Sodium 500 mg (Cymevene® Vials) Product leaflet.
- Drug Information Handbook, 21th Edition
- McGraw-Hill's IV Drug Handbook. (2009)
- Truven Health Analytics. Micromedex (Version 1.77)

GENTAMICIN

Brand Name & Strength

Garasent 80 mg/2 ml Injection

Reconstitution

Not required ^[1]

Further Dilution

IV infusion

- Dilute in 100 – 200 ml of diluent (max concentration: 1 mg/ml) ^[1,2]

Diluent

NS, D5 ^[1]

Administration & Infusion rate

IV infusion

- Administer 30 – 120 min ^[1,2,3]

Slow IV

- Administer over 2 – 3 min ^[1]

IM ^[1,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	48 hr ^[3]	48 hr ^[3]

Remarks

-

References

- Duopharma: Garasent 80mg/2ml Product leaflet. Revision Date: January 2012
- McGraw Hill's IV Drug Handbook. (2009)
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

GLUCAGON



Brand Name & Strength

GlucaGen® 1 mg/ml

Reconstitution

Reconstitute 1 vial with 1 ml of provided diluent ^[1,2,3] or WFI for diagnostic use ^[2,3]

Further Dilution

IV infusion

- Dilute 4 vials (4 mg) in 50 ml diluent (concentration: 0.08mg/ml) ^[3]

Diluent

D5 ^[3]

Administration & Infusion rate

SC, IM ^[1,3]

IV bolus

- Administer over 1 min ^[2]

IV infusion ^[3]

- Based on indication
- Beta-blocker/calcium channel blocker toxicity
 - Administer at 3 – 5 mg/hr
- Anaphylactic reaction (refractory) in patients on beta-blocker therapy
 - Administer at 5 – 15 mcg/min

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	Immediately ^[1,2,3]	-
After dilution	-	-

Remarks

- Bolus IV doses > 1 mg are not recommended for diagnostic aid. ^[3]

References

1. Novo Nordisk. Glucagon (GlucaGen® 1 mg) Product Leaflet. Revised date: 2010
2. McGraw Hill's IV Drug Handbook. (2009)
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
4. Mc Graw Hill's IV Drug Handbook. (2009)



GLYCERYL TRINITRATE

G

Brand Name & Strength

Gitrinil Injection 50 mg/10 ml

Reconstitution

Not required

Further Dilution

IV infusion

- Dilute 50 mg in 500 ml diluent (100 mcg/ml) ^[1]
- Dilute 50 mg in 250 ml diluent. Alternatively use 10 mg in 50 ml diluent (200 mcg/ml) ^[4]
- Max concentration: 400 mcg/ml ^[1]

Diluent

D5, NS ^[1]

Calculation

Eg. Doctor ordered IV GTN 5 mcg/min. What is the infusion rate?

$$\begin{aligned}
 1. \text{ Determine dose (mg/hr)} &= \frac{\text{Dose (mcg/min)} \times 60 \text{ min/hr}}{1000 \text{ mcg/mg}} \\
 &= \frac{5 \times 60}{1000} = 0.3 \text{ mg/hr} \\
 2. \text{ Determine concentration (mg/ml)} &= \frac{100 \text{ (mcg/ml)}}{1000 \text{ (mcg/mg)}} = 0.1 \text{ mg/ml} \\
 3. \text{ Calculate infusion rate (ml/hr)} &= \frac{\text{Dose (mg/hr)}}{\text{Concentration (mg/ml)}} = \frac{0.3}{0.1} = 3 \text{ ml/hr}
 \end{aligned}$$

Administration & Infusion rate

IV infusion

- Initially administer 5 mcg/min, increase by 5 mcg/min every 3 – 5 min to 20 mcg/min ^[1,2,3]
- If no response, increase by 10 mcg/min every 3 – 5 min to 20 mcg/min ^[1,2,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	40 hr ^[1]	7 days ^[1]
After dilution	40 hr ^[1]	7 days ^[1]

Remarks

- Not to be used undiluted ^[1,2,3]
- Invert the glass parenteral bottle several times following admixture to assure uniform dilution ^[1]
- Dilution and storage of GTN for IV infusion should be done only in glass parenteral solution bottles ^[1,2,3]

References

1. Duopharma. Glyceryl Trinitrate (Gitrinil Injection) Product leaflet. Revision date: March 2011
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
3. McGraw Hill's IV Drug Handbook. (2009)
4. Sarawak Handbook of Medical Emergencies, 3rd Edition (2011)

GLYCOPYRROLATE

Brand Name & Strength

Glycopyrrolate Injection USP 200 mcg/ml

Reconstitution

Not required ^[1,4]

Further Dilution

Slow IV

- May be administered undiluted ^[1,3,4] or dilute in diluent ^[1]

Diluent

D5, D10, HS, NS, Ringer's injection ^[1,2,4]

Administration & Infusion rate

IM ^[1]

Slow IV ^[1]

- Give each 0.2 mg over 1 – 2 min ^[2,3]
- For chronic paediatric uses, consider further dilution and infusing over 20 – 30 min ^[3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	48 hr ^[1]	48 hr ^[1]

Remarks

- Do not mix in Barbiturates ^[1], Diazepam ^[1], or lactated Ringer's Injection ^[1,2,4]
- Not intended for neonates because it contains benzyl alcohol ^[2]
- May be administered in the same syringe with neostigmine or pyridostigmine. ^[3]

References

1. SM Pharmaceutical Sdn Bhd. Glycopyrrolate 0.2 mg/ml Injection Product Leaflet. Revised November 2007
2. Mc Graw Hill's IV Drug Handbook (2009)
3. Lexi-Comp, Inc. (Lexi-Drugs©). Lexi-Comp, Inc; March 20, 2017.
4. Truven Health Analytics. Micromedex (Version 1.77)

GRANISETRON

Brand Name & Strength

Viatrinil 3 mg/3 ml Solution for Injection/Infusion, Kytron Solution For Injection/ Infusion 3 mg/3 ml

Reconstitution

Not required

Further Dilution

IV bolus

- Chemotherapy-induced nausea and vomiting: Dilute 3 mg in 15 ml diluent ^[1]
- Post-operative nausea and vomiting: Dilute 1 mg in 5 ml diluent^[1]

IV infusion

- Chemotherapy-induced nausea and vomiting: Dilute 3 mg in 20 – 50 ml diluent ^[1,3]

Diluent

IV bolus: NS ^[1]

IV infusion: NS, D5, Mannitol 10%, Hartmann's Solution ^[1,3]

Administration & Infusion rate

IV bolus

- Administer over at least 30 sec ^[1,3,4]

IV infusion

- Administer over 5 min ^[1,2,3,4]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	24 hr ^[1,2,3]	-

Remarks

- Can be admixed with Dexamethasone injection ^[1]

References

1. Vianex S.A. Granisetron (Viatrinil) Product leaflet. Revised Date: Dec 2011
2. Lexi-Comp, Inc. (Lexi-Drugs[®]). Lexi-Comp, Inc; March 20, 2017.
3. Duopharma (M) Sdn Bhd (Kytron[®]) Product leaflet. Revised Date:1 Oct 2015
4. British National Formulary 70th Edition

HAEMOPHILUS INFLUENZAE TYPE B VACCINE

Brand Name & Strength

Hiberix™ 10 mcg/0.5 ml

Reconstitution

Reconstitute with provided solvent ^[1]

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IM

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	Use immediately ^[1]	-

Remarks

- In patients with thrombocytopenia or bleeding disorders, the vaccine should be administered SC ^[1]
- It should not be administered intravenously^[1]

References

1. GSK Haemophilus influenzae type b Vaccine (Heberix™) Product Leaflet (Revised date:18th Dec 2012)

HALOPERIDOL

Brand Name & Strength

Manace 5 mg/ml Injection

Reconstitution

Not required ^[1]

Further Dilution

IV bolus ^[2]

- Dilute with diluent to a maximum concentration of 1 mg/ml

Diluent

D5 ^[2]

Administration & Infusion rate

IV bolus ^[2]

- Maximum rate: 5 mg/min

Can be given IM ^[1,2]

Storage & Stability

	RT (<30 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Subsequent doses may be given as often as half hourly for IV injections and one hourly for IM injections. Total daily dose should not exceed 100 mg ^[1]

References

1. Duopharma Manace Injection Product leaflet Revision date July 2011
2. Lexi-Comp, Inc. (Lexi-Drugs©). Lexi-Comp, Inc; March 20, 2017.

HEMATO POLYVALENT SNAKE ANTIVENIN



H

Brand Name & Strength

Polyvalent Snake Antivenin 1 ml which contains: Russell's Viper Venom (0.6mg), Green Pit Viper Venom (0.7mg), Malayan Pit Viper Venom (1.6mg)

Reconstitution

Reconstitute with 10 ml of WFI ^[2]

Further Dilution

Dilute the reconstituted antivenom with 5 – 10 ml/kg diluent for children or 250 – 500 ml diluent for adult ^[3]

Diluent

NS, D5 ^[1]

Administration & Infusion rate

IV infusion ^[3]

- Initial dose is 30 ml (3 vials)
- Administer at 1 – 2 ml/min over 10 – 15 min. If no reaction, complete the infusion at a rate of 5 – 10 ml/min within less than 1 hr. If active bleeding still persist, the second dose can be administered after 2 hr or earlier.
- Subsequent dose can be given every 6 hr according to clinical signs and symptoms.

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	Use immediately	-
After dilution	Use immediately	-

Remarks

- Gently swirl until serum become clear colourless or pale yellow liquid ^[1]
- Observe for any anaphylaxis and delay serum sickness reactions. ^[1,2]
- Skin test should be performed prior administration to avoid serious allergic reaction. ^[1]

References

1. Queen Saovabha Memorial Institute. Hemato Polyvalent Snake Antivenin (Polyvalent snake antivenin) Product leaflet.
2. Guideline for the Management of Snake-Bites, 2nd Edition (2010), World Health Organization
3. Snakebite Management Guide For Healthcare Providers In Malaysia. Dr Ahmad Khaldun Ismail. Updated: May 2014 © Copyrights UKM 2014 available from <http://mstoxinology.blogspot.com>



HEPARIN SODIUM

H

Brand Name & Strength

Heparinol® 1000 IU/ml (5000 IU/5 ml), 5000 IU/ml (25,000 IU/5 ml)

Reconstitution

Not required

Further Dilution

IV infusion ^[3]

- Dilute 25,000 IU with 250 ml of diluent. Infuse via infusion pump.

Diluent

NS, D5 ^[2, 4]

Administration & Infusion rate

SC ^[2]

IV slow bolus

- Administer over at least 1 min ^[2]

IV infusion

- Administer over 4 – 24 hr depending on dosage and volume of infusion solution ^[2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	28 days ^[1]	-

Following the withdrawal of the first dose the remainder should be used within 28 days provided aseptic technique is employed and withdrawal of the solution is via the rubber bung. Do not refrigerate after opening. ^[1]

Remarks

- Do not administer IM ^[1, 2]

References

- Ain Medicare Sdn. Bhd. Heparin Sodium (Heparinol ®) Product Leaflet. Revised date: 18/09/2013
- Mc Graw Hill's IV Drug Handbook (2009)
- Lexi-Comp, Inc. (Lexi-Drugs©). Lexi-Comp, Inc; March 20, 2017.
- Intravenous Dilution Database. GlobalRPh. Available at: http://www.globalrph.com/index_dilution.htm

HEPARINISED SALINE

Brand Name & Strength

Heparinol 10 IU/ml

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

10 – 50 IU flushed through catheter / cannula every 4 hr or as required. ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	Use immediately ^[1]	-

Remarks

-

References

1. Ain Medicare. Heparinised saline (Heparinol[®] 10). Revised 26 December 2013.

HEPATITIS B IMMUNE GLOBULIN

Brand Name & Strength

Hepabig 100 IU/0.5 ml & 200 IU/ml

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IM

- Administer in anterolateral aspect of upper thigh and deltoid muscle of upper arm ^[2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	Use immediately ^[1]	-

Remarks

- Not for IV administration ^[1,2]

References

- Green Cross Corporation. Hepatitis B Immune Globulin (Hepabig) Product Leaflet.
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; March 20, 2017

HEPATITIS B VACCINE (ADULT)

Brand Name & Strength

Hepavax-Gene TF Injection

Reconstitution

Not required ^[1]

Further Dilution

Not required ^[1]

Diluent

Not required

Administration & Infusion rate

IM

- Administer in the deltoid muscle ^[1]

SC

- Can be given SC in patients with severe bleeding tendencies (e.g haemophiliacs). ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Store vaccine in refrigerator (2 – 8 °C). Do not freeze. ^[1]
- Shake vaccine well before use. ^[1]

References

1. Berna Biotech Korea Corp: Hepavax-Gene TF Injection (Hepatitis B Vaccine Adult) Product Leaflet. Revised Date: Feb 2015.

HUMAN ALBUMIN 20%

Brand Name & Strength

Albumex 20 (20 g/100 ml), Zenalb 20 (10 g/50 ml)

Reconstitution

Not required

Further Dilution

IV infusion

- If further dilution required, a dose of albumin is added to a suitable diluent in the proportion of 1 ml albumin to 4 ml diluent (1:4) ^[1]
- If concentration of 5% Human Albumin is required; dilute 20% Human Albumin (1 bottle) with 300 ml diluent ^[3]

Diluent

NS, D5 ^[1,3]

Calculation

$$\text{Human Albumin 5\%} = \frac{20 \text{ g}}{100 \text{ ml (1 bottle human albumin 20\%) + 300 ml diluent}} \times 100\%$$

Administration & Infusion rate

For IV infusion only ^[1,2]

- Administer should not exceed 2 ml/min for hypoproteinaemia in acutely ill patient ^[1]
- Administer at a rate of 2 – 4 ml/min for shock ^[1]
- Administer at 1 ml/min ^[1]

*The rate of infusion should be adjusted according to individual and the indication.

Storage & Stability

	RT (<25°C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	4 hr after opening ^[1]	-

References

1. CSL Limited. Human Albumin. Albumex 20 Product Leaflet; Revised date: NA
2. BPL Bio Products Laboratory Limited. Human Albumin 20% Solution. Zenalb 20 Product Leaflet; Revised date: June 2014
3. Lexi-Comp, Inc. (Lexi-Drugs©). Lexi-Comp, Inc; March 20, 2017



HUMAN ALBUMIN 25%

Brand Name & Strength

Albutein® 25% in 50 ml, Albutein® 25% in 100 ml

Reconstitution

Not required

Further Dilution

Not required (may be further diluted if clinically desirable) ^[1,2,4]

Diluent

NS, D5 ^[1,2,4]

Administration & Infusion rate

IV

- Administer as rapidly as necessary in patients in shock with greatly reduced blood volume to improve clinical condition. May be repeated in 15 – 30 min. ^[1]
- In patients with slightly low or normal blood volume, administer at 1 ml/min. ^[1,2,3]
 Max rate is 2 – 3 ml/min in patients with hypoproteinemia. ^[3]

Storage & Stability

	RT (<30 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	Use immediately ^[1]	-

Remarks

- Do not use sterile water for injection because of risk of fatal hemolysis and acute renal failure. ^[2,4]
- Rapid infusion may cause vascular overload. ^[3]

References

1. Grifols Biologicals Inc, Albumin (Human) U.S.P. (Albutein®) Product Leaflet. Revised date: May 2009
2. McGraw-Hill’s IV Drug Handbook. (2009)
3. Lexi-comp, Inc (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
4. Intravenous Dilution Database. GlobalRPh. Available at: http://www.globalrph.com/index_dilution.htm

HUMAN ALBUMIN 5%

Brand Name & Strength

Albutein 5% Solution (12.5 g/250 ml)

Reconstitution

Not required

Further Dilution

Not required ^[2]

Diluent

Not required

Administration & Infusion rate

IV infusion ^[1,2]

- In slightly low or normal blood volume patient, rate of administration should be 1 – 2 ml/min ^[1] (max rate: 4 ml/min) ^[3]
- In patient with hypoproteinaemia, do not to exceed administration of 5 – 10 ml/min ^[2,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Rapid infusion may cause vascular overload ^[3]
- The usual rate of administration in children is 25% of adult rate ^[1,2]
- Use within 4 hr after opening. ^[1,2,3]

References

1. Grifols Biological Inc. Albumin (Human) USP. Albutein 5% Solution Product Leaflet; Revised date: May 2009
2. McGraw-Hill's I.V. Drug Handbook. (2009)
3. Lexi-Comp, Inc. (Lexi-Drugs©). Lexi-Comp, Inc; March 20, 2017

HUMAN CHORIONIC GONADOTROPHIN

Brand Name & Strength

Pregnyl® 5000 IU, HuCoG® 5000 IU

Reconstitution

Reconstitute 5000 IU ampoule with provided solvent ^[1,2]

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

Slow IM ^[1,2,3]

SC ^[1,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	Use immediately ^[1,3]	-
After dilution	-	-

Remarks

- Use appropriate precautions for receiving, handling, administration and disposal. ^[1,2]

References

1. Merck Sharp & Dohme (Malaysia) Sdn. Bhd. Human Chorionic Gonadotropin (Pregnyl®) Product Leaflet. Revised date: April 2013
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
3. Bharat Serums and Vaccines Limited. Chorionic Gonadotropin (HuCoG®) Product Leaflet. Revised date: January 2013

HUMAN NORMAL IMMUNOGLOBULIN

Brand Name & Strength

Intragam P 6% (3 g/50 ml)

Reconstitution

Not required ^[1]

Further Dilution

Not required but may be diluted with up to 2 parts of diluent ^[1]

Diluent

NS, D5 ^[1]

Administration & Infusion rate

IV infusion ^[1]

- Initial rate: 1 ml/min
- Gradually increase (over 15 min) to a maximum 3 – 4 ml/min

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Rate of infusion which is too rapid may cause flushing and changes in heart rate and blood pressure. ^[1]
- Consideration should be given to reducing the rate of infusion in elderly patients and in patients with pre-existing renal disease. ^[1]
- Intragam P contains no preservatives and must be used immediately after opening the bottle. Any unused portion should be discarded. ^[1]

References

1. CSL Limited: Intragam P Product leaflet. Revision Date: February 2014



HYALURONIDASE

Brand Name & Strength

Hyaluronidase 1500 IU Powder for Solution for Injection / Infusion

Reconstitution

Conditions	Reconstitution
SC Infusion (hypodermoclysis), Extravasation, Haematoma	Dilute 1 vial in 1ml WFI or NS ^[1]
SC, IM	Dissolve 1 vial directly in to solution to be injected ^[1]
Local Anaesthetics	Dilute 1 vial with quantity of local anaesthetic solution to be used. 15 IU/ml is recommended in ophthalmology ^[1,2]

Further Dilution

Not required

Diluent

SC infusion (hypodermoclysis)

- NS, D5 ^[1]

Administration & Infusion rate

IM, SC, SC infusion ^[1]

- SC infusion (hypodermoclysis): Hyaluronidase injected into the site before the infusion is set up, or injected into the tubing of the infusion set, about 2 cm back from the needle, at the start of the infusion.
- Extravasation: infiltrated into the affected area
- Haematoma: infiltrated into the affected area

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	Immediately ^[1]	-

Remarks

- Should not be administered by intravenous injection. ^[1,2]

References

1. CP Pharmaceuticals Ltd. Hyaluronidase (Hyaluronidase 1500 I.U. Powder for Solution for Injetion/ Infusion) Product Leaflet. Revised date: April 2008.
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

HYDRALAZINE

Brand Name & Strength

Hydralazine HCl 20 mg/ml

Reconstitution

Reconstitute with 1 ml WFI ^[1] or NS ^[2]

Further Dilution

Slow IV

- Undiluted ^[1] or dilute 5 – 10 mg with 10 ml diluent ^[3,4]

IV infusion

- Dilute in 500 ml diluent ^[1]

Diluent

NS ^[1,2]

Administration & Infusion rate

IM ^[1,3]

- Administer undiluted

Slow IV

- Administer at a rate of 10 mg/min ^[2]

IV infusion

- Administer at an initial rate of 200 – 300 mcg/min ^[1,3]
- Maintenance flow rates must be determined individually and are usually within the range of 50 – 150 mcg/min. ^[1,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	Use immediately	Do not refrigerate
After dilution	Use immediately	Do not refrigerate

Remarks

- Use drug immediately after vial is opened. Any remainder should be discarded. ^[1,2]

References

1. Product Leaflet (Hydralazine HCl: Ciron Drugs & Pharmaceuticals Pvt. Ltd.)
2. Global RPh (http://www.globalrph.com/hydralazine_dilution.htm)
3. British National Formulary 70th Edition
4. MOH Drug Formulary (Blue Book)

HYDROCORTISONE

Brand Name & Strength

Hydrocortisone 100 mg

Reconstitution

Reconstitute with not more than 2 ml WFI ^[1,2,4]

Further Dilution

IV infusion

- Dilute in 100 – 1000 ml of diluent

Diluent

NS, D5 ^[2,4]

Administration & Infusion rate

IM

Slow IV

- Administer over 30 sec for 100 mg dose; 10 min for 500 mg dose or higher ^[1,2,4]

IV infusion

- Administer over 20 – 30 min ^[2,4]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	24 hr ^[1]	-
After dilution	4 hr ^[2,4]	-

Remarks

- For IM administration, avoid injection into the deltoid muscle due to high incidence of subcutaneous atrophy ^[4]

References

1. SM Pharmaceutical Sdn Bhd Hydrocortisone Sodium Succinate (Hydrocortisone) product leaflet. Revised date: 20/07/2011
2. McGraw-Hill IV Drug Handbook (2009)
3. Truven Health Analytics. Micromedex (Version 1.77)
4. Lexi-Comp, Inc. (Lexi-Drugs©). Lexi-Comp, Inc; March 20, 2017

HYOSCINE

Brand Name & Strength

Copan Injection 20 mg/ml

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IM ^[1]

Slow IV

- Administer over at least 1 min. May be administered without dilution. ^[2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

-

References

1. Duopharma (M) SB. Hyoscine Butylbromide (Copan Injection) Product Leaflet. Revised date: 20 July 2011.
2. Lexi-Comp, Inc. (Lexi-Drugs©). Lexi-Comp, Inc; March 20, 2017

IBUPROFEN

Brand Name & Strength

Ibuprofen Injection 10 mg/2 ml

Reconstitution

Not required

Further Dilution

Preferably undiluted. May also be diluted to any suitable amount with diluent if necessary. ^[1]

Diluent

NS, D5 ^[1,2]

Administration & Infusion rate

IV infusion

- Administer over 15 min, preferably undiluted. ^[1]
- If necessary, the injection volume may be adjusted with NS or D5 for infusion. ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	-	-
After dilution	Use immediately ^[1]	-

Remarks

- For intravenous use only. ^[1,2]

References

1. Samarth Life Sciences Pvt Ltd. Ibuprofen Injection Product Leaflet.
2. Lexi-comp, Inc (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

ILOPROST

Brand Name & Strength

Ilomedin 0.5 ml (contains 67 mcg Iloprost Trometamol equivalent to 50 mcg Iloprost)

Reconstitution

Not required

Further Dilution

For infusion pump use

- Dilute 50 mcg (0.5 ml) with 250 ml diluent to a final concentration of 0.2 mcg/ml ^[1]

For syringe driver use

- Dilute 50 mcg (0.5 ml) with 25 ml diluent to a final concentration of 2 mcg/ml ^[1]

Diluent

NS, D5 ^[1]

Administration & Infusion rate

IV infusion ^[1]

- Administer over 6 hr via a peripheral vein or a central venous catheter.
- Treatment can be started at an infusion rate to deliver 0.5 ng/kg/min for 30 min. The dose can then be increased at intervals of about 30 min in steps of 0.5 ng/kg/min up to 2 ng/kg/min. (Refer to product leaflet for the table that consists of infusion rate corresponding to weight.)

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Ilomedin must be administered after dilution. ^[1]
- The infusion solution should be made up freshly each day to ensure sterility. ^[1]

References

- Bayer. Iloprost (Ilomedin)Product Leaflet. Revised date 14 Oct 2013

IMIPENEM-CILASTATIN

Brand Name & Strength

Tienam® 500 mg

Reconstitution

Reconstitute with 10 ml diluent ^[1], repeat with an additional 10 ml of diluent to ensure complete transfer of vial contents. ^[1]

Further Dilution

Dilute with 100 ml of diluent (max concentration: 5 mg/ml) ^[1,3]

Diluent

D5, NS

Administration & Infusion rate

IV infusion

- Dose ≥ 750 mg: Administered at over 40 – 60 min ^[2]
- Dose ≤ 500 mg: Administered at over 20 – 30 min ^[2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	4 hr ^[1]	24 hr ^[1]

Remarks

- Administer only as slow IV infusion. Do not give by direct IV injection. ^[2,3]
- To slow infusion rate if patient experienced nausea, vomiting, dizziness, or sweating. ^[3]

References

1. MSD. Imipenem and Cilastatin (Tienam) product leaflet. Revision Date December 2013
2. Lexi-Comp, Inc. (Lexi-Drugs©). Lexi-Comp, Inc; March 20, 2017
3. McGraw-Hill. IV Drug Handbook. (2009)

INFLIXIMAB

Brand Name & Strength

Remicade 100 mg

Reconstitution

Reconstitute with 10 ml of WFI (Concentration: 10 mg/ml) ^[1,2,3]

Further Dilution

Dilute the reconstituted solution with diluent to obtain a total infusion volume of 250 ml (Concentration: 0.4 – 4 mg/ml) ^[1,2,3]

Diluent

NS ^[1,2,3]

Administration & Infusion rate

IV infusion

- Administer over at least 2 hr (max rate: 2 ml/min) ^[1,2,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	3 hr ^[1,3]	24 hr ^[1]
After dilution	3 hr ^[1,3]	24 hr ^[1]

Remarks

- The solution is colourless to light yellow and opalescent ^[1]
- The solution may develop a few fine translucent particles, as infliximab is a protein ^[1]
- Do not use if opaque particles, discoloration, or other foreign particles ^[1]
- Do not infuse in same IV line as other agents ^[2]
- Use an infusion set with an in-line filter, with pore size of 1.2 micrometer or less ^[1,2]

References

- Janssen Biologics (Remicade) Product leaflet. Revised date: 2011
- McGraw-Hill's IV Drug Handbook. (2009)
- Lexi-comp, Inc (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

INFLUENZA VACCINE

Brand Name & Strength

Influvac® 0.5 ml

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IM or SC ^[1,2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Shake well before use ^[1,2]
- Allow to warm to room temperature prior to use ^[2]
- Contains trace amounts of chicken egg protein, formaldehyde, gentamicin and polysorbate 80. [Used during manufacturing process]. ^[1,2]

References

1. Abott. Influenza Vaccine (Influvac®) product leaflet. Revision date: Nov 2015
2. Lexi-comp, Inc (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

IRON(III)-HYDROXIDE DEXTRAN COMPLEX

Brand Name & Strength

CosmoFer® 50mg/ml (2ml amp)

Reconstitution

Not required ^[1,2,3]

Further Dilution

See **Administration & Infusion rate**

Diluent

NS ^[1,2,3,4]

Calculation

Total Iron Deficit (mg) = Body Weight (kg) x [Target Hb (g/dl) - Actual Hb (g/dl)] x 2.4 + Depot Iron (mg)

Body Weight	Depot Iron
< 35 kg	15 mg/kg body weight
≥ 35 kg	500 mg

Administration & Infusion rate

IV injection

	Slow IV ^[1]	IV infusion ^[1]	Total dose infusion ^[1]
Test dose	Administer the first 25 mg over 1 – 2 min	Administer the first 25 mg over 15 min	Administer the first 25 mg over 15 min
Dose	100 – 200 mg	100 – 200 mg	Determined dosage (see Calculation) (max per dose: 20 mg/kg)
Volume of diluent	10 – 20 ml	100 ml	500 ml
Rate	Inject slowly over 10 – 20 min	Infuse over at least 30 min	Infuse over 4 – 6 hr

Deep IM ^[1]

- Administer undiluted in doses of up to 100 mg in the upper outer quadrant of the buttocks, alternate buttocks with subsequent injections.

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	Use immediately ^[1]	-

Remarks

- Following test dose, administer the remaining portion of dose after 15 min if there are no adverse reactions ^[1]
- For total dose infusion, if the total iron deficit is more than 20 mg/kg, split into multiple doses and administer once a week ^[1]
- Discontinue oral iron preparations before starting IV therapy as concomitant use can cause the absorption of oral iron to be reduced ^[1,2]
- Oral iron not to be given until 5 days of last injection. ^[1,4]

References

1. Pharmacosmos. Iron Dextran 50 mg/ml Product Leaflet. Revised June 2015
2. Mc Graw Hill's IV Handbook (2009)
3. Lexi-Comp, Inc. (Lexi-Drugs©). Lexi-Comp, Inc; March 20, 2017
4. British National Formulary 70th Edition

IRON SUCROSE

Brand Name & Strength

Venofer 100 mg/5 ml

Reconstitution

Not required

Further Dilution

IV infusion

- Dilute 100 mg (5 ml) in 100 ml of diluent
- Dilute 500 mg (25 ml) in 500 ml of diluent

Diluent

NS

Calculation

Total Iron Deficit (mg) = Body Weight (kg) x [Target Hb (g/dl) - Actual Hb (g/dl)] x 2.4 + Depot Iron (mg)

Body Weight	Target Hb	Depot Iron
< 35 kg	13 g/dl	15 mg/kg body weight
≥ 35 kg	15 g/dl	500 mg

Administration & Infusion rate

Test Dose

Weight	Test Dose
Children (<14 kg)	1.5 mg iron/kg
Children (>14 kg) & Adult	1 ml (20 mg)

Administration	Administer
IV drip infusion	The first 20 mg iron of the therapeutic dose should be infused over 15 min as a test dose.
Slow IV injection	Administer 1 ml by slow IV over 1 – 2 min and observe for 15 min.

IV injection (undiluted)

- Administer 100 mg iron (5 ml) in at least over 5 min or 200 mg iron (10 ml) over 10 min.
- As injection, maximum tolerated dose per day, given not more than 3 times per week: 200 mg iron (10 ml) injected over at 10 min.

IV infusion ^[1,2,3]

Dose	100 mg	200 mg	300 mg	400 mg	500 mg
Administer Over	15 min	30 min	1 ½ hour	2 ½ hour	3 ½ hour

- As infusion, **maximum** tolerated single dose per day given **NOT** more than once per week:

Weight	<70 kg	>70 kg
Maximum dose/week	7 mg iron/kg body weight	500 mg

- For CKD patients ^[2]

Category	Hemodialysis	Non-dialysis	Peritoneal dialysis
Dilute in diluent	Each 100 mg in < 100 ml	500 mg in maximum 250 ml	Each dose in < 250 ml
Administer over	15 min	3.5 – 4 hr	1.5 hr

Storage & Stability

	RT (23 – 27 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	7 days ^[3]	-

Remarks

- Venofer must only be mixed with sterile 0.9% m/V Sodium Chloride solution ^[1]
- Compatibility with containers other than glass, polyethylene and PVC is not known ^[1]
- The diluted solution must appear as brown and clear solution ^[1]

References

- Fresenius Medical Care Malaysia Sdn Bhd. Iron Sucrose (Venofer) Product Leaflet
- McGraw-Hill's IV Drug Handbook 2009
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)



ISOPRENALINE

I

Brand Name & Strength

Isuprel™ 0.2 mg/ml, 1 mg/5 ml, Isoprenaline Hydrochloride Monico 0.2 mg/1 ml

Reconstitution

Not required ^[1,2]

Further Dilution

IM, SC, Intracardiac

- No further dilution required ^[1]

IV bolus

- Dilute 1 ml with 10 ml diluent ^[1]

IV infusion

- Adults with shock and hypo perfusion states:
 - Dilute 5 ml (1 mg) in 500 ml of D5. ^[1] Concentration up to 10x greater have been used when limitation of volume is essential
- Adults with heart block, Adams-Stokes attacks and cardiac arrest:
 - Dilute 10 ml (2 mg) in 500 ml of diluent ^[1]

Diluent

D5, NS ^[1,2]

Administration & Infusion rate

IM, SC, Intracardiac

IV bolus ^[1]

- Adults with heart block, Adams-Stokes attacks and cardiac arrest:
 - Administer 0.02 – 0.06 mg (1 – 3 ml of diluted solution)
 - Subsequent administration: 0.01 – 0.2 mg (0.5 – 10 ml of diluted solution)
- Bronchospasm occurring during anaesthesia:
 - Administer 0.01 – 0.02 mg (0.5 – 1 ml of diluted solution)
 - Dose may be repeated when necessary

IV infusion ^[1]

- Adults with shock and hypo perfusion states:
 - Administer at 0.5 – 5 mcg/min (0.25 – 2.5 ml of diluted solution)
 - Rates over 30 mcg/min have been used in advanced stages of shock. Rate should be adjusted based on heart rate, central venous pressure, systemic blood pressure and urine flow. If heart rate > 110 bpm, it may be advisable to decrease or temporarily discontinue the infusion.
- Adults with heart block, Adams-Stokes attacks and cardiac arrest:
 - Rate: Administer at 5 mcg/min. (1.25 ml of diluted solution per min)

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- The usual route of administration is by IV infusion or IV bolus injection. In dire emergencies, the drug may be administered by intracardiac injection. If time is not of the utmost importance, initial therapy by IM or SC injection is preferred ^[1]

References

- Hospira. Isoprenaline (Isuprel) Product Leaflet. Revised date: 23 July 2014
- Monico Isoprenaline Hydrochloride Product Leaflet. Revised date: 1 Dec 2011

ISOSORBIDE DINITRATE

Brand Name & Strength

Isoket[®] 10 mg/10 ml (0.1%)

Reconstitution

Not required

Further Dilution

	Volume of diluent ^[1]	Concentration (mcg/ml) ^[1]
5 x 10 ml ampoule	500 ml	100
10 x 10 ml ampoule	500 ml	200

Diluent

NS, D5 ^[1]

Administration & Infusion rate

IV infusion

- Administer as per prescribed dose (2 – 12 mg/hr, may increase to 20 mg/hr) ^[2,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Avoid use of PVC infusion containers, administration sets and in-line filters if possible. Rigid plastics, i.e. polyethylene, polytetrafluoroethylene or polypropylene administration sets and syringes, should be used if available. ^[3]

References

- GSK. Isosorbide Dinitrate (Isoket[®]) Product Leaflet. Revised date: 2014.
- Truven Health Analytics. Micromedex (Version 1.77)
- Gray A. Injectable Drugs Guide. 2014. [Last Accessed: 22 January 2017]



KETAMINE

K

Brand Name & Strength

Ketamine Fresenius 200 mg/20 ml

Reconstitution

Not required

Further Dilution

IV infusion

- Dilute 1 ampoule (200 mg) with 180 ml of diluent (1 mg/ml) ^[1]
- If fluid restriction required, dilute 1 ampoule (200 mg) with 80 ml of diluent (2 mg/ml) ^[1,2]

Diluent

NS, D5

Administration & Infusion rate

Slow IV

- Administer over 60 seconds or at 0.5 mg/kg/min ^[2]

IV infusion

- Administer at 1 – 5 mg/kg/hr ^[1]

IM ^[3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Do not mix with barbiturates or diazepam (precipitation may occur) ^[1,3]

References

1. Fresenius Kabi. Ketamine (Ketamine Fresenius) Product leaflet. Revised date: 15 January 2009
2. McGraw Hill's IV Handbook (2009)
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; March 20, 2017



LABETALOL HCl

L

Brand Name & Strength

Trandate™ 5 mg/ml (25 mg/5 ml)

Reconstitution

Not required

Further Dilution

IV infusion

- Dilute with diluent to final concentration of 1 mg/ml ^[1,3]

Diluent

NS, D5 ^[1,4]

Administration & Infusion rate

Slow IV

- Administer 50 mg over at least 1 min. Max dose: 200 mg ^[1,5]

IV infusion

- Hypertension Crisis: Administer 0.5 – 2 mg/min. Max dose is 300 mg ^[5]
- Hypertension In Pregnancy: Administer 20 mg/hr. Max dose is 160 mg/hr ^[5]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	24 hr ^[1]	-

Remarks

- Do not mix with 5% sodium bicarbonate injection ^[1,2,4]
- Patient should remain supine after IV injection for at least 3 hours ^[1,5]

References

- Aspen Bad Oldesloe GmbH. Labetalol HCl (Trandate™) Product Leaflet. Revised date : Jun 2011
- McGraw Hill's IV Drug Handbook. (2009)
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; March 20, 2017
- Intravenous Dilution Database. GlobalRPh. Available at http://www.globalrph.com/index_dilution.htm
- Dilution Guide for High Alert Medications, Pharmaceutical Services Division, Malaysia.

LEUCOVORIN CALCIUM

Brand Name & Strength

Leucovorin Calcium Injection USP 3 mg/ml, 50 mg/5 ml

Reconstitution

Not required

Further Dilution

IV infusion

- Dilute the required dose in 100 – 250 ml diluent ^[5]

Diluent

NS, D5, D10, NSD10, Ringers solution ^[1]

Administration & Infusion rate

IV bolus, Slow IV, IM

IV infusion

- Administer over 15 min to 2 hours ^[3] (rate not to exceed 160 mg/min) ^[6]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	24 hr (NS, Ringer's), 12 hr (D5, D10), 6 hr (NSD10) ^[1]	-

Remarks

- Leucovorin is harmful or fatal if given intrathecally ^[1,2,3,4]
- Do not administer IV solutions at a rate > 160 mg/min due to the calcium content of the solution ^[1,2,3,4]

References

1. Fresenius Kabi Oncology Ltd. Leucovorin calcium Inj USP Product Leaflet. Revised date : 06/2009
2. McGraw Hill's IV Drug Handbook. (2009)
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; March 20, 2017
4. Intravenous Dilution Database. GlobalRPh. Available at http://www.globalrph.com/index_dilution.htm
5. Pharmaceutical Press. Injectable Drugs Guide. (2011)
6. WebMD, LLC. Medscape (Version 5.6.1)

L

LEVETIRACETAM

Brand Name & Strength

Kepra® 500 mg/5 ml

Reconstitution

Not required

Further Dilution

Dilute the required dose with 100 ml of diluent (concentration: 2.5 – 15 mg/ml) ^[1,2,3]

Diluent

NS, D5, lactated Ringer's solution ^[1,2,3]

Administration & Infusion rate

IV infusion

- Administer over 15 min ^[1,2,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	4 hr ^[2] (in PVC bags)	-

Remarks

- This product contains 0.83 mmol (19 mg) sodium per vial. It should be taken into consideration by patients on a controlled sodium diet ^[1]

References

1. Patheon Italia S.p.A., Monza (MI), Italy Kepra Product leaflet. Revised date: 20 December 2013
2. Lexi-comp, Inc (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
3. Truven Health Analytics. Micromedex (Version 1.77)



LEVOBUPIVACAINE

L

Brand Name & Strength

Chirocaine 5 mg/ml

Reconstitution

Not required

Further Dilution

Dilute 1 vial with 2 – 8 ml of diluent (concentration: 0.625 – 2.5 mg/ml)

Diluent

NS

Administration & Infusion rate

Surgical Anesthesia

- Administer as epidural, intrathecal, peripheral nerve block, local infiltration or peribulbar block in ophthalmic surgery ^[1]

Pain Management

- Administer as continuous epidural infusion, single or multiple bolus administration ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	-	-
After dilution	Use immediately ^[1]	-

Remarks

- May not be compatible with alkaline solutions having pH greater than 8.5 ^[1]
- Compatible with saline solutions containing morphine, fentanyl and clonidine ^[1]
- Use adequate test dose (3 – 5 ml) of short-acting local anaesthetic solution containing epinephrine prior induction of complete nerve block ^[1]
- Avoid rapid injection of a large volume of local anaesthetic solution ^[1]

References

- Takeda Nycomed AS for Abbvie. Levobupivacaine (Chirocaine) Product Leaflet. Revised August 2012.
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; November 3, 2016

LEVOFLOXACIN

Brand Name & Strength

Glevo I.V 500 mg/100 ml

Reconstitution

Not required

Further Dilution

Not required ^[1,2,3]

Diluent

Not required

Administration & Infusion rate

IV infusion

- Administer slowly over a period of not less than 60 or 90 min, depending on the dosage ^[1,2,3]
 - 250 – 500 mg: administer over 60 min
 - 750 mg: administer over 90 min

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Not for IM, intrathecal, intraperitoneal or SC administration ^[1,2,3]
- Avoid rapid or bolus IV administration as this may cause severe hypotension ^[1,2,3]
- Maintain adequate hydration of patient to prevent crystalluria ^[4]

References

- Glenmark Pharmaceuticals (Glevo I.V[®]) product leaflet. Revised date: 29th June 2011
- McGraw-Hill's IV Drug Handbook. (2009)
- WebMD, LLC. Medscape (Version 5.6.1)
- Drug Information Handbook, 23rd Edition

L

LIDOCAINE 2% WITH ADRENALINE

Brand Name & Strength

Xylestesin™-A 20 mg/ml

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

Local anaesthetic in dentistry

- Administer at a rate not exceeding 0.5 ml in 15 sec i.e. one cartridge per min ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- For single use only
- Not for IV administration ^[1]
- Must not be used in the event of allergy or hypersensitivity to sulphite, as well as severe bronchial asthma ^[1]

References

1. 3M Espe. Lidocaine (Xylestesin-A) Product leaflet. Revised date: Sept 2013



LIGNOCAINE (Preservative Free)

L

Brand Name & Strength

Injecsol Lig2 100 mg/5 ml – Preservative Free

Reconstitution

Not required

Further Dilution

Continuous IV infusion

- Dilute 1000 mg in 250 ml (concentration: 4 mg/ml) or 2000 mg in 250 ml (concentration: 8 mg/ml) diluent ^[2]
- Dilute with diluent to a final concentration of 1 – 2 mg/ml ^[3]

Diluent

D5 ^[1]

Administration & Infusion rate

IV bolus

- Administer at 25 – 50 mg/min ^[2]. In cardiac arrest (eg, ventricular fibrillation or pulseless ventricular tachycardia): may be administered rapidly into peripheral vein ^[2]

Continuous IV infusion

- Administer with infusion pump no faster than 4 mg/min, according to indication-specific infusion rates ^[2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

-

References

1. Ain Medicare. Lignocaine 2% (Injecsol Lig2) Product Leaflet. Revised 20 December 2011.
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; November 1, 2016
3. UKCPA: Minimum Infusion Volumes for Fluid Restricted Critically Ill Patients 4th Edition (v4.4) December 2012

LIGNOCAINE 2%

Brand Name & Strength

Lakan 200 mg/10 ml Injection

Reconstitution

Not required ^[1]

Further Dilution

Not required ^[1]

Diluent

Not required ^[1]

Administration & Infusion rate

IM or SC only ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Store in refrigerator for not more than 4 weeks after opening. Do not freeze. ^[1]

References

1. Duopharma: Lignocaine Hydrochloride 2% Inj. (Lakan) Product Leaflet. Revised date: 21 August 2014.

LINEZOLID

Brand Name & Strength

Zyvox 600 mg/300 ml Solution for Infusion

Reconstitution

Not required

Further Dilution

Not required

Diluent

D5, NS, lactated Ringer's solution ^[1,2,3]

Administration & Infusion rate

IV infusion

- Administer over 30 – 120 min ^[1,2,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Single use, ready to use infusion bags. Keep infusion bags in foil overwrap until ready to use. ^[1,3]
- Do not use this intravenous infusion bag in series connection. Do not introduce additives into solution. ^[1]
- Flush IV line with compatible solution before and after administering drug to avoid incompatibilities. ^[1,3]
- Linezolid solution for infusion may exhibit a yellow colour that can intensify over time without adversely affecting potency. ^[1,3]
- Physical incompatibility at simulated Y-site administration: Amphotericin B, Chlorpromazine HCL, Diazepam, Pentamidine Isothionate, Erythromycin Lactobionate, Phenytoin Sodium, Trimethoprim-Sulfamethoxazole. ^[1]
- Chemical incompatibility: Ceftriaxone Sodium ^[1]

References

- Fresenius Kabi Norge AS. Linezolid (Zyvox) Product Leaflet. Revised date: Jul 08.
- Lexi-comp, Inc (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
- McGraw Hill's IV Drug Handbook. (2009)

MAGNESIUM CHLORIDE HEXAHYDRATE, POTASSIUM CHLORIDE & PROCAINE HYDROCHLORIDE

Brand Name & Strength

Sterile Concentrate for Cardioplegia Infusion^R

Reconstitution

Not required ^[1]

Further Dilution

Dilute 1 amp with 1000 ml diluent (ratio: 20 ml with 1000 ml) ^[1]

Diluent

Ringer's Solution (Compound Sodium Chloride Injection BPC) ^[1]

Administration & Infusion rate

IV infusion

- Administer by infusion into coronary arteries during cardiopulmonary bypass ^[1]
- Total dose is patient specific, recommended infusion rate 2 – 4 ml/g myocardium for not less than 30 sec ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	Should be cooled prior to administration ^[1]

Remarks

- The diluted solution should only be used for infusion into the coronary arteries during cardiopulmonary bypass ^[1]

References

1. Martindale Pharmaceuticals. Magnesium chloride hexahydrate, Potassium chloride and Procaine hydrochloride (Sterile Concentrate for Cardioplegia Infusion^R) Product leaflet. Revised: April 2005.
2. Medicines and Healthcare Products Regulatory Agency (MHRA). Summary of Product Characteristics (Sterile Concentrate for Cardioplegia Infusion). Revised: 24 June 2013. Accessed at www.mhra.gov.uk/spc-pil/?prodName=STERILE%20CONCENTRATE%20FOR%20CARDIOPLEGIA%20INFUSION.&subsName=MAGNESIUM%20CHLORIDE%20HEXAHYDRATE&pageID=SecondLevel



MAGNESIUM SULFATE



Brand Name & Strength

DBL Magnesium Sulfate Concentrated Injection 2.465 g/5 ml (10 mmol/5 ml)

Reconstitution

Not required

Further Dilution

- IM**
- Administer undiluted or dilute 1 ampoule with 5 ml diluent (max concentration: 25 – 50% of Mg for adult, 20% of Mg for infants or children) ^[1]
- Slow IV, IV infusion**
- Dilute 1 ampoule by adding at least 7.5 ml of diluent (max concentration: 20% of Mg) ^[1]

Diluent

NS, lactated Ringer’s solution, D5, NSD5 ^[1]

Administration & Infusion rate

- IM**
- Administer not to exceed 3 ml/min ^[2]
- Slow IV**
- Administer not faster than 150 mg/min; may administer over 1 – 2 min ^[2,3]
- IV infusion**
- Administer over 2 – 4 hr, rate not to exceed 125 mg/kg/hr. Administer over 10 – 20 min for treatment of severe asthma or torsades de pointes ventricular tachycardia ^[4]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	24 hr ^[1]	24 hr ^[1]

Remarks

-

References

- Hospira Australia Pty Ltd. Magnesium Sulfate BP. DBL Magnesium Sulfate Concentrated Injection Product Leaflet; 1 October 2014
- McGraw Hill’s I.V. Drug Handbook. (2009)
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; November 3, 2016
- WebMD, LLC. Medscape (Version 5.6.1)



MALAYAN PIT VIPER ANTIVENIN



Brand Name & Strength

Malayan Pit Viper Antivenin

Reconstitution

Reconstitute with provided diluent or 10 ml of WFI ^[1]

Further Dilution

Dilute the reconstituted antivenom with 5 – 10 ml/kg of diluent for children or 250 – 500 ml diluent for adult ^[1]

Diluent

NS, D5 ^[1]

Administration & Infusion rate

IV infusion

- The initial dose is 30 ml (3 vials) for systemic envenoming
- Administer at 1 – 2 ml/min over 10 – 15 min
- If no reaction, complete the infusion at a rate of 5 – 10 ml/min within less than 1 hr
- Subsequent dose can be given every 6 hr according to the clinical signs & symptoms ^[2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

-

References

1. Queen Saovabha Memorial Institute. Malayan Pit Viper Antivenin (Malayan Pit Viper Antivenin) Product Leaflet. Revised date: April 2012.
2. Snakebite Management Guide for Healthcare providers in Malaysia. Copyrights UKM 2014. Updated: May 2014

MENINGOCOCCAL VACCINE (Mencevax)

Brand Name & Strength

Mencevax 50 mcg/0.5ml

Reconstitution

Reconstitute vial with 0.5 ml provided solvent ^[1]

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

SC only ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	Use immediately	Use within 8 hr ^[1]
After dilution	-	-

Remarks

- Protect the reconstituted solution from light ^[1]

References

1. GlaxoSmithKline. Mencevax®. Revised Date: April 2014

MENINGOCOCCAL VACCINE (Menveo)

Brand Name & Strength

Menveo® 50 mcg/0.5 ml

Reconstitution

Reconstitute vial with provided solvent ^[1]

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IM only

- Preferably into deltoid muscle (adults, adolescents, toddlers) or anterolateral aspect of the thigh (infants) ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	Use immediately or within 8 hr ^[1]	-
After dilution	-	-

Remarks

- Not to be administered by IV, SC or intradermal ^[1]
- Separate injection site must be used if more than one vaccine is being administered at the same time ^[1]

References

1. Novartis AG. Menveo®. Revised date: Aug 2013

MEROPENEM

Brand Name & Strength

DBL Meropenem 500 mg & 1 g

Reconstitution

Reconstitute each 500 mg of Meropenem with 10 ml of WFI ^[1]

Further Dilution

IV infusion

- Further dilute with 50 – 200 ml diluent (Concentration: 1 – 20 mg/ml) ^[1]

Diluent

NS, D5 ^[1]

Administration & Infusion rate

Slow IV

- Administer over 3 – 5 min ^[1,2,3]

IV infusion

- Administer over 15 – 30 min ^[1,2,3]
- Administer over 4 hr (extended infusion) ^[1,4]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	8 hr	24 hr
After dilution	8 hr (NS), 3 hr (D5)	24 hr (NS), 14 hr (D5)

Remarks

- Extended infusion has been shown to improve the time the free drug remains above MIC that predicts the killing characteristic of the antibiotic ^[4]

References

- Hospira: DBL Meropenem 500 mg Product leaflet. Revision Date: November 2014
- McGraw Hill's IV Drug Handbook. (2009)
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; January 23, 2017
- Malaysian Society of Intensive Care: Guide to Antimicrobial Therapy in the Adult ICU 2012

MESNA

M

Brand Name & Strength

Uromitexan 400 mg/4 ml

Reconstitution

Not required

Further Dilution

IV infusion

- Dilute to a final concentration of 20 mg/ml ^[2,3]

Diluent

NS, D5, lactated Ringer's solution ^[2]

Administration & Infusion rate

IV bolus

- Administer over 1 min ^[2]

IV infusion

- Administer over 15 min ^[1,3,4]

Continuous IV infusion

- Administer over 12 – 24 hr after completion of ifosfamide infusion ^[1,3,4]
- Refer to specific protocol for administration rate/details

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	24 hr ^[2,3,8]	-

Remarks

- Maintain adequate hydration and urinary output during ifosfamide treatment ^[3]

References

- Baxter. Mesna (Uromitexan) Product Leaflet. Revised October 2015.
- McGraw Hill's IV Drug Handbook. (2009)
- Lexi-Comp Online Database (Accessed 16 January 2017)
- Intravenous Dilution Database. GlobalRPh. Available at: http://www.globalrph.com/index_dilution.htm

METHYLENE BLUE

Brand Name & Strength

Metiblo® 10 mg/ml

Reconstitution

Not required

Further Dilution

Not required.

However, may be diluted in 50 ml diluent to avoid local pain, especially in paediatric patients. [2,3]

Diluent

D5 [2,3]

Administration & Infusion rate

Slow IV

- Administer over 5 min [1,2,3]

IV infusion

- Diluted and administered over at least 5 – 30 min [3]

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	Immediately [3]	-
After dilution	-	-

Remarks

- Do not administer by SC injection (risk of necrosis) or intrathecal injection (nerve damage) [1]
- Intra-amniotic use is categorically contraindicated [1]
- Do not mix with NS [3]

References

- Laboratoires STEROP S.A. Methylene blue (Metiblo®) Product Leaflet. Revised date: February 2000
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; November 3, 2016
- Truven Health Analytics. Micromedex (Version 1.77)

METHYLPREDNISOLONE

Brand Name & Strength

Solu-Medrol™ 500 mg, 1 g

Reconstitution

Dilute with provided solvent ^[1,3]

Vial (mg)	Volume of solvent (ml)
500	7.8
1000	15.6

Further Dilution

IV infusion

- Dilute with 50 – 250 ml diluent ^[1,2,3]

Diluent

NS, D5, NSD5 ^[1]

Administration & Infusion rate

Slow IV

- Administer doses ≤ 250 mg over at least 5 min ^[1]

IV infusion

- Administer doses > 250 mg over at least 30 min ^[1]

IM ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	48 hr ^[1,3]	-
After dilution	48 hr ^[1,3]	-

Remarks

- Administer separately from other drugs ^[1,2,3]

References

- Pfizer. Methylprednisolone (SOLU-MEDROL™) Product Leaflet Revision date: Jan 2005
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; November 2, 2016
- Injectable Drugs Guide. 2014 [Accessed 3 Nov 2016]

METOCLOPRAMIDE

Brand Name & Strength

PULIN Injection 'Yung Shin' 10 mg/2 ml

Reconstitution

Not required ^[2,3,4,5]

Further Dilution

- Dose less than 10 mg: no further dilution required ^[2,3,5]
- Dose exceed 10 mg: dilute with 50 ml diluent ^[2,3,5]

Diluent

NS, NSD5, HSD5, lactated Ringer's solution ^[2,3]

Administration & Infusion rate

IM ^[1,3]

Slow IV (doses < 10 mg)

- Administer over 2 min ^[2,3,5]

IV infusion (doses > 10 mg)

- Administer over at least 15 min ^[2,3,5]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	24 hr in normal light and 48 hr when protected from light ^[2,3,5]	-

Remarks

- Avoid dose exceeding 0.5 mg/kg/day ^[1]
- Contains benzyl alcohol and should be avoided in children less than two years of age. Not to be used in neonates ^[1]
- Not recommended for the first trimester of pregnancy ^[1]

References

1. Yung Shin Pharmaceutical Ltd. Metoclopramide 10 mg/2 ml Injection Product Leaflet
2. McGraw Hill's IV Drug Handbook. (2009)
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; November 3, 2016
4. Intravenous Dilution Database. GlobalRPh. Available at http://www.globalrph.com/index_dilution.htm
5. Truven Health Analytics. Micromedex (Version 1.77)

METRONIDAZOLE

Brand Name & Strength

Metronol 0.5 % w/v Injection

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

Slow IV

- Administer over 30 – 60 min ^[1,2,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Should not be mixed with Cefamandole Nafate, Cefoxitin Sodium, Dextrose 10 % compound Sodium Lactate injection and Penicillin G Potassium ^[1]
- Do not use equipment containing aluminium, as solution may turn brownish ^[2]
- Do not introduce additives into infusion ^[2]

References

1. Ain Medicare Sdn Bhd. Metronidazole (Metronol®) Injection Product Leaflet. Revised date: 20.11.2006
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; November 3, 2016
3. McGraw Hill's IV Drug Handbook. (2009)



MIDAZOLAM (Domi)

M

Brand Name & Strength

Domi injection 5 mg/ml

Reconstitution

Not required

Further Dilution

Slow IV

- Dilute with diluent to a concentration of 1 – 5 mg/ml ^[3]

IV infusion

- Dilute with diluent to a final concentration of 0.5 mg/ml (Paediatric) or 1 mg/ml ^[3]

Diluent

NS, D5, D10, fructose intravenous infusion, laevulose 5%, Ringer's solution, Hartmann's solution ^[1]

Administration & Infusion rate

IM ^[1]

IV bolus ^[1]

- Induction of anaesthesia: Administer 0.15 – 0.2 mg/kg (10 – 15 mg) at a rate of 2.5 mg/10 sec ^[1] or 5 – 30 sec bolus ^[3]

Slow IV

- Administer over 2 – 5 min ^[1,2,3]. Wait an additional ≥ 2 min to fully evaluate the sedation effect ^[1,2,4]

IV infusion

- IV sedation in ICU: Administer at 0.03 – 0.2 mg/kg/hr ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	24 hr (in D5, NS) ^[2,3,4] , 4 hr (lactated Ringer's) ^[2,4]	-

Remarks

- May be mixed in the same syringe with frequently used premedicants: Morphine Sulphate, Pethidine, Atropine Sulphate or Scopolamine. ^[1,2,4]

References

- Duopharma (M) SB. Midazolam (Domi injection) Product Leaflet. Revised date: 18 August 2011
- McGraw Hill's IV Drug Handbook. (2009)
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; November 3, 2016
- Truven Health Analytics. Micromedex (Version 1.77)



MIDAZOLAM (Midazolam-hameln)

M

Brand Name & Strength

Midazolam-hameln 5 mg/ml injection (1 ml & 3 ml)

Reconstitution

Not required

Further Dilution

Slow IV

- Dilute with diluent to a concentration of 1 – 5 mg/ml ^[3]

IV infusion

- Dilute 15 mg Midazolam to 100 – 1000 ml diluent (concentration: 0.15 mg/ml – 0.015 mg/ml) ^[1]
- Dilute with diluent to a concentration 0.5 mg/ml ^[2]

Diluent

NS, D5, D10, Ringer's solution ^[1]

Administration & Infusion rate

IM

- Administer undiluted into large muscle ^[3]

Slow IV

- Conscious sedation: Administer over 2 min ^[1]
- Induction of anaesthesia: Administer at 2.5 mg/10 sec (15 mg/min) ^[1]
- Premedication: Administer at 1 mg/30 sec (2 mg/min) ^[1]

IV infusion

- Maintenance dose for sedation in intensive care is 0.03 – 0.2 mg/kg/hr ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	72 hr ^[1]	24 hr ^[1]

Remarks

- May be mixed in the same syringe with Meperidine, Atropine, Scopolamine, or Morphine ^[1,2]

References

- Hameln pharmaceuticals gmbh. Midazolam (Midazolam-hameln) Product Leaflet. Revised date: August 2002
- McGraw Hill's IV Drug Handbook. (2009)
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc; November 3, 2016
- Dilution Guide for High Alert Medications. (2011)

MILRINONE LACTATE

Brand Name & Strength

Primacor 10 mg/10 ml

Reconstitution

Not required ^[1]

Further Dilution

Loading Dose

- May be given undiluted, or diluted to a total volume of 10 – 20 ml ^[1,2,3]

Maintenance Dose

- Dilute 1 ampule (10 mg/10 ml) with 40 ml of diluent for a total volume of 50 ml
- Dilute 2 ampules (20 mg/20 ml) with 80 ml of diluent for a total volume of 100 ml (final concentration: 200 mcg/ml) ^[1,2,3]

Diluent

NS, D5 ^[1,2,3]

Calculation

Loading dose: 50 mcg/kg

Loading dose of Milrinone in ml(s)										
Weight (kg)	30	40	50	60	70	80	90	100	110	120
Dose (mg)	150	200	250	300	350	400	450	500	550	600
ml	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0

Maintenance dose: Infusion rate (ml/hr) using 200 mcg/ml concentration

Dose (mcg/kg/min)	Patient Body Weight									
	30	40	50	60	70	80	90	100	110	120
0.375	3.4	4.5	5.6	6.8	7.9	9.0	10.1	11.3	12.4	13.5
0.400	3.6	4.8	6.0	7.2	8.4	9.6	10.8	12.0	13.2	14.4
0.500	4.5	6.0	7.5	9.0	10.5	12.0	13.5	15.0	16.5	18.0
0.600	5.4	7.2	9.0	10.8	12.6	14.4	16.2	18.0	19.8	21.6
0.700	6.3	8.4	10.5	12.6	14.7	16.8	18.9	21.0	23.1	25.2
0.750	6.8	9.0	11.3	13.5	15.8	18.0	20.3	22.5	24.8	27.0

Administration & Infusion rate

Loading dose

- Administer slowly over 10 min ^[1,2,3]

Maintenance dose (continuous infusion)

- Minimum infusion rate: 0.375 mcg/kg/min ^[1,2,3]
- Standard infusion rate: 0.50 mcg/kg/min ^[1,2,3]
- Maximum infusion rate: 0.75 mcg/kg/min ^[1,2,3]

**refer to 'Calculation' for infusion rates in ml/hr*

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	24 hr ^[1]	-

Remarks

- Infusion rate should be adjusted according to haemodynamic and clinical response. Dosage should be titrated to the maximum haemodynamic effect and should not exceed 1.13 mg/kg/day. ^[1]
- Please refer to product leaflet for dosage adjustment in renally impaired patients. ^[1]
- Do not administer through same IV line as frusemide or torsemide, as precipitate will form. ^[2]

References

- Sanofi Aventis: Primaqor Product Leaflet. Revised date: Nov 2011
- McGraw-Hill I.V Drug Handbook
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

MEASLES, MUMPS AND RUBELLA (MMR) VACCINE

Brand Name & Strength

Priorix® (Combined measles, mumps and rubella vaccine, live, attenuated) lyophilized powder for injection

Reconstitution

Reconstitute with provided solvent ^[1]

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

For IM or SC only ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	8 hr ^[1]
After dilution	-	-

Remarks

- Do not administer IV ^[1,2]
- SC route is preferred in patients with thrombocytopenia or any coagulation disorder ^[1]
- Administer SC in outer aspect of the upper arm in patients \geq 12 months ^[2]

References

1. GlaxoSmithKline UK. Measles, Mumps and Rubella live vaccine (Priorix®) Product Leaflet. Revised date: 20/08/2015
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)



MORPHINE SULPHATE

M

Brand Name & Strength

Morphine Sulphate Inj 10 mg/ml (Preservative free)

Reconstitution

Not required

Further Dilution

IV bolus

- Dilute 1 ampoule (10 mg/ml) with 2 – 20 ml of diluent (concentration: 0.5 – 5 mg/ml). ^[3] May also be given undiluted. ^[2]

IV infusion

- Dilute 1 ampoule (10 mg/ml) with 10 – 100 ml diluent (concentration: 0.1 – 1 mg/ml). Usual infusion concentration: 1 mg/ml. ^[2]

Diluent

NS, D5 ^[2,3]

Administration & Infusion rate

IV bolus

- Administer 4 – 5 min ^[2,3]

IV infusion

- Administer using infusion pump or PCA pump. Titrate dosage to provide adequate pain relief. ^[2,3]

Can be given IM, SC, Intrathecal and Epidural ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	7 days ^[4]	7 days ^[4]

Remarks

- Repeated IM injections are not recommended due to painful administration, variable absorption and lag time to peak effect. ^[3]
- Repeated SC administration causes local tissue irritation, pain and induration. ^[3]

References

- Duopharma (M) Sdn Bhd. Morphine (Injection Morphine Sulphate BP) Product Leaflet. Revised date:14.04.2009
- McGraw Hill's IV Drug Handbook. (2009)
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
- Intravenous Dilution Database. GlobalRPh. Available at: http://www.globalrph.com/index_dilution.htm

MOXIFLOXACIN

Brand Name & Strength

Avelox 400 mg/250 ml Injection

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IV infusion

- Administer over 60 min ^[1,2,3]

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Do not administer by rapid or bolus IV injection ^[2,3]
- If Moxifloxacin solution for infusion is to be given with another drug, each drug should be given separately. ^[1]
- When using same IV line to administer other drugs, flush line before and after infusion with compatible IV solution (NS, D5). ^[1,2]
- Do not refrigerate infusion solution. ^[1,2,3]

References

1. Bayer Schering Pharma AG, Germany. Moxifloxacin 400 mg/250 ml Product Leaflet. Revised Date: 18th November 2010
2. McGraw-Hill IV Drug Handbook. (2009)
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

MYCOPHENOLATE MOFETIL

Brand Name & Strength

CellCept® 500 mg

Reconstitution

Reconstitute with 14 ml D5 ^[1]

Further Dilution

1 g dose: Dilute 2 reconstituted vials into 140 ml diluent ^[1]

1.5 g dose: Dilute 3 reconstituted vials into 210 ml diluent ^[1]

Diluent

D5 ^[1]

Administration & Infusion rate

IV infusion

- Administer over a period of not less than 2 hr ^[1]

Storage & Stability

	RT (<30 °C)	Fridge (2 – 8 °C)
After reconstitution	4 hr ^[1]	-
After dilution	4 hr ^[1]	-

Remarks

- Must not be administered by rapid or bolus intravenous injection ^[1,2]
- Should not be mixed or administered concurrently via the same infusion catheter with other IV drugs or infusion admixtures ^[1]

References

1. Roche. Mycophenolate Mofetil (CellCept®) Product Leaflet. Revised September 2014.
2. McGraw-Hill's IV Drug Handbook. (2009)

N-ACETYLCYSTEINE

Brand Name & Strength

Hidonac 5 g/25 ml

Reconstitution

Not required ^[1]

Further Dilution

IV infusion (for Paracetamol Poisoning and non-Paracetamol Acute Liver Failure)

- Please refer to **Administration & Infusion rate**

IV infusion (for Prevention of Contrast-Induced Nephropathy) ^[4]

- Dilute 600 – 1200 mg in 50 – 100 ml NS

Diluent

D5 ^[1,2,3]

Administration & Infusion rate

IV infusion (for Paracetamol poisoning) ^[1,2,3]

- 150 mg/kg in 200 ml D5 over 15 min, followed by
50 mg/kg in 500 ml D5 over 4 hr, then
100 mg/kg in 1000 ml D5 over 16 hr

IV infusion (for Prevention of Contrast-Induced Nephropathy) ^[4]

- Administer over 30 – 60 min

IV infusion (for non-Paracetamol Acute Liver Failure) ^[5]

- 150 mg/kg in D5 over 15 min, followed by
50 mg/kg in D5 over 4 hr, then
6.25 mg/kg/hr in D5 for 67 hr

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	24 hr ^[1-3]	-

Remarks

- There are varying NAC regimes for prevention of contrast induced nephropathy, but the most commonly used regime in a meta-analysis of 10 studies is 600 – 1200 mg BD for 2 days (this is the oral tablet dose). It is important to note that the meta-analysis is inconclusive on the efficacy of NAC in preventing contrast induced nephropathy. ^[4]
- In the study on IV NAC for non-paracetamol acute liver failure, no specific dilution was recommended for IV NAC. ^[5] However, the dilution of IV NAC used for Paracetamol poisoning can be applied for this indication (as recommended by product leaflet).

References

1. Zambon S.p.A: N-Acetylcysteine (Hidonac) Product Leaflet. Revised Date:
2. Mc Graw-Hill's I.V Drug Handbook
3. Lexicomp
4. Sun Z, Fu Q, Cao L, Jin W, Cheng L, Li Z. Intravenous N-Acetylcysteine for Prevention of Contrast-Induced Nephropathy: A Meta-Analysis of Randomized, Controlled Trials. PLoS ONE. 2013;8(1):e55124.
5. Lee WM et al. Intravenous N-acetylcysteine improves transplant-free survival in early stage non-acetaminophen acute liver failure. Gastroenterology 2009 Sep; 137:856.

NALBUPHINE

N

Brand Name & Strength

Intapan Injection 10 mg/ml, Intapan Injection 100 mg/10 ml

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IV bolus

- Administer undiluted over 2 – 3 min ^[2, 3]
- Larger induction doses should be administered over 10 – 15 min ^[1,2,3]

IM ^[1,3]

SC ^[1,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Preparation contains Sodium Metabisulphite, may cause allergy-type reactions ^[1]
- Make sure emergency resuscitation equipment and Naloxone (antidote) are available before starting therapy ^[2]

References

1. Duopharma: Nalbuphine Hydrochloride Inj. (Intapan) Product Leaflet. Revised Date: 18 June 2010.
2. Mc Graw-Hill's I.V. Drug Handbook. (2009)
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

NALOXONE

N

Brand Name & Strength

Mapin 0.4 mg/ml

Reconstitution

Not required

Further Dilution

IV bolus

- Use undiluted or dilute 0.4 mg (1 ampoule) with 9 ml diluent to a total volume of 10 ml (40 mcg/ml) ^[2,3]

IV infusion

- Dilute 2 mg (5 ampoules) in 500 ml of diluent (4 mcg/ml) ^[1,2,3]

Diluent

NS, D5 ^[1,2]

Administration & Infusion rate

IV bolus

- Administer doses of 0.4 mg or less (undiluted) by direct injection over 15 sec ^[2] or 30 sec ^[3]

IV infusion

- As prescribed by doctor, titrated based on patient's response. ^[1,2]

IM, SC ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	24 hr ^[1,2,3]	-

Remarks

- The most rapid onset is achieved by IV administration and is recommended in emergency situations. ^[1]

References

1. Duopharma (M) Sdn Bhd. Naloxone Hydrochloride. Mapin Injection Product Leaflet; Revised date: NA
2. McGraw-Hill's I.V. Drug Handbook. (2009)
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

NEOSTIGMINE

Brand Name & Strength

Setisin Injection 2.5 mg/ml

Reconstitution

Not required

Further Dilution

Not required ^[2]

Diluent

Not required

Administration & Infusion rate

IV bolus

- Administer over 1 min ^[1,3]

IM, SC ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

-

References

1. Duopharma (M) Sdn Bhd. Neostigmine Methylsulphate BP. Setisin Injection Product Leaflet; Revised date: NA
2. McGraw-Hill's I.V. Drug Handbook. 2009
3. WebMD, LLC. Medscape (Version 5.6.1)

NEURO POLYVALENT SNAKE ANTIVENOM



N

Brand Name & Strength

QSMI Thai Red Cross Neuro Polyvalent Snake Antivenom

Reconstitution

Reconstitute with provided solvent or 10 ml WFI ^[1]

Further Dilution

Dilute the reconstituted antivenom with 5 – 10 ml/kg diluent for children or 250 – 500 ml diluent for adult

Diluent

NS, D5 ^[2,3]

Administration & Infusion rate

IV infusion

- Initial dose is 50 ml (5 vials) for kraits or 100 ml (10 vials) for cobra & king cobra
- Administer at 1 – 2 ml/min over 10 – 15 min. If no reaction, complete the infusion at a rate 5 – 10 ml/min within less than 1 hr
- Subsequent dose can be given every 1 – 2 hr according to clinical signs and symptoms.

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	24 hr (preferably to use immediately)	-
After dilution	24 hr (preferably to use immediately)	-

Remarks

- Indicated for local and systemic envenomation from Cobra (*Naja kaouthia* & *Naja sumatrana*), King Cobra (*Ophiophagus hannah*), Malayan Krait (*Bungarus candidus*), Banded Krait (*Bungarus fasciatus*) ^[2,3]
- Dose for children should be similar to adult, the dose depends on the amount of venom instead of the size of patients ^[4]

References

1. QSMI Thai Red Cross Neuro Polyvalent Snake Antivenom Product Leaflet.
2. Snakebite Management Guide For Healthcare Providers In Malaysia. Dr Ahmad Khalidun Ismail. Updated: May 2014 © Copyrights UKM 2014 available from <http://mstoxinology.blogspot.com>
3. Selection of Antivenom In Universiti Kebangsaan Malaysia Medical Centre Updated: May 2014 © Copyrights UKM 2014
4. Pediatric Protocol For Malaysian Hospital 3rd Ed 2015

NIMODIPINE

Brand Name & Strength

Nimotop[®] 10 mg/50 ml

Reconstitution

Not required

Further Dilution

IV infusion

- Should be given via a three-way stopcock with diluent. ^[1]

Diluent

D5, NS, lactated Ringer's solution, lactated Ringer's with Mg, Dextran 40 ^[1], mannitol, human albumin, blood

Administration & Infusion rate

IV infusion (for subarachnoid haemorrhage)

- Administer at 1 mg/hr for 2 hr, then increase to 2 mg/hr (BW \geq 70 kg)
- Administer at 0.5 mg/hr or less (BW < 70 kg)

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	Immediately ^[1]	-

Remarks

- Only polyethylene (PE) infusion tubing may be used. ^[1]
- Avoid use in direct sunlight. ^[1] Protected by opaque wrapping. ^[1]

References

- Bayer Schering Pharma AG. Nimodipine (Nimotop) Product Leaflet. Revised date: 21.4.2011.
- Reference: <http://www.medsafe.govt.nz/profs/Datasheet/n/nimotoptabinf.pdf>



NORADRENALINE

N

Brand Name & Strength

Cardiamed 4 mg/4 ml, Levophed 4 mg/4 ml, Biemefrin 4mg/4ml

Reconstitution

Not required

Further Dilution

IV infusion

- Single strength: Dilute 1 ampoule in 50 ml diluent (0.08 mg/ml) ^[4]
- Double strength: Dilute 2 ampoule in 50 ml diluent (0.16 mg/ml) ^[6]
- Max concentration: 32 mg/50 ml ^[6]

Diluent

D5, D5NS ^[1,2,3,4]

Calculation

Eg. Doctor ordered IV Noradrenaline 0.05 mcg/kg/min. Patient's weight is 70 kg. What is the infusion rate?

- Determine dose (mg/hr) =
$$\frac{\text{Dose (mcg/kg/min)} \times \text{BW (kg)} \times 60 \text{ min/hr}}{1000 \text{ mcg/mg}}$$

$$= \frac{0.05 \times 70 \times 60}{1000} = 0.21 \text{ mg/hr}$$
- Determine concentration (mg/ml) = 0.16 mg/ml (if double strength is used)
- Calculate infusion rate (ml/hr) =
$$\frac{\text{Dose (mg/hr)}}{\text{Concentration (mg/ml)}} = \frac{0.21}{0.16} \approx 1.3 \text{ ml/hr}$$

Administration & Infusion rate

Continuous IV infusion

- Dose: 8 – 12 mcg/min; maintenance dose 2 – 4 mcg/min ^[7]
- Rate of infusion: As per calculation above
- Must always be administered through a dedicated lumen of a central line ^[5]

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	-	-
After dilution	24 hr ^[4]	-

Remarks

- D5 is recommended to be used as the diluent as it provides protection against excessive oxidation where subsequently can cause loss of potency ^[5]
- Administration with NS is not recommended by the manufacturer but stability in NS has been demonstrated. ^[3]

References

1. Duopharma Cardiamed Injection 1 mg/ml Product leaflet. Revision date: August 2010
2. McGraw-Hill IV Drug Handbook. (2009)
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc: March 20, 2017
4. Dilution Guide for High Alert Medication Pharmacy Service Division 2011
5. Selayang Hospital IV Noradrenaline Policy & Protocol Third Issue 2015
6. UKCPA: Minimum Infusion Volumes for Fluid Restricted Critically Ill Patients 4th Edition (v4.4) December 2012
7. Sarawak Handbook of Medical Emergencies, 3rd Edition (2011)

OCTREOTIDE

Brand Name & Strength

Sandostatin® 0.05 mg/ml or 0.1 mg/ml

Reconstitution

Not required

Further Dilution

IV infusion

- Dilute up to 500 mcg in 50 ml of diluent ^[3]

Continuous IV infusion

- Dilute 600 mcg in 250 ml of diluent (rate: 25 mcg/hr); 1250 mcg in 250ml of diluents (rate: 50 mcg/hr)^[3]

Diluent

NS (preferred), D5 ^[1,2,3]

Administration & Infusion rate

SC ^[1]

Slow IV

- Administer over 3 min ^[2,3,4]

IV infusion

- Administer over 15 – 30 min ^[2,3]

Continuous IV infusion

- Administer at 25 – 50 mcg/hr ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	24 hr ^[1,2]	-

Remarks

- In emergencies such as carcinoid crisis, drug may be given by rapid IV bolus.

References

- Novartis. Octreotide (Sandostatin®) Product Leaflet. Revised date: December 2014.
- McGraw Hill's IV Handbook
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.1)
- Truven Health Analytics, Micromedex (Version 1.77)
- GlobalRPh (http://www.globalrph.com/index_dilution.htm)

OMEPRAZOLE

Brand Name & Strength

Omezol Lyo-Injection 40 mg

Reconstitution

Reconstitute with provided solvent ^[1]

Further Dilution

Not required ^[1]

Diluent

Not required

Administration & Infusion rate

Slow IV

- Administer over not less than 2.5 min (no greater than 4 ml/min) ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	4 hr ^[1]
After dilution	-	4 hr ^[1]

Remarks

- No other infusion solution should be used for dilution of this drug ^[1]

References

- Standard Chem & Pharm. Omeprazole (Omezol Lyo Injection) Product Leaflet. Revision Date: NA

ONDANSETRON

Brand Name & Strength

Zofran Injection 8 mg/4 ml, Flexi-amp Ampoules 8 mg/4 ml

Reconstitution

Not required

Further Dilution

IV infusion

- Dose \geq 8 mg: dilute in 50 – 100 ml diluent ^[1]

Diluent

NS, D5 ^[1]

Administration & Infusion rate

IV infusion

- Administer over 15 min after further dilution ^[5]
 - For dose of 8 mg, can be given by constant infusion of 1 mg/hr for up to 24 hr ^[1]
 - For doses \geq 8 mg and up to 32 mg may only be given by IV infusion over 15 min ^[1,2,5]

IM ^[1]

- Undiluted over at least 30 sec, preferably over 2 – 5 min ^[5]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	7 days ^[1]	7 days ^[1]

Remarks

-

References

1. GlaxoSmithKline Australia Pty Ltd. Ondansetron. Zofran Injection, Flexi-amp Ampoules; Revised date: 22 July 2005
2. Mc Graw Hill's IV Drug Handbook. (2009)
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
4. Truven Health Analytics. Micromedex (Version 1.77)
5. WebMD, LLC. Medscape (Version 5.6.1)

OXYTOCIN

Brand Name & Strength

Udoxan Injection 10 IU/ml

Reconstitution

Not required

Further Dilution

IV infusion

- **Induction and Enhancement of Labour**
 - Dilute 10 IU to 1000 ml diluent to yield Oxytocin 0.01 IU/ml (10 mIU/ml) ^[1,2,3,4]
- **Postpartum uterine bleeding**
 - Dilute 10 – 40 IU to running IV infusion ^[2,3,4], max: 40 IU/1000 ml ^[3,4]

Diluent

NS ^[1,2,3,4], or lactated Ringer's solution ^[2,3,4]

Administration & Infusion rate

IV infusion

- **For induction and enhancement of labour**
 - Administer at 1 – 4 mIU/min (0.1 – 0.4 ml/min or 2 – 8 drops/min). Increase rate gradually at intervals of not shorter than 20 min. Max rate: 20 mIU/min (2 ml/min or 40 drops/min) ^[1]
- **For postpartum bleeding**
 - Administer 10 – 40 IU at a rate sufficient to sustain uterine contraction and control uterine atony. ^[2,3,4]

IM ^[1]

- Administer 10 IU after delivery ^[3,4]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- IV bolus for more than 2 I.U can cause acute hypotension ^[1]
- Use of D5 is not recommended. Not compatible with solutions containing bisulphites and metasulphites as preservatives ^[1]
- Do not exceed 30 IU in 12-hr period because of risk of water intoxication ^[2]

References

1. Duopharma Sdn Bhd. Oxytocin 10 IU/ml Injection Product Leaflet. Revised: 20 February 2004
2. Mc Graw Hill's IV Handbook. (2009)
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
4. Truven Health Analytics. Micromedex (Version 1.77)

OXYTOCIN-ERGOMETRINE

Brand Name & Strength

Syntometrine 5 IU/500 micrograms solution for Injection

Reconstitution

Not required ^[1]

Further Dilution

Not required ^[1]

Diluent

Not required

Administration & Infusion rate

IM

- Maximum 3 doses (3 ml) within 24 hr ^[1,2]

Slow IV

- Limited for cases of severe haemorrhage due to uterine atony: 0.5 – 1 ml ^[1,2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Product should not be exposed to sunlight ^[1]

References

1. Alliance. Oxytocin & Ergometrine (Syntometrine) Product Leaflet. Revised date: May 2014
2. Drug Information Handbook 23rd Edition
3. McGraw-Hill's IV Drug Handbook 2009

PALIVIZUMAB

Brand Name & Strength

Synagis® 100 mg

Reconstitution

Reconstitute with 1 ml of WFI ^[1]

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IM only ^[1,2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	6 hours	-
After dilution	-	-

Remarks

- During reconstitution, the vial should be gently swirled for 30 seconds to avoid foaming. Do not shake the vial. ^[1, 2] Allow the vial to stand at room temperature for a minimum of 20 min until the solution clarifies. ^[1]
- Does not contain preservatives, for single use only, discard after use. ^[1]
- Not compatible with other medication or diluent other than WFI. ^[1]

References

1. Boehringer Ingelheim. Palivizumab 50mg (Synagis) product leaflet. Revision date: September 2014.
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

PAMIDRONATE

P

Brand Name & Strength

Pamisol™ 30 mg/10 ml

Reconstitution

Reconstitute with 10 ml of WFI [2]

Further Dilution

Dilute reconstituted solution with 250 – 1000 ml of diluent [1,2]

Condition	Bone metastases with multiple myeloma	Bone metastases with metastatic breast cancer	Paget's disease	Tumour-induced hypercalcemia
Diluent	Dilute 90 mg with 500 ml diluent	Dilute 90 mg with 250 ml diluent	500 ml NS or D5	Dilute 90 mg with 500 ml diluent

Diluent

HS, NS, D5 [1,2]

Administration & Infusion rate

Condition	Bone metastases with multiple myeloma	Bone metastases with metastatic breast cancer	Paget's disease	Tumour-induced hypercalcemia
Infusion time	Over 4 hr	Over 2 hr	Over 4 hr	Over 4 hr [1]
Max rate	60 mg/hr (1 mg/min)		15 – 30 mg/2 hr	60 mg/hr

Storage & Stability

	(<25 °C)	Fridge (2 – 8 °C)
After reconstitution	24 hr [1,2]	24 hr [1,2]
After dilution	24 hr [1,2]	24 hr [1,2]

Remarks

- Do not give as bolus injection. [1]
- Incompatible with calcium-containing infusion solutions (i.e. Ringer's injection) [2]
- Give other drugs and fluids via separate IV lines. [2]

References

1. Hospira. Pamidronate [PAMISOL] Product Leaflet. Revision Date: October 2014
2. McGraw-Hill. IV Drug Handbook. 2009



PANCURONIUM

P

Brand Name & Strength

Pancuronium Bromide-Fresenius 4 mg/2 ml

Reconstitution

Not required

Further Dilution

Not required

Diluent

NS, D5, lactated Ringer's solution ^[2]

Administration & Infusion rate

IV ^[1,3]

- ICU: 0.05 – 0.1 mg/kg bolus followed by 0.8 – 1.7 mcg/kg/min once initial recovery from bolus observed or 0.1 – 0.2 mg/kg every 1 – 3 hr ^[1,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	48 hr ^[2]	-

Remarks

- Use ideal body weight for obese patients. ^[3]
- Contains benzyl alcohol, avoid use in children under two years of age. ^[1]

References

1. Fresenius. Pancuronium Bromide Product Leaflet. Revised date: June 2013.
2. Truven Health Analytics. Micromedex (Version 1.77)
3. Lexi-Comp Drug Information Handbook, 11th Edition

PANTOPRAZOLE

Brand Name & Strength

Pantosec 40 mg, Vaxcel Pantoprazole 40 mg Injection

Reconstitution

Reconstitute with provided solvent ^[1] or 10 ml NS ^[5]

Further Dilution

IV infusion

- Dilute 40 – 80 mg in 100 ml diluent ^[3,4]

Continuous IV infusion

- Dilute 80 mg in 100 ml diluent ^[3,4]

Diluent

NS, D5 ^[1]

Administration & Infusion rate

Slow IV

- Administer over at least 2 min ^[2,3]

IV infusion

- Administer over 15 min (not to exceed 7 ml/min) ^[2,3]

Continuous IV infusion

- Administer at a rate of 10 ml/hr (dose: 8 mg/hr) ^[4]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	12 hr ^[1]	-
After dilution	12 hr ^[1]	-

Remarks

- Reconstituted solution does not need to be protected from light ^[2,4]

References

- Cipla Malaysia Sdn Bhd. Pantoprazole (Pantosec) Product leaflet. Revised date: December 2013
- McGraw Hill's IV Handbook. (2009)
- Truven Health Analytics, Micromedex (Version 1.77)
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.1)
- Kotra Pharma Sdn Bhd. Vaxcel Pantoprazole 40 mg Injection Product leaflet

PAPAVERINE HYDROCHLORIDE

Brand Name & Strength

Paveron N 25 mg/ml

Reconstitution

Not required

Further Dilution

Diluted with diluent to achieve a final solution of 1 mg/ml ^[1]

Diluent

NS ^[1]

Administration & Infusion rate

Slow IV ^[1,2,3] or IM ^[2,3]

- Administer over 1 – 2 min ^[1,2,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Avoid rapid administration; may result in arrhythmias and fatal apnea ^[3]

References

1. Linden Arzneimittel (PAVERON® N) product leaflet. Revised date: September 2013
2. WebMD, LLC. Medscape (Version 5.6.1)
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

PARACETAMOL

P

Brand Name & Strength

Ifimol*IV 10 mg/ml, Paracetamol-AFT 10 mg/ml

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IV infusion

- Administer over 15 min ^[1,2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

-

References

1. Unique Pharmaceutical Laboratories. Paracetamol BP (Ifimol*IV) Product Leaflet. Revised date: May 2013
2. AFT Pharmaceuticals (SE Asia) Sdn. Bhd. Paracetamol BP (Paracetamol-AFT) Product Leaflet. Revised date: January 2015

PARECOXIB SODIUM

Brand Name & Strength

Dynastat® 40 mg

Reconstitution

Reconstitute 40 mg vial with 2 ml of provided solvent (Concentration: 20 mg/ml) ^[1]

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IV bolus

- May be given directly into a vein or into an existing IV line

IM

- Should be given slowly and deeply into the muscle

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	24 hr ^[1]	-
After dilution	-	-

Remarks

- From a microbiological point of view, the prepared product should be used immediately. If not used immediately, in-use storage times would not normally be longer than 12 hours at 25 °C.
- Do not inject Parecoxib into an IV line delivering any other drug. The IV line must be adequately flushed prior to, and after Parecoxib injection with a solution of known compatibility.

References

1. Pfizer Manufacturing Belgium NV. Parecoxib Sodium (Dynastat®) Product Leaflet.

PARENTROVITE

Brand Name & Strength

CCM-Trovite IV Injection

Reconstitution

Not required

Further Dilution

Slow IV

- No dilution required
- Mix 5 ml of Ampoule No. 1 and 5 ml of Ampoule No. 2 in a syringe (Total: 10 ml) ^[1]

IV infusion

- Dilute 1 pair (Ampoule No. 1 and Ampoule No. 2) with 50 – 100 ml of diluent ^[1]

Diluent

NS, D5 ^[1]

Administration & Infusion rate

Slow IV

- Administer over 10 min ^[1]

IV infusion

- Administer over 30 min (preferred) ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	4 hr ^[1]	-

Remarks

- For injection into vein only and should not be given by any other route ^[1]

References

1. Duopharma. Parentrovite (CCM-Trovite) Product Leaflet. Revised 14 January 2015.

PENTAMIDINE ISETHIONATE

Brand Name & Strength

DBL Pentamidine Isethionate 300 mg

Reconstitution

Reconstitute 300 mg vial in 3 – 5 ml WFI ^[1]

Further Dilution

Dilute the required dose in 50 – 250 ml diluent ^[1,2,3]

Diluent

D5, NS ^[1,2]

Administration & Infusion rate

IV infusion

- Administer over at least 60 – 120 min ^[1,2,3]

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	48 hr ^[1,3]	48 hr ^[1]
After dilution	Solution diluted to 1 – 2.5 mg/ml in diluent: 24 hr ^[1,4]	-

Remarks

- Injection should be given as a slow IV infusion with patient in a supine position in order to reduce the incidence of sudden severe hypotension ^[1,2]
- Direct IV bolus or rapid administration must not be used ^[1]

References

- Hospira Australia Pty Ltd (DBL Pentamidine Isethionate) product leaflet. Revised date: 1st December 2012
- McGraw Hill's IV Drug Handbook. (2009)
- WebMD, LLC. Medscape (Version 5.6.1)
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)



PETHIDINE

P

Brand Name & Strength

Pethidine Injection 50 mg/ml & 100 mg/2 ml

Reconstitution

Not required

Further Dilution

Slow IV

- Use undiluted, or preferably dilute with 5 ml diluent ^[2]

IV infusion

- Dilute each 10 mg in 1 ml diluent (concentration: 10 mg/ml) ^[2,3]

Diluent

NS, D5, D10, lactated Ringer's solution ^[2]

Administration & Infusion rate

Slow IV ^[4]

IV infusion

- Administer at 15 – 35 mg/hr (as required) ^[4]

IM, SC ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Ensure patient is lying down during IV administration ^[1,2,3,4]
- Rapid I.V. injection increases risk of serious adverse reactions (such as severe respiratory depression, apnea, hypotension, peripheral circulatory, collapse, and cardiac arrest). ^[2]

References

1. Duopharma. Pethidine (Pethidine Injection) Product Leaflet. Revised 17 July 2006.
2. McGraw Hill's IV Drug Handbook. (2009)
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
4. Truven Health Analytics. Micromedex (Version 1.77).

PHENOBARBITONE

Brand Name & Strength

Phenobarbital Sodium Injection 200 mg/ml

Reconstitution

Not required

Further Dilution

IV bolus

- May be given undiluted, or diluted with 10 times its own volume (10 ml) with diluent. ^[1,2]

Diluent

WFI ^[1,2]

Administration & Infusion rate

IV bolus

- Administer at a rate NOT more than 60 mg/min in adults ^[2,3] and 30 mg/min in children ^[3]

IM (deep) ^[1,2,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Avoid SC administration because severe reactions (tissue necrosis and pain) may occur. ^[2,3]
- For IM injection, do not exceed 5 ml per injection site due to potential for tissue irritation. ^[2,3]
- Rapid IV administration can cause respiratory depression. ^[2,3]

References

1. Martindale Pharmaceuticals: Phenobarbital Sodium Inj. 20 mg in 1 ml Product Leaflet. Revised Date: October 2011.
2. Mc Graw-Hill's I.V. Drug Handbook. (2009)
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)



PHENYLEPHRINE



Brand Name & Strength

Frenin 10 mg/ml

Reconstitution

Not required

Further Dilution

Slow IV

- Dilute 10 mg (1 ml) with 9 ml WFI [1,2]

IV infusion

- Dilute 10 mg (1 ml) in 500 ml diluent [1,2,4]

Diluent

D5, NS, D5W, WFI [2,3,4]

Administration & Infusion rate

SC, IM [1]

Slow IV

- Administer over 20 – 30 sec [3,4]

IV infusion

- Administer up to 180 mcg/min, reduced according to response to 30 – 60 mcg/min [1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	4 hr [4]	24 hr [4]

Remarks

- Administration of phenylephrine in late pregnancy or labour may cause foetal hypoxia and bradycardia [1]

References

- Samarth Life Sciences Pvt Ltd. Phenylephrine Hydrochloride. Frenin Product Leaflet; Revised date: NA
- McGraw-Hill's I.V. Drug Handbook. (2009)
- Drug Information Handbook, 11th Edition
- Truven Health Analytics. Micromedex (Version 1.77)

PHENYTOIN

P

Brand Name & Strength

Dilantin 250 mg/5 ml

Reconstitution

Not required

Further Dilution

IV infusion

- Dilute dosage required in 50 – 100 ml diluent (maximum concentration: 10 mg/ml) ^[1]

Diluent

NS ^[1]

Administration & Infusion rate

IV infusion

- Administer over 1 hr ^[1]
- Do not exceed dose of 50 mg/min in adults and not to exceed 1 – 3 mg/kg/min in neonates and children ^[1]

Slow IV

- Administer slowly, not exceeding 50 mg/min in adults ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	Stable as long as free of haziness and precipitate ^[1]	-

Remarks

- Avoid IM administration due to severe risk of local tissue destruction and necrosis; use Fosphenytoin if IM administration necessary ^[3]
- The manufacturer's labelling includes IM administration; however, in general the IM route should be avoided and should not be used for status epilepticus ^[3]

References

1. Pfizer. Dilantin (Phenytoin Sodium Injection USP) Product Leaflet; Revised date: NA
2. McGraw-Hill's I.V. Drug Handbook (2009)
3. Drug Information Handbook, 11th Edition

PHYTOMENADIONE (VITAMIN K1) 10mg



P

Brand Name & Strength

Kisan 10 mg, Konakion 10 mg

Reconstitution

Not required

Further Dilution

IV infusion

- Dilute 0 – 20 mg in 50 ml diluent ^[4]
- Dilute 21 – 50 mg in 100 ml diluent ^[4]

Diluent

NS, D5, D5NS ^[3,4]

Administration & Infusion rate

Oral ^[1,2]

IM

- Administer undiluted ^[2,3]

Slow IV

- Administer not exceeding 1 mg/min ^[1,2,3]

IV infusion

- Administer 0 – 20 mg over 30 min ^[4]
- Administer 21 – 50 mg over 60 min ^[4]

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	Use immediately	-
After dilution	Use immediately	-

Remarks

- IV injection must be reserved for potentially fatal haemorrhage and situations where other routes not feasible ^[1]
- Should be avoided in children under two years of age ^[1]
- Not to be used in neonates ^[1]

References

1. Product Leaflet (Kisan: Duopharma (M) Sdn. Bhd.)
2. Product Leaflet (Konakion® MM Roche Revised date April 2008)
3. McGraw-Hill's IV Handbook 2009
4. Global RPh (http://www.globalrph.com/index_dilution.htm)

PHYTOMENADIONE (VITAMIN K1) 1mg

Brand Name & Strength

Kisan 1 mg/ml (benzyl alcohol free)

Reconstitution

Not required

Further Dilution

Not required

Diluent

NS, D5, NSD5 (when dilution is indicated) ^[2]

Administration & Infusion rate

Oral

IM , SC ^[1,2]

- Administer undiluted

Slow IV

- Administer not exceeding 1 mg/min ^[2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	Use immediately	-
After dilution	-	-

Remarks

- Severe reactions, including fatalities, have occurred during and immediately after intravenous injection of Phytomenadione, even when precautions have been taken to dilute the Phytomenadione and to avoid rapid infusion.
- Severe reactions, including fatalities, have also been reported following intramuscular administration.
- Therefore the intravenous and intramuscular routes should be restricted to those situations where the subcutaneous route is not feasible and the serious risk involved is considered justified.

References

1. Duopharma (M) Sdn. Bhd. Kisan Product Leaflet
2. McGraw-Hill's IV Drug Handbook. (2009)
3. Intravenous Dilution Database. GlobalRPh. Available at: http://www.globalrph.com/index_dilution.htm

PIPERACILLIN-TAZOBACTAM

Brand Name & Strength

Tapicin Powder for Injection 4.5 g

Reconstitution

Reconstitute each vial with 20 ml of WFI, NS or D5 ^[1,2,3]

Further Dilution

IV infusion

- Dilute with 50 – 150 ml diluent ^[1,2,3]

Diluent

NS, D5, WFI ^[1,2,3]

Administration & Infusion rate

IV bolus

- Administer over 3 – 5 min ^[1]

IV infusion

- Administer over 30 min ^[1,2,3]
- Administer over 3 – 4 hr (extended infusion) ^[3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	24 hr ^[1,2,3]	7 days ^[1,3]
After dilution	-	-

Remarks

- Extended infusion has been shown to improve the time the free drug remains above MIC that predicts the killing characteristic of the antibiotic ^[4]

References

- Yung Shin Pharmaceutical IND Co. LTD: Tapicin Powder for Injection Product leaflet. Revised Date: NA
- McGraw-Hill's IV Drug Handbook. (2009)
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
- Malaysian Society of Intensive Care: Guide to Antimicrobial Therapy in the Adult ICU 2012

PIRACETAM

Brand Name & Strength

YSP Knowful 1 g/5 ml Injection, Nootropil® 1 g/5 ml Injection

Reconstitution

Not required

Further Dilution

IV infusion

- Dilute with diluent for IV infusion ^[1]

Diluent

NS, D5 ^[1]

Administration & Infusion rate

Slow IV

- Administer over several min ^[3]

IV infusion ^[1,2]

- Administer continuously at the recommended daily dose over a 24 hr period ^[3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Contents of any remaining ampoules can be given by mouth should parenteral treatment be discontinued ^[1,2]

References

1. YSP. Piracetam (Knowful) Product Leaflet. Revised date: 25 Aug 2015
2. GSK. Piracetam (Nootropil®) Product Leaflet. Revised Date: Feb 2011
3. UCB. Core Safety Profile.
http://www.bfarm.de/SharedDocs/Downloads/EN/Drugs/vigilance/PSURs/csp/m-p/piracetam.pdf?__blob=publicationFile&v=4 on 18 January 2016

PLERIXAFOR

Brand Name & Strength

Mozobil® 24 mg/1.2 ml

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

SC only ^[1,2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

-

References

1. Genzyme Corporation. Plerixafor (Mozobil) Product Leaflet. Revised date: Feb 2012
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.1)

P

PNEUMOCOCCAL POLYSACCHARIDE VACCINE

Brand Name & Strength

Pneumovax® 23

Reconstitution

Not required ^[1,2]

Further Dilution

Not required ^[1,2]

Diluent

Not required

Administration & Infusion rate

SC, IM

- Administer as a single dose at deltoid muscle or lateral mid-thigh ^[1,2,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Do not give IV or intrademally ^[1,2,3]

References

- MSD. Pneumococcal Polysaccharides Vaccine (Pneumovax® 23) Product Leaflet. Revised date: March 2013.
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
- Truven Health Analytics. Micromedex (Version 1.77)

POLYMYXIN B

Brand Name & Strength

POLY-B™ 500 000 IU

Reconstitution

Not required

Further Dilution

IV infusion

- Dilute in 300 – 500 ml D5 ^[1]

IM

- Dilute in 2 ml WFI, NS, or 1% Procaine HCL ^[1]

IT

- Dilute in 10 ml NS ^[1]

Diluent

As above

Administration & Infusion rate

IV infusion

- Administer over 60 – 90 min ^[3]

IM

IT

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	72 hr
After dilution	-	72 hr

Remarks

- Ensure adequate fluid intake before and during therapy ^[2]

References

- Samarth. Polymyxin B [Poly B] Product Leaflet.
- McGraw-Hill's IV Drug Handbook. (2009)
- McEvoy GK, ed. AHFS drug information 2011. Bethesda, MD: American Society of Health-System Pharmacists; 2011



POTASSIUM CHLORIDE

P

Brand Name & Strength

Injecsol K10 Potassium Chloride 10% w/v Injection BP
(Each 10 ml contains 13.4 mmol Potassium Ion & 13.4 mmol Chloride Ion)

Reconstitution

Not required

Further Dilution

Dilute 1 vial (10 ml) with not less than 500 ml of diluent (max concentration: 40 mmol/l) ^[1,2]

Diluent

NS ^[1]

Administration & Infusion rate

IV infusion

- Max rate: 10 mmol/hr ^[1], 10 – 20 mEq/hr ^[2, 3]. Total dose not to exceed 200 mmol/24hr (2 – 3 mmol/kg/24hr). ^[1]
- In urgent treatment (serum K⁺ < 2 mmol/L with ECG changes or paralysis): max rate 40 mmol/hr, up to 400 mmol/24 hr (with cardiac monitoring). ^[1,3]

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Potassium Chloride must not be injected undiluted ^[1,2,3]
- Too rapid infusion rate may cause hyperkalaemia, local pain and rarely, vein irritation. Adjust infusion rate per tolerance ^[1,2,3]
- Maximum infusion rate without cardiac monitoring is 20 mEq/hr ^[3]
- Concentration and rate of infusion may be greater with central line administration (peripheral infusion: 10 mEq/100 ml; central infusion: 20 – 40 mEq/100 ml) ^[2]

References

1. Ain Medicare Sdn Bhd. Potassium Chloride 10% w/v Injection BP (Injecsol K10) Product Leaflet. Revised date: 30.06.2011
2. Drug Information Handbook 23rd Edition
3. McGraw-Hill's IV Drug Handbook 2009

POTASSIUM DIHYDROGEN PHOSPHATE



P

Brand Name & Strength

DBL Potassium Dihydrogen Phosphate Concentrated Injection 1.361 g/10 ml
(Each 10 ml contains 10 mmol potassium ions, 10 mmol phosphate ions & 20 mmol hydrogen ions)

Reconstitution

Not required ^[1]

Further Dilution

Dilute up to 10 mmol phosphate in 100 ml ^[4] or 250 ml ^[1,3] diluent

*Dose, concentration of infusion and rate of administration may be dependent on patient condition and specific institution policy.

Diluent

NS, D5 ^[1]

Administration & Infusion rate

IV infusion ^[1]

- Administer over 12 hr (adults); over 6 hr (children) not to exceed 0.2 mmol/kg/hr ^[1]
- Administer over 4 – 6 hr ^[2,4]

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	-	-
After dilution	Use immediately	Use immediately

Remarks

- Must be diluted before use ^[1,2]
- For peripheral line, should not exceed 10 mmol/250 ml ^[2]
- Phosphates are incompatible with calcium, magnesium containing solutions ^[1]
- Use of phosphate in severe renal impairment is contraindicated ^[1]

References

1. Hospira Australia Ltd. Potassium Dihydrogen Phosphate Injection Product Leaflet. Revised 1 October 2014
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
3. Dilution Guide for High Alert Medications 2011.
4. Critical Care Pharmacy Handbook 2013.

PRALIDOXIME

Brand Name & Strength

Pampara Injection 500 mg/20 ml

Reconstitution

Not required

Further Dilution

IV infusion

- Dilute 1 – 2 g in 100 ml NS ^[1,2]

Diluent

NS ^[1]

Administration & Infusion rate

IV infusion

- Administer over 15 – 30 min (max rate: 200 mg/min) ^[2]

Slow IV

- Administer over ≥ 5 min (max concentration: 50 mg/ml) for fluid restriction only ^[3]

SC, IM ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

-

References

- Siu Guan Chem. Ind. Co. Ltd. Pralidoxime (Pampara) Product leaflet. Revised date: April 2006
- Truven Health Analytics. Micromedex (Version 1.77)
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

PROCAINE BENZYL PENICILLIN

Brand Name & Strength

Fortified Procaine Benzyl Penicillin For Injection 4.0 Mega Units

Reconstitution

Reconstitute with suitable amount of WFI [3]

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IM

- For deep IM injection only [1,2]

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Avoid intravenous, intravascular, or intra-arterial administration of Procaine Benzylpenicillin since severe and/or permanent neurovascular damage may occur [2]

References

1. Karnataka Antibiotics & Pharmaceuticals Limited. Procaine Benzylpenicillin (Fortified Procaine Benzyl Penicillin for Injection 4.0 Mega Units) Product Leaflet. Revised 30 June 2008.
2. Lexi-Comp Online Database (Accessed 16 January 2017)
3. Assessed from <http://www.mercatorpharma.com/index.php/fortified-procaine-penicillin-powder-for-injection.html> on 21/03/2017

PROCHLORPERAZINE MESYLATE

Brand Name & Strength

Lartil Injection 12.5 mg/ml

Reconstitution

Not required

Further Dilution

IV infusion

- Dilute 20 mg in no less than 1 L of diluent ^[4]
- Dilute in 50 – 100 ml diluent ^[3]

Diluent

NS, D5 ^[1,2,3,4]

Administration & Infusion rate

IM

- Administer by deep IM into outer quadrant of buttocks ^[3]

Slow IV

- Administer at a rate no faster than 5 mg/min (usual rate: 2.5 mg/min) ^[1,4]

IV infusion

- Administer at 1 mg/min ^[4]

Storage & Stability

	RT (<30 °C)	Fridge (2-8 °C)
After reconstitution	-	-
After dilution	Use immediately ^[1]	-

Remarks

- Do not administer as IV bolus injection ^[3,4]
- Subcutaneous administration is not advisable because of local irritation ^[4]

References

1. Duopharma (M) Sdn Bhd. Prochlorperazine (Lartil) Product Leaflet. Revised date : 27.01.2012
2. Mc Graw Hill's IV Drug Handbook. (2009)
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
4. Intravenous Dilution Database. GlobalRPh. Available at: http://www.globalrph.com/index_dilution.htm

PROCYCLIDINE HCl

Brand Name & Strength

Kemadrin™ 5 mg/ml (10 mg/2 ml)

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IV bolus

IM

- May be repeated after 20 min if necessary

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	Use immediately	-

Remarks

-

References

1. Auden Mckenzie. Procyclidine (Kemadrin™) Product Leaflet. Revised date : 13/05/2011

PROMETHAZINE

Brand Name & Strength

Promethazine HCl-Fresenius 50 mg/2 ml Injection

Reconstitution

Not required

Further Dilution

Slow IV & IV infusion

- Not required or dilute 50 mg (2 ml) in 18 ml NS (Concentration: 2.5 mg/ml) ^[2]

Diluent

WFI, D5, D10, NS ^[1,3]

Administration & Infusion rate

IM

Slow IV

IV infusion

- Final concentration should not be more than 25 mg/ml (usual concentration: 2.5mg/ml) ^[1]
- Administer over 10 – 15 min (max rate: 25 mg/min) ^[1,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	Use immediately	-

Remarks

- Not for subcutaneous use (Promethazine is a chemical irritant) ^[3]
- Drug may form precipitate with Heparin, flush heparinised infusion set with sterile WFI or NS solution before and after administration ^[2]
- IV administration is not the preferred route; severe tissue damage may occur. Ensure proper needle or catheter placement prior to and during administration. ^[3]

References

1. Fresenius Kabi. Promethazine 50 mg/2 ml (Promethazine HCl-Fresenius 50 mg/2 ml Injection) Product Leaflet. Revised June 2013.
2. McGraw-Hill's IV Drug Handbook. (2009)
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
4. Intravenous Dilution Database. GlobalRPh. Available at: http://www.globalrph.com/index_dilution.htm



PROPOFOL

P

Brand Name & Strength

Fresofol (10 mg/ml) 1% MCT/LCT Emulsion for Injection or Infusion

Reconstitution

Not required

Further Dilution

No further dilution required or may be diluted (maximum dilution must not exceed 1 part with 4 parts of diluent, minimum concentration: 2 mg/ml) ^[1]

Diluent

NS, D5

Administration & Infusion rate

IV infusion

- Glass infusion bottles must be used for diluted propofol
- Infusion of undiluted propofol should not exceed 12 hr

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	-	-
After dilution	6 hr ^[1]	-

Remarks

- For single use, any unused emulsion must be discarded ^[1]
- If two layers can be seen after shaking, the emulsion should not be used ^[1]

References

1. Fresenius Kabi. Propofol 10 mg/ml (Fresofol 1 % MCT/LCT Emulsion for Injection or Infusion) Product Leaflet. Revised September 2006
2. McGraw-Hill's IV Drug Handbook. (2009)
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

PROPRANOLOL HCl

Brand Name & Strength

Properol Injection BP 1 mg/ml

Reconstitution

Not required

Further Dilution

IV infusion

- Dilute 1 – 3 mg in 50 ml diluent ^[4]

Diluent

NS, D5, lactated Ringer's solution ^[2]

Administration & Infusion rate

IV bolus

- Administer at a rate of 1 mg/min ^[3]

IV infusion

- Administer over 30 minutes ^[3]
- Do not exceed administration rate of 1 mg/minute ^[1,2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	Use immediately ^[1]	-

Remarks

- Do not administer as continuous IV infusion ^[2]

References

- Samarth Life Sciences Pvt Ltd. Propranolol (Properol Injection BP 1mg/ml) Product Leaflet. Revised Sept 2012.
- McGraw Hill's IV Drug Handbook. (2009)
- Lexi-Comp Online Database (Accessed 16 January 2017)
- Intravenous Dilution Database. GlobalRPh. Available at: http://www.globalrph.com/index_dilution.htm (Accessed 19 January 2017)

PROTAMINE

Brand Name & Strength

Protamine Sulphate 10 mg/ml Solution for Injection

Reconstitution

Not required ^[1]

Further Dilution

Not required ^[2]

Diluent

Not required

Administration & Infusion rate

IV bolus

- Maximum of 50 mg administered over 10 min ^[1,2,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Use immediately after opening ^[1]
- Too rapid administration may cause hypotension ^[2,3]
- 1 mg of Protamine neutralises about 100 unit of Heparin given subcutaneously ^[1-3]
- Dose of Protamine for reversal Heparin given intravenously: ^[1,3]

Time elapsed since last dose of IV heparin	Dose of Protamine to neutralise 100 units of Heparin (mg)
Immediate	1
30 – 60 minutes	0.5 – 0.75
> 2 hours	0.25 – 0.375

References

1. Wockhardt: Protamine Sulphate 10 mg/ml Solution for Injection Product Leaflet. Revised Date: 25 October 2013.
2. McGraw Hill's IV Drug Handbook. (2009)
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

QUININE DIHYDROCHLORIDE

Brand Name & Strength

Malakin Injection 600 mg/2 ml

Reconstitution

Not required

Further Dilution

Dilute dosage required in 250 – 500 ml of diluent ^[1]

Diluent

D5, NS ^[2]

Administration & Infusion rate

IV infusion

- Administer over 4 hr ^[1,2]

Storage & Stability

	RT (<25 °C / <30 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- For IV use in children, dilute to a concentration of 2 mg/ml (max 30 mg/ml in fluid restriction) ^[2]

References

1. Duopharma (M) SDN BHD. Quinine Dihydrochloride. Malakin Injection Product Leaflet; Revised date: NA
2. British National Formulary 70th Edition

Q

RABIES VACCINE

Brand Name & Strength

Verorab 0.5 ml

Reconstitution

Reconstitute with provided solvent (in a prefilled syringe) ^[1]

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IM only ^[1]

- Administer into deltoid area in adults or anterolateral aspects of the thigh in infants ^[1,2,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	Use immediately ^[1]	-
After dilution	-	-

Remarks

- Do not inject in the buttocks ^[1]
- Do not inject via IV route, ensure that the needle does not penetrate a blood vessel before vaccine injection ^[1]
- Do not administer by subcutaneous route ^[2]

References

- Sanofi Pasteur. Rabies Vaccine For Human Use, Prepared on Cell Cultures (Inactivated). Verorab Product Leaflet; Revised date: 25 August 2015.
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
- British National Formulary 70th Edition

RANITIDINE

R

Brand Name & Strength

Arnetin 50 mg/2 ml

Reconstitution

Not required

Further Dilution

Slow IV

- Dilute with 20 ml diluent ^[1] (max concentration: 2.5 mg/ml) ^[2,4]

IV infusion

- Dilute with 100 ml diluent ^[3] (max concentration: 0.5 mg/ml) ^[2]

Continuous IV infusion

- For other than Zollinger-Ellison syndrome: Dilute 150 mg in 250 ml diluent ^[2,3]
- For Zollinger-Ellison syndrome: Add to diluent to produce concentration not exceeding 2.5 mg/ml ^[2]

Diluent

NS, D5 ^[1,2]

Administration & Infusion rate

IM

- Administer undiluted ^[3,4]

Slow IV

- Administer over 2 min ^[1] but inject no faster than 4 ml/min ^[2]

IV infusion

- Administer over 2 hr at a rate of 25 mg/hr ⁽¹⁾ or over 15 – 20 min ^[4]

Continuous IV infusion

- For other than Zollinger-Ellison syndrome: Administer at 6.25 mg/hr for 24 hr ^[3]
- For Zollinger-Ellison syndrome: Start infusion at 1 mg/kg/hr ^[2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	24 hr ^[1]	-

Remarks

-

References

- Medochemie Ltd Ranitidine (Arnetin[®]) product leaflet. Revised date: 02/1998
- McGraw Hill's IV Drug Handbook. (2009)
- WebMD, LLC. Medscape (Version 5.6.1)
- Lexi-Comp, Inc. (Lexi-Drugs[®]). Lexi-Comp, Inc (Version 3.0.2)

REMIFENTANIL HYDROCHLORIDE



R

Brand Name & Strength

Ultiva™ 5 mg

Reconstitution

Reconstitute with 1 ml of diluent per 1 mg of Remifentanil (concentration: 1 mg/ml) ^[2,3,4]

Further Dilution

Continuous IV infusion

- Dilute to final concentration of 20, 25, 50, or 250 mcg/ml ^[4]
(50 mcg/ml is recommended for adults and 20 – 25 mcg/ml for paediatric patients aged ≥ 1 year) ^[1]

Diluent

NS, D5 ^[1]

Administration & Infusion rate

IV bolus

- Administer over 30 – 60 sec ^[1,3,4]

Continuous IV infusion

- 0.05 – 0.1 mcg/kg/min before anaesthetic is given; after anaesthetic is given, titrate rate to 0.025 to 0.05 mcg/kg/min; then adjust rate by 0.025 mcg/kg/min every 5 min when needed ^[2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	24 hr ^[1,4]	-
After dilution	4 hr (if dilute with lactated Ringer's with concentration 20-250 mcg/ml) ^[4]	-

Remarks

- Delivery rate exceeding 0.2 mcg/kg/min may cause respiratory depression ^[2]

References

- GlaxoSmithKline Remifentanil (ULTIVA®) product leaflet. Revised date: 25/09/2014
- McGraw Hill's IV Drug Handbook. (2009)
- WebMD, LLC. Medscape (Version 5.6.1)
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

RIFAMPICIN

R

Brand Name & Strength

Rifadin 600 mg Infusion

Reconstitution

Reconstitute with 10 ml of provided solvent ^[1]

Further Dilution

Dilute with 100 ml or 500 ml diluent ^[1,2]

Diluent

NS, D5 ^[1,3]

Administration & Infusion rate

IV infusion ^[1,2]

- 100 ml solution: Administer over 30 min ^[1,2]
- 500 ml solution: Administer over 3 hr ^[1,2]

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	24 hr ^[1,2,3]	-
After dilution	4 hr (in D5), 24 hr (in NS) ^[1,2,3]	-

Remarks

- Do not administer by IM or SC. ^[1,2,3]
- Avoid extravasation, as local irritation and inflammation may occur. In extravasation, discontinue infusion and restart at another site. ^[1,2,3]
- Avoid temperature above 40 °C. Protect from light.

References

1. Sanofi: Rifadin 600 mg Infusion Product Leaflet. Revised Date: Oct 2016
2. McGraw-Hill's I.V. Drug Handbook. (2009)
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

RISPERIDONE

Brand Name & Strength

Risperidal Consta 25 mg, 37.5 mg & 50 mg Injection

Reconstitution

Reconstitute with provided solvent (pre-filled syringe) ^[1]

Further Dilution

Not required ^[1]

Diluent

Not required

Administration & Infusion rate

Deep IM ^[1,2]

- Deltoid: Alternate injections between two arms using the 1-inch needle provided
- Gluteal: Alternate injections between two buttocks using the 2-inch needle provided

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	24 hr ^[1]	-
After dilution	-	-

Remarks

- Please refer to product leaflet on detailed instructions on how to administer Risperidal Consta ^[1]
- From a microbiological standpoint, Risperidal Consta should be used immediately. If not used immediately, in-use storage times would normally not be longer than 6 hours, unless reconstitution has taken place in controlled and validated aseptic conditions ^[1]
- The entire Risperidal Consta dose pack should be stored in refrigerator at 2 – 8 °C. If refrigeration is unavailable, it can be stored at temperatures not exceeding 25 °C for no more than 7 days prior to administration. ^[1]

References

1. JANSSEN-CILAG Pharmaceuticals Ltd: Risperidone Injection 25 mg, 37.5 mg, 50 mg. Revised date: 03 March 2010
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

RITUXIMAB

R

Brand Name & Strength

Mabthera® 500 mg/50 ml

Reconstitution

Not required

Further Dilution

Dilute in 125 – 500 ml diluent to give a concentration of 1 – 4 mg/ml ^[1,2]

Diluent

NS, D5 ^[1,2,3]

Administration & Infusion rate

IV infusion

- 1st infusion: administer at a rate of 50 mg/hr, can be escalated in 50 mg/hr increments every 30 min (max: 400 mg/hr) ^[1,2]
- Subsequent infusions: administer at a rate of 100 mg/hr, can be escalated in 100 mg/hr increments every 30 min (max: 400 mg/hr) ^[1,2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	12 hr ^[1]	24 hr ^[1]

Remarks

- Administer premedication (consisting of an analgesic/antipyretic (e.g: Paracetamol) and antihistamine drug (e.g: Diphenhydramine), 30 minutes prior to each Rituximab infusion ^[1,2]
- Premedication with glucocorticoids should be also considered particularly if Rituximab is not given in combination with steroid containing chemotherapy ^[1]
- Do not administer as IV push or bolus ^[1]
- Gently invert the bag to mix the solution. Do not shake. ^[3]

References

1. Roche. Rituximab (Mabthera®) Product Leaflet.
2. McGraw-Hill's IV Drug Handbook. (2009)
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

ROCURONIUM



R

Brand Name & Strength

Esmeron 50 mg/5 ml

Reconstitution

Not required ^[1]

Further Dilution

Continuous IV infusion

- Dilute with diluent to a concentration of 0.5 – 2 mg/ml ^[1]
- Maximum concentration: 5 mg/ml ^[2]

Diluent

NS, D5, NSD5, lactated Ringer's solution ^[1,2]

Administration & Infusion rate

IV bolus ^[1,2]

Continuous IV infusion ^[1,2]

- Rate of infusion is as directed by physician (as requirements vary from patient to patient and with the anaesthetic method used).

Storage & Stability

	RT (<30 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	24 hr ^[1]	24 hr ^[1]

Remarks

- After dilution, chemical and physical in-use stability has been demonstrated for 72 hr at 30 °C. But, from a microbiological point of view, the diluted product should be used immediately. ^[1]

References

1. MSD: Esmeron 10 mg/ml Solution for Injection Product Leaflet. Revised Date: August 2014
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)



R

ROPIVACAINE 2mg/ml

Brand Name & Strength

Naropin® 2 mg/ml

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

Acute pain management in Adult

- **Continuous epidural infusion**
 - Administer over 12 – 20 mg/hr (up to 28 mg/hr for postoperative pain) ^[1,3]
- **Peripheral nerve block**
 - Administer over 10 – 20 mg/hr or by intermittent injection (min interval 30 min) ^[1,3]

Acute pain relief (peri & postoperative) in Children

- **Caudal epidural block and continuous epidural infusion**
 - Up to 72 hr ^[1]
 - > 30 days & up to 6 months: 0.2 mg/kg/hr
 - 6 months to 12 years: 0.4 mg/kg/hr

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- In order to avoid intravascular injection, aspiration should be repeated prior to and during administration of the main dose, which should be injected slowly or in incremental dose, at a rate of 25 – 30 mg/min. ^[1]
- When an epidural dose is to be injected, a preceding test dose of 3 – 5 ml lidocaine with adrenaline (Xylocaine® 1 – 2 % with Adrenaline 1:200 000) is recommended ^[1]
- Do not administer large volume of anaesthetic rapidly ^[2]

References

1. AstraZeneca. Ropivacaine (Naropin®) Product Leaflet. Revised date: August 2012
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
3. British National Formulary 70th Edition

ROPIVACAINE 7.5mg/ml



R

Brand Name & Strength

Naropin® 7.5 mg/ml

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

Surgical Anaesthesia in Adults

- Lumbar Epidural block / Thoracic epidural block / major nerve block / field block ^[1,2,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- In order to avoid intravascular injection, aspiration should be repeated prior to and during administration of the main dose, which should be injected slowly or in incremental dose, at a rate of 25 – 30 mg/min. ^[1]
- When an epidural dose is to be injected, a preceding test dose of 3 – 5 ml lidocaine with adrenaline (Xylocaine® 1 – 2 % with Adrenaline 1:200 000) is recommended ^[1]
- Do not administer large volume of anaesthetic rapidly ^[2]

References

1. AstraZeneca. Ropivacaine (Naropin®) Product Leaflet. Revised date: August 2012
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
3. British National Formulary 70th Edition

SALBUTAMOL



S

Brand Name & Strength

Salbutamol Injection “Yung Shin” 0.5 mg/ml

Reconstitution

Not required

Further Dilution

Slow IV

- Dilute 1 ml of the 0.5 mg/ml to 10 ml WFI (concentration: 50 mcg/ml) ^[3]

IV infusion

- Dilute 5 mg in 500 ml NS, WFI or D5 ^[2,3]
- Preterm labor, syringe pump administration: Dilute 10 mg in 40 ml D5 (final concentration: 200 mcg/ml) ^[3]

Diluent

NS, D5 ^[1, 2,3]

Administration & Infusion rate

Slow IV ^[1]

IV infusion

- Administer at a rate of 3 – 20 mcg/min. ^[1,2,3] Infusion should not exceed 20 mcg/min. Faster rates have been used in respiratory failure. ^[3]
- Preterm labor, syringe pump administration: Administer at a rate of 10 – 45 mcg/min. Do not infuse for more than 48 hr. ^[3]

IM, SC ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	24 hr ^[2]	-

Remarks

- Do not inject undiluted. Reduce concentration by at least 50% before infusing ^[2]

References

- Yung Shin Salbutamol 0.5 mg/ml Injection Product Leaflet
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
- Truven Health Analytics. Micromedex (Version 1.77)

SODIUM BICARBONATE

Brand Name & Strength

Pharmaniaga Sodium Bicarbonate 8.4% Injection (10 mEq/10 ml = 10 mmol/10 ml)

Reconstitution

Not required

Further Dilution

IV infusion

- Dilute 1 ampoule (10 ml) to 46 ml of diluent to an isotonic concentration of 1.5% w/v ^[4]

SC

- Dilute 1 ml of Sodium Bicarbonate 8.4% with 4.6 ml WFI (isotonic solution 1.5%) ^[1,4]

Diluent

NS, D5, WFI ^[1,3]

Administration & Infusion rate

IV infusion ^[1,3]

- 2 – 5 mEq/kg over 4 – 8 hours. Dosage is highly individualized based on patient's condition, blood pH and carbon dioxide content.

Slow IV (for emergency cases) ^[2]

- Administer slowly over 5 min ^[5] (maximum rate in infants: 10 mEq/min)

SC ^[1]

- To be used only when IV route is not applicable

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Undiluted hypertonic 8.4% sodium bicarbonate may be given by IV injection during cardiac arrest ^[4]
- Avoid rapid infusion, which may cause tetany in children ^[3]
- In children, do not administer more than 8 mEq/kg/day ^[3]
- Do not give concurrently with calcium or catecholamine. If patient is receiving any of these drugs, flush IV line thoroughly after each dose ^[3]

References

- Pharmaniaga. Sodium Bicarbonate Product Leaflet. Revised date: 28 June 2011
- Drug Information Handbook 23rd Edition
- McGraw-Hill's IV Drug Handbook 2009
- Truven Health Analytics. Micromedex (Version 1.77)
- Sarawak Handbook of Medical Emergencies, 3rd Edition (2011)

SODIUM CHLORIDE CONCENTRATE 20% B.P.



S

Brand Name & Strength

Sodium Chloride 20 g/100 ml

Reconstitution

Not required

Further Dilution

Dilute the calculated amount of Sodium Chloride with 250 ml diluent (maximum osmolarity: 800 mOsm/l)
^[1]

Diluent

D5 ^[2]

Administration & Infusion rate

IV infusion

- Maximum infusion rate depending on the prevailing clinical situation ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	Use immediately ^[1] or within 4 hr ^[2]	-

Remarks

- Do not use undiluted ^[1,2,3]
- Care should be taken to add the Sodium Chloride concentrate to the infusion solution under strictly aseptic conditions immediately before setting up the infusion. After mixing the infusion bottle should be gently shaken ^[1]
- Infuse slow IV to minimise risk of pulmonary oedema. ^[3]

References

1. B. Braun Medical Industries Sdn. Bhd. 20% Sodium Chloride Concentrate B.P. Product Leaflet.
2. AstraZeneca Pty Ltd. Sodium Chloride Inj 20% Product Information. Revised date: 16 February 2004. Available from: https://gp2u.com.au/static/pdf/S/SODIUM_CHLORIDE_20_-PI.pdf
3. Mc Graw Hill IV Drug Handbook. (2009)

SODIUM NITROPRUSSIDE

Brand Name & Strength

Nitroprussiat Fides 50 mg

Reconstitution

Reconstitute with provided solvent ^[1]

Further Dilution

Dilute reconstituted solution with 500 – 1000 ml diluent ^[1]

Diluent

D5 ^[1,2]

Administration & Infusion rate

IV infusion ^[1] (only with an infusion pump)

- Administer initially at 0.3 mcg/kg/min, titrate every few min to desired effect. Usual effective rate is 3 mcg/kg/min. Max rate 10 mcg/kg/min. ^[3]
- Be aware that if drug is given at a rate more than 500 mcg/kg faster than 2mcg/kg/min, cyanide is generated at a rate faster than patient can eliminate it ^[2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	4 hr ^[1]	-

Remarks

- Never infuse at maximum dosage rate for more than 10 minutes. If blood pressure is not adequately controlled after 10 minutes of maximum-rate infusion, end infusion immediately. ^[2]
- Must be protect from light during preparation as it is sensitive to certain wavelength of lights. ^[2] (wrapping with tin foil) ^[1,3]
- Do not administer other drug in the same solution ^[3]
- Watch for signs and symptoms of cyanide toxicity (lactic acidosis, dyspnea, headache, vomiting, confusion and loss of consciousness) ^[2]

References

1. Rottapharm, S.L. Sodium Nitroprusside (Nitroprussiat Fides) Product Leaflet. Revised date:
2. McGraw-Hill's IV Drug Handbook. (2009)
3. Truven Health Analytics. Micromedex (Version 1.77)

SODIUM TETRADECYL SULPHATE

Brand Name & Strength

Setrol 30 mg/ml

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

Slow IV [1, 2, 3]

- 0.5 ml – 1 ml to be injected slowly at each site of the 4 sites (maximum: 4 ml) in the superficial vein [1].
- Maximum 10 ml per treatment session [2,3,4]

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- It is not desirable to inject more than 1 ml at any site [1]

References

1. Samarth Life Sciences Pvt. Ltd. (Unit II). Sodium Tetradecyl Sulphate. Setrol Injection Product Leaflet; Revised date: NA
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
3. Truven Health Analytics. Micromedex (Version 1.77)
4. WebMD, LLC. Medscape (Version 5.6.1)

SODIUM VALPROATE

Brand Name & Strength

Epilim 400 mg

Reconstitution

Reconstitute with the provided 4 ml solvent (concentration: 95 mg/ml) ^[1]

Further Dilution

IV infusion

- Dilute reconstituted solution with 50 ml of diluent ^[3]

Diluent

NS, D5 ^[1,2,3]

Administration & Infusion rate

Slow IV

- Administer over 3 – 5 min ^[1,2,3]

IV infusion

- Administer over 1 hr (max rate: 20 mg/min) ^[1,2,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	24 hr ^[1]
After dilution	-	24 hr ^[1]

Remarks

- Should not be administered via the same line as other IV additives ^[1,2,3]

References

1. Sanofi Aventis. Sodium Valproate (Epilim®) Intravenous Product Leaflet. Revised date: May 2014
2. Drug Information Handbook 23rd Edition
3. McGraw-Hill's IV Drug Handbook 2009



STREPTOKINASE

Brand Name & Strength

Streptase[®] 1.5 MIU/vial

Reconstitution

Reconstitute with 5 ml of NS or D5

Further Dilution

Dilute reconstituted solution (1,500,000 IU) with 50 – 250 ml of diluent or with 150 ml D5 (10,000 IU/ml) [2]

Diluent

NS, D5, lactated Ringer's solution, laevulose solution [1]

Administration & Infusion rate

IV, Intraarterially

- Acute evolving transmural myocardial infarction: 1.5 MIU over 1 hr [3]
- Pulmonary embolus: Loading dose 250,000 IU over 30 min followed by 100,000 IU/hr for 24 hr [3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	Use immediately [1]	24 hr [1]
After dilution	-	-

Remarks

- Give test dose of 100 IU and wait for 20 minutes to check for hypersensitivity [3]
- Infusion should be performed slowly at the beginning of therapy as fall in blood pressure, increase/decrease in heart rate are commonly observed [1]
- Do not use drop-counting infusion methods, since drug may alter drop size [4]
- Reconstituted solution can be filtered through 0.8-micron filter [3]

References

1. CSL Behring. Streptokinase (Streptase[®]) Product leaflet. Revised date: September 2012
2. Intravenous Dilution Database. GlobalRPh. Available at: http://www.globalrph.com/index_dilution.htm
3. McGraw Hill's IV Drug Handbook. (2009)
4. Truven Health Analytics. Micromedex (Version 1.77)

STREPTOMYCIN SULPHATE

S

Brand Name & Strength

Streptin Injection 1 g

Reconstitution

Reconstitute with 4.2 – 4.5 ml of diluent (Concentration: ~200 mg/ml) or 3.2 – 3.5 ml of diluent (Concentration: ~250 mg/ml) ^[1]

Further Dilution

Not required

Diluent

NS, WFI ^[1]

Administration & Infusion rate

IM

- Administer deep into large muscle mass; mid lateral thigh muscle (preferred site for children); mid lateral thigh muscle or upper buttocks (adult) ^[2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	24 hr ^[1]
After dilution	-	-

Remarks

-

References

1. SM Pharmaceuticals SDN BHD. Streptomycin Sulfate (Streptin Injection) Product Leaflet. Revised date : 11th March 2003
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

SUGAMMADEX SODIUM

Brand Name & Strength

Bridion 200 mg/2 ml

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IV bolus

- Administer over 10 sec ^[2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	Use immediately	-

The vials may be stored outside the carton for up to 5 days ^[1,2]

Remarks

-

References

1. Merck Sharp & Dohme (Malaysia) Sdn Bhd. Sugammadex Sodium (Bridion). Injection Product Leaflet. Revised Date: May 2014.
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

SULPHAMETHOXAZOLE-TRIMETHOPRIM

Brand Name & Strength

DBL™ Sulfamethoxazole 400 mg and Trimethoprim 80 mg Concentrate Injection BP 480 mg/5ml Injection

Reconstitution

Not required

Further Dilution

Dilute 1 ml to 25 – 30 ml of diluent ^[1]

Diluent

D5, NS, D10, HS, Hartmann's Injection ^[1]

Administration & Infusion rate

IV infusion

- Administer over 60 – 90 min ^[3]
- Duration of infusion should not exceed 1.5 hr ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	24 hr ^[1]	Do not refrigerate ^[1]

Remarks

- Must be diluted prior to administration ^[1]
- Avoid rapid infusion or bolus injection ^[2]
- Not for IM injection ^[3]

References

1. Hospira. Sulphamethoxazole + Trimethoprim (DBL™ Sulfamethoxazole 400mg and Trimethoprim 80mg Concentrate Injection BP) Product leaflet. Revised 1 December 2012.
2. McGraw Hill's IV Drug Handbook. (2009)
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)



SUXAMETHONIUM

S

Brand Name & Strength

Suxamethonium Chloride-Fresenius 100 mg/2ml

Reconstitution

Not required

Further Dilution

IV infusion

- Dilute with 50 – 100 ml of diluent (concentration: 1 – 2 mg/ml) ^[3]

Diluent

D5, NS ^[1]

Administration & Infusion rate

IM

- Administer deep IM only when IV access is not available (usually for infants and older children). Total dose not exceeding 150 mg ^[3]

IV bolus

- Administer by rapid IV injection without further dilution ^[3]

IV infusion

- Administer at 2.5 – 4.3 mg/min. Total dose not to exceed 500 mg/hr ^[1,4]

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	-	-
After dilution	Use immediately ^[1]	-

Remarks

-

References

- Bodene (PTY) Limited Trading. Suxamethonium (Suxamethonium Chloride-Fresenius 100mg/2ml) Product leaflet. Revised February 2006.
- McGraw Hill's IV Drug Handbook. (2009)
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
- Intravenous Dilution Database. GlobalRPh. Available at: http://www.globalrph.com/index_dilution.htm

SYNTHETIC SALMON CALCITONIN

Brand Name & Strength

Miacalcic 50 IU/ml & 100 IU/ml

Reconstitution

Not required

Further Dilution

IV infusion

- Dilute dose of 5 – 10 IU/kg in 500 ml diluent ^[1,2,3,4]

Diluent

NS ^[1,4]

Administration & Infusion rate

SC, IM or IV ^[1,2,3]

- Route of administration is based on indications and volume of medications ^[1]
- Prevention of osteoporosis, Paget's disease and chronic hypercalcaemic states**
 - To be administered via SC or IM injection ^[1,2,3,4]
 - If medication volume ≤ 2 ml, it is preferable to administer via SC ^[1,2]
 - If medication volume > 2 ml, it is preferable to administer via IM at varying sites of injection ^[1,2,3,4]
- Emergency treatment for hypercalcaemic crisis**
 - To be administered via IV infusion over at least 6 hours/day; ^[1] or
 - To be administered via slow IV injection in 2 – 4 divided doses ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- One IU corresponds to about 0.2mcg of synthetic salmon calcitonin ^[1]
- Allow to reach room temperature before administration ^[1]
- The ampoules are for single use only. Leftover solution must be discarded ^[1]

References

- Novartis Corporation (Malaysia) Sdn. Bhd. Synthetic Salmon Calcitonin. Miacalcic Ampoules; Revised date: September 2015
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
- Truven Health Analytics. Micromedex (Version 1.77)
- British National Formulary 70th Edition

TEICOPLANIN

Brand Name & Strength

Targocid 200 mg, 400 mg

Reconstitution

Reconstitute with provided solvent

- Concentration for 200 mg vial: 100 mg/1.5 ml ^[1]
- Concentration for 400 mg vial: 400 mg/3 ml ^[1]

Further Dilution

IV infusion

- Dilute the reconstituted solution in diluent ^[2]

Diluent

NS, D5, D10, HSD5 ^[2]

Administration & Infusion rate

IV bolus

- Administer over 3 – 5 min ^[1,2]

IV infusion

- Administer over 30 min ^[1,2]

IM ^[1,2]

Storage & Stability

	RT (<25 °C)	Fridge (4 °C)
After reconstitution	-	24 hr ^[1]
After dilution	-	-

Remarks

- Rapid IV injection may (rarely) cause hypotension, dyspnea, tachycardia, angioedema, pruritus, urticaria and/or erythema. Dosage infusion over 30 min may limit these reactions ^[3]
- If a reaction occurs with bolus injection, stopping or slowing the infusion may stop the reaction ^[3]

References

1. Gruppo Lepetit (Targocid) Product leaflet.
2. Micromedex Version Number 1.77.Ob2590
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

T



TENECTEPLASE

T

Brand Name & Strength

Metalyse 6000 units (30 mg)

Reconstitution

Reconstitute with provided solvent (in pre-filled syringe) to a concentration of 5 mg/ml ^[1]

Further Dilution

Not required ^[1]

Diluent

Not required

Calculation

Volume required to administer the correct dose: ^[1]

Patient's body weight (kg)	Tenecteplase dose (mg)	Corresponding volume of reconstituted solution (ml)
< 60	30	6
60 – 69	35	7
70 – 79	40	8
80 – 89	45	9
≥ 90	50	10

Administration & Infusion rate

IV bolus

- Administer the appropriate dose over 5 – 10 sec ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	8 hr	24 hr
After dilution	-	-

Remarks

- If a line is used, the line should be flushed after Metalyse injection for proper delivery.
- Metalyse should not be administered into a line containing dextrose or mixed with other drugs in the same venous line.
- Metalyse may be used in a pre-existing intravenous line that has been used for the administration of NS ONLY.
- Please refer to the product leaflet for detailed instructions on the use and handling of Metalyse Injection.

References

- Boehringer Ingelheim: Tenecteplase (Metalyse) Product Leaflet. Revised Date: February 2014.



TERBUTALINE

T

Brand Name & Strength

Baltic 0.5 mg/ml

Reconstitution

Not required

Further Dilution

IV infusion

- Dilute 1.5 – 2.5 mg (3 – 5 ampoules) with 500 ml diluent ^[2]

Diluent

D5, NS ^[2]

Administration & Infusion rate

SC

- Administer undiluted ^[1,2]

IV infusion

- Administer at a rate of 90 – 300 mcg/hr with concentration of 3 – 5 mcg/ml for 8 – 10 hr ^[2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- This preparation contains benzyl alcohol, its use should be avoided in children under two years of age. Not to be used in neonates ^[1]

References

- L.B.S. Laboratory LTD. Terbutaline. Baltic Product Leaflet; Revised date: 11 November 2011
- British National Formulary 70th Edition

TERLIPRESSIN

Brand Name & Strength

Glypressin 1 mg

Reconstitution

Reconstitute with provided solvent (5 ml WFI) ^[1]

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

Slow IV

- Rate: Administer over 1 min ^[2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	Use immediately ^[1]	-
After dilution	-	-

Remarks

-

References

1. British National Formulary 70th Edition
2. Ferring International Center S.A. Terlipressin. Glypressin Product Leaflet; Revised date: May 2009

T

TESTOSTERONE ENANTATE

Brand Name & Strength

Jenasteron 250 mg/ml

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

Deep IM

- Administer into gluteal muscle ^[2,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Store below 25°C. Protect from light
- Warm to room temperature. Shaking vial will help redissolve crystals that have formed after storage.

References

1. Jesalis Pharma GmbH Testosterone Enantate (Jenasteron®) product leaflet. Revised date: 01/2012
2. WebMD, LLC. Medscape (Version 5.6.1)
3. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

T

TETANUS IMMUNOGLOBULIN (HUMAN Ig)

Brand Name & Strength

Igantet 250 IU/ml

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IM^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Can be administered via SC route in cases of IM contraindication (i.e. clotting disorder).
- If large dose (≥ 5 ml) are required, administer in divided dose at different sites

References

1. Grifols Tetanus Immunoglobulin 250 IU (Igantet) Product Leaflet (Revised 2005)

TETANUS TOXOID VACCINE

Brand Name & Strength

TT Vaccine 0.5 ml

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IM ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Once opened, multi dose vials should be kept between 2°C - 8°C and must not be frozen. ^[1]
- The vaccine vial should be shaken well to homogenize the suspension before use. Discard vial if suspension cannot be resuspended. ^[1,2]

References

1. Biofarma: Adsorbed Tetanus Vaccine Product Insert. Revised Date: 2/2/10
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

TETRACOSACTIDE ACETATE

Brand Name & Strength

Synacthen i.m./i.v.® 250 mcg/ml

Reconstitution

Not required

Further Dilution

Slow IV

- Dilute in 2 – 5 ml NS ^[3]

IV infusion

- Dilute in NS or D5 ^[2,3]

Diluent

D5, D12.5%, NS ^[1]

Administration & Infusion rate

IM ^[1]

Slow IV ^[1]

- Administer over 2 min ^[2,3]

IV infusion ^[1]

- Administer over 4 – 8 hr ^[3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	12 hr ^[3]	-

Remarks

- Not advisable to add tetracosactide to blood or plasma transfusions, as it may be broken down by enzymes in the blood ^[1]
- Duration of infusion must not exceed 4 hours ^[1]

References

- Novartis. Tetracosactide Acetate (Synacthen i.m./i.v.®) Product Leaflet. Revised date: November 2012.
- McGraw Hill's IV Drug Handbook. (2009)
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

THIAMINE

T

Brand Name & Strength

Benerva® 100 mg/ml

Reconstitution

Not required

Further Dilution

IV infusion

- Dilute 1 – 3 ampoules with 100 ml diluent ^[2]

Diluent

NS, D5 ^[2]

Administration & Infusion rate

IM ^[1]

Slow IV

- Administer over 5 min ^[3]

IV infusion

- Administer over 30 min ^[2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	12 hr ^[1]	-
After dilution	24 hr ^[1]	-

Remarks

- Protect the solution from light ^[3]
- Do not mix in the same syringe as Penicillin, Phenylbutazone or Propylphenazone as precipitation may occur. ^[1]

References

- Bayer. Thiamine (Benerva) Product Leaflet.
- Intravenous Dilution Database. GlobalRPh. Available at: http://www.globalrph.com/index_dilution.htm
- McGraw Hill's IV Drug Handbook. (2009)

THIOPENTAL SODIUM

Brand Name & Strength

Pentotex 0.5 g Injection

Reconstitution

Reconstitute with diluent ^[1]

Further Dilution

IV infusion

- Dilute with diluent to a final concentration of 0.2 – 0.4 %. ^[4] Do not use WFI for these concentration, as hemolysis will occur ^[2,3]

Diluent

NS, D5 ^[1,4]

Calculation

	Slow IV	IV infusion
WFI	10 – 20 ml	-
NS or D5	-	125 – 250 ml
Concentration	25 – 50 mg/ml	2 – 4 mg/ml
Concentration	2.5 % - 5 %	0.2 % - 0.4 %

Administration & Infusion rate

Slow IV

- Administer over 20 – 30 sec ^[2]

IV infusion

- Administer using infusion pump ^[2]

Rectal

- May be given rectally as solution for basal anaesthesia in a dose of up to 44 mg/kg; a dose of 30 mg/kg has been suggested for pre-anaesthetic sedation. ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	Use immediately ^[1]	24 hr ^[1]
After dilution	Use immediately ^[1]	-

Remarks

- Do not mix with solutions of succinylcholine, tubocurarine, or other drugs with acidic pH ^[1,2]
- It is advisable to inject a small test dose of 25 – 75 mg (1 – 3 ml of a 2.5% solution) to assess tolerance or unusual sensitivity ^[4]

References

1. Duopharma Sdn Bhd. Pentotex 0.5g Injection (thiopental sodium) Product Leaflet. Revised date 11 April 2008
2. McGraw Hill's IV Drug Handbook. (2009)
3. Drug Information Handbook, 21st Edition.
4. Truven Health Analytics. Micromedex (Version 1.77)

TIGECYCLINE

Brand Name & Strength

Tygacil® 50 mg

Reconstitution

Reconstitute with 5.3 ml of diluent to achieve a concentration of 10 mg/ml ^[1,2,3]

Further Dilution

Withdraw 5 ml of reconstituted solution and dilute with 100 ml diluent ^[1,2]
Final concentration should not exceed 1 mg/ml ^[2,3]

Diluent

NS, D5, lactated Ringer's solution ^[1,2,3]

Administration & Infusion rate

IV infusion

- Administer over 30 – 60 min every 12 hr ^[1,2,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	6 hr ^[1,3]	-
After dilution	24 hr ^[1,3]	48 hr ^[1,3]

Remarks

- Not to be given with Amphotericin B, Chlorpromazine, Diazepam, Esomeprazole, Omeprazole, Methylprednisolone or Voriconazole simultaneously. ^[1, 2]
- Reconstituted solution must be transferred and further diluted for IV Infusion. ^[1]
- Reconstituted solution should be yellow-orange in colour. Discard otherwise.^[4]

References

- Pfizer. Tigecycline (TYGACIL®) product leaflet. Leaflet number: 0713
- McGraw-Hill. IV Drug Handbook. 2009.
- Lexicomp Online Database. [Last Accessed on: 18th January 2017]
- Drug Information Handbook, 23rd Edition



TIROFIBAN HYDROCHLORIDE

T

Brand Name & Strength

Aggrastat® 0.25 mg/ml (50 ml vial)

Reconstitution

Not required

Further Dilution

IV infusion

- Dilute up to 250 ml of diluent (max concentration: 50 mcg/ml)

Diluent

NS, D5^[1,3]

Calculation

$$\text{Infusion rate for CrCl} > 60 \text{ ml/min (ml/hr)} = \frac{0.15 \text{ mcg/kg/min} \times \text{Body Weight (kg)} \times 60 \text{ min/hr}}{50 \text{ mcg/ml}}$$

$$\text{Infusion rate for CrCl} \leq 60 \text{ ml/min (ml/hr)} = \frac{0.075 \text{ mcg/kg/min} \times \text{Body Weight (kg)} \times 60 \text{ min/hr}}{50 \text{ mcg/ml}}$$

Administration & Infusion rate

Slow IV

- Administer over 5 min^[1]

IV infusion

- Administer according to individualized CrCl in 12 – 24 hr

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	24 hr ^[4]	-

Remarks

- To be administered in combination with heparin^[1]
- Should not be administered in the same IV line as diazepam^[1,3]
- Do not use plastic containers in series connection^[2,3]

References

- Patheon. Tirofiban hydrochloride (Aggrastat®) Product Leaflet. Revised date: 2009.
- Micromedex
- McGraw Hill IV Drug Handbook. Tirofiban hydrochloride. Page 613
- Gray A. Injectable Drugs Guide Monograph: Tirogiban. 2014. [Last Accessed: 22 January 2017]

TOCILIZUMAB

Brand Name & Strength

Actemra® 80 mg/4 ml & 400 mg/20 ml

Reconstitution

Not required ^[1]

Further Dilution

IV infusion

- ≥ 30 kg: Dilute to 100 ml with diluent ^[1,2]
- < 30 kg: Dilute to 50 ml with diluent ^[1,2]
- The volume of NS solution removed is equal to the volume of Tocilizumab solution required for the patients' dose ^[1,2,3]

Diluent

NS ^[1]

Administration & Infusion rate

IV infusion

- Administer over 1 hr ^[1,2,3]

Storage & Stability

	RT (<30 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	24 hr ^[1]	24 hr ^[1]

Remarks

- Do not administer IV push or IV bolus ^[2]
- Allow diluted solution for infusion to reach room temperature prior to administration ^[1,2]
- Gently invert to mix (avoid foaming)
- Diluted solution should be protected from light

References

1. Roche. Tocilizumab (Actemra®) Product Leaflet
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
3. Medscape Apps Ver 5.5

TRAMADOL

Brand Name & Strength

Domadol 50 mg/ml & 100 mg/2 ml

Reconstitution

Not required

Further Dilution

IV infusion

- Dilute with suitable volume of diluent ^[3]

Diluent

NS, D5

Administration & Infusion rate

IM, SC ^[1]

Slow IV ^[1]

- Administer over 2 – 3 min ^[2,3]

IV infusion

- Administer at a suitable rate ^[3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

-

References

1. Unichem Laboratories. Tramadol (Domadol) Product Leaflet. Revised date: Mac 2014
2. Drug Information Handbook 23rd Edition
3. Pharmaceutical Press. Injectable Drugs Guide. (2011)



TRANEXAMIC ACID

T

Brand Name & Strength

Tranexamic Acid 10 % w/v (500 mg/5 ml)

Reconstitution

Not required ^[1]

Further Dilution

Not required ^[1]

Diluent

Not required ^[1]

Administration & Infusion rate

Slow IV

- Administer over 5 – 10 min (rate: 1 ml/min) ^[1,2]

IM

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- When administer through IM, avoid contact with nerves ^[1]
- Also, if repeated injection is needed through IM, change the injection site ^[1]
- Tranexamic acid is incompatible with blood or injections containing penicillin ^[1,2]

References

1. Bioindustria Laboratria Italiano Medicinali S.p.A. Tranexamic Acid Injection Product Leaflet. Revised date: October 2011
2. Drug Information Handbook, 23rd Edition.
3. McGraw Hill's IV Drug Handbook. (2009)

TRIAMCINOLONE ACETONIDE

Brand Name & Strength

Shincort I.M. 40 mg/ml, Tricort 40 mg/ml Injection

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IM ^[1]

- To ensure deep intramuscular injection is given into the gluteal site to avoid subcutaneous fat atrophy ^[3]

Intra-articular/Intrabursal/Intradermal ^[1]

- As adjunctive therapy for short term administration ^[3]

Storage & Stability

	RT (<30 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	Use immediately ^[1]	-

Remarks

- Do not administer via IV, epidural or intrathecal route ^[1,2]
- Discard any remaining solution ^[3]
- Corticosteroids should not be injected into unstable joints ^[3]

References

- Yung Shin Pharmaceuticals Ind. Co., LTD. Triamcinolone Acetonide (Shincort I.M). Injection Product Leaflet.
- Lexicomp Drug Information Handbook, 21st Edition.
- Cadila Pharmaceuticals Ltd. Triamcinolone Acetonide Injectable Suspension (Tricort 40 mg/ml Injection). Product Leaflet, Gujarat State, India. 2007.

TUBERCULIN PPD

Brand Name & Strength

Tuberculine PPD 5T.U/0.1 ml, Tuberculin PPD RT 23 SSI 2T.U/0.1 ml

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

Intradermal (intracutaneous) injection

- Administer intradermally (uppermost layer of the skin) ^[2] into the middle third of the forearm (volar or dorsal site) ^[1]
- If neither arm can be used, may administer to back of shoulder ^[3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Do not inject IM, IV or SC ^[1,3]
- Avoid pressure or bandage at injection site ^[3]
- Multi dose vials may be used for up to maximum 4 weeks if kept as per stated above and used aseptically ^[1]

References

1. InterVax. Ltd. Tuberculin PPD for Human Use Product Leaflet.
2. Tuberculin PPD RT 23 SSI for Mantoux Test. Statens Serum Institut. Denmark. November 2014
3. Lexicomp Drug Information Handbook, 21st Edition.

UROKINASE

Brand Name & Strength

Urokinase-GCC Inj 6000 IU

Reconstitution

Reconstitute with small amount of sterile WFI or saline ^[1]

Further Dilution

Dilute with diluent to a desired volume for administration ^[1]

Diluent

NS ^[1]

Administration & Infusion rate

Loading dose (in 15 ml solution)

- Administer over 10 min ^[1]

IV infusion

- Administer over 12 – 24 hr ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

-

References

1. Urokinase-GCC Inj Product Leaflet
2. Drug Information Handbook, 21st Edition.

VANCOMYCIN

Brand Name & Strength

DBL™ Vancomycin Hydrochloride 500 mg, Vancomycin Lyomark 50 mg/ml

Reconstitution

Reconstitute 1 vial with 10 ml WFI (concentration: 50 mg/ml) ^[1]

Further Dilution

IV infusion

- Dilute with 100 ml of diluent ^[1]
- For fluid restricted patients concentration of up to 10 mg/ml may be used ^[1]

Continuous IV infusion

- Dilute with 250 ml of diluent ^[5]

Diluent

NS, D5 ^[1]

Administration & Infusion rate

IV infusion

- Administer 500 mg over at least 60 min ^[1]
- Administer 1 g over at least 2 hr ^[1]

Continuous IV infusion

- Administer over 12 hr. The total daily dose should be split into two and the infusion rate set at 20.8 mg/hr ^[5]

Oral

- Administer 500 mg in 30 ml of distilled water ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	96 hr ^[1] , 48 hr ^[2]
After dilution	24 hr ^[1]	Not more than 24 hr ^[1]

Remarks

- Recommended infusion period of ≥ 30 min for every 500 mg administered ^[3]
- Not for IM administration ^[3]
- Rapid IV administration (eg. over less than 60 min) may result in hypotension, flushing, erythema, urticaria, pruritus and rarely cardiac arrest. ^[4]

References

1. Hospira. Vancomycin 500mg (DBL™ Vancomycin Hydrochloride for Intravenous Infusion) Product leaflet. Revised 1 June 2014.
2. Lyomark Pharma GmbH. Vancomycin Lyomark 50 mg/ml Product leaflet. Revision date: Dec 2009
3. McGraw Hill's IV Drug Handbook. (2009)
4. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
5. Clinical Pharmacokinetics Pharmacy Handbook. (2015)

VARICELLA VACCINE

Brand Name & Strength

Varivax® 1350 PFU/0.5 ml

Reconstitution

Reconstitute with provided solvent ^[1]

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

SC

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	30 min	-
After dilution	-	-

Remarks

-

References

1. MSD. Varicella lyophilized attenuated vaccine (Varivax®) Product Leaflet (Revision date July 2014)

VARICELLA ZOSTER IMMUNE GLOBULIN

Brand Name & Strength

VZIG-GCC 125 IU/2.5 ml

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IM ^[1,4]

- For individuals weight ≤ 10 kg via IM route: Administer 1.25 ml at single site. ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	12 hr ^[2,3]
After dilution	-	-

Remarks

- VZIG-GCC injection should not be administered by IV injection. ^[1]

References

- Green Cross Corporation. Varicella Zoster Immune Globulin Injection. Varicella Zoster Immune Globulin Injection (VZIG-GCC) Product Leaflet; Revised date: NA
- Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
- Truven Health Analytics. Micromedex (Version 1.77)
- Medscape



VASOPRESSIN

V

Brand Name & Strength

Vasopressin Injection USP 20 IU/ml

Reconstitution

Not required

Further Dilution

IV infusion

- Dilute with diluent to a concentration of 0.1 – 1 IU/ml ^[1]
- Example: 20 IU in 50 ml diluent (0.4 IU/ml) ^[3]

Diluent

NS, D5 ^[2]

Calculation

Eg. Doctor ordered IVI Vasopressin 0.03 IU/min. What is the infusion rate?

1. Determine dose (IU/hr) = Dose (IU/min) x 60 min/hr
= 0.03 x 60 = 1.8 IU/hr
2. Determine concentration (IU/ml) = 0.4 IU/ml (if dilute 20 IU in 50 ml diluent)
3. Calculate infusion rate (ml/hr) = $\frac{\text{Dose (IU/hr)}}{\text{Concentration (IU/ml)}} = \frac{1.8}{0.4} = 4.5 \text{ ml/hr}$

Administration & Infusion rate

IV infusion

- Septic shock: 0.03 IU/min (doses above 0.03 IU/min may have more cardiovascular side effects and should only be reserved for salvage therapy) ^[2]
- Infusion rates may vary as directed by physician

IM or SC ^[1,2]

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After dilution	-	-

Remarks

- A maximum of 0.1 IU/min has been recommended for post-cardiotomy shock ^[2]
- In patients with fluid restriction, suggested final concentration of diluted solution is 1 IU/ml ^[2]
- Use extreme caution to avoid extravasation because of risk of necrosis and gangrene ^[2]
- Discard vial after 48 hours after first entry ^[2]

References

1. Health Biotech Ltd: Vasopressin Injection USP 20IU/ml Product Insert. Revised Date: -
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)
3. UKCPA: Minimum Infusion Volumes for Fluid Restricted Critically Ill Patients 4th Edition (v4.4) Dec 2012

VERAPAMIL

V

Brand Name & Strength

Verpamil 5 mg/2 ml

Reconstitution

Not required ^[1]

Further Dilution

Continuous IV infusion

- Dilute 50 mg (10 ampoule = 20 ml) with 80 ml diluent (total volume = 100 ml); final concentration: 0.5 mg/ml ^[2]

Diluent

D5, NS^[1]

Administration & Infusion rate

Slow IV

- Administer slowly over 1 min period ^[1] and 2 min in elderly patient ^[1]

Continuous IV infusion

- Administer 5 – 10 mg/hr ^[1]. The total daily dose should not exceed 100 mg (20 ampoules) ^[1]

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	-	-
After dilution	24 hr ^[3]	-

Remarks

- For IV use only ^[1]
- For continuous electrocardiographic and blood pressure monitoring during IV bolus administration ^[1]

References

- Orion Corporation. Verapamil Hydrochloride. Verpamil Product Leaflet; Revised date: July 2009
- Intravenous Dilution Database. GlobalRPh. Available at: http://www.globalrph.com/index_dilution.htm
- McGraw-Hill's I.V. Drug Handbook.(2009)

VERTEPORFIN

Brand Name & Strength

Visudyne® 15 mg

Reconstitution

Reconstitute with 7 ml WFI to produce 7.5 ml of a 2 mg/ml solution ^[1]

Further Dilution

Dilute the required dose of reconstituted solution with diluent to a final volume of 30 ml ^[1,2]

Diluent

D5 ^[1,2,3]

Administration & Infusion rate

IV infusion

- Administer over 10 min (max: 3 ml/min) ^[1,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	4 hr	-
After dilution	4 hr	-

Remarks

- Incompatible and precipitate in saline solutions ^[1]
- Infusion line filter is recommended. Pore sized of not less than 1.2 micrometres used in clinical trials. ^[1]
- Protect infusion from light. ^[2]

References

- Novartis Pharma AG. Verteporfin (Visudyne®) Product Leaflet. Revision date: Aug 2015
- BNF 70th Ed. Sept 2015 – Mar 2016
- McGraw-Hill's IV Drug Handbook 2009

VORICONAZOLE

Brand Name & Strength

Vfend 200 mg

Reconstitution

Reconstitute with 19 ml of WFI (Concentration: 10 mg/ml) ^[1,2]

Further Dilution

Dilute with appropriate volume of diluent (Concentration: 0.5 – 5 mg/ml) ^[1,2]

Diluent

NS, D5, HSD5, D5 in 20 mEq KCl, HS, NSD5 ^[1,2]

Administration & Infusion rate

IV infusion

- Administer over 1 – 2 hr. Maximum rate: 3 mg/kg/hr ^[1,2,3]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	24 hr ^[1,2]
After dilution	-	-

Remarks

- Not recommended for IV bolus administration ^[1,2,3]
- Must not dilute with 4.2 % sodium bicarbonate. ^[3]

References

- Pfizer. Voriconazole (Vfend) Product Leaflet. Revised date: April 2014
- McGraw Hill's IV Drug Handbook. (2009)
- Truven Health Analytics. Micromedex (Version 1.77)

ZIDOVUDINE

Z

Brand Name & Strength

Retrovir™ 200 mg/20 ml

Reconstitution

Not required

Further Dilution

Dilute with diluent to a concentration of 2 mg/ml (max concentration: 4 mg/ml) [1,2,3]

Diluent

D5 [1]

Administration & Infusion rate

IV infusion

- Administer over 1 hr [1,4]
- Prevention of maternal-fetal HIV transmission: Administer loading dose over 1 hr followed by continuous IV infusion of 1 mg/kg/hr until delivery [4]

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	-	-
After dilution	48 hr [1]	48 hr [1]

Remarks

- Avoid rapid infusion or bolus injection [4]
- Do not administer IM [4]
- Administer within 8 hr if stored at 25 °C or within 24 hours if refrigerated at 2 – 8 °C [2,3]

References

1. Glaxo Wellcome Operations. Retrovir™: ViiV Healthcare. Rev 11th Apr 2012
2. McGraw Hill's IV Drug Handbook. (2009)
3. Intravenous Dilution Database. GlobalRPh. Available at: http://www.globalrph.com/index_dilution.htm
4. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 5.5.0)

ZOLEDRONIC ACID (Zometa)

Brand Name & Strength

Zometa 4 mg/5 ml, 4 mg/100 ml

Reconstitution

Not required

Further Dilution

Dilute with 100 ml of diluent (for 4 mg/5 ml)^[1,2]

Diluent

NS, D5 ^[1,2] (calcium free infusion solution)

Administration & Infusion rate

IV infusion

- Administer single infusion in no less than 15 min ^[1,2]

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	-	-
After dilution	-	24 hr (from dilution until end of administration)

Remarks

- Maintain adequate hydration prior to and following administration of Zoledronic Acid ^[1]
- Refrigerated solutions must be allowed to reach room temperature before administration. Flush IV line with 10 ml NS following infusion. Infuse in a line separate from other medications. ^[1,3]

References

- Novartis. Zoledronic acid (Zometa 4 mg/5 ml) Product Leaflet. Revised August 2015.
- McGraw Hill's IV Drug Handbook
- Lexi-Comp Online Database (Accessed 17 January 2017)

ZOLEDRONIC ACID (Aclasta)

Brand Name & Strength

Aclasta 5 mg/100 ml

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IV infusion

- Administer as a single IV infusion over at least 15 min ^[1,2,3]

Storage & Stability

	RT (<25 °C)	Fridge (2-8 °C)
After reconstitution	-	-
After dilution	-	24 hr ^[1]

Remarks

- Patient must be appropriately hydrated prior administration of Aclasta ^[1]
- Allow refrigerated solution to reach room temperature before administration ^[1]
- Aclasta solution for infusion must not be allowed to come into contact with any calcium- or other divalent cation-containing solutions ^[1]
- Infusion times faster than 15 minutes may cause renal failure. ^[2]

References

- Novartis. Zoledronic Acid (Aclasta 5 mg/100 ml) Product Leaflet. Revised August 2015.
- McGraw Hill's IV Drug Handbook
- Lexi-Comp Online Database (Accessed 17 January 2017)

ZUCLOPENTHIXOL ACETATE

Z

Brand Name & Strength

Clopixol-Acuphase 50 mg/ml

Reconstitution

Not required ^[1]

Further Dilution

Not required ^[1]

Diluent

Not required

Administration & Infusion rate

IM

- Administer deep into the gluteal region ^[1,2]

Storage & Stability

	RT (<25 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Injection volumes exceeding 2 ml should be distributed between 2 injection sites ^[2]
- May be mixed with Zuclopenthixol Decanoate in a syringe and given as co-injection. ^[1,2]

References

1. H. Lundbeck: Clopixol-Acuphase 50 mg/ml Product Leaflet. Revised Date: Sep 2013
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

ZUCLOPENTHIXOL DECANOATE

Brand Name & Strength

Clopixol Depot 200 mg/ml

Reconstitution

Not required

Further Dilution

Not required

Diluent

Not required

Administration & Infusion rate

IM

- Administer only into the upper outer quadrant of the buttock ^[1,2]

Storage & Stability

	RT (<30 °C)	Fridge (2 – 8 °C)
After reconstitution	-	-
After dilution	-	-

Remarks

- Zuclopenthixol Decanoate and Zuclopenthixol Acetate can be mixed in a syringe and given as one injection (co-injection) ^[1]
- Injection volume exceeding 2 ml should be distributed between 2 injections sites. ^[2]

References

1. H. Lundbeck A/S Zuclopenthixol Decanoate (Clopixol® Depot) product leaflet. Revised date: -
2. Lexi-Comp, Inc. (Lexi-Drugs®). Lexi-Comp, Inc (Version 3.0.2)

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